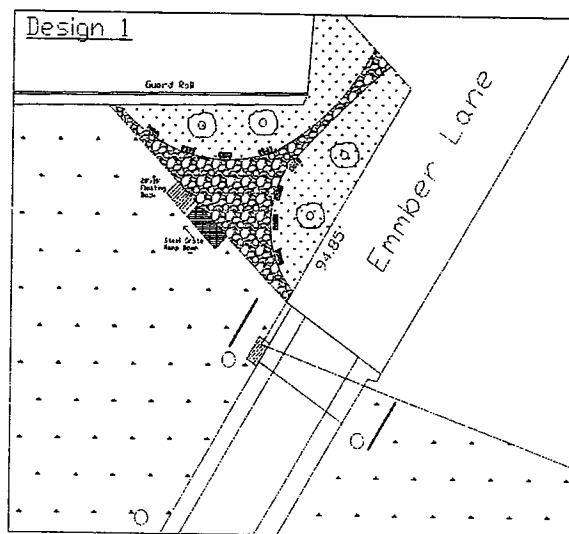


Design Option 1



Description

Option 1 instead of diverting the trash from accumulating in the corner, eliminates the area. The main benefit of this design is that it will provide an additional 6,750 S.F. of green space for the city. The area can now be used as a public park and launch for non-motorized boats, both assets to the Menomonee Valley. Also provides access to the Milwaukee Urban River Trail as shown in Exhibit 4. This option gives the Central Menomonee Valley another access point to the outside community. The only goal this option does not meet is to provide new fish habitat. The creation of the green space and launch make this a viable design option. See Exhibit 6 for the plan view drawing and Exhibit 7 for a photo rendering of this design option.

Details

This design requires 140 linear feet of sheet piling to retain the 5,140 C.Y. that will be filled behind it. Tie backs will also be installed to provide stability to the wall system. There is an elaborate landscaping design that will include a gravel walkway, trees, park benches and shrubbery. A floating dock would also be installed for public access to the river. The dock would be secured to the new wall that is being added similar to what is pictured in Exhibit 13. A cantilevered deck with a hinged ramp would be installed similar to what is pictured in Exhibit 14 and Exhibit 15. The ramp would have rollers on the bottom which allows for changes in river levels. As the water level changes the ramp would roll on the dock allowing the transition to remain safe and usable (See Exhibit 15). This cantilevered deck with hinged ramp and floating dock detail is the same for all three of the design options.

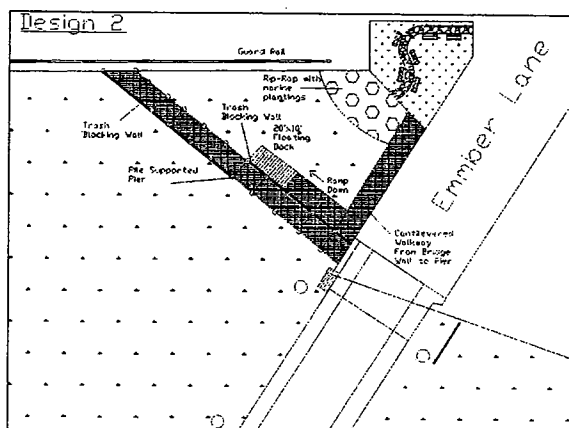
Cost Overview

This design appears to be the simplest way to resolve the problems at Emmer Lane Bridge but it is by far the most costly. The most expensive aspect of the construction of this design is the retaining wall and the fill that is needed behind it. This will make up roughly 70% of the overall cost. A detailed cost breakdown for Design Option 1 can be found in Appendix A.

The cost per square foot of new usable space installed is \$68.

Final Cost \$462,000

Design Option 2



Description

Design Option 2 is quite different from Design Option 1. Instead of eliminating the problem zone, this design focuses on diverting trash and using this corner for public river access and aquatic vegetation. This is accomplished with a dock running the length of the problem zone and rip-rap in the corner. The walkway will be elevated and the trash wall will have an opening in it to allow canoeists to maneuver under the walkway to a protected dock area. Sediment accumulation will still occur as the trash wall does not keep sediment out. The advantage is that if this happens the plantings would expand onto the new sedimentation and additional fish habitat would be created. See Exhibit 8 for the plan view drawing and Exhibit 9 for a photo rendering of this design option.

Details

A walkway on piles will run from the North river wall across the problem zone and attach to the bridge as far out as possible. See Exhibit 12 for picture of walkway on piles that was installed in the Third Ward which is similar to what we are proposing. Attached to the pilings will be a sheet wall that will act as a trash barrier for the corner. See Exhibit 16 for a drawing of this detail. This trash screen will span elevations above and below the average river high and low water levels, but will not reach the river bed. From here, the trash skimmer that runs up and down the Menomonee River will be able to remove any trash that may accumulate here. Inside the enclosed area will be a protected launch area for public access to the river. The area behind the newly placed rip-rap will incorporate native species of aquatic vegetation. A listing of possible plantings can be found in the "Currents" news letter in Appendix G. New landscaping will be incorporated in the current green space area between the sidewalk and the existing river bulkhead. A cantilevered walkway will act as a passage to the floating dock and walkway. Design Option 2 will provide 2,655 S.F. of dock walkway along with the floating dock itself.

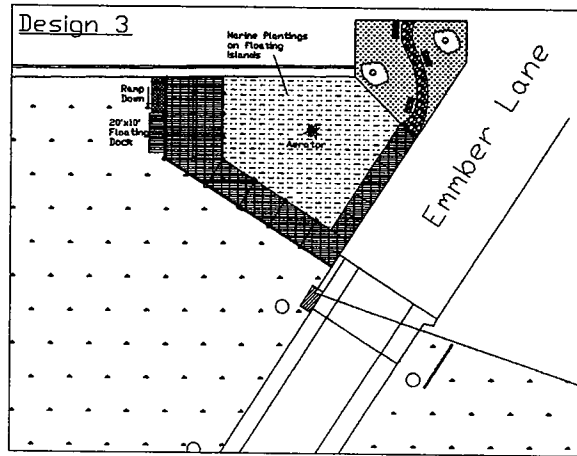
Cost Overview

This design is considerably less than the first. The main cost will come from the walkway and pilings that need to be installed. These costs make up about 25% of the total cost. Rip-rap constructed in this corner is about 7% of the total cost. A detailed cost breakdown can be found in Appendix A.

The cost per square foot of new usable space installed is \$96.

Final Cost \$254,800

Design Option 3



Description

The third design that was drafted is similar to Design Option 2. This design incorporates the same concept used in Design Option 2 to divert the trash using a pile supported walkway with a trash barrier. The walkway will not be elevated but transition downward toward a floating dock. Public launch access will be located outside of the walkway system. The enclosed area will be totally dedicated to vegetation and fish habitat. See Exhibit 10 for the plan view drawing and Exhibit 11 for a photo rendering of this design option.

Details

The dock for this design differs from the second design in two ways. First there is a larger deck area for the public to gather on and it will be closer to the water. Second is that the floating dock will be attached to the outside of the enclosed area. As done previously, a trash wall will be implemented to act as a barrier to the enclosed water area.

The water area between the existing bulkhead wall and the new deck will have aquatic vegetation and floating islands supporting the native species. See Exhibit 17 and the Canadian Pond products brochure in Appendix F for floating island information and Appendix G for types of plantings. Floating islands serve several benefits, fish habitat is provided as well as a food source for aquatic life. At this time, the area behind the walkway will incorporate islands and vegetation which will make up approximately 25% of the total enclosed surface water area. The planting area can be increased at a later time if so desired.

In the planting area an aerator/fountain has been incorporated. Aeration increases the oxygen levels in the water and serves as an aesthetic focal point as shown in Exhibit 18. Also by keeping the water in motion it prevents mosquito larvae from accumulating on the water surface.

Another way to create fish habitat is to install cages below the surface of the water like the AquaCrib™ as shown in Exhibit 19. They create an area that fish are attracted to.

The landscaping to be done is going to be very similar to that of Design Option 2. There is going to be 3,944 S.F. of deck added along with the cantilevered walkway that will be cantilevered off the present bridge sheet wall. The same problem exists with the inability to stop the sedimentation in the corner as option 2. Again the idea of allowing the plantings to expand would also apply.

Cost Overview

This design is very close in cost to Design Option 2. The major costs are the dock and pilings. This cost is approximately 32% of the overall cost. The plantings and floating islands incorporated are considerably higher than the second design. However, this design will not include any of the rip-rap which will drop the overall cost back down to the same level as the second design. A detailed breakdown for this design can be found in Appendix A.

The cost per square foot of new usable space installed is \$68.

Final Cost \$269,800

Cost Estimate Comparison (Breakdown)

A detailed cost estimate was prepared for the three design options that are being proposed as solutions. Items included in each cost estimate are engineering, permits, construction, material, dock and ramp, landscaping, project management, construction inspection, environmental inspection and construction contingency. The construction contingency is only on the construction labor and material and is approximately 10 percent.

A complete breakdown of each of the categories listed above can be found in Appendix A.

The overall cost estimates for each of the design options are as follows:

Design Option 1 Cost:	\$462,000
Design Option 2 Cost:	\$254,800
Design Option 3 Cost:	\$269,800

The engineering, permit preparation, project management, construction inspection and environmental inspection cost estimates were done by JBL Engineering and are our best estimate of the anticipated time and costs. A breakdown of the hours needed to complete the different engineering tasks is listed in the design option assumptions. The construction costs were estimated with numbers received from Gillen Company using the conceptual drawings for each of the options. The permit fee costs were based on input from the DNR.

Permitting

A set of conceptual plans was sent to the Wisconsin Department of Natural Resources (WDNR) for their review and input for the type of permits required and permitting issues that may arise for each of the design options. A response was received on Monday April 10 providing feedback on the different permits required for each option and possible issues.

Design Option 1

Design Option 1 is the easiest to permit through the WDNR. It requires a bulkhead adjustment line adjustment. This requires the City to make a change to the bulkhead line ordinance. Also required is that the WDNR sign off on this change. The WDNR would require that the land created would always be kept for public use or they would not sign off on the bulkhead adjustment. Once the bulkhead line adjustment is completed the WDNR would no longer have Chapter 30 authority over the project.

The Army Corp of Engineers (ACOE) would then take section 404 authority for this project for filling in a waterway. This would require a permit with the ACOE and a 401 Water Quality Certification. There is a \$2000 permit fee and requires a public notice in the local paper. If state or federal grant monies are being used then the permit fee would be waived.

Using the DNR pier planner JBL Engineering concludes that a permit would be required because the dock will be wider than 6 feet.

The outfall structure that currently discharges at the existing bulkhead wall will need to be extended through the fill and out the new sheet pile wall. This will require a permit for intake/outfall structures.

While a general permit is usually preferred, as in this case where we have many activities one individual permit will probably make more sense. It means only filling out one form and only one fee. This fee with the DNR is \$500.

Design Option 2

The advantage of this option is that its configuration which allows access to the water behind the walkway the DNR would not require a bulkhead line adjustment. This would still need to be verified with the City of Milwaukee.

A permit would be required to place the piles and attach the sheet trash wall to them under Chapter 30.12. A permit to place the fill and rip rap in the corner would also be required. The placement of this fill and rip rap would also require an ACOE permit and a 404 Water Quality permit. A DNR permit would also be required for the floating dock and walkway. As in Design Option 1 it would be best to fill out one individual permit and pay one fee.

Design Option 3

This design option presented some difficulty for the DNR to interpret because this option encloses an area of the river that now becomes inaccessible to navigation. Based

on this input it is now proposed to make the area behind the walkway into a wetland. This would be accomplished with the use of floating islands with vegetation and floating fish habitat.

This option would require a bulkhead line adjustment with the City of Milwaukee. A permit would be required with the DNR to place the piles, attach the sheeting to the piles, and install the decking and floating dock. As in Design Option 1 it will be best to apply for one individual permit for all of these activities. An ACOE permit and 404 Water Quality Certification would be required to place rip rap, floating islands and fish habitat.

A copy of each of the Wisconsin DNR permits and their criteria that will be required for each of the design options have been included in this report. See Appendix D for this information. A copy of the ACOE permits and the guidelines on how to fill them out are also included in this report. See Appendix D for this information.

A matrix was set up that lists the permits required for each option and is in Appendix D.

Criteria Evaluation Matrix

JBL Engineering had to develop some way of evaluating the different design options beside cost alone. So an evaluation criterion was developed that cost was just one of the components. The Army Corp of Engineers evaluation factors was used as the basis for the criterion (Appendix B). The ACOE evaluation factors are used to determine whether to grant or deny a permit based on a public interest review of the probable impact of the proposed activity and its intended use.

The Menomonee Valley Partners redevelopment guidelines were also incorporated into the evaluation criterion. These included geographic, cultural environmental and economic. This resulted in a matrix which consists of eighteen categories with one or more subcategories in each.

The matrix which is in Appendix B uses a grading scale from 0 to 3. A grade of 0 is used if no value is added or if the design option is seen as a negative to the listed criteria. A score of 3 is used if the design option is seen as a positive and the design option meets the activity listed. A value in between is used if the activity somewhat meets the criteria. If an option were to receive a perfect score in each category it would result in a total of 109.5 points. Several of the criteria did not apply to the evaluation of these design options so the maximum score would be 97.5. The criteria which were not addressed are floodplain values, shore erosion and accretion, water supply and conservation and energy needs.

The cost of any project is usually seen as an overriding factor in any decision made so an importance factor of 1.5 was used to increase the overall rating scale from 0 to 4.5 for the overall lowest cost solution criteria.

The overall ratings of the design options are as follows:

Option 1 Score:	54
Option 2 Score:	61.5
Option 3 Score:	70.5

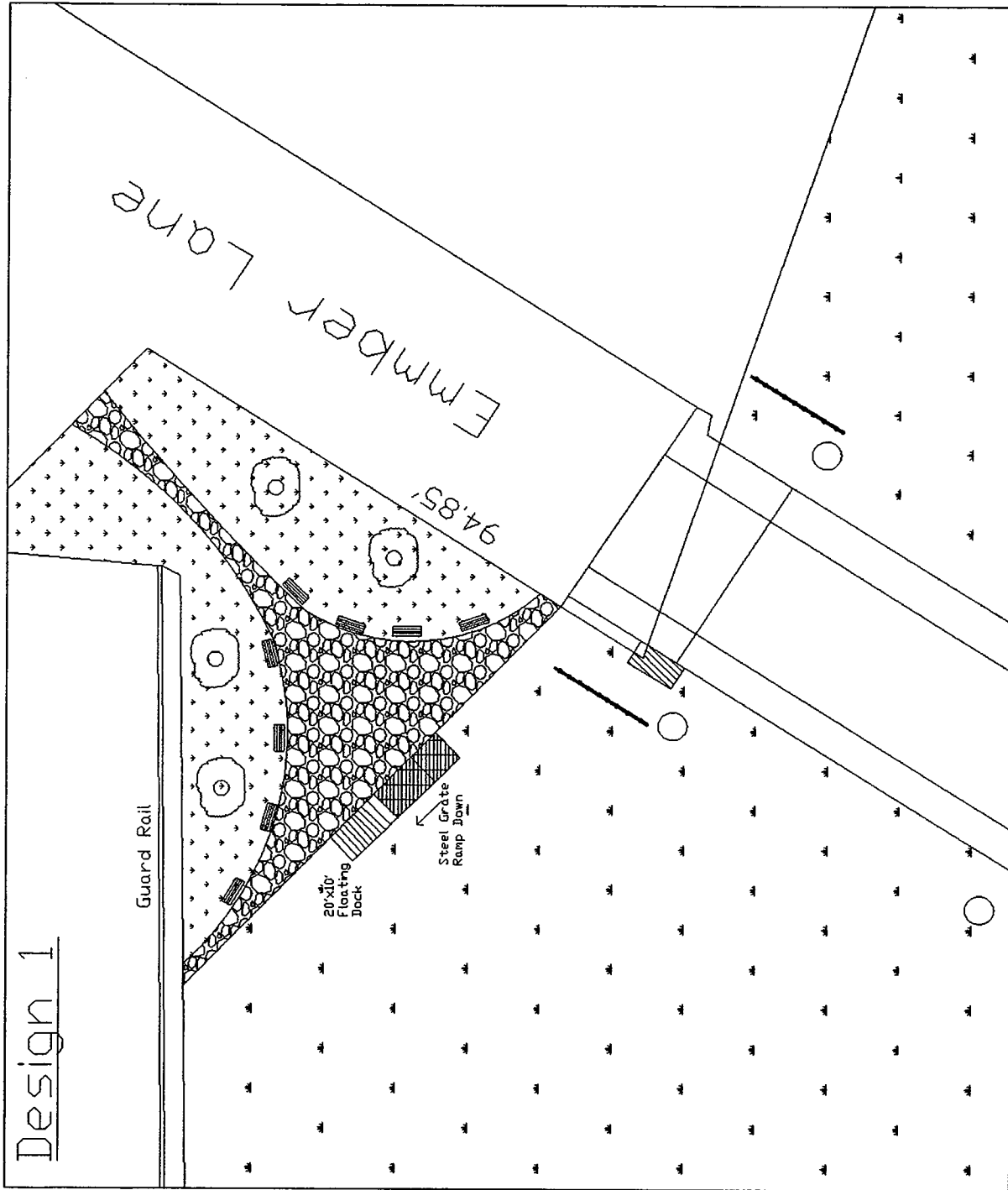
The complete listing of the evaluation categories and our scoring is shown in the Evaluation Criteria Matrix in Appendix B.

Conclusions

Having started with a scope of work and a set of criteria provided by the Sigma Group, JBL Engineering has come up with three viable solutions to solve the river debris problem in the corner of the Menomonee River at the Emmber Lane Bridge. A listing of the design options that were rejected and the reasons that they were eliminated are also included in this report.

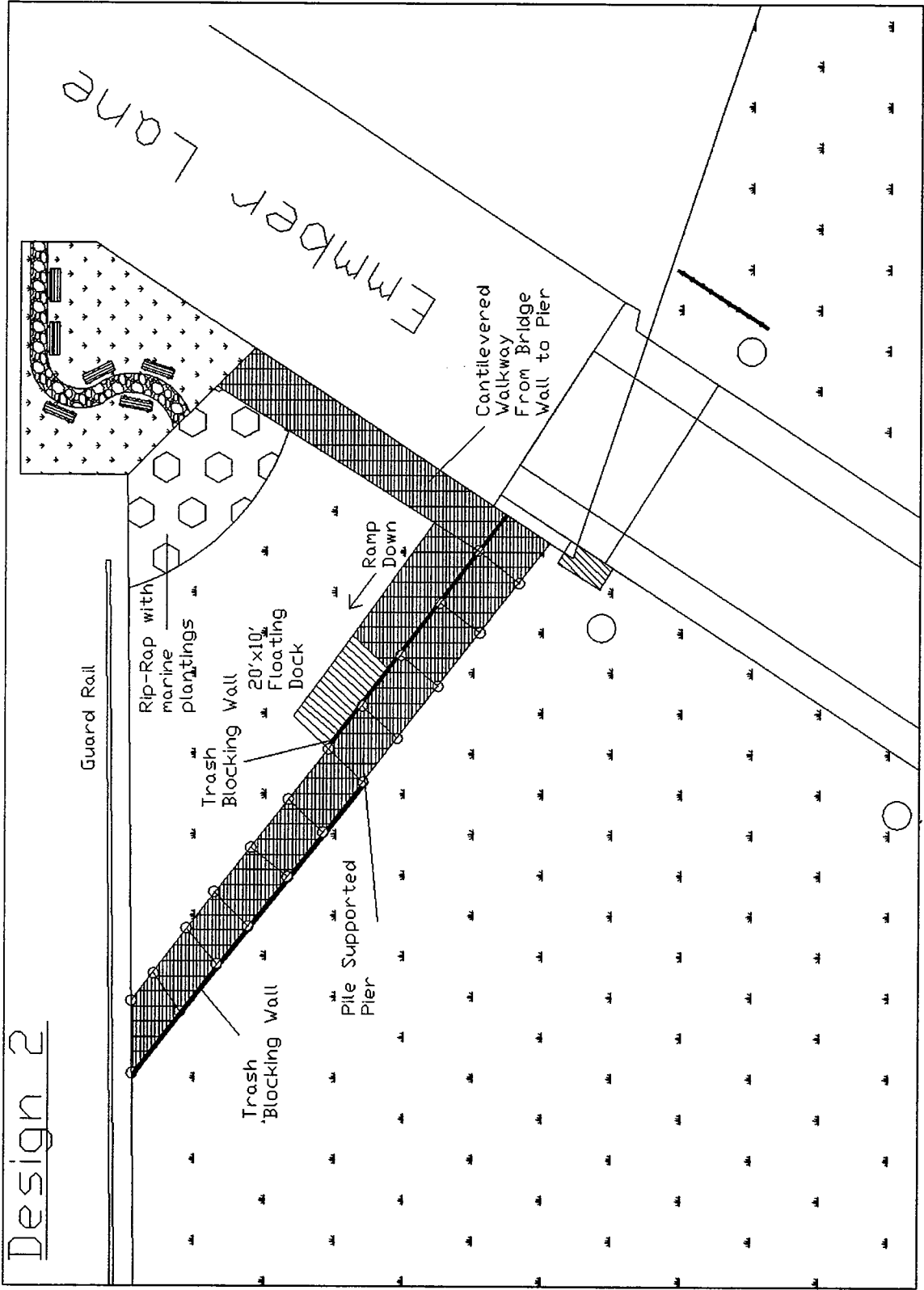
Using our evaluation criteria (see Criteria Evaluation Matrix section in Appendix B), Design Option 3 scored the highest and thus is the design option recommended by JBL Engineering. While Design Option 3 is \$20,800 more than Design Option 2, it is tied for the lowest cost per square foot of new space installed with Design Option 1. So for \$15,000 more which is an 8 percent cost increase over Design Option 2 you get approximately fifty percent, 1,300 S.F., more usable deck space over Design Option 2. This demonstrates that Design Option 3 is a better value than Design Option 2.

Design 1



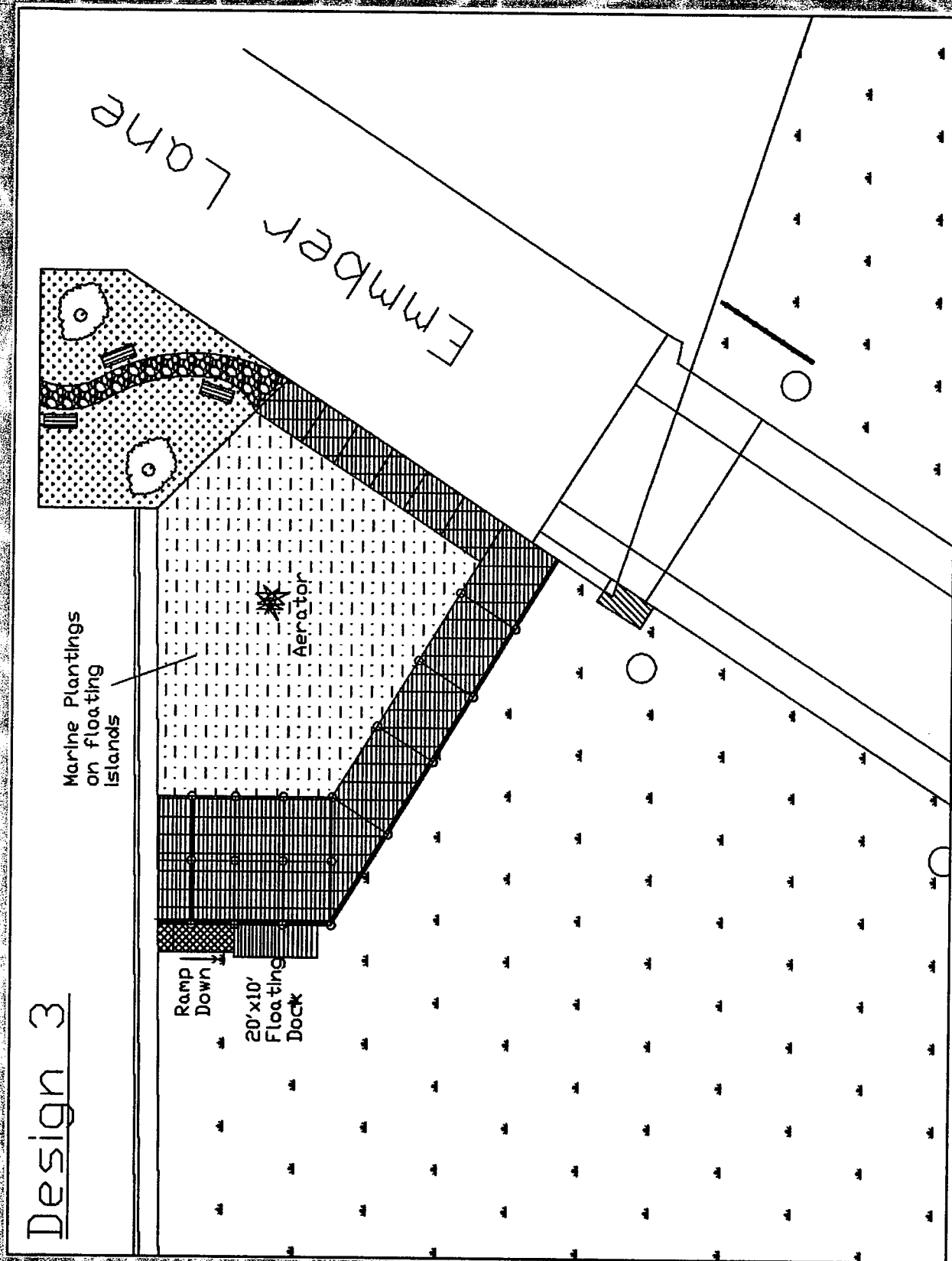
Design Option #1

Design 2



Design Option #2

Design 3



Design Option #3

