EXHIBIT D - BENEFIT/COST ANALYSIS – PORT OF BROOKINGS HARBOR (PORT)

A. Port of Brookings Harbor (Port) Contribution to Regional Economy

1. Regarding Probability and Vulnerability

Different methods are used to assess risk at local and state levels. All methods employ history, probability, and vulnerability data to determine probability and vulnerability scores for each hazard. These scores identify high priority areas to which local and state governments can target mitigation actions. The challenge with these varied methodologies is that access to, interpretation of, and scale of the data is not necessarily the same at local and state levels. As a result, local and state probability and vulnerability scores for a specific hazard in a specific community are not always the same.

The Benefit/Cost Analyses will use the regional data to calculate the Ratio. However, the close link between the Port contribution to the regional economy and Port revenue requires the best analyses of the condition of Port services and operations.

2. Source of Regional Data

The 2015 Strategic Business Plan was constructed and presented by the FCS GROUP, a company that was established in 1988. This firm provides utility rate and fee consulting, utility management consulting, financial planning and analysis, and economic services to public sector clients inclusive of city and county governments, municipal corporations, ports, special purpose districts, and state agencies.

The Port is satisfied that the FCS Group is an independent and objective firm. The company has provided consulting services in over 3,000 engagements and has served more than 550 clients. Their staff provides their services to clients throughout the western United States and Canada from locations in Redmond, Washington, and Lake Oswego, Oregon. The FCS GROUP's management team includes professionals with backgrounds in public administration, management, finance, accounting, economics and engineering disciplines.
Regional Economic Contributions

The data from the above-cited source(s) are presented below, and tabularized in EXHIBIT K V-, ANNUAL REGIONAL BENEFITS DEPRECIATION.

.

a. Totally Port related Oregon Employment of 860 jobs (706 direct and 150 for indirect/induced);
b. Oregon output (gross sales) were nearly $67.9 million ($40.9 million direct and $27. million in direct/induced);
c. Oregon real Gross Domestic Product of $39.4 million ($22.65 million direct and $16.78 million in direct/induced);
d. Oregon labor income of $23.93 million ($12.89 million direct and $11.05 million in direct/induced);

e. Annual local and Oregon tax revenue/payments of $4.21 million ($1.26 million in local and $2.95 million in state tax revenues);
f. Annual federal tax/payments by Oregon enterprises and employees of $5.12 million.

3. Evaluating Losses Suffered by Subprojects, and their Individual and Aggregate Effect on the Port's Regional Economy

Based on the above data, a 100% loss overall for the inter-dependent above-listed six items (employment, gross sales, real Gross Domestic Product, labor income, and state and federal taxes would exceed $140.6 Million each year.

Recent observations rate of loss of utility of these above listed service areas, and numerous engineering reports and studies, indicate that it is expected that 10% of the Sport Basin (Basin 1) capacity, 100% of the Boardwalk North Deck, 25% of the Transient Dock, 100% of the Fuel Dock Upland Storage Area Landing, 75% of the embankments and 68% of the Commercial Receiving Docks (100% in the case of Pac-Choice) will not be practically available to the PORT within the next 5 – 7 years, approaching 100% loss of all above-listed service areas, and thus the effective loss of the PORT, in its entirety, occurring over the next 7 – 10 years. The details of how these estimates were derived are discussed in the Section below entitled "Subproject Contributions to Port Income".

B. Subproject Contributions to Port Income

Focusing on the proposed Subprojects in this Application, the Fuel Dock and upland storage area landing, the Commercial Shipping/Receiving Docks, Travel Lift, Floating Docks and the Access/Material Handling/Parking paved surfaces, estimations of the rate of loss of utility is provided below.

These estimations utilize engineering study and opinion, and observations by consultants and Port staff of the condition of each of the Subprojects identified. It also uses the above-described well-supported regional data. Finally, it reasonably assumes a direct and proportional relationship between Port revenues/services and contributions to the regional economy. It should be noted that the levels of degradation observed at each of the in-water Subprojects approximately corresponds with the dates of their construction (see "Estimated Built" column in EXHIBITS K-3 and K-4).

The cited 2015 Strategic Plan places a good deal of its focus on the natural hazards faced by the Port, and these "Data Inputs" (enlisted below under the Data Inputs section) are crucial to the design of the work proposed in this INFRA Grants Application, and also serve to corroborate engineering and Port Staff explanation for observed Substructure deterioration.
Commercial vessels comprise about 60% of moorage income, and most of the fuel and ice purchases at the Port. The paved surfaces that are proposed as Subprojects, which are either presently of degraded asphalt or else gravel and dirt, are exclusively used by commercial dock lessors for material handling and transport, dock and workplace access/parking and fishing gear storage. The proportion of annual revenue attributable to commercial operations (as opposed to

RV Park and Recreational/Sport revenues) are about 42%. The commercial facilities included in this Application as Subprojects comprise 83% of all of the Port's commercial facilities, and so contributing about 35% of the total Port annual income of about $2.8 million.

1. *Fuel Dock*: A preliminary study was performed by EMC-Engineers/Scientists, LLC (EMC) to explain the mechanism for the failing of the Fuel Dock access pad, resulting in concern over the loss of utilities and release of fuels from severed fuel lines. In its Conclusion section the study states "The existing slip of the system westward will continue. When full failure occurs the attached lines and conduit are likely to be separated. Additionally, the gangway approach to the Fuel Dock from the pad would be damaged and probably lost."

Since that study, presented in January, 2017, EMC has been observing this structure, and has measured its ongoing rate of continued failure. At this point the access pad located upgradient of the floating Fuel Dock is gated off, and access restricted to employees, who are cautioned to utilize the pad and gangway with caution. As seen in Photo 2, Page 2, EXHIBIT E-5, the gap evidence of a tension crack seen between the Access Pad and the adjoining sidewalk was about five inches. That crack had been noted to be about two inches wide for a period of 11 months prior. EMC had since observed that the same crack had extended to over a foot, in less than a year (observed in December, 2017). At the time of this application narrative, the pad has sunk on its west side and now sits on this failing embankment at about a 10% slope. It is therefore noted that the problem is, as the preliminary study stated, the entire slope beneath the base of the pad. Therefore there are no repair solutions. The underlying slope must be stabilized. When the slope completely fails, which will happen in the next few years, Fuel Dock operations at the Port of Brookings Harbor will effectively cease.

Though fueling could be provided on a temporary basis off of the Port receiving and high docks via portable tank trucks, it cannot be a permanent solution. Due to the significant difference in distance between ports along the Southern Oregon coast, commercial vessels would no longer be able to fuel and operate at the Port of Brookings Harbor. Therefore commercial moorage fueling and fish processing would cease. Since the commercial activities at the Port provide a significant portion of total Port income (about 42%), the loss of commercial activities at the Port would effectively close the Port.

2. Pac-Choice Dock, and All Similarly Constructed Shipping/Receiving Docks - As stated in EXHIBIT E-1, Gowers Forensic states "Existing Receiving Dock (Pac-Choice Dock) is in a dilapidated condition, and is in need of substantial repair, both locally and globally". The Conclusions go on to say "It is my opinion that the dock should be taken out of service until a comprehensive repair solution is developed, and repairs have been implemented." Consequently, since the report was submitted to the Port Board of Commissioners, this dock has been condemned. Pac-Choice is presently using in its place the south-adjacent dock (Bornstein Dock), which had been replaced in 2012.

3. Other Shipping/Receiving Docks - As stated in the Narrative for this Application, Page 7, regarding the Old BC Fisheries Dock "With the exception of the newly constructed BC Fisheries Dock (a cantilevered dock structure), the support structures for these adjacent shipping/receiving docks are almost identical.

Studies cited within the Narrative, performed by Bill Galli of the Galli Group (geotechnical engineer), OBEC Consulting Engineers, West Consultants Engineering, EMC and Reid-Middleton Engineering all support the opinion that these facilities are deteriorating.

The Reid-Middleton study supports concerns about the Travel Lift Dock more indirectly, because, at the date of the study (2013), the existing Travel Lift facility was categorized to be in "fair condition". However, six years later, concerns regarding its reliability to pull heavy loads safely raise serious concern in the minds of experienced Travel Lift operators, including the present Harbormaster. Wave surge analysis as put forth by West Consultants (EXHIBIT E-7) and the Technical Dock and Pile Analysis (EXHIBIT E-9), performed by OBEC, provide explanation regarding the deterioration of the in-water structures that are supported by wooden piles at the Port.

The nature of infrastructure deterioration at structural points is that it accelerates as the elements of support begin to give way. Based on the observations the last six years, the Port has seen about a 15% loss of utility (Fuel Dock Access, Pac-Choice). It is estimated that the in-water Subprojects will suffer an additional 65% loss within the next 5 – 7 years.

4. Shipping/Receiving Dock, and Travel Lift Dock/Boatlift Surfaces - The paved areas serving all of the shipping/receiving docks, the Travel Lift Dock and Boatlift operations are not considered, in this analysis, to directly provide revenue to the Port or Regional Economy, for the following reasons:

a. Though present material handling inefficiencies are cited in the Narrative (see Access, Parking and Material Handling Surfaces, Page 12), net gains in revenue as a result of the surfacing Subprojects are difficult to quantify. A gain in efficiency may bring more productivity and increased profits, perhaps increased wages, to a dock lessor or contracting operating operator, and so may increase Regional contributions in terms of output, taxes and wages. However, it may or may not provide direct increases in revenue to the Port, unless perhaps the increase in desirability of the leased space may in the future raise per square foot values.

b. For the purposes of this analysis, the Access, Material Handling Surfaces being proposed are considered integral to retain and attract good lessors.

C. Benefit/Cost Ratio (BCR) Calculations

1. *Total Proposed Project Costs* - Numbers used for this calculation are summarized and in the attached EXHIBITs K-1 through K-4. The budget estimate for each Subproject can be found in the second column to the right in K-1.

These estimates are summarized from the itemized budget details in EXHIBITS J-1 through J-10, which assign expected costs for each task needed for each Subproject. The Total Budget calculated is **$11,470,212.**

2. Total Benefit to the Regional Economy

As previously stated, the justifications for considering the total benefit to the regional economy in the BCR are:

a. The inter-related nature of the proposed Subprojects create a nearly "zero-sum" scenario. The following paragraphs, explained in more detail within the Application Narrative (see Grant Project Narrative) are provided to show this inter-relation.

   The Pac-Choice Dock is presently condemned. Pac-Choice therefore is depending on the Bornstein Dock on which to conduct its business. Pac-Choice activities also overflow onto the Old BC Fisheries Dock. The Bornstein Dock, recently (2012) replaced (via the same design recommended for the Subproject Docks). However, if the Old Fisheries Dock, which presently has the same construction as the Pac-Choice Dock, also fails, Pac-Choice options at the Port will be limited.
   If the Fuel Dock, which is in the beginning of failure, ultimately fails, then commercial vessels will no longer be able to moor at the Port, and so will need to relocate to other Ports and sell to fishery companies at those ports. The multi-level of the adjacent docks (Old BC Fisheries, New BC Fisheries, Pac-Choice and Bornstein Docks) make cross-dock transport impossible. Consequently, transport of product must go across the "paved" surfaces adjacent and east of these docks.

   These surfaces are also used for all of the storages of fishing gear, supplies and equipment. These surfaces are severely degraded and not suitable for efficient truck and forklift transport needed to serve the docks. The deterioration of all of the Subproject Docks is exacerbated by the erosive and upper-groundwater charging forces created by poorly managed stormwater on these surfaces. The Port cannot sustain its operations without the commercial contribution.

b. The Port contribution to the regional economy is well-supported. It is intuitive that if the Port income is reduced, but the Port is still able to function, its contribution to the regional economy will be proportionally reduced. If and when the Port ultimately completely fails, contributions from the Port to the regional economy will end.

Since the portions of contributions by each of the Subprojects to the total Port revenue are known (calculated from relative lease space, taxes, moorage, fuel sales, ice purchases, etc.), they are placed in EXHIBIT K-2, fourth column to the right. Their individual contributions to Port income are used to proportion the contribution of each to the regional economy, placed in the fifth column to the right in EXHIBIT K-2 (also see the footnotes). The docks listed as Subprojects comprise about 83% of all commercial revenue to the Port, which in total comprise about 42% of the Port total income. Therefore 35% of the annual Port income (about $2.8 Million) is provided by these Subprojects.

The next columns to the right in K-2 are from calculations summarized in EXHIBIT K-3 and K-4. These show the predicted reduction in revenues over the next six years to both the Port and to the regional economy. The year-to-year calculations begin with the expected status of the Subprojects after six years. Pac-Choice and the Fuel Docks are the easiest, because, even if temporary measures were able to successfully postpone total closure of these, these measure could not sustain these docks for six years.

The Ice House repairs to sustain the bulkhead are not absolutely needed, and it is estimated by Port staff that the Ice House, without the recommended actions, would be able to operate at 95% of its capacity. A few of the largest commercial vessels would not be able to moor close enough to the existing bulkhead.

The remaining docks comprising the Subprojects list range between five and 10 years younger than the failed Pac-Choice Dock. These, like the Pac-Choice Dock, are all subjected to the same wave surge and erosive forces as the Pac-Choice Dock, and have the same timber substructure and concrete slab decking.

Since the Pac-Choice Dock, 5 – ten years older than the other Subproject docks, was determined to be unsafe in May, 2016 (see Gowers Forensic in EXHIBIT E-1), and since engineers and Port Staff alike agree that signs of failure are seen at these dock, it is reasonable to predict similar conditions to occur over the next six years.

The deterioration rate and resulting reduction in Port and regional revenues are weighted in these calculations year by year, with a slight rate increase per year. Due to the necessarily approximate nature of these estimates (confidence is greater than + or – 7%), present and future values are not used in the calculations.

The total loss of contributions to the regional economy, shown in the last row of EXHIBIT K-4, is the sum of the differences between 2015 Strategic Plan-estimated annual contribution and the losses at the end of each year, or ($49,216,000-$44,824,549)+ ($49,216,000-$44,824,549)+ ($49,216,000-$44,824,549)+ ($49,216,000-$44,824,549)+ ($49,216,000-$44,824,549)+ ($49,216,000-$44,824,549), or a staggering **$111,087,385**.

Of course the loss of regional benefits, aside from jobs, would be $49,216,000 each year after the Port closed.

For this analysis the loss in contributions if no action is taken is equal to the benefit gained if the proposed action is taken.

The resulting BCR, restricting the analyses period to six years, would be

$$\frac{\$111,087,385}{\$11,470,212}$$

$$= 9.7$$

Assuming funding is received and Subprojects completed according to the individual, detailed schedules presented in EXHIBITS H-1 through H-10, and in phase as described on Pages 18 through 21 of the Grant Narrative, then benefits would not be obtained until Phase completion, but, due to demand for these areas, already existing but improved by the completion of the Subprojects, would be seen directly after phase completion. So the costs and benefits for each of the three phases would be derived during years two, three and four, respectively, and the costs incurred from years one, two and three respectively (an interest cost for one year at each phase, therefore, is calculated. If we restrict the analysis period to years 1 through 4, calculating as above, our BCR would follow from the following:

Phase I: The Total Budget for the Phase I Subprojects = $5,748,453, with a Future Value (given a 7%/yr. Interest Rate) = $6,150,844. The calculated contribution to the Regional Economy is $18,221,472, and the BCR is **2.96.**

Phase II: The Total Budget for the Phase I Subprojects = $1,641,600, with a Future Value (given a 7%/yr. Interest Rate) = $1,756,512. The calculated contribution to the Regional Economy is $12,110,564, and the BCR is **6.89**.

Phase III: The Total Budget for the Phase I Subprojects = $4,080,158.89, with a Future Value (given a 7%/yr. Interest Rate) = $4,365,770. The calculated contribution to the Regional Economy is $18,877,964, and the BCR is **4.32**
.