3. Bollards would be installed to secure the loading arms and transfer pipelines from accidental impact by trucks, which operate on the multi-use pier.

4. Fire suppression system. Two fixed foam monitors using seawater for foam generation would be installed on the pier next to the loading platform. Different types of foam would be required for different fuel that is handled. The fixed foam monitors are installed on shore-side at suitable locations to allow good working coverage of foam spray on the fuel berth.

5. Adequate fixed lighting would be installed to illuminate all parts of the fuel pier that are critical for operating the fuel pier.

6. A central fuel monitoring system (fuel flow, pressures, temperatures, etc.) would inform the operator about fuel transfer progress.

7. An alarm system would alert the operator to stop pumping when the unloading arms near the limits of their reach.

8. An emergency shutdown system that could be activated from a central point or at the pier.

9. Adequate draft at the dedicated fuel pier would be established by dredging to a continuous depth of 35 feet. Some of the dredged material could be used as fill for the bulkhead pier structure.

10. Interconnecting pipelines would be installed in Pier 1D to connect the fuel transfer station with the fuel transfer pumping station. The pipelines would be installed in a below-ground concrete pipeline gallery. The pipeline gallery would have removable cover to allow for cost-effective installation and efficient maintenance.

11. A fuel transfer pumping station would be constructed at Pier 1C. The fuel pumping station would be equipped with a number of fuel pumps that act as booster pumps for the long transfer pipelines that connect the new fuel facilities with the existing fuel tank farms. Booster pumps would increase the liquid fuel pressure in the pipelines, since the capacities of the pumps on the barges might not be adequate to transfer the fuel over the significant distance to the existing fuel storage tanks. Since the shore-side fuel pumps operate with electric power, emissions by tankers and barges during unloading could significantly diminish.

12. Interconnecting pipelines would be installed above-ground from the fuel transfer pumping station on Pier 1C to the existing storage facilities, which are located in the eastern part of Kahului Harbor. The total length of individual interconnecting pipelines would be approximately 2,400 feet. The pipelines would be installed above-ground, on pipeline racks. The pipeline racks would be located inside the harbor peripheral fence. The pipeline and pipeline racks would be protected by bollards against accidental impact from trucks.

13. The number of required interconnecting pipelines would be determined by the type of fuel to be conveyed. Installation of pipelines on pipeline racks would offer a cost-effective and flexible installation and efficient maintenance of the pipelines. As an alternative to transferring the fuel through multiple product pipelines over the long distance between the new fuel pier and the existing tank farms, piggable pipelines could be used in order to pump batch trains of different products through one or two pipelines. This would reduce the number and therefore the costs of the interconnecting pipelines.

All fuel storage tanks are presently located outside of Harbors Division's property and therefore are operated and/or owned by individual fuel companies. The current fuel storage capacity is limited if the number of days of fuel supply is considered. For example, there is approximately 7 days worth of gasoline on Maui at any given time. By law, the number of days of fuel for electrical generation is approximately 30 days. The installation of additional storage capacity is deemed necessary to expand the storage capacities to meet the needs of current petroleum products, but also for biofuels and its feedstock and other emerging petroleum-based fuels. Because of the finite space in Kahului Harbor, storage facilities within Harbors Division's property will not be considered at this time unless additional lands are acquired.

6.3.7.2 Pier 1C Modifications for Fuel Tankers

A Handysize tanker would moor and off-load/load at the existing Pier 1C. New fuel transfer components would be installed at Pier 1C in order to allow a safe and efficient unloading/loading of fuel and fuel feedstock.

Pier 1C would have the following components:

1. Fuel loading arms (either single-product or dual-product loading arms) would establish safe and efficient shore-to-ship fuel transfer connections. The number of loading arms would be determined by the type of fuel to be loaded and unloaded at the fuel berth.

2. Bollards would be installed around the fuel transfer station in order to secure the loading arms and above ground transfer piping from accidental impact by trucks, which operate on the multi-use pier.

3. Fire suppression system. Two fixed foam monitors using seawater for foam generation would be installed on the pier next to the loading platform. Different types of foam would be required for different fuel that is handled. The fixed foam monitors are installed at suitable locations to allow good working coverage of foam spray on the fuel berth.

4. Adequate fixed lighting would be installed to illuminate all parts of the fuel pier that are critical for operating the fuel pier.

5. Transfer pipelines would be installed to connect the fuel transfer station at Pier 1C with the fuel transfer pumping station. Transmission pipelines would be installed underground in a concrete pipe gallery with a removable cover for easy installation and maintenance.

6.3.8 Conceptual Design Alternative D

Figure 6-27 shows a plan view of Design Alternative D. Alternative D would incorporate two fuel transfer locations: (1) the modified Pier 3 that would accommodate fuel barges and (2) a new upgraded fuel berth at the existing Pier 1A that would accommodate Handysize tankers. The modified Pier 3 would be a multi-use pier using a combination of pilings and bulkhead designs. Since Pier 3 would not be dedicated to fuel transfer, Kahului Harbor's cargo handling capacity could be increased. The proposed Pier 3 structure would provide a significant additional area for cargo operations. The main disadvantage of Alternative D would be the fact that the fuel transfer would not be carried out at dedicated fuel piers. The main advantage of Alternative D would be the additional pier space that would be provided by the extension of Pier 3 as well as the close proximity of the new fuel transfer station on Pier 3 to the existing interconnecting fuel pipeline, thus causing no major new pipeline construction.

Kahului Alternative D (refer to Figures 6-28, 6-29 and 6-30 for detailed descriptions) includes two improvements: (1) Pier 1A modifications and (2) Pier 3 modifications:

6.3.8.1 Pier 1A Modifications for the Fuel Tankers or Fuel Barges

Fuel barges and Handysize tankers would moor and be off-loaded/loaded at upgraded fuel transfer facilities at the multi purpose Pier 1A. The tankers and barges would use the breasting line and mooring infrastructure at Pier 1A. The types of fuels handled at Pier 1A are: gasoline, diesel, residual oil, biofuels and its feedstock. There are existing fuel lines in Pier 1A that could be incorporated into the final design.

Pier 1A would have the following components:

1. The upgraded fuel pier at Pier 1A is preferably fitted with loading arms. Permanently installed loading arms, however, could impede mixed-cargo operations at Pier 1A. It has to be determined if loading arms at Pier 1A are too obstructive for the mixed cargo use of Pier 1A.

2. In order to improve the fuel transfer operation and to shorten the time for loading/off-loading the installation of new interconnecting pipelines on or below Pier 1 is recommended where existing pipelines are too small to discharge the quantity of fuel that is anticipated in the future.

3. Fire suppression system. Two fixed foam monitors are installed on the pier that would use seawater for the foam generation. Different types of foam would be required for different fuel that is handled. The fixed foam monitors would be installed at suitable locations to allow good working coverage of foam spray on the fuel berth.

4. Adequate fixed lighting would be installed to illuminate all parts of the fuel pier that are critical for operating the fuel pier.

6.3.8.2 Pier 3 Extension for Fuel Barges

The new fuel pier at the multi-use pier Pier 3 would accommodate fuel barges, but no tankers. The new breasting line of the pier would be dredged to a depth of 35 feet. This would expand Pier 3 by means of a piled pier platform, thus creating an additional 57,000 square feet of operating area for cargo operations. Since the expanded Pier 3 would be a multi-use pier, it would accommodate both fuel and cargo operations. The fuel barges would use fuel loading arms, which would be installed at a fuel transfer station in the center of the pier, close to the pier face. The fuel transfer station with fuel loading arms and bollards would protect fixed foam monitors in order to avoid accidental impacts of cargo handling equipment.

Pier 3 would have the following components:

1. The multi-purpose pier would be the extension of the existing Pier 3. The entire pier would be built as a piled structure.

2. The fuel and cargo barges would moor against the pier face. A fendering system would accommodate vessel movement that is at times affected by significant wave action at Pier 3.

3. The northern portion of the extended pier structure would be a piled pier structure from the pier face to the existing rock revetment at the shoreline of the harbor basin. The piling and rock revetment would contribute to energy dissipation of the incident waves, therefore lowering wave actions in this part of the harbor basin.

4. Fuel loading arms (either single-product or dual-product loading arms) would establish safe and efficient shore-to-ship fuel transfer connections. The number of loading arms would be determined by the type of fuel to be loaded and unloaded at the fuel berth.

5. Fire suppression system. Two fixed foam monitors would be installed at Pier 3 that would use seawater for foam generation. Different types of foam would be required for different fuel that is handled. The fixed foam monitors would be installed at suitable locations to allow good working coverage of foam spray on the fuel berth.

6. Adequate fixed lighting would be installed to illuminate all parts of the fuel pier that are critical for operating the fuel pier.

7. A central fuel monitoring system (fuel flow, pressures, temperatures, etc.) would inform the operator about fuel transfer progress. The fuel monitoring system would be equipped with alarms for certain high or low controls functions.

8. An alarm system that would alert the operator to stop pumping when the unloading arms near the limits of their reach.

9. An emergency shutdown system that could be activated from the central point or at the pier.

10. Adequate draft at the pier would be established by dredging to a continuous depth of 35 feet.

11. Depending on operational requirements (compatibility of fuel, batching or dedicated pipelines), new fuel pipelines for a range of fuel products (e.g., gasoline, diesel, jet fuel, ethanol, biodiesel, LPG) would be installed that connect the fuel transfer station with existing interconnecting pipelines.

12. Fuel pipelines serving the new fuel transfer facilities in Pier 3 would connect to the existing interconnecting pipelines, which convey the fuel from Pier 3 to the storage tank farms. Pipelines for petroleum and non-petroleum fuel would connect to pipelines that are installed in the harbor. Fuel pipelines for LPG (e.g., propane) would connect to existing interconnecting piers that are installed in Pier 2.

13. As required, new interconnecting pipelines would be installed for future fuel types. Wherever possible, pipelines would be installed below-ground in pipe galleries, in order to facilitate construction and maintenance of the fuel pipes.

All fuel storage tanks are presently located outside of Harbors Division's property and therefore are operated and/or owned by individual fuel companies. The current fuel storage capacity is very limited if the number of days of fuel supply is considered. For example, there is approximately 7 days worth of gasoline on Maui at any given time. By law, the number of days of fuel for electrical generation is approximately 30 days. The installation of additional storage capacity is deemed necessary to expand the storage capacities to meet the needs of current petroleum products, but also for biofuels and its feedstock and other emerging petroleum-based fuels. Because of the finite space in Kahului Harbor, storage facilities within Harbors Division's property will not be considered at this time unless additional leads are acquired.

6.3.9 Conceptual Design Alternative E

Figure 6-31 shows the plan view of Design Alternative E. Alternative E would incorporate two fuel transfer locations: (1) the modified multi-use Pier 3 would accommodate a fuel barge and (2) a new fuel facility on the existing Pier 1A would accommodate Handysize Tankers. It would provide fuel transfer infrastructure to off-load and load both types of fuel vessels. The modified Pier 3 would have the same overall dimension as the existing Pier 3. A sheetpile apron would be installed around the existing Pier 3 in order to allow dredging to a depth of 35 feet, thereby making this fuel berth capable of accommodating the design fuel barge at full draft. The main advantage of the new fuel pier configuration would be the limited amount of construction that is required to improve fuel transfer operations at Pier 3. Another advantage of Alternative E would be the close proximity of the new fuel transfer station on Pier 3 to the existing fuel pipelines in this part of the harbor, thus requiring no major new pipeline construction.

Kahului Alternative E (refer to Figures 6-32 and 6-33 for detailed descriptions; see 11x17 inch drawing at the end of this section) includes two improvements: (1) Pier 1A modifications and (2) Pier 3 modifications.

6.3.9.1 Pier 1A Modifications for the Fuel Vessels

Handysize tankers and barges would be moored at upgraded fuel transfer facilities at the existing Pier 1A. Pier 1A would be a multi-use pier that would accommodate both fuel and cargo uses. There are existing fuel pipelines in Pier 1A, which might be incorporated into the final design.

Pier 1A would have the following components:

1. The upgraded Pier 1A would be preferably fitted with loading arms. Permanently installed loading arms, however, could impede mixed-cargo operations at Pier 1A. It has to be determined if loading arms at Pier 1A would be too obstructive for the mixed cargo use of Pier 1A.

2. In order to improve the fuel transfer operation and to shorten the time for loading/unloading the installation of new interconnecting pipelines on or below Pier 1 is recommended where existing pipelines are too small to discharge the quantity of fuel that is anticipated in the future.

3. Fire suppression system. Two fixed foam monitors would be installed at Pier 1A that would use seawater for foam generation. Different types of foam would be required for different fuel that is handled. The fixed foam monitors would be installed at suitable locations to allow good working coverage of foam spray on the fuel berth.

4. Adequate fixed lighting would be installed to illuminate all parts of the fuel pier that are critical for operating the fuel pier.

6.3.9.2 Pier 3 Modifications for Fuel Barges

The modified Pier 3 would accommodate fuel barges, but no tankers. The new breasting line of the pier is dredged to a depth of 35 feet. The pier would be a multi-purpose pier that could accommodate both fuel and cargo operations. The fuel barges would use fuel loading arms, which would be installed at a fuel transfer station in the center of the pier, close to the pier face. The fuel transfer station and fixed foam monitors would be protected by bollards in order to avoid accidental impact of cargo handling equipment.

Pier 3 would have the following components:

1. The multi-use pier would be a modification of the existing Pier 3. A sheetpile apron would be installed in front of the Pier 3 to allow dredging to a design depth of 35 feet, which would enable fully loaded fuel barges to dock.

2. In order to extend the breasting line of the pier, a breasting dolphin would be installed between Piers 1 and 3. The breasting dolphin would have a mooring bollard. The breasting dolphin would be accessible from landside by means of a catwalk.

3. Larger barges would moor against the pier face and the breasting dolphin. A fendering system would accommodate vessel movement that is at times affected by significant wave action at Pier 3.

4. Fuel loading arms (either single-product or dual-product loading arms) would establish safe and efficient shore-to-ship fuel transfer connections. The number of loading arms would be determined by the type of fuel to be loaded and unloaded at the fuel berth.

5. Fire suppression system. Two fixed foam monitors would be installed at Pier 2 That would use seawater for foam generation. Different types of foam would be required for different fuel that is handled. The fixed foam monitors would be installed at suitable locations next to the new fuel transfer station to allow good working coverage of foam spray on the fuel berth.

6. Adequate fixed lighting would be installed to illuminate all parts of the fuel pier that are critical for operating the fuel pier.

7. A central fuel monitoring system (fuel flow, pressures, temperatures, etc.) would inform the operator about fuel transfer progress.

8. Two-stage alarm system would alert the operator to stop pumping fuel when the unloading arms near its limits of reach or when the mooring line loads are near its limits of loading capacity.

9. An emergency shutdown system could be activated from the central point or at the pier.

10. Adequate draft at the pier would be established by dredging to a continuous depth of 35 feet.

11. Depending on operational needs, new fuel transmission pipelines would be installed for a range of fuel products that connect the new fuel transfer station on Pier 3 with existing interconnecting pipelines.

12. Fuel pipelines in Pier 3 would connect the fuel transfer station to the existing interconnecting pipelines. Fuel pipeline for LPG (e.g., propane) connect to existing interconnecting piers that are installed in Pier 2.

All fuel storage tanks are presently located outside of Harbors Division's property and therefore are operated and/or owned by individual fuel companies. The current fuel storage capacity is limited if the number of days of fuel supply is considered. For example, there is approximately 7 days worth of gasoline on Maui at any given time. By law, the number of days of fuel for electrical generation is approximately 30 days. The installation of additional storage capacity is deemed necessary to expand the storage capacities to meet the needs of current petroleum

products, but also for biofuels and its feedstock and other emerging petroleum-based fuels. Because of the finite space in Kahului Harbor, storage facilities within Harbors Division's property will not be considered at this time unless additional lands are acquired.

6.3.10 Advantages and Disadvantages of Conceptual Design Alternatives

Table 6-1 lists advantages and disadvantages of the five conceptual design alternatives for Kahului Harbor.

Figure 6-18 : CONCEPTUAL DESIGN - ALTERNATIVE A - SITE PLAN
Kahului Commercial Harbor, Maui

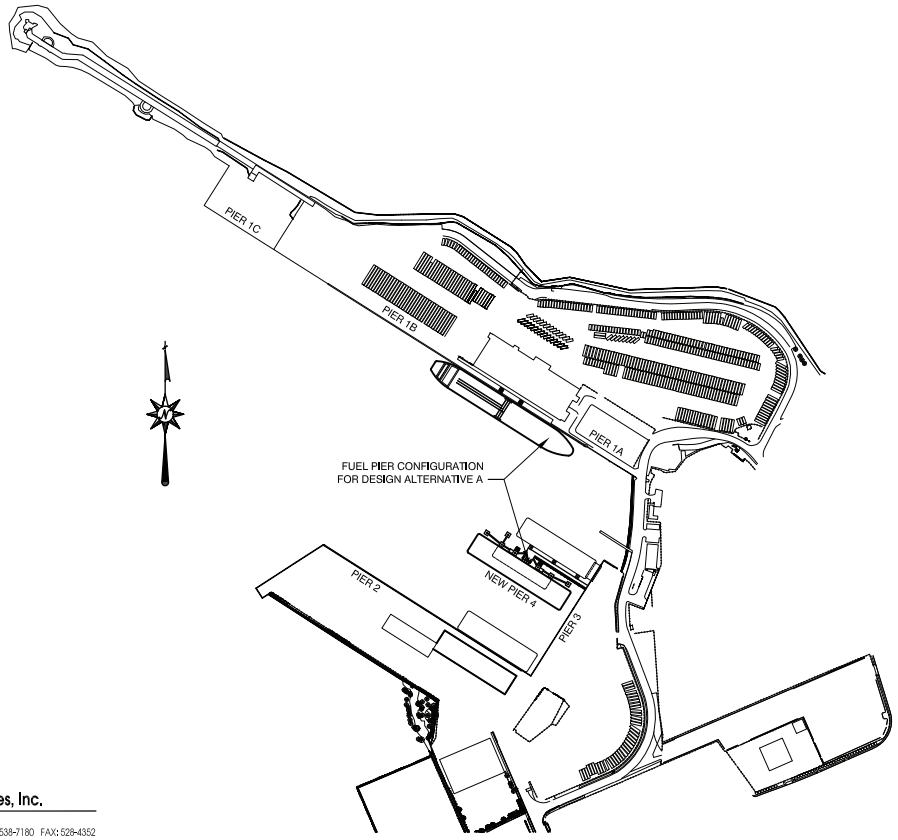

FIGURE 6-18

GRAPHIC SCALE:
350' 0 350' 700'
SCALE: 1" = 350'-0"

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DWG: J:\124A\Engineering\Presentation--4_Review\KAHULUI (12-10-07)\Figure 6-18.dwg USER: esantos
DATE: May 22, 2008 2:40pm XREFS: 124+-x-IBK Kahului 11x17 124+-x-Kahului CONFIG-1 IMAGES:

FIgure 6-19 : CONCEPTUAL DESIGN - ALTERNATIVE A - DETAIL PLAN
Kahului Commercial Harbor, Maui

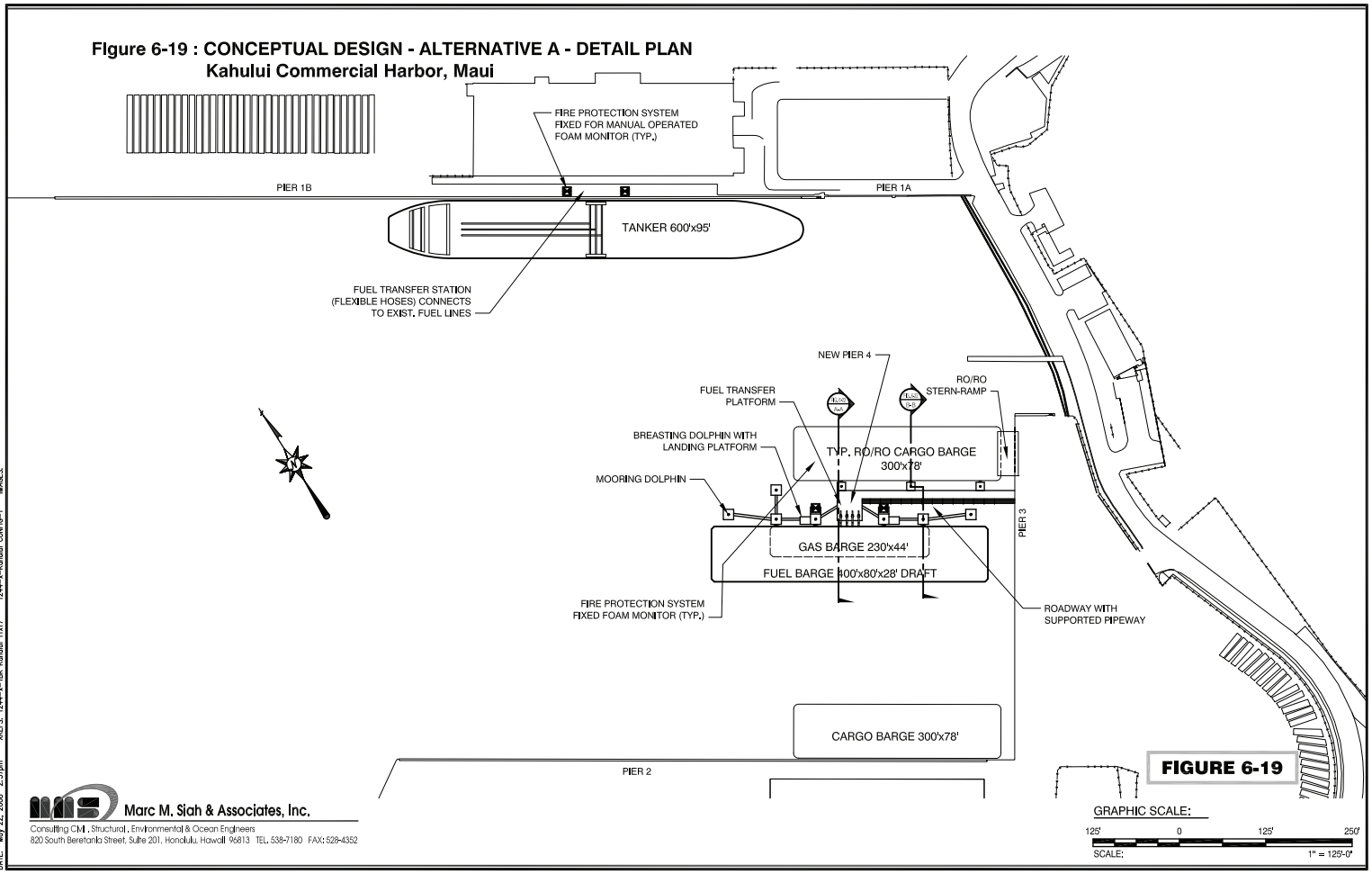

FIGURE 6-19

GRAPHIC SCALE:
125' 0 125' 250'
SCALE: 1" = 125'-0"

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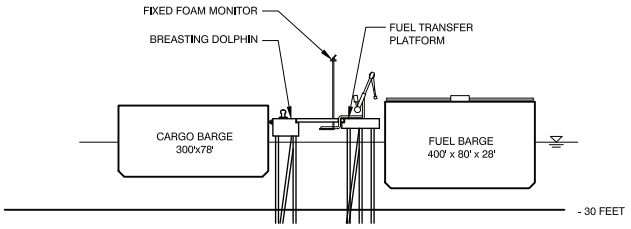
DWG: J:\1244\Env\Presentation—4_Revised\KAHULUI (12-10-07)\Figure 6-19.dwg USER: rsantos
DATE: May 22, 2008 2:57pm XREFS: 1244—x—IBK Kahului 11x17 1244—x—Kahului CONFIG-1 IMAGES:

Figure 6-20 : CONCEPTUAL DESIGN - ALTERNATIVE A - DETAIL SECTIONS
Kahului Commercial Harbor, Maui



SECTION "A-A"
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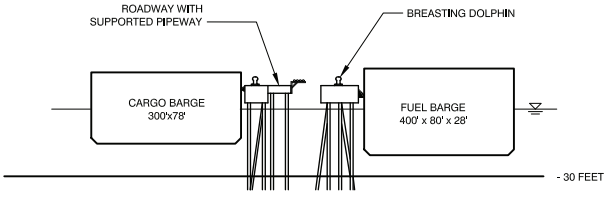

SECTION "B-B"
SCALE: NTS

FIGURE 6-20

GRAPHIC SCALE:
50' 0 50' 100'
SCALE: 1" =50'-0"

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DWG: c:\124A\dwg\Presentation-4_Revised\KAHULUI (12-10-07)\Figure 6-20.dwg USER: rsantos
DATE: May 22, 2008 3:07pm XREFS: 1244-x-TBK Kahului 11x17 IMAGES:

Figure 6-21 : CONCEPTUAL DESIGN - ALTERNATIVE B - SITE PLAN
Kahului Commercial Harbor, Maui

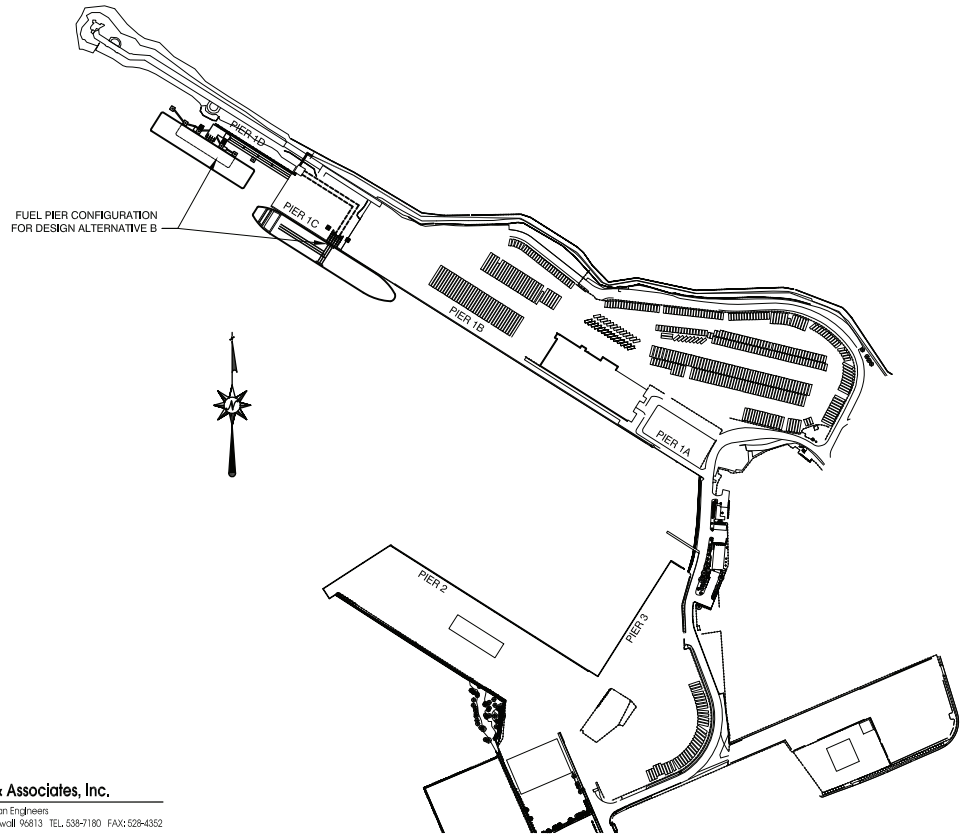

FIGURE 6-21

GRAPHIC SCALE:
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SCALE: 1" = 350'-0"

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DWG: J:\124A\Env\Presentation--4_Review\KAHULUI (12-10-07)\Figure 6-21.dwg USER: eeantes
DATE: May 22, 2008 3:09pm XREFS: 124+-x-IBK Kahului 11x17 IMAGES: 124+-x-Kahului CONFIG-2

Figure 6-22 : CONCEPTUAL DESIGN - ALTERNATIVE B - DETAIL PLAN
Kahului Commercial Harbor, Maui

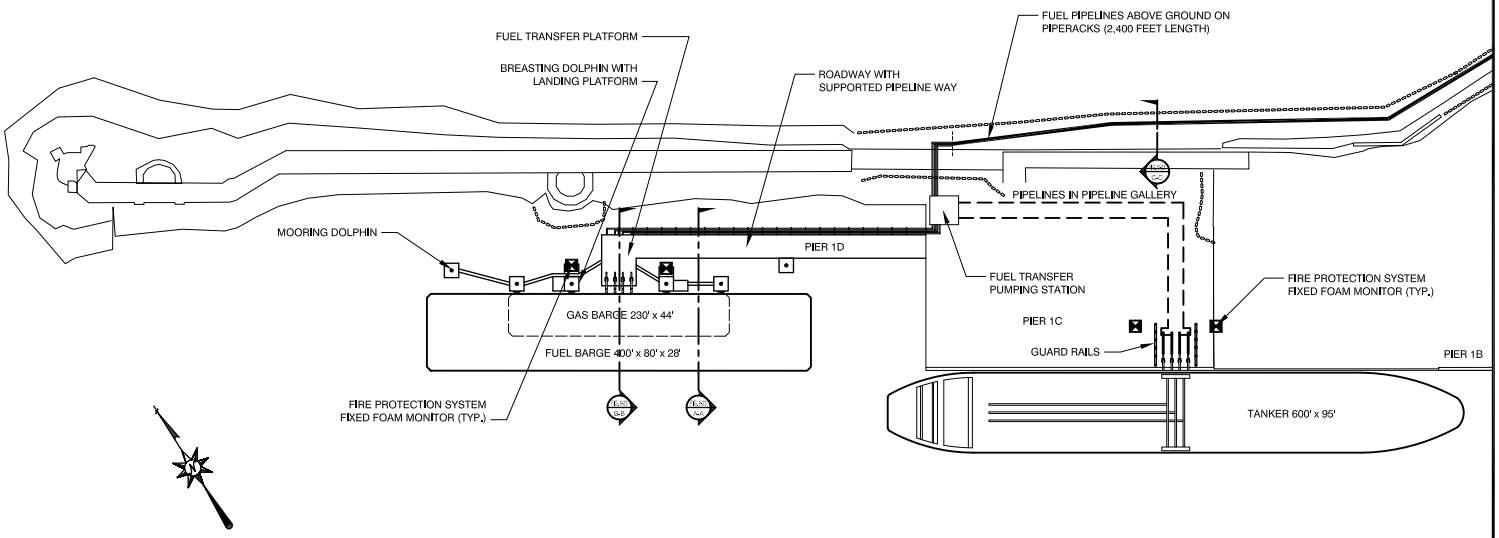

FIGURE 6-22

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GRAPHIC SCALE:
100' 0 100' 200'
SCALE: 1" = 100'-0"

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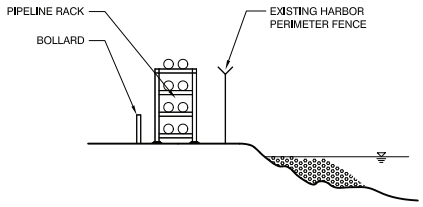
DATE: May 22, 2008 3:13pm XREFS: 124=x-ref BK Kahului 11x17 124=x-Kahului CONFIG-2_NEW IMAGES:

FIgure 6-23 : CONCEPTUAL DESIGN - ALTERNATIVE B - DETAIL SECTIONS
Kahului Commercial Harbor, Maui



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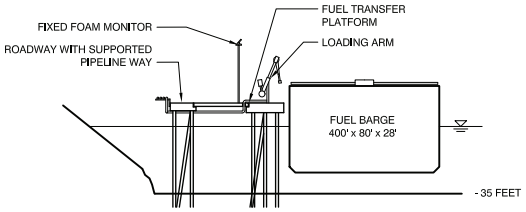

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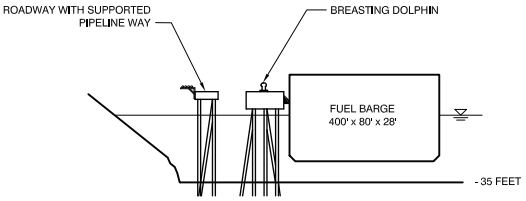

SECTION "A-A"
SCALE: NTS

FIGURE 6-23

GRAPHIC SCALE:
50' 0 50' 100'
SCALE: 1" = 50'-0"

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DWG: J:\124A\Arev\Presentation---4_Review\KAHULUI (12--07)\Figure 6--23.dwg USER: rsantos
DATE: May 22, 2008 3:14pm XREFS: 124---r-TBK Kahului 11x17 IMAGES:

Figure 6-24 : CONCEPTUAL DESIGN - ALTERNATIVE C - SITE PLAN
Kahului Commercial Harbor, Maui

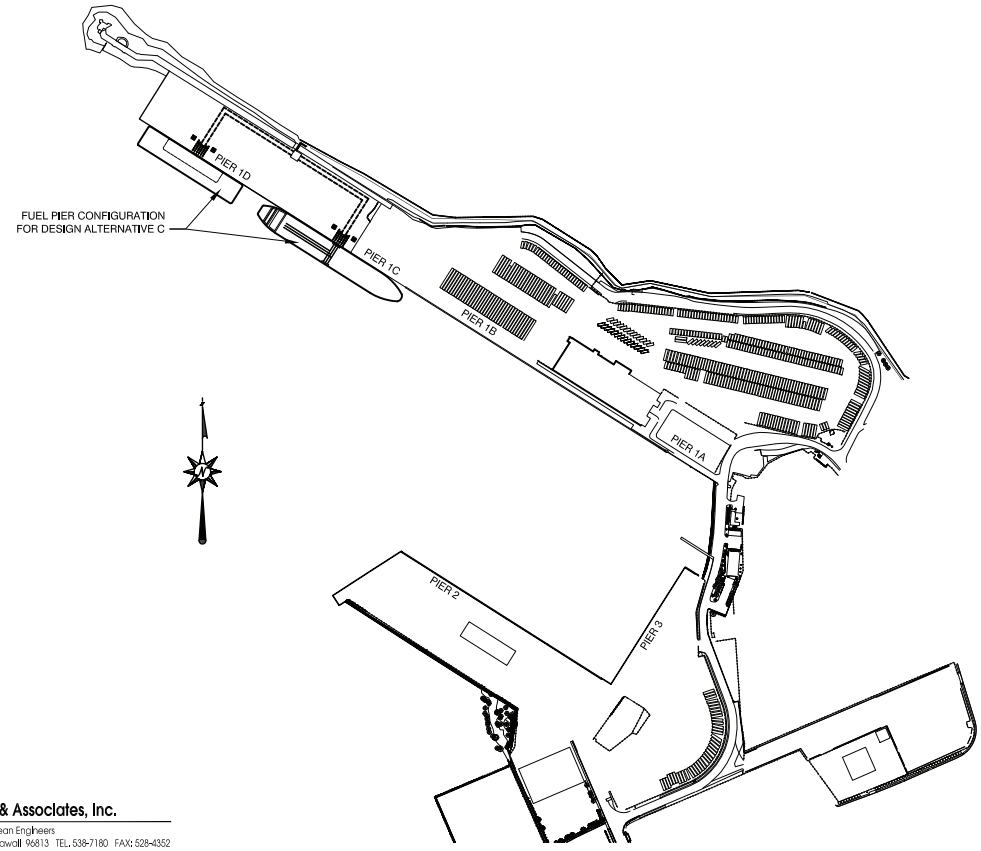

FIGURE 6-24

GRAPHIC SCALE:
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SCALE: 1" =350'-0"

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DWG: J:\1244\Word\Presentation—4. Revised\KAHULUI (12_10_07)\Figure 6_24.dwg USER: rosetos
DATE: May 22, 2008 3:15pm XREFS: 1244-+-TBK Kahului 11x17 1244-+-Kahului CONFIG-3_NEW IMAGES:

Figure 6-25 : CONCEPTUAL DESIGN - ALTERNATIVE C - DETAIL PLAN
Kahului Commercial Harbor, Maui

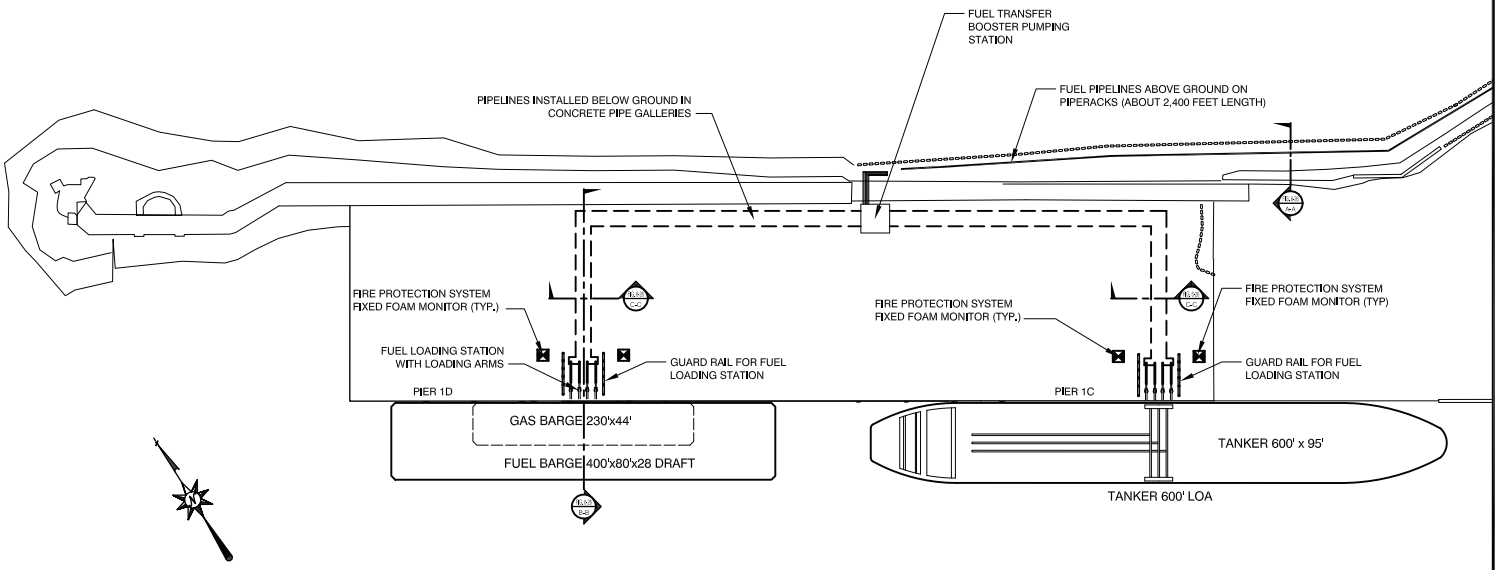

FIGURE 6-25

GRAPHIC SCALE:
100' 0 100' 200'
SCALE: 1" = 100'-0"

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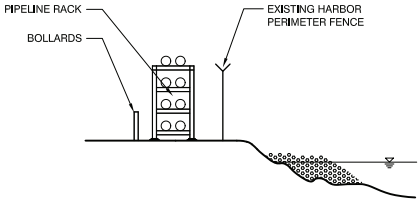
DATE: May 22, 2008 3:16pm XREFS: 124+-x-TBK Kahului 11x17 124+-x-Kahului CONFIG-3_NEW IMAGES:

FIgure 6-26 : CONCEPTUAL DESIGN - ALTERNATIVE C - DETAIL SECTIONS
Kahului Commercial Harbor, Maui



SECTION "A-A"
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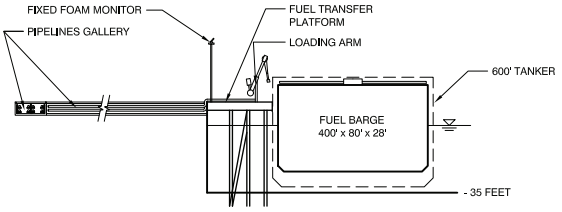

SECTION "B-B"
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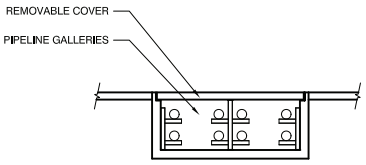

SECTION "C-C"
SCALE: NTS

FIGURE 6-26

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GRAPHIC SCALE:
50' 0 50' 100'
SCALE: 1" = 50'-0"

Figure 6-27 : CONCEPTUAL DESIGN - ALTERNATIVE D - SITE PLAN
Kahului Commercial Harbor, Maui

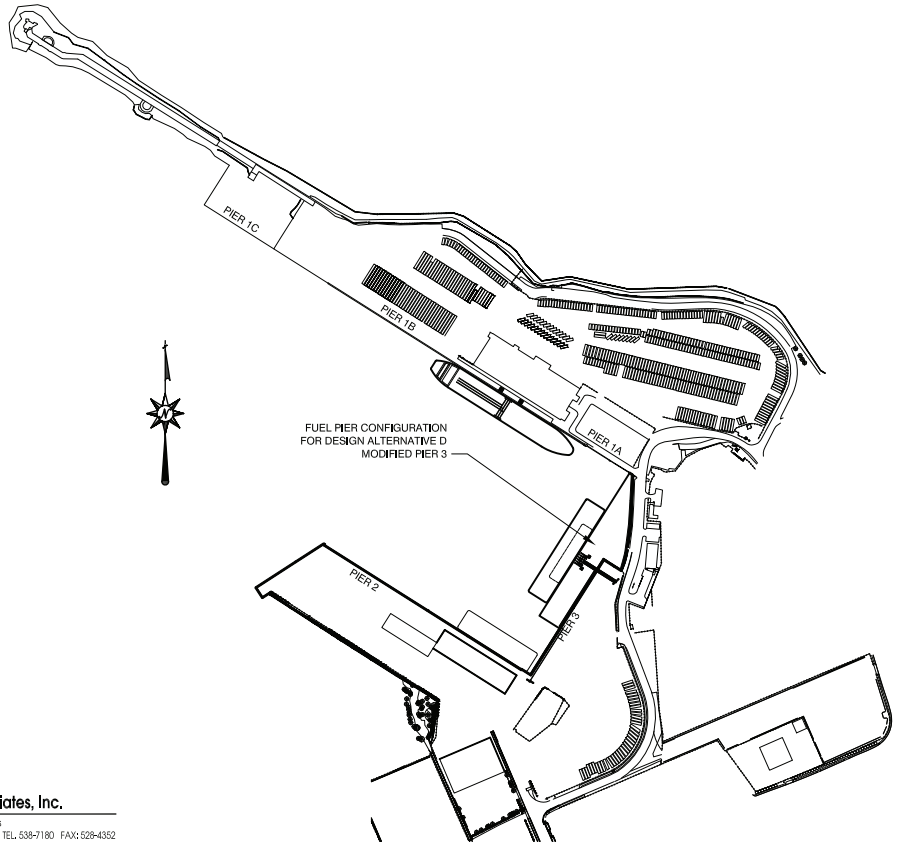

FIGURE 6-27

GRAPHIC SCALE:
350' 0 350' 700'
SCALE: 1" = 350'-0"

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DWG: J:\124A\Env\Presentation—4_Review\KAHULUI (12-10-07)\Figure 6-27.dwg USER: eeanter
DATE: May 22, 2008 3:18pm XREFS: 124+—+ TBK Kahului 11x17 124+—+Kahului CONFIG=4 IMAGES:

Figure 6-28 : CONCEPTUAL DESIGN - ALTERNATIVE D - DETAIL PLAN
Kahului Commercial Harbor, Maui

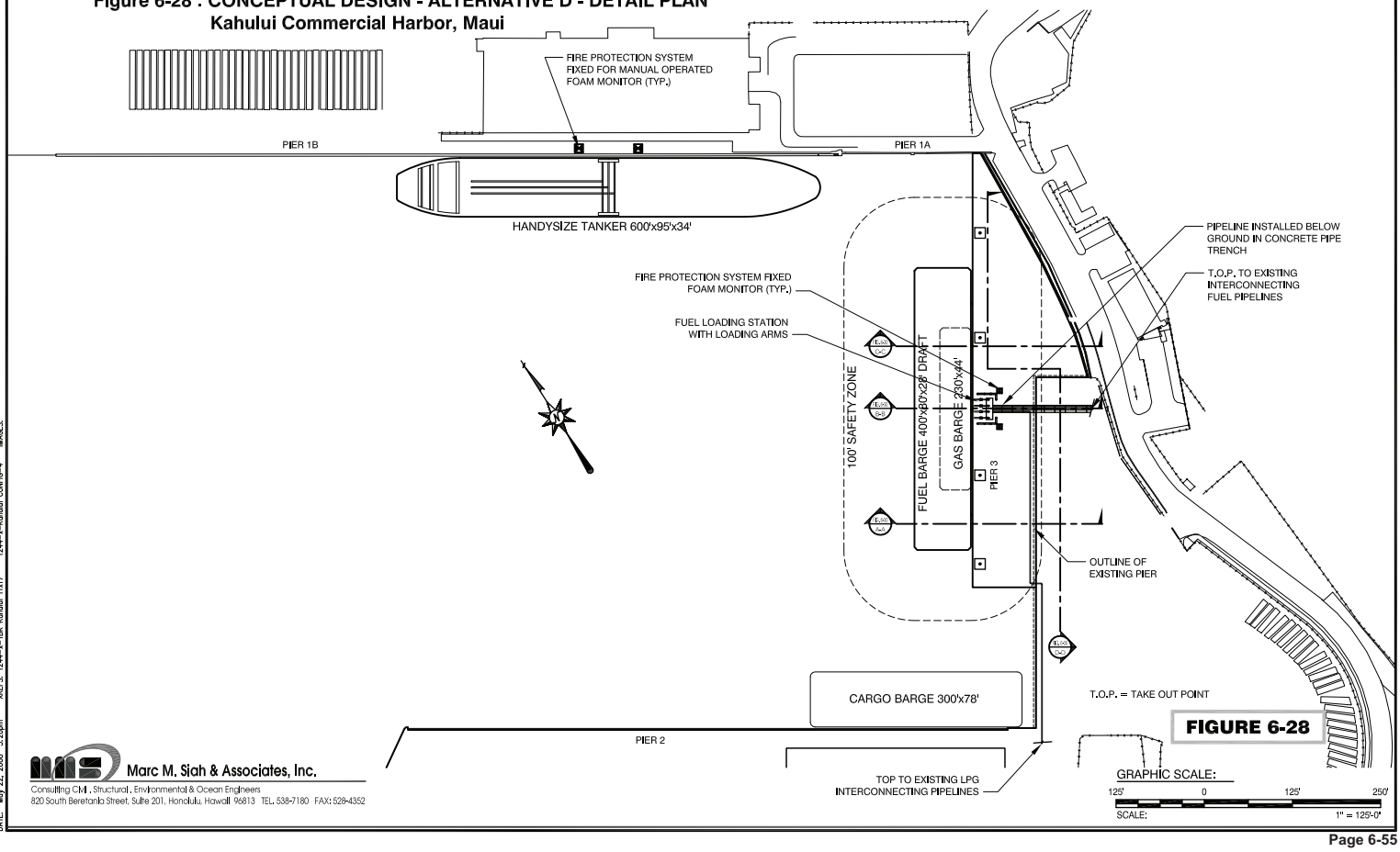

FIGURE 6-28

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DWG: J:\1244\Aview\Presentation--4_Reviews\KAHULUI (12-10-07)\Figure 6-28.dwg USER: neanton
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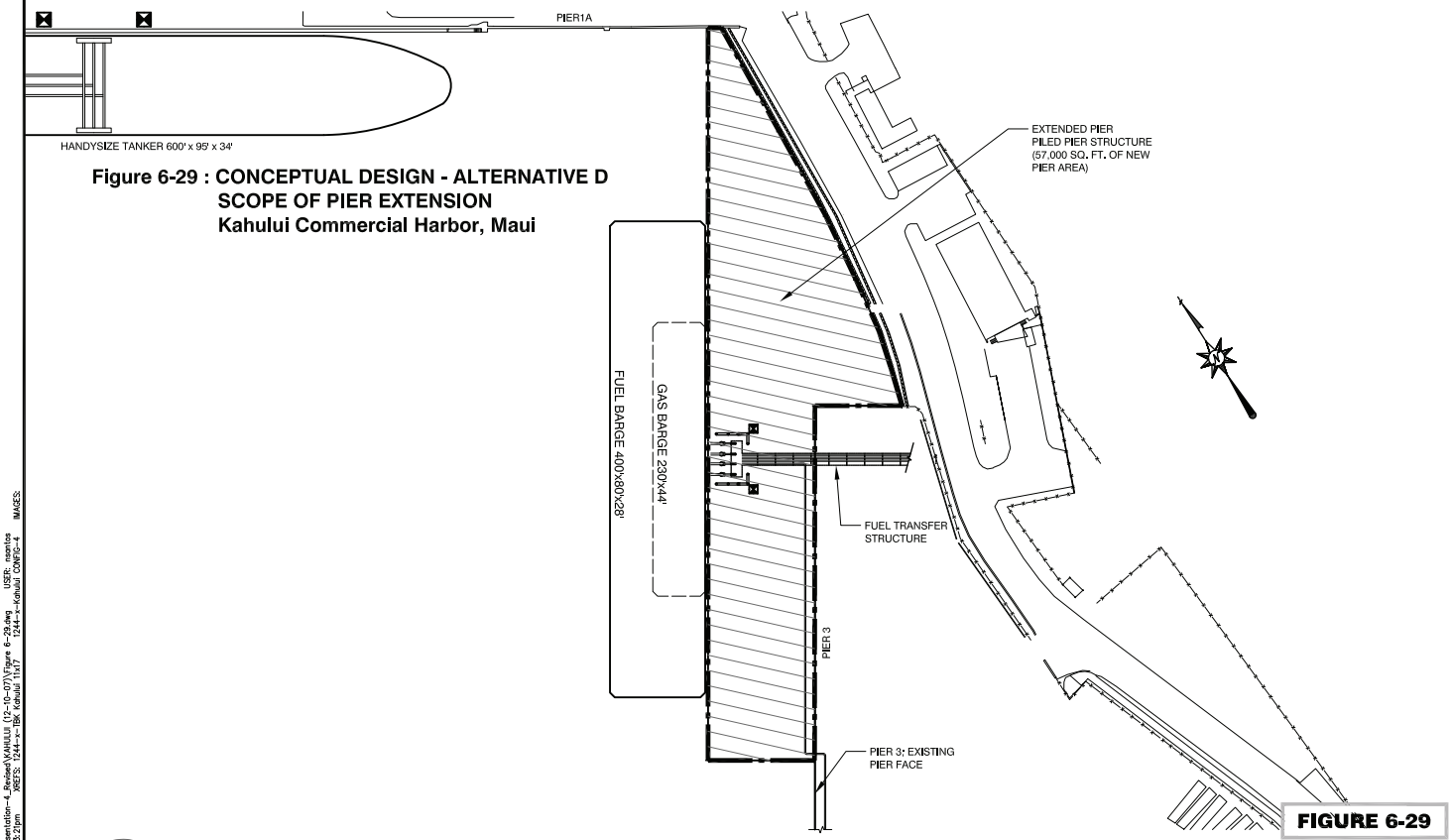

Figure 6-29 : CONCEPTUAL DESIGN - ALTERNATIVE D
SCOPE OF PIER EXTENSION
Kahului Commercial Harbor, Maui

FIGURE 6-29

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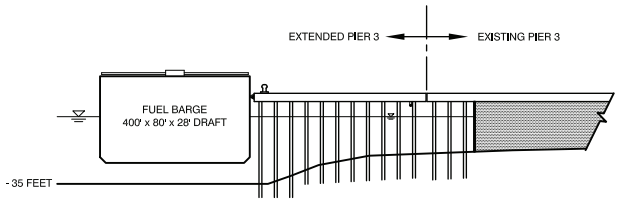
GRAPHIC SCALE:
80' 0 80' 160'
SCALE: 1" = 80'-0"

DWG: J:\124A\Arev\Presentation--4_Review\KAHULUI (12-10-07)\Figure 6-29.dwg USER: eaontan
DATE: May 22, 2008 3:21pm XREFS: 124+-+-TBK Kahului 11x17 124+-+-Kahului CONFIG-4 IMAGES:

Figure 6-30 : CONCEPTUAL DESIGN - ALTERNATIVE D - DETAIL SECTIONS
Kahului Commercial Harbor, Maui



SECTION "A-A"
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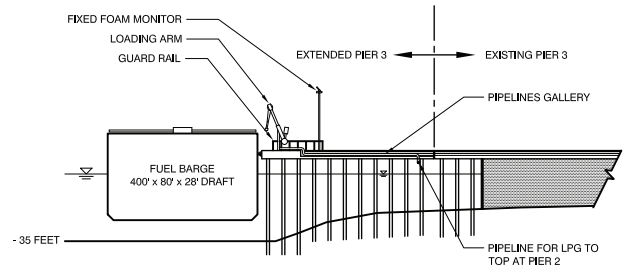

SECTION "B-B"
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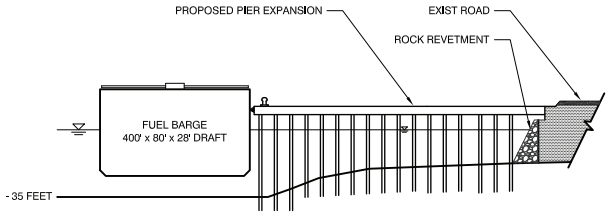

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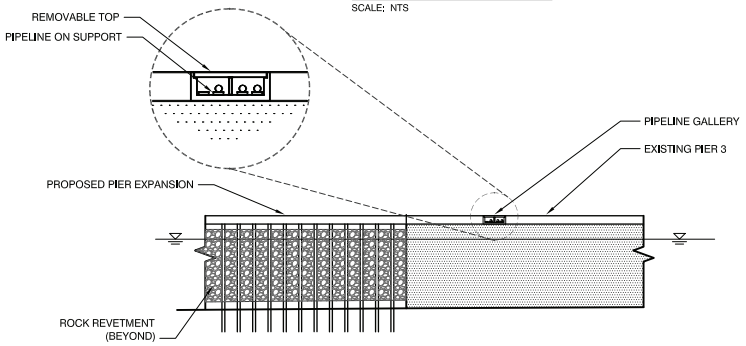

SECTION "D-D"
SCALE: NTS

FIGURE 6-30

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GRAPHIC SCALE:
50' 0 50' 100'
SCALE: 1" = 50'-0"

DWG: J:\124A\Jeng\Presentation---4_Revised\KAHULUI (12--10--07)\Figure 6--30.dwg USER: rsantos
DATE: May 22, 2008 3:21pm XREFS: 124---r--TBK Kahului 11x17 IMAGES:

Figure 6-31 : CONCEPTUAL DESIGN - ALTERNATIVE E - SITE PLAN
Kahului Commercial Harbor, Maui

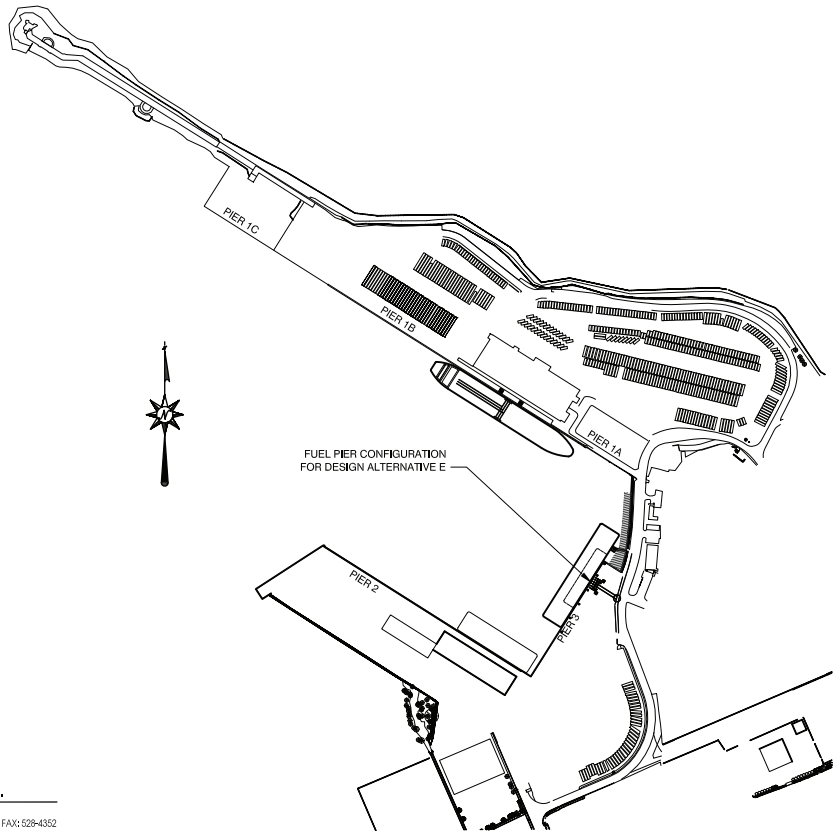

FIGURE 6-31

GRAPHIC SCALE:
350' 0 350' 700'
SCALE: 1" = 350'-0"

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DWG: J:\124A\Env\Presentation--4_Review\KAHULUI (12-10-07)\Figure 6-31.dwg USER: rsantos
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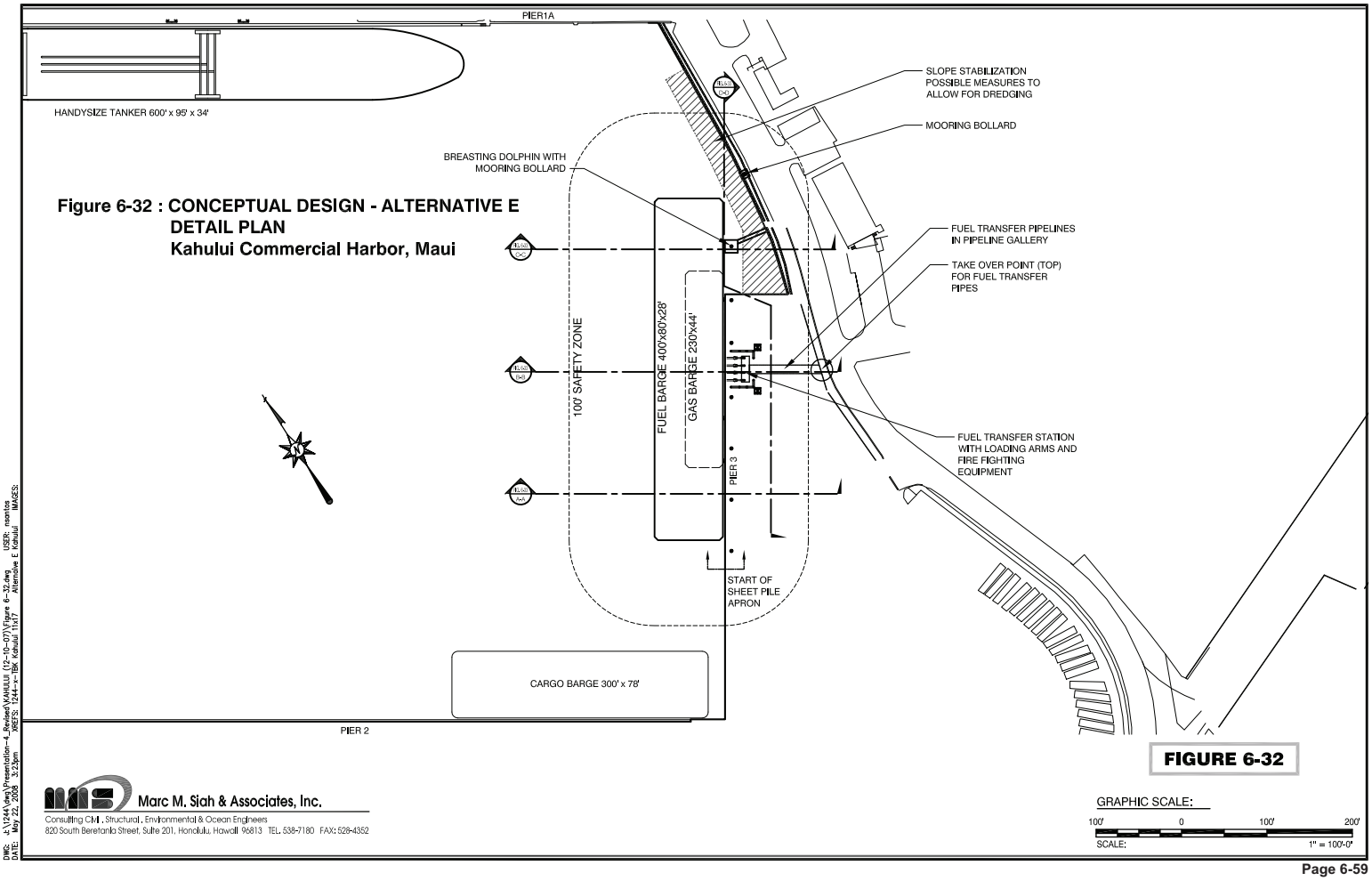

Figure 6-32 : CONCEPTUAL DESIGN - ALTERNATIVE E
DETAIL PLAN
Kahului Commercial Harbor, Maui

FIGURE 6-32

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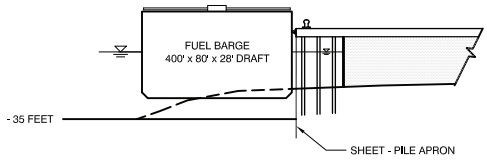
GRAPHIC SCALE:
100' 0 100' 200'
SCALE: 1" = 100'-0"

DWG: J:\124A\Engr\Presentation--4_Revised\KAHULUI (12-10-07)\Figure 6-32.dwg USER: rsantos
DATE: May 22, 2008 3:23pm XREFS: 124A-x-TBK Kahului 11x17 Alternative E Kahului IMAGES:

Figure 6-33 : CONCEPTUAL DESIGN - ALTERNATIVE E - DETAIL SECTIONS
Kahului Commercial Harbor, Maui



SECTION "A-A"
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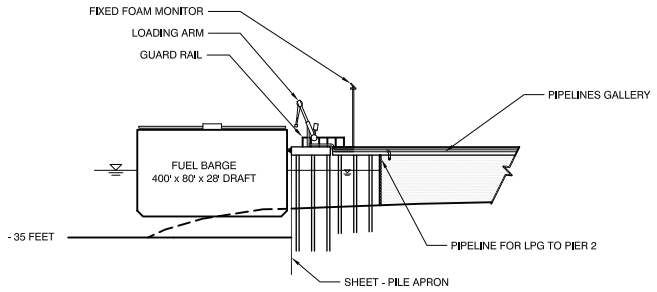
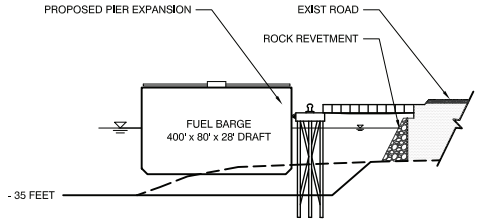


SECTION "B-B"
SCALE: NTS



SECTION "C-C"
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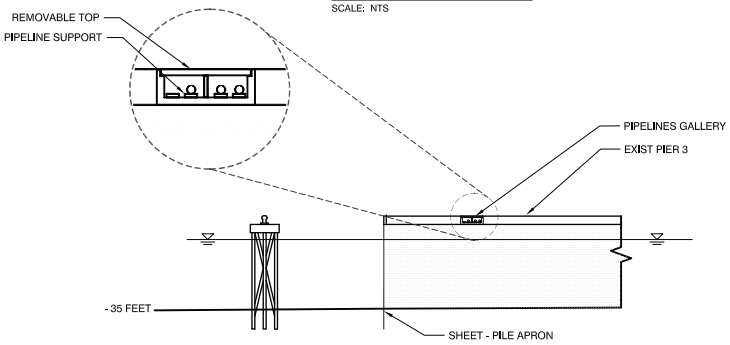

SECTION "D-D"
SCALE: NTS

FIGURE 6-33

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GRAPHIC SCALE:
50' 0 50' 100'
SCALE: 1" = 50'-0"

DWG: J:\124A\dwg\Presentation---4_Revised\KAHULUI (12-10-07)\Figure 6-33.dwg USER: rsantos
DATE: May 22, 2008 3:24pm XREFS: 124---x---IBK Kahului 11x17 IMAGES:

Table 6-1 Kahului Harbor: Advantages and Disadvantages of Conceptual Design Alternatives (Page 1 of 5)

Kahului Alternative A: New Pier 4 and improved fuel transfer facility at Pier 1A.

Advantages	Disadvantages
• Two fuel berths would be available providing operational flexibility and redundancy. • One side of the new Pier 4 would be dedicated to fuel barges and this would guarantee availability and flexibility of mooring for fuel barges. • On the other side of the new Pier 4, a RO/RO cargo pier could be integrated into the pier improvement and this would provide an additional mooring space in the harbor. • The close proximity of the new Pier 4 to existing transmission pipelines would minimize the costs for new fuel pipelines. • The piled pier structure (consisting of a fuel transfer platform, roadway, breasting and mooring dolphins) is a cost-effective improvement. • The construction period of the piled structure would be shorter than a conventional bulkhead pier. Structural components could be pre-fabricated and expeditiously installed. This would minimize the impacts to harbor operations. • The new Pier 4 (and integrated RO/RO cargo pier) would provide additional berthing where it is logistically most beneficial (i.e., in the inner harbor). • Using fuel loading arms would reduce the vulnerability of fuel barges to large movements due to short- and long-period waves in the inner harbor.	• The new Pier 4 would protrude more than 450 feet into the inner harbor basin. The pier configuration in Alternative A may create navigational conflicts in the inner harbor. • During pier construction, there would be considerable disruptions of harbor operations. With Pier 3 temporarily not available, the fuel barges would have to use Pier 1A exclusively to unload fuel. This may create an untenable situation because fuel barges would have to compete with other harbor users for berthing and time at Pier 1A. • In the event of a fuel spill at the new Pier 4, the inner harbor could not be used. Fuel would aggregate in the innermost harbor basin. • Wave actions caused by wave reflection and long-period waves in the harbor would be significant at the site of the new Pier 4.

Table 6-1 Kahului Harbor: Advantages and Disadvantages of Conceptual Design Alternatives (Page 2 of 5)

Kahului Alternative B: New Pier 1D (using piled, protruding pier structure) and improved fuel transfer facility at Pier 1C.

Advantages	Disadvantages
• Two fuel berths would be available providing operational flexibility and redundancy. • The new Pier 1D would be dedicated to fuel barges and this would guarantee availability and flexibility of mooring for fuel barges. • The piled pier structure, consisting of a fuel transfer platform, roadway, breasting dolphins and mooring dolphins, would be a cost-effective structure. • The construction period of the piled structure would be shorter than a conventional bulkhead pier. Structural components could be pre-fabricated and expeditiously installed. • Wave action at the new Pier 1D would be limited since the new pier would be recessed inwards towards the breakwater, away from the face of Pier 1. • Using the loading arms would reduce the vulnerability of fuel barges/tankers to large movements due to short and long period waves at the pier. Fuel transfer would be safer with loading arms than with flexible hoses. • Amount of dredging at the new Pier 1D would be limited. • Aboveground transmission pipelines would allow for flexibility. Interconnecting pipelines on pipeline racks result in cost-effective construction and maintenance. Pipelines could be easily added on the pipeline racks. • Minimal impact on harbor operations during construction of the new Pier 1D.	• The long distance between Pier 1D to existing fuel tanks and existing transmission pipelines system located in the inner harbor necessitates the installation of a new and costly 2,400-foot long pipeline system. • Since fuel vessels might have insufficient pumping capacity to discharge fuel through the new pipeline system, a fuel pumping station would be added to increase pressure for the efficient discharge of product to the existing tank farms (The electric shore-site pumping station limits the burning of residual oil to drive the fuel pumps for unloading). • The placement of the aboveground transmission pipelines inside the harbor area would take space away from harbor operation (i.e., traffic area, cargo storage, parking area). • The pipeline racks with the pipelines would be protected against impact from cargo handling equipment and traffic adjacent to the northern fence of the harbor. (It is assumed that security for the pipelines is provided for inside harbor boundaries). • Fuel spills are likely to travel downwind of prevailing wind direction (trade winds from the northeast) into Kahului Bay.

Table 6-1 Kahului Harbor: Advantages and Disadvantages of Conceptual Design Alternatives (Page 3 of 5)

Kahului Alternative C: New Pier 1D (using bulkhead and piled pier structure) and improved fuel transfer facility at Pier 1C.

Advantages	Disadvantages
• The new Pier 1D would be a multi-use pier that would provide additional berthing space in the harbor; the new pier could accommodate all types of ships. • Using the loading arms would reduce the vulnerability of fuel vessels to large movements due to short- and long-period waves in the inner harbor. • Amount of dredging at the new Pier 1D would be minimized because the pier is located close to deep water. • Dredged material could be used to fill in behind the bulkhead piers. • Flexible configuration of the belowground installation of pipelines at existing Pier 1C and new Pier 1D in concrete pipe galleries would allow for flexibility in construction and operation. • Flexible configuration of the aboveground installation of pipelines would allow for flexibility; transmission piping on pipeline racks result in cost effective construction and maintenance, as well as addition of pipelines on the pipeline racks. • Moderate impact on harbor operations during construction of the new fuel pier since the new pier would be at a previously undeveloped site of the harbor.	• Since Pier 1D would be a multi-use facility and not dedicated to fuel operations, there may be limited ability to install flexible fuel transfer technology. • Because the Pier 1D pier face coincides with the existing pier face, the fuel vessels would be closer to wave excitation. • The construction of the conventional bulkhead pier would be more costly and time consuming than a piled protruding segmented pier dedicated to fuel transfer only. The construction of Pier 1D would cause moderate disruptions of harbor operations. • The distance of Pier 1D from the tank farms and existing inter-connecting pipelines necessitates the installation of new and costly 2,400-foot of transmission pipelines. • Since fuel vessels might have insufficient pumping capacity to discharge fuel through the new pipelines system, a fuel pumping station would be added to increase pressure for the efficient discharge of product to the existing tank farms (The electric shore-site pumping station limits the burning of residual oil to drive the fuel pumps for unloading). • The placement of the transmission pipelines inside the harbor area would take space away from harbor operation (traffic area, cargo storage, parking area). The pipeline rack and the pipelines on it would have to be protected against impact by cargo handling equipment and traffic adjacent to the northern fence. • Fuel spills are likely to travel downwind of prevailing wind direction (trade winds from the northeast) into Kahului Bay.

Table 6-1 Kahului Harbor: Advantages and Disadvantages of Conceptual Design Alternatives (Page 4 of 5)

Kahului Alternative D: Extended Pier 3 and improved fuel transfer facility at Pier 1A.

Advantages	Disadvantages
• Two fuel berths would be available providing operational flexibility and redundancy. • The close proximity of the extended Pier 3 to existing transmission pipelines would minimize construction and maintenance costs for new fuel pipeline infrastructure. • Both fuel berths would be multi-purpose berths, which would increase cargo-handling capacity in the harbor. • The extended Pier 3 would significantly increase the area that is available for cargo handling and temporary storage. • The construction period of the piled structure would be shorter than a conventional bulkhead pier. Structural components could be pre-fabricated and expeditiously installed. This would minimize impacts to harbor operations. • The piled pier structure and the rock revetment at the shoreline of the harbor basin would contribute to wave attenuation due to energy dissipation through flow around piles and partial reflection from the rock revetment. The resulting wave action at the extended, piled Pier 3 would therefore be less than with a solid bulkhead pier close to the pier face. • Using fuel loading arms would reduce the vulnerability of fuel barges/tankers to significant movements due to short and long period waves in the inner harbor and increases safety of the fuel transfer. • Dredging could be carried out without impact on the existing structure of Pier 3, therefore it could be fully integrated into the extended Pier 3.	• During pier construction, there could be considerable disruptions to harbor operations. With Pier 3 temporarily not available, fuel barges would have to use Pier 1A exclusively to off-load fuel. This creates a situation where fuel barges would have to compete with other harbor users for berthing space and time at Pier 1A. • In the event of a fuel spill at Pier 3 or 1A, the inner harbor could not be used. Spilled fuel would aggregate in the innermost harbor basin. Accumulation of fuel under the piled pier (Pier 3) sections could cause significant environmental. • The area that is covered with the new pier structure would be comparatively large and therefore construction time and costs would be considerable. However, the piling and construction of the pier structure between existing Pier 3 and Pier I could be carried out without significant interference of harbor operations since this part of the harbor is presently not used. • The area between existing Pier 3 and Pier 1 is presently used for mooring/berthing of smaller utility and service boats (i.e., boats to combat fuel spills). New berthing spaces would have to be provided for these smaller workboats.

Table 6-1 Kahului Harbor: Advantages and Disadvantages of Conceptual Design Alternatives (Page 5 of 5)

Kahului Alternative E: Pier 3 with new sheet pile apron and improved fuel transfer facility at Pier 1A.

Advantages	Disadvantages
• Two fuel berths would be available providing operational flexibility and redundancy. • The close proximity of fuel transfer equipment to existing interconnecting pipelines at Pier 3 would minimize construction and maintenance costs for new fuel pipeline infrastructure. • Both fuel berths would be multi-purpose berths, which increase cargo handling capacity in the harbor. • The construction period of the sheet pile apron around Pier 3 would be shorter than for a conventional bulkhead pier or plied pier. This would minimize impacts to harbor operations. • Using fuel-loading arms would reduce the vulnerability of fuel barges/tankers to significant movements due to short and long period waves in the inner harbor and increases safety of the fuel transfer. • By installing a breasting dolphin, the pier face at Pier 3 could be extended to accommodate a 400-foot long design barge with enough space left for cargo barges at Pier 2. • The pier modifications at Pier 3 would be very cost effective.	• During pier construction, there could be considerable disruptions to harbor operations. With Pier 3 temporarily not available, fuel barges would have to use Pier 1A exclusively to unload fuel. This could create situations where fuel barges would have to compete with other harbor users for berthing space and time at Pier 1A. • In the event of a fuel spill at Piers 3 or 1A, the inner harbor could not be used. Spilled fuel will aggregate in the innermost harbor basin. • Stagnant water, possibly contaminated with fuel, below Pier 3 (and inside the sheet pile apron) could be an environmental concern. • Dredging close to the shoreline in the area between Piers 1 and 3 might impact shore stability and might require slope stabilization measures.