

DANA POINT HARBOR REVITALIZATION DRY BOAT STORAGE ANALYSIS



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MVE Institutional
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DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS EXECUTIVE SUMMARY

For the Dana Point Harbor Revitalization Project, an analysis has been developed to compare the concept of constructing a **Dry Stack Boat Storage Building** versus a **Dry Boat Storage Deck** to meet the boat storage requirement for Planning Area 1 of Dana Point Harbor.

This analysis was based on the requirements to accommodate 493 spaces for dry boat storage, 334 spaces for visitor vehicles with trailers, and 157 vehicle parking spaces for both the boat storage users and the retail/office space in Planning Area 1.

The **Dry Stack Boat Storage Building** would be an enclosed structure, 65 feet tall, with a footprint of approximately 50,000 square feet and will house storage racks on 5 levels for up to 400 boats and an automated craned boat delivery system.

The **Dry Boat Storage Deck** option would be planned as a two-level structure, one level at grade and one elevated, totaling approximately 393,300 square feet.

In comparing the **Dry Stack Boat Storage Building** and the **Dry Boat Storage Deck**, several factors were analyzed including: Boater Operational Efficiency, Site Circulation, Constructability, Construction Cost, and Views. Both options were taken to the same level of conceptual design so all of these factors could be studied and compared. The following is a summary of some of the findings.

In analyzing boater operational efficiency, the **Dry Stack Boat Storage Building** will provide better circulation and less congestion since it provides its own boat launch in the building, separate from the visitor boat launch ramp.

In reviewing constructability, it is required to keep dry boat storage and the boat launch ramp available during construction. With the **Dry Stack Boat Storage Building**, and its smaller building footprint, disruption to the boating facilities will be minimized.

Regarding construction costs, the **Dry Stack Boat Storage Building** is the more economical option with its overall cost less than the **Dry Boat Storage Deck** by approximately 1.16 million dollars.

The final criteria analyzed was views. The **Dry Stack Boat Storage Building** will have a lesser impact on views. With the building set back 260 to 390 feet from Dana Point Harbor Drive, view corridors from the scenic highway will still be available. With the **Dry Boat Storage Deck**, views will be blocked from the scenic highway for the entire 850-foot length of the **Dry Boat Storage Deck**.

Based upon this analysis, it recommended that the County of Orange proceed with the **Dry Stack Boat Storage Building** option for Planning Area 1 of the Dana Point Harbor Revitalization.

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DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS INTRODUCTION

For the Dana Point Harbor Revitalization Project, an analysis has been developed to compare the concept of constructing a **Dry Stack Boat Storage Building** versus a **Dry Boat Storage Deck** to meet the boat storage requirement for Planning Area 1 of Dana Point Harbor. MVE Institutional along with its consultant team has compared the two options in four different aspects:

1. Boater Operational Efficiency and Circulation Impacts
2. Constructability
3. Cost Analysis
4. Views of the Site from Dana Point Harbor Drive

This analysis was based on the requirements to accommodate 493 spaces for dry boat storage, 334 spaces for visitor vehicles with trailers, and 157 vehicle parking spaces for both the boat storage users and the retail/office space in Planning Area 1. There will also be a new Marine Services Building that will replace the existing building on the site. Included in this report are the revised conceptual design drawings of Planning Area 1 for both options which are based on these project requirements along with comments and input received from OC Dana Point Harbor.

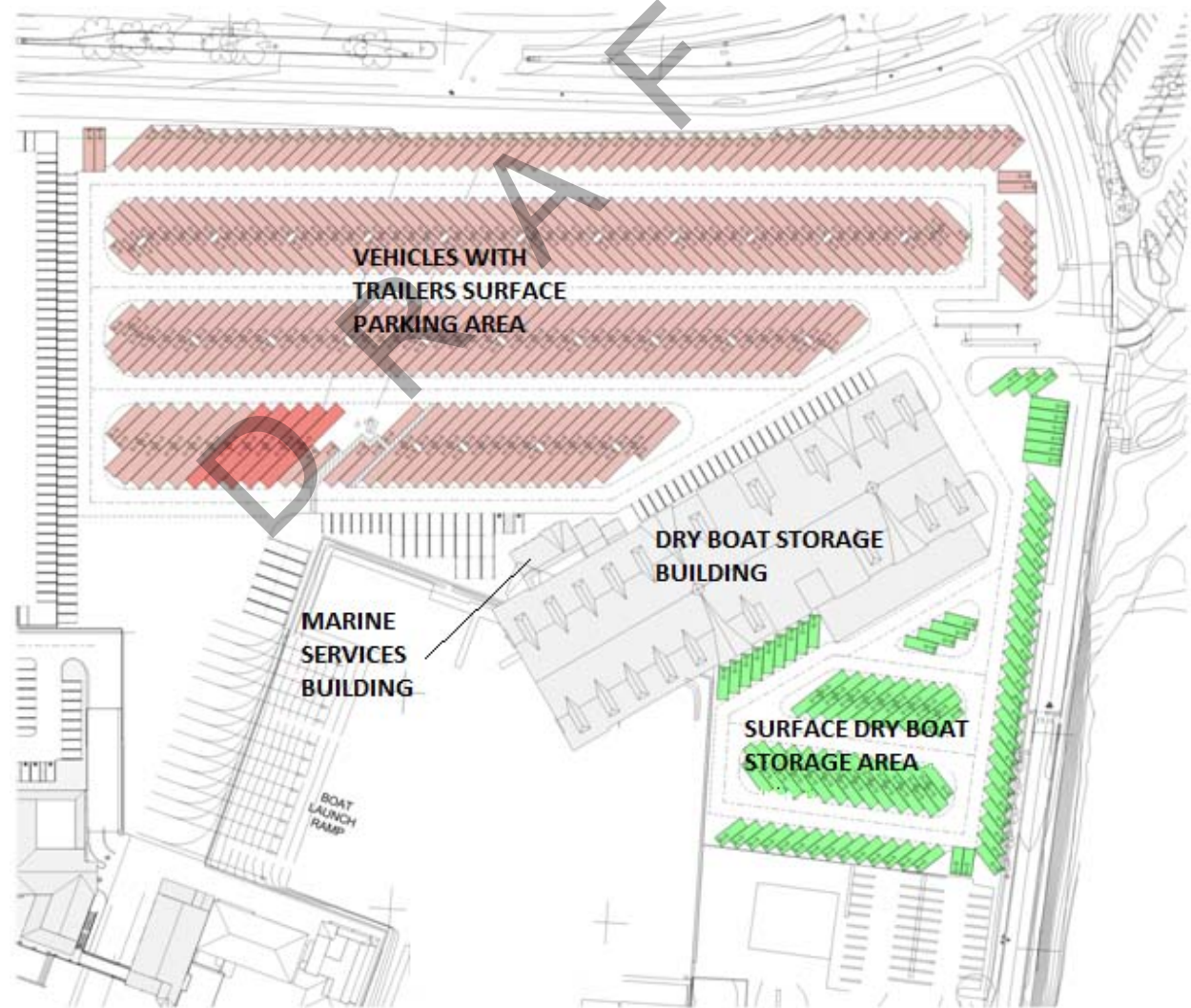


DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS PROJECT DESCRIPTIONS

Dry Stack Boat Storage Building

The **Dry Stack Boat Storage Building** would be an enclosed structure with a footprint of approximately 50,000 square feet and will house storage racks for up to 400 boats and an automated craned boat delivery system. The overall height of the building would not exceed 65 feet from the surrounding grade. The remaining 93 boat spaces would be provided in an open-to-the-sky surface boat storage area south and east of the **Dry Stack Boat Storage Building**. The 334 spaces for visitors and their trailers will be accommodated in an open-to-the-sky surface lot located north and west of the **Dry Stack Boat Storage Building**.

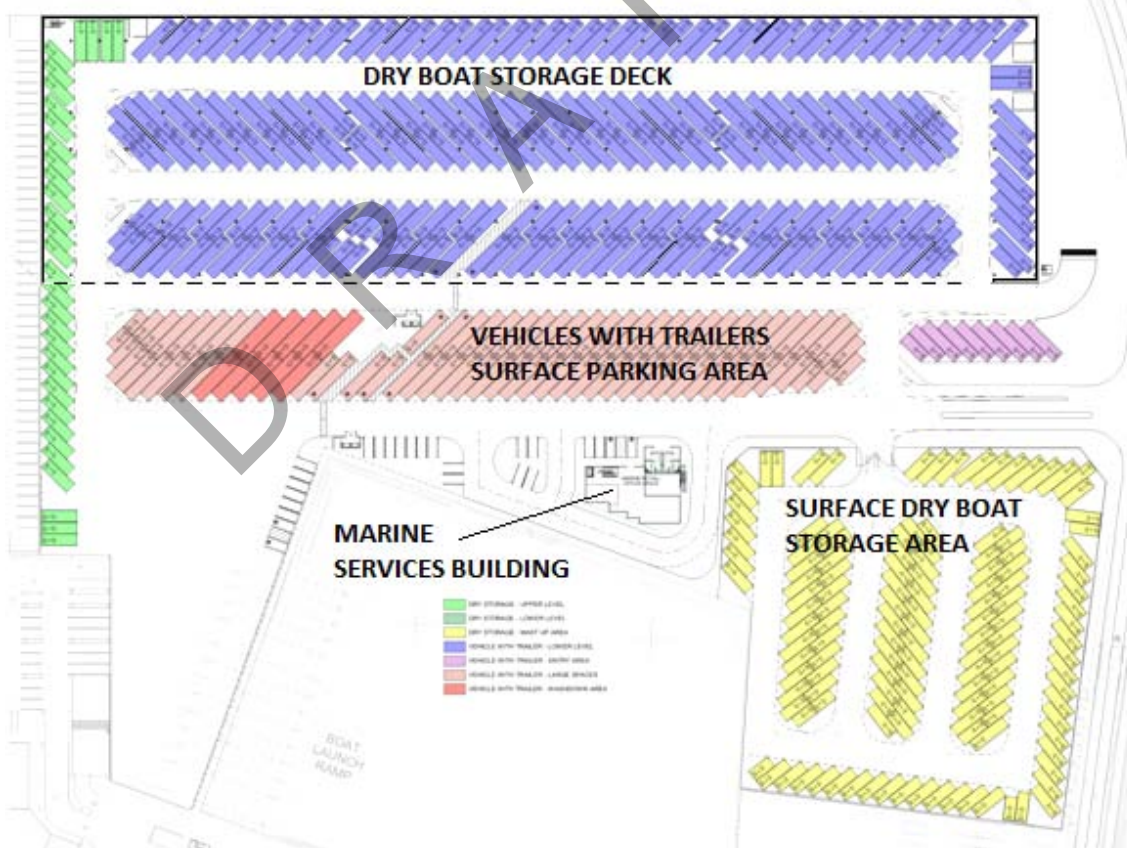
Also included in this option is the new Marine Services building that will house the Waiting Area, Boater Restrooms, and Office Space, and approximately 2,000 square feet of Retail Space; it will be attached to the north side of the **Dry Stack Boat Storage Building**. The total square footage for the Marine Services building is approximately 7,600 square feet.



Dry Boat Storage Deck

The **Dry Boat Storage Deck** option would be planned as a two-level structure, one level at grade and one elevated, totaling approximately 393,300 square feet. The structure would be similar to that of a concrete long span parking structure and will accommodate a majority of the required 493 dry boat storage spaces with 327 boats (on trailers) on the upper level and 32 boats (on trailers) on the lower level. The remaining 134 dry boat storage spaces would be accommodated in a surface dry boat storage area on the south side of Planning Area 1. For the 334 spaces required for visitor vehicles with trailers, 241 of these spaces would be located on the lower level of the **Dry Boat Storage Deck**, the remaining 93 required spaces will be provided in an open-to-the-sky parking area immediately south of the new **Dry Boat Storage Deck**. The **Dry Boat Storage Deck** would be naturally ventilated with openings on the north and south sides of the building. A ramp on the east side of the **Dry Boat Storage Deck** will provide access to the upper level and the entire south side of the lower level will align with the surface parking lot to accommodate parking spaces along this edge of the structure.

Included in this option would be a new standalone Marine Services Building to replace the existing building on the site; this facility will house a Waiting Area, Boater Restrooms, Office Space, and Retail Space totaling approximately 7,600 square feet. This building will be two stories and located in the middle of the site north of the seawall and boat ramps.



DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS BOATER OPERATIONAL EFFICIENCY AND CIRCULATION IMPACTS

One of the most critical aspects of the analysis is “Boater Operational Efficiency.” In this analysis further definition of the options will be provided along with their advantages and disadvantages.

Dry Stack Boat Storage Building

A **Dry Stack Boat Storage Building** is a professionally operated enterprise whereas boats are stored within a vertical rack system. The vessels within the building are handled by a forklift or crane system specially engineered and manufactured for this application. The boat handling system is designed with the capacity to safely move the vessels from the storage rack to the water, a trailer, or a forklift and vice versa. The machinery would also be able to move the vessels in less time and over shorter distances compared to a **Dry Boat Storage Deck**.

The advantages of a **Dry Stack Boat Storage Building**:

- 1) Efficient storage of boats on a defined land area
- 2) Potential cost savings to boat owners as boat trailers are not required
- 3) Less of a visual impact with a majority of the boats stored indoors
- 4) Vessels kept within the facility enjoy the following benefits:
 - a) Little or no damage from the weather elements
 - b) Less maintenance
 - i) No antifouling paint required
 - ii) Less washing, waxing etc.
 - c) Vessel owners’ peace of mind
 - i) Better security
 - ii) Fire sprinkler protection
 - iii) The vessel can be stored for long periods of time indoors
 - d) No need for boat cover removal and installation each time the vessel is used
- 5) User friendly:
 - a) The boat owners do not need to handle their vessels themselves
 - b) Vessels can be moved through the facility within a five to ten minute cycle time
 - c) Flexibility in scheduling launch times
 - d) Flexibility to pickup and drop off the boat at the staging docks after hours
 - e) The vessel owner can request that the boat be placed into a maintenance area to perform his/her own or vendor service work
- 6) Navigational access and benefits:
 - a) The vessel owner does not have to queue up and wait for the launch ramp
 - b) The vessel can move directly to the open water without delay
 - c) The vessel can be easily returned to staging dock

The disadvantages of a **Dry Stack Boat Storage Building**:

- 1) Boat size and weight restricted by the building structural bay size, crane, and lift capacity
- 2) Owners have no access to their vessels unless they are brought down by the staff
- 3) Trailer may need to be provided by operator for offsite boat movement

Dry Boat Storage Deck

A **Dry Boat Storage Deck** is a concrete deck structure similar in application to a vehicle parking garage where the vessels are surface stored on trailers. No racking, stands or blocking devices are used to secure the vessels. The vessels would be stored on trailers and they would be moved by vessel owners' vehicles or facility-operated trailer tugs.

The advantages of a **Dry Boat Storage Deck**:

- 1) Less restricted height limits: boat tops, and fixed antennas can be accommodated
- 2) Vessel owners do not need to move the boats themselves; staff moves the boats with the trailer tug (this could also be seen as a disadvantage with vessel owners not being able to move their own boat)
- 3) User friendly
 - a) Staff can haul and launch the boat for vessel owners
 - b) Owners can drop the boat off and have staff return the boat to storage when they are finished with the boat for the day

The disadvantages of a **Dry Boat Storage Deck**:

- 1) Vessel size is limited by the available parking space dimensions, trailer capacity, and/or tug capacity
- 2) Vessels are stored outdoors exposed to weather and elements
- 3) Vessels are not as secure as they would be indoors
- 4) More maintenance required (i.e. cleaning and waxing) for being stored outdoors
- 5) Boat cover installation and removal would be necessary
- 6) Trailer maintenance necessary
- 7) Vessels stored on the **Dry Boat Storage Deck** are within visual range of the surrounding areas and roads
- 8) Longer launch and retrieval cycle time (compared to the Dry Stack) due to the handling requirements:
 - a) Trailer tug availability and travel time
 - b) Queue at the launch ramps
- 9) More risks for vessel damage due to the multiple handling functions
- 10) The negative visual impact of boats stored outdoors versus within a building

Project Specific Challenges

Both options have site specific challenges that impact boater operational efficiency; however, some are easier to overcome.

For the **Dry Stack Boat Storage Building** option, the main challenge is designing an efficient boat rack system to accommodate the different sizes of boats, but with good planning this can be accomplished.

For the **Dry Boat Storage Deck** option, one challenge is the inability of the owners to retrieve or launch their own boats. The site constraints call for a layout with a narrow and steep access ramp with tight turning radius that limits access to the upper level. Due to this restricted layout the only practical solution to move the boats back and forth from the launch ramp is to utilize a small staff-operated trailer tug to retrieve and return boats to/from their storage spaces on the upper level. The narrow

ramp and lanes leading to the upper level also preclude two way traffic passing safety thus slowing the launch retrieval cycle time. One of the solutions to expedite the boat launch cycle times is to stage more boats in the surface launch ramp parking lot south of the **Dry Boat Storage Deck** but this solution further impacts the available parking spaces planned for launch ramp users and spaces under the upper level cannot be used due to height restrictions. Widening the ramp and access lanes to allow for sufficient two-way traffic will take up more site area and increase construction costs.

For visitors using the boat launch ramp in the **Dry Boat Storage Deck** option, parking vehicles with trailers in the lower level of the deck may be challenging. In order to support the upper level and address the seismic loads on the structure, two foot diameter columns and 18 inch wide shear walls are needed. Drive aisles are sized to accommodate maneuvering clearances of vehicles with trailers but the columns and shear walls, located between the parking spaces, could pose to be an obstacle to the person parking in the lower level. The image below illustrates the column and shear wall impact on parking on the lower level of the **Boat Storage Deck** .



View of parking and structure in the lower level of the Dry Boat Storage Deck

For both options visual impacts from Dana Point Harbor Drive are addressed in more detail in the "Views of the Site From Dana Point Harbor Drive" analysis later in this report.

Site Circulation Impacts

When comparing on-site vehicle circulation, the **Dry Boat Storage Deck** would have the same congestion problem at the existing boat launch ramp since all boats on the site, whether in dry boat storage or a visitor boat on a trailer, will need to be launched in the same boat launch area. (Except for those launches with the Embarcadero hoist)

In contrast, the **Dry Stack Boat Storage Building** option reduces this congestion issue at the existing boat launch ramp by separating its launching operation completely. Vessel owners who store their boats in the **Dry Stack Boat Storage Building** will be isolated from the boats on trailers at the launch ramp; this option will lessen traffic issues and parking problems that could be experienced with the **Dry Boat Storage Deck** option.

DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS CONSTRUCTABILITY

Both the **Dry Stack Boat Storage Building** and the **Dry Boat Storage Deck** options have constructability challenges but neither option is beyond what is considered "typical construction" with regards to constructing a building. The **Dry Stack Boat Storage Building** is a steel column and beam framed structure with metal panel exterior walls and a standing seam metal roof. The steel framing for the boat storage racks will be used to support boats in storage, the crane system, as well as the building's walls and roof. Steel brace frames will be used for the lateral loads and the concrete slab at level one built to accommodate the loads of both boats and a forklift if used. The **Dry Boat Storage Deck** is a post tensioned long span concrete slab and beam structure similar to a concrete parking structure but with much greater spans to accommodate the turning radius and parking requirements for vehicles with trailers. At the lower level, concrete shear walls will be constructed between parking spaces to accommodate the lateral loads placed on the building and two expansion joints will separate the building into 3 segments. Both options will be built on a pile foundation and grade beams.

With regard to the building option, this will require the construction of foundations for part of the building out over the water. This option will also require designing a boat rack system and crane system that is efficient and safe, and will require a reconfiguration of the docks in front of the proposed building to work in conjunction with launching operations from the building and the staging of vessels where the **Dry Boat Storage Deck** option can use the existing dock configuration.

With regards to the site work for the **Dry Boat Storage Deck** option, this option will require approximately 9,000 cubic yards more site earth work (equivalent to a football field 2 feet deep) than the **Dry Stack Boat Storage Building** and will require significant export of the dirt excavated for the project. The **Dry Boat Storage Deck** option will require the demolition of a much larger area of the existing parking area and the entire storm drain system will need to be removed and replaced. For the sewer, the amount of work required for the force main relocation is triple the cost of the force main construction in the **Dry Stack Boat Storage Building** option.

Site and Boat Launch Operations during Construction

In analyzing the **Dry Stack Boat Storage Building** and the **Dry Boat Storage Deck** and how each option will impact boater operation on the site during the construction, phasing will be important. The advantage of the **Dry Stack Boat Storage Building**, with its smaller footprint, is that it will disrupt a smaller portion of the site during the construction period. Also with the new building located on the southeast part of the site, the marine services building and the northern part of the existing dry boat storage operations can be maintained during construction. Access from Dana Point Harbor Drive to the dry boat storage and the boat launch, via Embarcadero Place, can be maintained until new access from Puerto Place is constructed. The remainder of the site construction, the demolition of the existing Marine Services Building and removal of Embarcadero Place can be done after the **Dry Stack Boat Storage Building** is completed, moved into, and is operational. Access to the boat launch during this later phase can be accommodated through the new entrance built from Puerto Place during the first phase of construction and there are more options on the number of the vehicles with trailers parking spaces maintained in this phase as a majority of this work is re-paving of the parking areas.

In contrast the **Dry Boat Storage Deck**, with its larger footprint, will require a much larger site area for construction and have a greater impact on available boat storage and vehicles with trailers parking spaces during construction. With the new **Dry Boat Storage Deck** and entrance from Puerto Place being constructed where the existing dry boat storage is located, this option will require relocating the existing dry boat storage area. The new entrance from Puerto Place would need to be constructed first to maintain access to the boat launch when Embarcadero Place is removed to make way for the **Dry Boat Storage Deck**. Once the new entrance work is done, then construction of the **Dry Boat Storage Deck** can begin. The impact of the **Dry Boat Storage Deck** construction on boater operations and parking can be minimized by phasing the construction of the deck over several phases, building and occupying it in 3 individual sections and phases, but this will increase the construction schedule and increase the cost to build the **Dry Boat Storage Deck**. Another impact is the export of the dirt excavated for the construction of the **Dry Boat Storage Deck**. This option will require finding a location for the excavated dirt and mitigating the added truck traffic on Dana Point Harbor Drive used to haul the dirt away.

Basis of Design for Building Systems

As part of the constructability analysis the Consultants on the project provided narratives that describe the site, structural, mechanical, plumbing and electrical systems used for each option. These narratives were the Basis of Design and are provided in Appendices A and B of this document. Also provided in Appendix D are the concept drawings used for the comparative conceptual cost estimate that was also as completed part of the analysis and provided in the next section of this document and in more detail in Appendix C.

**DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS
COST ANALYSIS**

For the Dana Point Harbor Revitalization Dry Boat Storage Analysis a comparative conceptual cost estimate has been developed for the **Dry Stack Boat Storage Building** and the **Dry Boat Storage Deck** options. The estimate is based on the Basis of Design documents attached in Appendices A and B and the Concept Drawings attached in Appendix D. The detailed cost estimate is provided in Appendix C and indicates an estimated construction costs of \$30.33M for the **Dry Stack Boat Storage Building** option and an estimated construction cost of \$31.48M for the **Dry Boat Storage Deck** option. Both of these estimates include sitework associated with each option and the Marine Services Building. The estimate includes escalation costs up to the anticipated construction start date in January 2015 and a construction duration of 12 months.

To summarize the comparative conceptual cost estimate the two options are similar in costs.

	Dry Stack Boat Storage Building	Dry Boat Storage Deck
Sitework	\$6,376,840	\$7,027,389
Storage Building / Deck	\$21,735,169	\$22,220,630
Marine Services Building	\$2,214,513	\$2,235,164
Total Estimated Construction Costs	\$30,326,521	\$31,483,183

Looking at the two options with regard to sitework the costs are similar. The costs for site utilities for the **Dry Stack Boat Storage Building** option are lower than then those for the **Dry Boat Storage Deck** but they are offset by the higher costs for site electrical required for the **Dry Stack Boat Storage Building** option. This is due to sewer work being more extensive in the **Dry Boat Storage Deck** option as compared to the amount of parking lot lighting in the **Dry Stack Boat Storage Building** option. The largest delta between the two options is the amount of earthwork required for the Deck option is nearly double that required for the Building option.

With regard to the cost of building the **Dry Stack Boat Storage Building** or **Dry Boat Storage Deck**, the **Dry Stack Boat Storage Building** option is more expensive for structural steel framing, exterior cladding, roof, and automated crane system, but this cost is offset in the **Dry Boat Storage Deck** with the amount of concrete required to build the deck. When comparing the two options they are almost identical in construction costs with the **Dry Stack Boat Storage Building** being less expensive.

For the Marine Services building the program and building square footages are identical and the two options are within \$20K of each other.

Both estimates include General Conditions, General Contractor Overhead and Profit, and Bonds and Insurance. Also included in the estimate is a 10% contingency. The detailed cost estimates are included in Appendix C and provide detailed information on each option.

DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS VIEWS OF THE SITE FROM DANA POINT HARBOR DRIVE

(Appendix E includes plans illustrating views were taken from for the illustrations in this section.)

When comparing the **Dry Stack Boat Storage Building** and the **Dry Boat Storage Deck**, one of the biggest differences is the view into the site from Dana Point Harbor Drive which the City has designated as a scenic highway. A requirement of the Dana Point Harbor District Regulations is to provide significant coastal public views through scenic corridors and from scenic viewpoints with some of these viewpoints indicated along Dana Point Harbor Drive. Boats stored on the upper level of the **Dry Boat Storage Deck** will block public views from Dana Point Harbor Drive. This is due to the natural grade of the site sloping upwards to the north from the seawall to Dana Point Harbor Drive and the required clearance for the lower level of the **Dry Boat Storage Deck**. The natural grade of the site will require the lower deck level of the **Dry Boat Storage Deck**, which aligns with the surface parking lot, to be placed at 11'-0" above mean sea level. To accommodate the vehicles with trailers, the ideal height clearance is 9'-9" for this lower level. This height clearance would also facilitate vehicles with equipment (i.e. kayaks) on roof racks. It would also accommodate those with lower profile boats or personal watercraft on trailers who wish to park on the lower level. Combine this height clearance requirement with the long spans required for the structural beams to facilitate vehicles with trailers and the result is a taller structure than that of a conventional parking garage.

With these criteria in place, the upper level of the **Dry Boat Storage Deck** will be located at an elevation of 24'-6" above mean sea level and the top of the guardrail height walls on the upper level 3'-6" above that elevation (28' above sea level). The elevation of Dana Point Harbor Drive along the **Dry Boat Storage Deck** ranges from 22'-0" to 24'-0" above mean sea level placing the street slightly below the elevation of the upper level of the **Dry Boat Storage Deck** and 4 to 6 feet below the top of the guardrail height wall at the upper level. This relationship between the elevation of Dana Point Harbor Drive and the **Dry Boat Storage Deck** is illustrated in Figure 1. Lowering the building below the 11'-0" elevation would burden the option with additional costs of significant earthwork. Reducing the height clearance on the lower deck level would reduce the available parking spaces for taller vehicles or vehicles with top mounted racks and increasing the risk of damages to vehicles and their top loads and doing so would still not eliminate the view impact from Dana Point Harbor Drive.

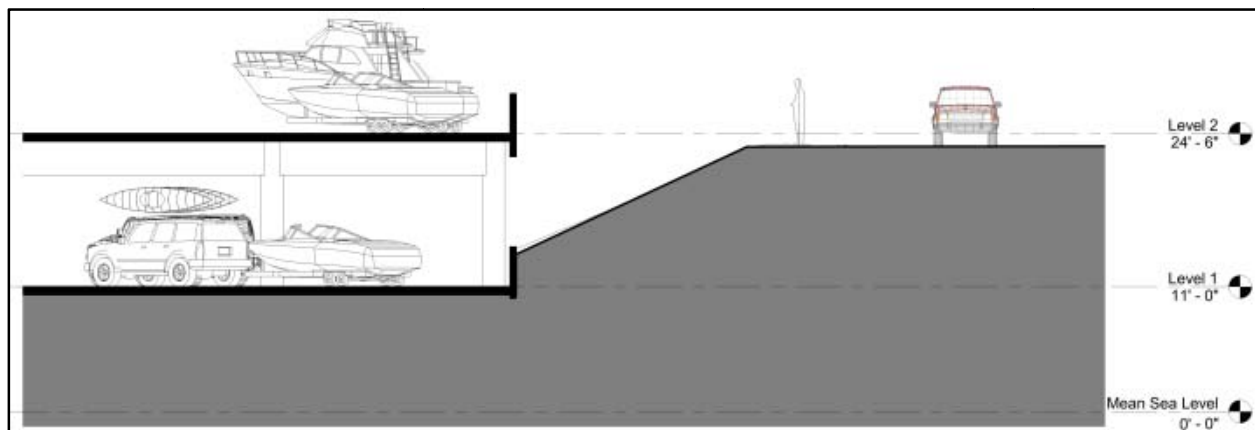


Figure 1D: Section at the Dry Boat Storage Deck and Dana Point Harbor Drive

As shown in Figures 2B and 2D the **Dry Boat Storage Deck** and the **Dry Stack Boat Storage Building** impact the views from Dana Point Harbor Drive in different ways. These views are taken just east of the intersection of Embarcadero Place and Dana Point Harbor Drive. Figure 2D shows the **Dry Boat Storage Deck** option with the boats in dry storage parked on the upper deck level. The boats that are currently stored in the dry boat storage at the Harbor range from 4 feet to 13 feet in height with a significant amount of them above 8 feet. Combine this height with the boat trailers and the top of some of the boats will reach 15' above the street. The views along Dana Point Harbor Drive, from Puerto Place heading west for 850 feet, will be obstructed by the boats on trailers on the **Dry Boat Storage Deck**. In contrast is a very different view with the **Dry Stack Boat Storage Building** as shown in Figure 2B. With the **Dry Stack Boat Storage Building**, scenic corridors can be accomplished along Dana Point Harbor Drive allowing views of the Pacific Ocean, the Harbor waters, Dana Island, the wharf, and the new commercial core buildings.



Figure 2B: Dry Stack Boat Storage Building Viewed From Dana Point Harbor Drive just east of the Existing Embarcadero Place Intersection

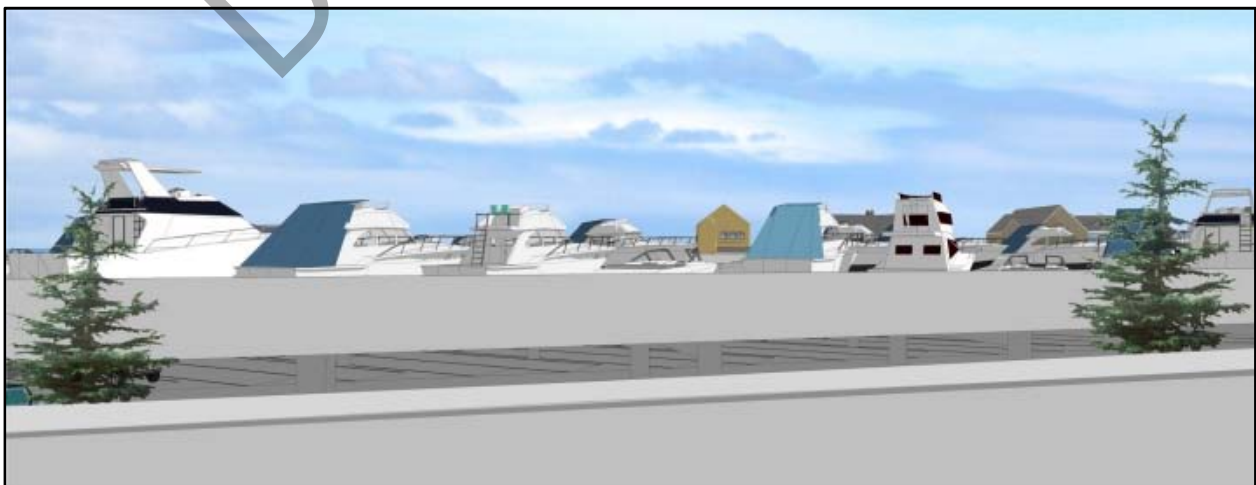


Figure 2D: Dry Boat Storage Deck Viewed From Dana Point Harbor Drive and just east of the Existing Embarcadero Place Intersection

Figures 3B and 3D show the view into the site further west of Dana Point Harbor Drive and the existing Embarcadero Place intersection. As is illustrated in these views the Ocean, Breakwater and Harbor waters can be seen in the plan with the Dry Stack Boat Storage Building (Figure 3B) and those views are blocked in the plan with the Dry Boat Storage Deck option (Figure 3D)



Figure 3B: Dry Stack Boat Storage Building Viewed From West Side of Dana Point Harbor Drive just west of the Existing Embarcadero Place Intersection



Figure 3D: Dry Boat Storage Deck Viewed From West Side of Dana Point Harbor Drive just west of the Existing Embarcadero Place Intersection

The views into the site for both options taken from the corner of Dana Point Harbor Drive and Puerto Place are illustrated in Figures 4B and 4D. With a maximum height of 65 feet, the **Dry Stack Boat Storage Building**, will be at approximately 49 feet above the elevation of Dana Point Harbor Drive spanning 423 feet. Unlike the **Dry Boat Storage Deck** option illustrated in Figure 4D, views from Dana Point Harbor Drive will be less impacted with the **Dry Stack Boat Storage Building** because it will be setback 260 feet to 390 feet from Dana Point Harbor Drive. Scenic corridors can be accomplished allowing views of the Harbor waters and new commercial buildings beyond as shown in Figure 4B. To lessen the impact of the massing of the **Dry Stack Boat Storage Building**, the exterior building elevations would vary with differing roof forms, shapes, materials and colors.

Figures 4B and 4D illustrate the view for a person in a vehicle driving West along Dana Point Harbor Drive at the corner of Dana Point Harbor Drive and Puerto Place.



Figure 4B: Dry Stack Boat Storage Building Driving West on Dana Point Harbor Drive at the Puerto Place intersection



Figure 4D: Dry Boat Storage Deck Driving West on Dana Point Harbor Drive at the Puerto Place intersection

Figures 5B and 5D illustrate the view for a person in a vehicle driving East along Dana Point Harbor Drive just east of the corner of Dana Point Harbor Drive and Street of the Golden Lantern. The **Dry Boat Storage Deck** option illustrated in Figure 5D blocks views from Dana Point Harbor Drive for its entire length as opposed to the **Dry Stack Boat Storage Building** which is setback from Dana Point Harbor Drive. The **Dry Stack Boat Storage Building** option allows scenic corridors views of the Harbor waters and ocean beyond as shown in Figure 5B.



Figure 5B: Dry Stack Boat Storage Building Driving East on Dana Point Harbor Drive



Figure 5D: Dry Boat Storage Deck Driving East on Dana Point Harbor Drive

DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS RECOMMENDATION

In comparing the **Dry Stack Boat Storage Building** and the **Dry Boat Storage Deck**, several factors were analyzed including: Boater Operational Efficiency, Site Circulation, Constructability Challenges, Construction Cost, and Views of the Project from Dana Point Harbor Drive. Both options were taken to the same level of concept design so all of these factors could be studied and compared. The following is a summary of some of the findings.

In analyzing boater operational efficiency, the **Dry Stack Boat Storage Building** will not have the same congestion issue since it provides its own boat launch in the building, separate from the visitor boat launch ramp. In contrast, with the **Dry Boat Storage Deck**, nearly all boats will be launched in the same area creating congestion on peak days. This option has the additional challenge of retrieving boats stored on the upper level of the **Dry Boat Storage Deck**. All boats will have to be retrieved by staff and when the owner wishes to launch his own boat valuable launch ramp parking spaces will need to be utilized to stage the boat delivered by staff. Also for visitors using the boat launch ramp a majority of their parking spaces are located in the lower deck level which will pose a challenge when maneuvering their vehicles with trailers.

As stated in the report, the constructability challenge for both options is phasing of the project; as it is required to keep boat storage and the boat launch ramp available during construction. With the **Dry Stack Boat Storage Building**, and its smaller building footprint, disruption to the boating facilities will be minimized. With the **Dry Boat Storage Deck**, to minimize its impact, more phases may need to be added which will increase the costs and lengthen the schedule of the project.

Regarding construction costs, the **Dry Stack Boat Storage Building** is the more economical option with its overall cost less than the **Dry Boat Storage Deck** by approximately 1.16 million dollars.

The final criteria used in the report was views from Dana Point Harbor Drive. As was illustrated, the **Dry Stack Boat Storage Building** will have a lesser impact on views. With the building set back 260 to 390 feet from Dana Point Harbor Drive, scenic corridors from the scenic highway of the ocean and island beyond will still be available. With the **Dry Boat Storage Deck**, boats will be stored on the upper level and will be as high as 15 feet above Dana Point Harbor Drive, With the structure sited within 15 feet of the Dana Point Harbor Drive, most views will be blocked from the scenic highway for the entire 850 foot length of the **Dry Boat Storage Deck**.

It is based upon these key findings in this report, the design team recommends proceeding with the **Dry Stack Boat Storage Building** option for Planning Area 1 of the Dana Point Harbor Revitalization.

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DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS

APPENDIX A - CONSULTANT NARRATIVES BASIS OF DESIGN DRY STACK BOAT STORAGE BUILDING

As part of the constructability analysis the following Consultant Narratives describe the systems used for the Dry Boat Storage Building option. The narratives were provided by the Civil Engineer-Fusco Engineering, Structural Engineer-KPFF Consulting Engineers, Mechanical and Plumbing Engineers-BP & Associates and Electrical Engineer-Konsortium 1.

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DANA POINT HARBOR REVITALIZATION PROJECT Dry Boat Storage Building Option

May 3, 2012

- 1) Demolition Exhibit
The existing paving for a portion of the site is being removed, including removal of existing curbs, gutters, concrete flatwork, street lights, and landscaping. The portion of the existing pavement that is to remain has various curbs, and landscaping that need to be removed as well as parking lot lighting. There is an existing cell phone tower and tsunami warning tower that needs to be relocated. The existing sewer lift station is to remain and the boat launching crane is to be removed. There are also various existing buildings/structures situated throughout the site that require removals.
- 2) Grading & Paving Exhibit
The proposed grading will follow existing drainage patterns and sheet flow towards the ocean. A series of curbs, concrete gutters, and catch basins will intercept the runoff. The ground floor of the storage building will be established by matching the existing seawall elevation. A sloping floor at 0.63% is proposed to absorb some of the elevation differences between the height of the sea wall and the Puerto Place entry elevations. New asphalt paving will be constructed throughout the site with new curbs, gutters, and flatwork. The existing pavement that was not removed will be grinded and an asphalt overlay will be constructed.
- 3) Drainage and Water Quality Exhibit
The existing site drains southerly in a sheet flow pattern towards the ocean. All of the existing site runoff is collected by an existing storm drain pipe. A portion of this existing storm drain pipe will remain and a portion that conflicts with the new building will be removed and realigned, as well as the construction of a new submerged outlet structure. Porous pavement in the parking areas will be installed to mitigate water quality requirements.
- 4) Sewer and Water Exhibit
The existing sewer lift station will remain in its current location. Due to the abandonment of Embarcadero Place, the existing force main will be removed and reconstructed to the existing gravity sewer in Dana Point Harbor Drive. A new gravity sewer line is being proposed to go under the Boat Storage Building, instead of going around the building. This sewer line will be encased in concrete or will be sleeved and an additional manhole will be needed. The future water main will be located in the future drive aisles and will connect to the existing water lines in Puerto Place and Dana Point Harbor Drive. A new recycled water line will be constructed parallel with the domestic water line to Puerto Place to a new recycled water line in Dana Point Harbor Drive, to be constructed by the South Coast Water District.



MEMORANDUM

DATE: June 19, 2012

TO: Bill Koster / MVE Institutional

FROM: Bill Thorpe / KPFF

RE: Dana Point Harbor Renovation
Dry Stack Boat Storage Building Structural System Narrative
KPFF Project #211207, File #1.10

This memo is to provide a narrative for the structural systems for the above referenced project. The building is approximately 120' x 423' and has up to five levels of storage and a roof. The building lateral and gravity systems will incorporate the framing for the storage levels as part of the building system. The building will also have a crane and forklift for use in storing and delivering the vessels.

The building structural system for gravity loads includes long span girders at the roof over the crane bay combined with shorter spanned beams transverse to the girders and over the storage bays. Metal deck supporting the standing seam roofing will span between the beams. The steel girders and beams bear on structural steel framed columns supported by concrete driven pile foundations. A concrete slab on grade will be under the open bay for forklift use with tie beams connecting the pile caps under the storage areas where gravel only will be the material at grade. The storage bays will consist of steel beams with wood nailers and buckies to help protect the boats during placement and removal from the storage racks.

The lateral system for the building is proposed to utilize the metal deck roof diaphragm to span to vertical Special Concentric Braced Frames utilized in both the longitudinal and transverse directions. In order for the interior storage levels to transfer their lateral loads to the braced frames, horizontal bracing will be installed in several of the storage bays.

With regards to the sea wall at the building, the floor slab will be designed so that the forklift loads and surcharges will not impact the wall. However, the existing sea wall may need to be mitigated to accommodate the construction that will be required around it. The design of the sea wall mitigation is not clearly defined at this time and will be provided once further information regarding the design of the wall is developed.

A two story office and locker/lounge building will be seismically separated from the storage building that has dimensions of approximately 40' x 100' is also part of this configuration. The building gravity system at the roof is proposed to include metal roof deck spanning to metal stud roof trusses spanning from the exterior metal stud walls to interior steel beams and columns. The gravity system at the floor is proposed to consist of metal floor deck filled with Gypcrete or other cementitious fill spanning from the exterior metal stud walls to interior steel beams and columns. The foundations for the building are anticipated to be shallow concrete foundations with a concrete slab on grade. The lateral force resisting system consists of the metal deck diaphragms spanning to shear walls or flat strap bracing located on the exterior.

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Consulting Engineers

MECHANICAL NARRATIVE FOR STORAGE BUILDING
MARINE SERVICES BUILDING

HVAC

- A. Work shall include furnishing and installing heating ventilation and air conditioning for occupied spaces within the building including ventilation of storage rooms, toilet rooms, janitor closets and other service areas. All work shall be per latest adapted city standards and latest state energy codes including the Cal Green code as applicable.
- B. HVAC Systems: Building shall be served by Rooftop high efficiency gas/electric A/C units with. All units shall have:
 - a. dedicated economizers
 - b. Power exhaust relief fans
 - c. Factory roof curbs
 - d. Stand-alone Temperature controls

Areas that shall receive air conditioning are listed below:

- 1. All office areas including private offices, lounge area, and lobby areas.
- C. Ventilation Systems: All locker rooms, shower areas, toilet rooms and janitors room shall be ventilated with roof-mounted or ceiling exhaust fans
- D. Design Criteria:

- a. Project Location: Dana Point, California (C.E.C. Zone 6)
- b. Outdoor Design Conditions:
Per ASHRAE Climatic Data for Region X (ASHRAE 0.1%)

	<u>Summer</u>	<u>Winter</u>
Design Temperatures:	80°F DB/68°F WB	35°F DB
c. Interior Design Conditions:		
Indoor Temperatures:		
General	74°F DB	70°F DB
50% RH, no humidity control.		
Electrical Rooms:	85°F DB	65°F DB
d. Non-conditioned rooms: Janitor Closets, Storage Rooms less than 100 sq.ft.		
e. Ventilation Rates:		
1. Occupied Areas:	Per Latest CEC Title-24 Standards, CBC, CMC	
2. Toilets & Janitor Closets:	12 Air Changes per Hour	



Consulting Engineers

BASIS OF DESIGN

DIVISION 21

General:

The purpose of this narrative is to propose a Programmatic and Schematic Design approach assist the reviewer in analyzing the recommended combined standpipe design solutions for this facility, and to obtain approval and feedback from the client.

Part 1 – Scope of Work

1.01. Codes:

- A. NFPA 303 National Fire Protection Associations (NFPA 303 – 2006 Edition).
- B. NFPA 13 National Fire Protection Associations (NFPA 13 – 2010 Edition).
- C. NFPA 14 National Fire Protection Associations (NFPA 14 – 2010 Edition).
- D. CFC: California Fire Code (CFC - 2010 Edition).
- E. CBC: California Building Code (CBC - 2010 Edition).
- F. CEC: California Electrical Code (CEC - 2010 Edition).
- G. Local Fire Marshal
- H. Local Amendments to above Codes.

1.02. Work Included:

- A. Aboveground and underground standpipe system.
- B. Aboveground and underground automatic fire sprinkler system.

1.03. Calculations/Design Criteria:

- A. The following are the calculations to be used in designing the plumbing system.
 1. Standpipe sizing calculations.
 2. Automatic Fire sizing calculations.
- B. Design Criteria
 1. Combined Standpipe:
 - a. Provide complete, a combined Class I wet standpipe/wet pipe automatic sprinkler system to serve the entire building and extending service main to a point five (5) feet beyond the building line for a point of connection into the underground service main. Coordinate with civil drawings for exact point of connection. The combined standpipe riser(s) and Class I standpipe riser(s) shall be located as shown on the drawings, to provide for complete combined standpipe and automatic sprinkler system to serve the entire building.
 2. Automatic Fire Sprinkler:
 - b. The Contractor shall be responsible for the Automatic Fire Sprinkler inside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite Fire system. This specification is intended to establish the required performance and quality of the work necessary to provide for a complete automatic sprinkler system above and below ceiling to serve the building on site as indicated on the drawings.

Part 2 – Combined Standpipe and Automatic Sprinklers System:

2.01. Standpipe Pipe and Fittings:

1. Main Water Services Below Grade: Pipe shall be ductile iron, cement lined with mechanical joint fittings Class 250, flanged or mechanical joint, in accordance with ANSI-AWWA C111/A21.11, Class 52 or AWWA C153 ductile iron compact fittings of dimensions to match pipe outside diameter, with AWWA C104, cement lining and AWWA C111 neoprene gaskets. Provide concrete thrust blocks at all underground fittings per manufacturers recommendations.
2. Black steel schedule 40, ASTM-53 for all piping with threaded joints and fittings or two inch and larger, code approved schedule 10 black thinwall or Dyna-flow pipe ASTM 795 or 135. All vertical standpipes and risers shall have flexible couplings.
3. Butterfly valves, 2" and larger, 300 lb ductile iron body and disc with EPDM coating. UL and FMG approved with grooved ends.
4. Check valves, 4" and larger, Class 250 lb ductile iron galvanized body with spring loaded non-slam clapper. UL and FMG approved with grooved ends.
5. Inspectors test assembly, 1-1/4" assembly with a test valve and drain valve required in accordance with NFPA 13. UL and FMG approved with threaded connections.

2.02. Automatic Sprinkler Pipe and Fittings:

1. Black steel Schedule 40, ASTM A 135 or ASTM A 795 for all piping with threaded joints and fittings. U.L./F.M. approved threadable schedule 10 lightwall pipe, such as Allied "XL" or equivalent, will be accepted.
2. Black steel Schedule 40, ASTM A 135 or ASTM A 795 with grooved ends, may be used for pipe 1-1/4" diameter and larger, unless otherwise noted. U.L./F.M. approved extra lightwall pipe, such as American Tube Co. "Dyna-flow" or equivalent, will be accepted.
3. Threaded fittings shall be of cast iron or malleable iron, class 125, conforming to ANSI B16.3 and ANSI B16.4.
4. Flanged fittings shall be provided where required. Flanges shall be of cast iron, class 125, conforming to ANSI B16.1.
5. Welded fittings shall be of wrought steel, conforming to ANSI B16.9.
6. One-piece reducing fittings shall be used wherever a change is made in pipe size. Bushings shall not be used, except where fittings of the required size are not available.
7. Grooved thinwall steel pipe connections shall be made using a U.L./F.M.G. approved ductile iron coupling housings, with pressure-responsive synthetic rubber gasket, grade to suit the intended service. Installation shall be per manufacturer's instructions.
 - a. Rigid Type: coupling housings cast with offsetting, angle-patter bolt pads shall be used to provide system rigidity and support and hanging in accordance with NFPA 13. Tongue and recess rigid type couplings shall not be permitted.
 - b. Flexible Type: Use in locations where stress relief and vibration attenuation are required.
 - c. Coupling gaskets shall be listed for use with the housings as follows:
 - i. Wet systems: 40 degrees F to 230 degrees F; EPDM, type A.
8. Grooved Mechanical Fittings: ASTM A536, Grade 65-45-12 ductile iron (FireLock);

ASTM A234 Grade WPB forged steel; or ASTM A53, Type F or Types E or S, Grade B fabricated steel fittings with grooves or shoulders designed to accept grooved end couplings of the same manufacturer.

9. Fittings for hole-cut connections, such as Victaulic "Hooker" or equivalent, are not acceptable and shall not be used.
10. Plain end couplings such as "Roust-a-bout" or "Plain Lock" are not acceptable.

2.03. Sprinkler Heads:

1. Dry Stack Boat Storage Building Interior Finished Ceilings and Exterior Soffits:
 - a. Heads shall be Reliable Model GFR VELO-ECOH upright sprinkler heads see manufacturer's bulletin 165. Equivalent products of Grinnell, Star, Viking or Central are acceptable. Corrosion-resistant finish shall be installed at exterior areas; finish shall be polyester or Teflon coating.
 - b. Concealed Areas: Heads shall be Reliable, model F1FR quick response sprinkler upright/pendent with rough brass finish. Equivalent products of Grinnell, Star, Viking or Central are acceptable. Where required, escutcheons shall be Sweet and Donaldson #401 with chrome finish at storage, mechanical and electrical room ceilings.
 - c. All areas without Suspended Ceilings, Concealed Areas, Unfinished Ceilings and Storage Areas: Heads shall be Reliable, model F1FR quick response sprinkler upright/pendent with rough brass finish. Equivalent products of Grinnell, Star, Viking or Central are acceptable. Where required, escutcheons shall be Sweet and Donaldson #401 with chrome finish at storage, mechanical and electrical room ceilings.
 - d. Sidewall Sprinklers: Sidewall sprinklers Reliable Model F1FR quick response sprinkler, and may be installed for interior and exterior applications, subject to prior approval by Architect. Heads shall be Reliable Model F1FR quick response sprinkler horizontal, with bright chrome finish. Equivalent products of Grinnell, Star, Viking, or Central are acceptable.
 - e. Temperature Ratings: Heads below finished ceilings, and in all other occupied areas shall have a temperature rating of Ordinary (155-165 degrees). Heads in unventilated, concealed and void spaces shall have a temperature rating of Intermediate (200-212 degrees), unless otherwise required by code.
 - f. Provide metal cabinet for a reserve supply of sprinkler heads, as required by NFPA 13. Include suitable head wrenches for each type of sprinkler installed. Stock shall include all types and temperature ratings installed. Locate as directed by Architect.
2. Provide U.L. listed guards for sprinkler heads where located in areas where sprinklers are susceptible to mechanical damage. Guards should be listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer.
3. Escutcheons:
 1. Furnish and install steel chrome plated set screw type escutcheons on all exposed pipes passing through walls, floors, ceilings and partitions.
 2. Escutcheons should be listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer.

END OF DIVISION 21



Consulting Engineers

BASIS OF DESIGN

DIVISION 22

General:

The purpose of this narrative is to propose a Programmatic and Schematic Design approach assist the reviewer in analyzing the recommended plumbing design solutions for this facility, and to obtain approval and feedback from the client.

Part 1 – Scope of Work

1.01. Codes:

- A. California Energy Commission Title-24 Standards (2008 Edition).
- B. CBC: California Building Code (CBC - 2010 Edition).
- C. CEC: California Electrical Code (CEC - 2010 Edition).
- D. CFC: California Fire Code (CFC - 2010 Edition).
- E. CMC: California Mechanical Code (CMC - 2010 Edition).
- F. California Green Code (2010 Edition).
- G. Local Amendments to above Codes.

1.02. Work Included:

- A. Aboveground and underground sanitary waste and vent system.
- B. Potable domestic cold water (CW) system.
- C. Potable domestic hot water (HW) system.
- D. Storm drainage system.
- E. Natural gas system.
- F. Condensate drain and water piping system for mechanical equipment.
- G. Plumbing Fixtures

1.03. Calculations/Design Criteria:

- A. The following are the calculations to be used in designing the plumbing system.
 - 1. Potable water sizing calculations.
 - 2. Sanitary drainage calculations.
 - 3. Storm drainage calculations.
 - 4. Natural gas sizing calculations.
 - 5. Hot water heater sizing calculations.
 - 6. Potable water savings calculations.
- B. Design Criteria
 - 1. Plumbing:
 - a. Storm drain, sewer, water and vent plumbing system shall comply with the requirements of the California Plumbing Code and local jurisdiction.
 - b. Sewer piping shall be sloped at $\frac{1}{4}$ inch per foot unless noted otherwise.

- c. Domestic shall be sized with a maximum pressure drop of 3 PSI per 100 feet and a maximum velocity of 8 feet per second for cold water and 5 feet per second for hot water.
 - d. A pressure reducing station shall be provided on the incoming water supply where the service static pressure exceeds 80 PSI.
2. Natural Gas:
- a. Natural gas piping system shall be sized per Chapter 12 of California Plumbing Code.

Part 2 – Plumbing System:

2.01. Plumbing Fixtures:

A. Water Closets:

- 1. Water closets shall low-flow 1.28 gallons per flush, elongated bowl, vitreous china fixture. Water closet shall be 15" high to top of seat for standard height and 17"-19" high to top of seat for accessible fixtures.
- 2. Flush valves for water closets shall be 1.28 gallons per flush, manual flush valves.

B. Urinals:

- 1. Urinals shall be wall-mounted, vitreous china fixture. Urinals shall have a flow of 1/8 gallons per flush.
- 2. Flush valves for urinals shall be 1/8 gallons per flush, manual flush valves.

C. Lavatories:

- 1. Men's and Women's Restroom
 - a. Lavatories shall be a vitreous china fixture.
 - b. Faucets shall have faucet with hot and cold water supplies and a flow of 0.35 gallons per minute.

D. Hose Bibb

- 1. Each gang restrooms shall be provided with one wall-mounted, loose-key hose bibb with integral vacuum breaker.
- 2. Roofs shall be provided shall be provided with free standing, loose-key hose bibb with integral vacuum breaker.
- 3. Hose bibb shall be provided along the perimeter of the exterior walls every 30'-0" or as required. Hose bibb shall be wall-mounted, loose-key hose bibb with integral vacuum breaker.

E. Sinks:

- 1. Sinks for faculty use shall be 5-1/2" deep, single or double compartment, stainless steel sink. Complete with a gooseneck faucet with hot and cold water supplies and flow of 1.5 gallons per minute.
- 2. Lunch Room shall be provided with a double compartment, stainless steel sink. Complete with sink disposer, sprayer, and 1.5 gallons per minute faucet with hot and cold water supplies.

F. Floor Drains:

- 1. Gang restrooms and single restrooms shall be provided with a floor drain. Complete with a trap primer with shut-off valve and access panel.
- 2. Dry Stack Boat Storage Building shall be provided with a floor drain. Complete with a trap primer with shut-off valve and access panel.

3. Shower shall be provided with a floor drain.

G. Showers:

1. Non ADA Shower completed with pressure balancing mixing valve with lever handle, integral stops. Complete with adjustable spray nozzle type head.
2. ADA Shower completed with pressure balancing mixing valve with lever handle, integral stops. Complete with adjustable spray nozzle type head with hand held shower 60" hose inline vacuum breaker and 30" slide bar.

H. Service Sinks:

1. Custodial Rooms shall be provided with a corner floor mounted, enameled cast-iron service sink. Complete with wall-mounted faucet with integral vacuum breaker, male hose thread outlet, wall brace and pail hook.

I. Water Heater:

1. Electric water heaters shall be provided as required and shall be located in the custodial rooms if possible. Electric water heaters (20 gallons or 30 gallons) shall be located above the service sink. Complete with wall mounted framing, platform and seismic strapping.
2. Each water heaters shall be provided with an expansion tank with a wall-mounted expansion tank cage.
3. Circulation pump with 7-day time clock shall be provided as required.

J. Drinking Fountains:

1. Wall-mounted dual-height cast aluminum trough type drinking fountains shall be provided as required.

2.02. Sanitary Sewer and Vent System

- A. All waste and vent shall be no-hub cast iron service weight pipe and fittings; asphaltum coated and shall comply with C.I.S.P.I. Standard 301.
- B. Stainless steel four-band couplings shall be used for sewer piping and vent pipings below grade.
- C. Standard couplings should be used for vent ppings above grade.

2.03. Storm Drainage System

- A. Roof and overflow drains shall be provided at locations indicated on the architectural drawings.
- B. All storm drain shall be no-hub cast iron service weight pipe and fittings, asphaltum coated and shall comply with C.I.S.P.I. Standard 301.
- C. Stainless steel four-band couplings shall be used.
- D. Overflow drains termination at the exterior wall of the building above finish grade.

2.04. Domestic Water Piping:

- A. All water piping shall be Type K copper pipe below grade and Type L copper above grade.
- B. All hot water and hot water return piping shall be insulated.

2.05. Natural Gas System

- A. Concealed gas piping within the building shall be Schedule 40 black steel pipe.
- B. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe.
- C. Seismic gas shut-off valve shall be provided and located at the gas meter.

2.06. Condensate Drain Piping

- A. All piping shall be Type M copper.
- B. All condensate drain piping above the ceiling shall be insulated.

END OF DIVISION 22

DRAFT



May 14, 2012

Mr. Bill Koster, AIA
Principal
MVE Institutional, Inc.
1900 Main Street, Suite 800
Irvine, CA 92614

Re: **Dana Point Harbor Dry Stack Boat Storage Building**
Konsortum1 Project #1130903

Subject: Basis of Design

The following is the electrical portion of the Basis of Design:

1. Project Description

This Basis of Design Narrative is a description and design criteria for the following systems as they impact the Dana Point Harbor Dry Stack Boat Storage Building project: electrical power, lighting, telecommunication and fire alarm. All these systems shall be designed to provide the user with maximum flexibility and all equipments that form part of these systems shall be selected for durability and maintenance ease.

2. Codes and Standards

All electrical work shall comply with the latest editions of the following codes and standards:

- California Code of Regulations, Title 24
 - Part 3, the California Electrical Code
 - Part 6, the California Energy Code
 - Part 9, the California Fire Code
- National Fire Protection Association (NFPA)
- National Electric Code (NEC), and all local amendments thereto or otherwise
- National Electrical Manufacturer's Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- American National Standards Institute (ANSI)
- Underwriters Laboratories, Inc. (UL)
- All local agencies having jurisdiction

In case of conflicts among the referenced codes and standards, the more stringent provision shall govern.

3. Electrical Systems

Based on preliminary load calculations, the building shall be served from a 480Y/277V, 3 phase, 4 wire, main switchboard rated at 400 amperes. The main electrical switchgear shall be located on the site adjacent to the utility transformer housed in a weatherproof enclosure. A 4" concrete pad will be provided for the switchgear to mount on.



Electrical Basis of Design

Dana Point Harbor Dry Stack Boat Storage Building

May 14, 2012

Page 2

Design Voltages:

Normal:

- 480Y/277V, 3 phase, 4 wire
- 208Y/120V, 3 phase, 4 wire

Overall Connected Volt-Ampere per Square Foot:

Area	Connection	Volt-Ampere (psf)
Dry Stack Boat Storage Building	Lighting	0.5
	Receptacle	0.3
	Equipment	1.0

The distribution panelboards, lighting control panels and step-down transformers shall be located within the electrical rooms. Panelboards shall be surface mounted in the electrical rooms. All panelboards shall be 42 circuit, 3-phase with 25% space and a minimum of six spare circuit breakers.

Proposed Distribution Voltages:

- 480V, 3 phase, 3 wire for all motor loads 1/2 horsepower and larger.
- 277V for lighting
- 120V for receptacles
- 120/208V single and three phase for specific equipment

Power Wiring:

Power wiring to all receptacles shall be provided as part of the electrical construction. All wiring below 120V shall be considered as part of other trades such as mechanical systems. All low voltage devices, where required, shall be provided with raceway only. 20 ampere branch circuits shall be provided for convenience outlets.

Grounding:

A grounding system consisting of a UFER ground system along with bonds to metal cold water piping and other items as required by code shall be established in the building and the main switchboard shall be connected to this grounding system. A central grounding system shall be provided from the building service to electrical panels, metallic conduit and raceways. A separate ground conductor shall be provided for all circuits and feeders.

4. Lighting System

Light fixtures and systems shall be selected for efficiency, durability, and maintenance ease. Indoor lighting shall be tailored to building's needs and theme.



Electrical Basis of Design

Dana Point Harbor Dry Stack Boat Storage Building

May 14, 2012

Page 3

The illumination levels shall conform to the latest edition of Illuminating Engineering Society (IES) guidelines, and shall be as follows:

<u>Area</u>	<u>Average Foot Candles</u>
Storage Building	2FC
Electrical Rooms	20FC

The storage levels shall be illuminated with surface mounted fluorescent fixtures equipped with T5HO fluorescent lamps and low harmonic electronic ballasts. The electrical rooms and ancillary spaces shall be illuminated with surface mounted fluorescent fixtures equipped with T8 fluorescent lamps and low harmonic electronic ballasts.

Fluorescent, LED or metal halide fixtures shall be installed on the outside building perimeter as needed. The perimeter of the building shall be highlighted by wall mounted light fixtures. These fixtures shall also provide coverage for pedestrians in proximity of the buildings. All exterior fixtures shall be dark sky compliant.

Emergency lighting shall be provided utilizing unit battery packs to support emergency egress lighting and exit signs. All exit pathways, and other areas required by code shall be illuminated to the current CBC requirement of a minimum one-foot candle along the egress pathway upon loss of normal power.

Lighting Control System:

The lighting control system shall be comprised of central relay panels with occupancy sensors where required for Title 24 requirements. Bi-level switches shall be provided where required. Exterior lighting shall be controlled by the lighting control system incorporating a photocell and timeclock. All illumination levels shall be verified using a point-by-point photometric analysis. The minimum exterior illumination level shall be one foot-candle at grade level.

6. Fire Alarm System

An addressable fire alarm monitoring system conforming to current California Building, Fire and NFPA 72 Codes shall be installed in the structure. Initiating devices comprising of smoke detectors and water flow detectors shall be installed per current codes. The fire alarm system shall be the standard product of a single manufacturer.

Sincerely,
KONSORTUM 1

Jerry Leonhardt
Project Manager

DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS

APPENDIX B - CONSULTANT NARRATIVES BASIS OF DESIGN DRY BOAT STORAGE DECK

As part of the constructability analysis the following Consultant Narratives describe the systems used for the Dry Boat Storage Deck option. The narratives were provided by the Civil Engineer-Fusco Engineering, Structural Engineer-KPFF Consulting Engineers, Mechanical and Plumbing Engineers-BP & Associates and Electrical Engineer-Konsortium 1.

D R A F T

DANA POINT HARBOR REVITALIZATION PROJECT Dry Boat Storage Deck Option

May 3, 2012

- 1) **Demolition Exhibit**

The existing paving for the entire site is being removed, including removal of existing curbs, gutters, concrete flatwork, street lights, and landscaping. There is an existing cell phone tower and tsunami warning tower that needs to be relocated. The existing sewer lift station and the boat launching crane will remain. There are also various existing buildings/structures situated throughout the site that require removals.
- 2) **Grading & Paving Exhibit**

The proposed grading will follow existing drainage patterns and sheet flow towards the ocean. A series of curbs, concrete gutters, and catch basins will intercept the runoff. The ground floor of the storage deck will be established by matching existing grades as close as possible. This will result in a retaining condition along its north side. New asphalt paving will be constructed throughout the site with new curbs, gutters, and flatwork.
- 3) **Drainage and Water Quality Exhibit**

The existing site drains southerly in a sheet flow pattern towards the ocean. All of the existing site runoff is collected by an existing storm drain pipe. This existing storm drain pipe will be removed and realigned under the proposed storage deck. It will be realigned to miss the future building pile foundation system. A new series of concrete gutters and catch basins will collect the proposed runoff. A bioswale along the north side of the deck, porous pavement in the parking areas and a bioretention basin will be installed to mitigate water quality requirements.
- 4) **Sewer and Water Exhibit**

The existing sewer lift station remains in its current location. Due to the abandonment of Embarcadero Place, the existing force main will be relocated and reconstructed to the existing gravity sewer in Dana Point Harbor Drive. A new gravity sewer line will be constructed under paved areas to the sewer lift station. The future water main will be located in the future drive aisles and will connect to the existing water lines in Puerto Place and Dana Point Harbor Drive. A new recycled water line will be constructed parallel with the domestic water line to Puerto Place, and will connect to a new recycled water line in Dana Point Harbor Drive, to be constructed by the South Coast Water District.



MEMORANDUM

DATE: May 15, 2012

TO: Bill Koster / MVE Institutional

FROM: Bill Thorpe / KPFF

RE: Dana Point Harbor Renovation
Dry Boat Storage Deck Structural System Narrative
KPFF Project #211207, File #1.10

This memo is to provide a narrative for the structural systems considered for the above referenced project and to discuss the benefits and difficulties for each system. The deck is approximately 225' x 850' and is one story with two deck levels, the upper deck level is an elevated slab and the lower deck level is on grade.

Since the deck is near a marine environment, the use of concrete is preferred for long term durability and special considerations to assist in that durability will be employed. Some of those considerations will include additional reinforcing coverage, admixtures to the concrete mix design for enhanced strength and corrosive protection, supplemental post-tensioning for flexural strength and reduced deflections and potential coatings for the reinforcing steel. Considerations for constructability, shrinkage and thermal expansion were also considered and two internal joints of 6" will be required in order to break up the 850' dimension into three similarly sized structures.

The structural systems considered for the gravity framing systems of the deck included conventional reinforced concrete slabs with beams and post-tensioned slabs and beams. The conventional system is less complicated in construction; however the additional reinforcing requirements and structural depths would be prohibitive. The basic structural system consists of an 8" concrete post-tensioned slab spanning approximately 28'-4" to 18" x 36" post-tensioned beams bearing on 24" diameter columns located at the front and back of the parking stalls. Since the parking stalls are at 45 degree angles from the drive aisles, the column locations and beam spans are dictated by the parking layout. The foundation system will be concrete pre-stressed piles driven to the locations and depths required by the geotechnical requirements.

The lateral systems reviewed for use included moment frames, inverted moment frames or cantilevered columns and shear walls. The columns for the moment frames and cantilevered systems need to be dimensionally compatible with layout of the parking stalls and which was based on 24" maximum columns. These columns are also directionally oriented meaning that frame column dimensions and strength in the direction of the frame are larger than the other direction. For this project, there were not enough columns that would fit with the current parking configuration for either moment frame or cantilevered column lateral systems. The shear wall layout for the deck was considered on a system that was orthogonal to the deck rectangular plan, however the use of walls on the perimeter of the deck was discourage in design as well as the fact that additional spaces would be lost to wall locations. Finally, walls that were located between parking aisles in two directions were reviewed. Since this last approach has the least impact on function, the least constructability issues and, therefore, the least cost, we recommend shear walls for each of the three pieces of the structure.

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Consulting Engineers

MECHANICAL NARRATIVE FOR STORAGE DECK
MARINE SERVICES BUILDING

HVAC

- A. Work shall include furnishing and installing heating ventilation and air conditioning for occupied spaces within the building including ventilation of storage rooms, toilet rooms, janitor closets and other service areas. All work shall be per latest adapted city standards and latest state energy codes including the Cal Green code as applicable.
- B. HVAC Systems: Building shall be served by Rooftop high efficiency gas/electric A/C units with. All units shall have:
- a. dedicated economizers
 - b. Power exhaust relief fans
 - c. Factory roof curbs
 - d. Stand-alone Temperature controls

Areas that shall receive air conditioning are listed below:

- 1. All office areas including private offices, lounge area, and lobby areas.
- C. Ventilation Systems: All locker rooms, shower areas, toilet rooms and janitors room shall be ventilated with roof-mounted or ceiling exhaust fans
- D. Design Criteria:

- a. Project Location: Dana Point, California (C.E.C. Zone 6)
- b. Outdoor Design Conditions:
Per ASHRAE Climatic Data for Region X (ASHRAE 0.1%)

	<u>Summer</u>	<u>Winter</u>
Design Temperatures:	80°F DB/68°F WB	35°F DB
c. Interior Design Conditions:		
Indoor Temperatures:		
General	74°F DB	70°F DB
50% RH, no humidity control.		
Electrical Rooms:	85°F DB	65°F DB
d. Non-conditioned rooms: Janitor Closets, Storage Rooms less than 100 sq.ft.		
e. Ventilation Rates:		
1. Occupied Areas:	Per Latest CEC Title-24 Standards, CBC, CMC	
2. Toilets & Janitor Closets:	12 Air Changes per Hour	



Consulting Engineers

BASIS OF DESIGN

DIVISION 21

General:

The purpose of this narrative is to propose a Programmatic and Schematic Design approach assist the reviewer in analyzing the recommended combined standpipe design solutions for this facility, and to obtain approval and feedback from the client.

Part 1 – Scope of Work

1.01. Codes:

- A. NFPA 303 National Fire Protection Associations (NFPA 303 – 2006 Edition).
- B. NFPA 13 National Fire Protection Associations (NFPA 13 – 2010 Edition).
- C. NFPA 14 National Fire Protection Associations (NFPA 14 – 2010 Edition).
- D. CFC: California Fire Code (CFC - 2010 Edition).
- E. CBC: California Building Code (CBC - 2010 Edition).
- F. CEC: California Electrical Code (CEC - 2010 Edition).
- G. Local Fire Marshal
- H. Local Amendments to above Codes.

1.02. Work Included:

- A. Aboveground and underground standpipe system.
- B. Aboveground and underground automatic fire sprinkler system.

1.03. Calculations/Design Criteria:

- A. The following are the calculations to be used in designing the plumbing system.
 - 1. Standpipe sizing calculations.
 - 2. Automatic Fire sizing calculations.
- B. Design Criteria
 - 1. Combined Standpipe:
 - a. Provide complete, a combined Class I wet standpipe/wet pipe automatic sprinkler system to serve the entire deck and extending service main to a point five (5) feet beyond the deck line for a point of connection into the underground service main. Coordinate with civil drawings for exact point of connection. The combined standpipe riser(s) and Class I standpipe riser(s) shall be located as shown on the drawings, to provide for complete combined standpipe and automatic sprinkler system to serve the entire deck.
 - 2. Automatic Fire Sprinkler:
 - b. The Contractor shall be responsible for the Automatic Fire Sprinkler inside of the building within five feet (5') of the foundation, and within the building itself. See Civil Engineer's plans for onsite Fire system. This specification is intended to establish the required performance and quality of the work necessary to provide for a complete automatic sprinkler system above and below ceiling to serve the building on site as indicated on the drawings.

Part 2 – Combined Standpipe and Automatic Sprinklers System:

2.01. Standpipe Pipe and Fittings:

1. Main Water Services Below Grade: Pipe shall be ductile iron, cement lined with mechanical joint fittings Class 250, flanged or mechanical joint, in accordance with ANSI-AWWA C111/A21.11, Class 52 or AWWA C153 ductile iron compact fittings of dimensions to match pipe outside diameter, with AWWA C104, cement lining and AWWA C111 neoprene gaskets. Provide concrete thrust blocks at all underground fittings per manufacturers recommendations.
2. Black steel schedule 40, ASTM-53 for all piping with threaded joints and fittings or two inch and larger, code approved schedule 10 black thinwall or Dyna-flow pipe ASTM 795 or 135. All vertical standpipes and risers shall have flexible couplings.
3. Butterfly valves, 2" and larger, 300 lb ductile iron body and disc with EPDM coating. UL and FMG approved with grooved ends.
4. Check valves, 4" and larger, Class 250 lb ductile iron galvanized body with spring loaded non-slam clapper. UL and FMG approved with grooved ends.
5. Inspectors test assembly, 1-1/4" assembly with a test valve and drain valve required in accordance with NFPA 13. UL and FMG approved with threaded connections.

2.02. Automatic Sprinkler Pipe and Fittings:

1. Black steel Schedule 40, ASTM A 135 or ASTM A 795 for all piping with threaded joints and fittings. U.L./F.M. approved threadable schedule 10 lightwall pipe, such as Allied "XL" or equivalent, will be accepted.
2. Black steel Schedule 40, ASTM A 135 or ASTM A 795 with grooved ends, may be used for pipe 1-1/4" diameter and larger, unless otherwise noted. U.L./F.M. approved extra lightwall pipe, such as American Tube Co. "Dyna-flow" or equivalent, will be accepted.
3. Threaded fittings shall be of cast iron or malleable iron, class 125, conforming to ANSI B16.3 and ANSI B16.4.
4. Flanged fittings shall be provided where required. Flanges shall be of cast iron, class 125, conforming to ANSI B16.1.
5. Welded fittings shall be of wrought steel, conforming to ANSI B16.9.
6. One-piece reducing fittings shall be used wherever a change is made in pipe size. Bushings shall not be used, except where fittings of the required size are not available.
7. Grooved thinwall steel pipe connections shall be made using a U.L./F.M.G. approved ductile iron coupling housings, with pressure-responsive synthetic rubber gasket, grade to suit the intended service. Installation shall be per manufacturer's instructions.
 - a. Rigid Type: coupling housings cast with offsetting, angle-patter bolt pads shall be used to provide system rigidity and support and hanging in accordance with NFPA 13. Tongue and recess rigid type couplings shall not be permitted.
 - b. Flexible Type: Use in locations where stress relief and vibration attenuation are required.
 - c. Coupling gaskets shall be listed for use with the housings as follows:
 - i. Wet systems: 40 degrees F to 230 degrees F; EPDM, type A.
8. Grooved Mechanical Fittings: ASTM A536, Grade 65-45-12 ductile iron (FireLock);

ASTM A234 Grade WPB forged steel; or ASTM A53, Type F or Types E or S, Grade B fabricated steel fittings with grooves or shoulders designed to accept grooved end couplings of the same manufacturer.

9. Fittings for hole-cut connections, such as Victaulic "Hooker" or equivalent, are not acceptable and shall not be used.
10. Plain end couplings such as "Roust-a-bout" or "Plain Lock" are not acceptable.

2.03. Sprinkler Heads:

1. Dry Boat Storage Deck Interior Finished Ceilings and Exterior Soffits:
 - a. Heads shall be Reliable Model GFR VELO-ECOH upright sprinkler heads see manufacturer's bulletin 165. Equivalent products of Grinnell, Star, Viking or Central are acceptable. Corrosion-resistant finish shall be installed at exterior areas; finish shall be polyester or Teflon coating.
 - b. Concealed Areas: Heads shall be Reliable, model F1FR quick response sprinkler upright/pendent with rough brass finish. Equivalent products of Grinnell, Star, Viking or Central are acceptable. Where required, escutcheons shall be Sweet and Donaldson #401 with chrome finish at storage, mechanical and electrical room ceilings.
 - c. All areas without Suspended Ceilings, Concealed Areas, Unfinished Ceilings and Storage Areas: Heads shall be Reliable, model F1FR quick response sprinkler upright/pendent with rough brass finish. Equivalent products of Grinnell, Star, Viking or Central are acceptable. Where required, escutcheons shall be Sweet and Donaldson #401 with chrome finish at storage, mechanical and electrical room ceilings.
 - d. Sidewall Sprinklers: Sidewall sprinklers Reliable Model F1FR quick response sprinkler, and may be installed for interior and exterior applications, subject to prior approval by Architect. Heads shall be Reliable Model F1FR quick response sprinkler horizontal, with bright chrome finish. Equivalent products of Grinnell, Star, Viking, or Central are acceptable.
 - e. Temperature Ratings: Heads below finished ceilings, and in all other occupied areas shall have a temperature rating of Ordinary (155-165 degrees). Heads in unventilated, concealed and void spaces shall have a temperature rating of Intermediate (200-212 degrees), unless otherwise required by code.
 - f. Provide metal cabinet for a reserve supply of sprinkler heads, as required by NFPA 13. Include suitable head wrenches for each type of sprinkler installed. Stock shall include all types and temperature ratings installed. Locate as directed by Architect.
2. Provide U.L. listed guards for sprinkler heads where located in areas where sprinklers are susceptible to mechanical damage. Guards should be listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer.
3. Escutcheons:
 1. Furnish and install steel chrome plated set screw type escutcheons on all exposed pipes passing through walls, floors, ceilings and partitions.
 2. Escutcheons should be listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer.

END OF DIVISION 21



Consulting Engineers

BASIS OF DESIGN

DIVISION 22

General:

The purpose of this narrative is to propose a Programmatic and Schematic Design approach assist the reviewer in analyzing the recommended plumbing design solutions for this facility, and to obtain approval and feedback from the client.

Part 1 – Scope of Work

1.01. Codes:

- A. California Energy Commission Title-24 Standards (2008 Edition).
- B. CBC: California Building Code (CBC - 2010 Edition).
- C. CEC: California Electrical Code (CEC - 2010 Edition).
- D. CFC: California Fire Code (CFC - 2010 Edition).
- E. CMC: California Mechanical Code (CMC - 2010 Edition).
- F. California Green Code (2010 Edition).
- G. Local Amendments to above Codes.

1.02. Work Included:

- A. Aboveground and underground sanitary waste and vent system.
- B. Potable domestic cold water (CW) system.
- C. Storm drainage system.
- D. Natural gas system.
- E. Condensate drain and water piping system for mechanical equipment.
- F. Plumbing Fixtures

1.03. Calculations/Design Criteria:

- A. The following are the calculations to be used in designing the plumbing system.
 1. Potable water sizing calculations.
 2. Sanitary drainage calculations.
 3. Storm drainage calculations.
 4. Natural gas sizing calculations.
 5. Hot water heater sizing calculations.
 6. Potable water savings calculations.
- B. Design Criteria
 1. Plumbing:
 - a. Storm drain, sewer, water and vent plumbing system shall comply with the requirements of the California Plumbing Code and local jurisdiction.
 - b. Sewer piping shall be sloped at $\frac{1}{4}$ inch per foot unless noted otherwise.

- c. Domestic shall be sized with a maximum pressure drop of 3 PSI per 100 feet and a maximum velocity of 8 feet per second for cold water and 5 feet per second for hot water.
- d. A pressure reducing station shall be provided on the incoming water supply where the service static pressure exceeds 80 PSI.
- 2. Natural Gas:
 - a. Natural gas piping system shall be sized per Chapter 12 of California Plumbing Code.

Part 2 – Plumbing System:

2.01. Plumbing Fixtures:

A. Water Closets:

- 1. Water closets shall low-flow 1.28 gallons per flush, elongated bowl, vitreous china fixture. Water closet shall be 15" high to top of seat for standard height and 17"-19" high to top of seat for accessible fixtures.
- 2. Flush valves for water closets shall be 1.28 gallons per flush, manual flush valves.

B. Urinals:

- 1. Urinals shall be wall-mounted, vitreous china fixture. Urinals shall have a flow of 1/8 gallons per flush.
- 2. Flush valves for urinals shall be 1/8 gallons per flush, manual flush valves.

C. Lavatories:

- 1. Men's and Women's Restroom
 - a. Lavatories shall be a vitreous china fixture.
 - b. Faucets shall have faucet with hot and cold water supplies and a flow of 0.35 gallons per minute.

D. Hose Bibb

- 1. Each gang restrooms shall be provided with one wall-mounted, loose-key hose bibb with integral vacuum breaker.
- 2. Roofs shall be provided shall be provided with free standing, loose-key hose bibb with integral vacuum breaker.
- 3. Hose bibb shall be provided along the perimeter of the exterior walls every 30'-0" or as required. Hose bibb shall be wall-mounted, loose-key hose bibb with integral vacuum breaker.

E. Sinks:

- 1. Sinks for faculty use shall be 5-1/2" deep, single or double compartment, stainless steel sink. Complete with a gooseneck faucet with hot and cold water supplies and flow of 1.5 gallons per minute.
- 2. Lunch Room shall be provided with a double compartment, stainless steel sink. Complete with sink disposer, sprayer, and 1.5 gallons per minute faucet with hot and cold water supplies.

F. Floor Drains:

- 1. Gang restrooms and single restrooms shall be provided with a floor drain. Complete with a trap primer with shut-off valve and access panel.
- 2. Dry Boat Storage Deck shall be provided with a floor drain. Complete with a trap primer with shut-off valve and access panel.

3. Shower shall be provided with a floor drain.

G. Area Drains:

1. Dry Boat Storage Deck Area drains shall be provided at top level and lower level per architect drawing location. Area drains complete with cast iron body and with round polished nickel-bronze heavy duty grate.

H. Showers:

1. Non ADA Shower completed with pressure balancing mixing valve with lever handle, integral stops. Complete with adjustable spray nozzle type head.
2. ADA Shower completed with pressure balancing mixing valve with lever handle, integral stops. Complete with adjustable spray nozzle type head with hand held shower 60" hose inline vacuum breaker and 30" slide bar.

I. Service Sinks:

1. Custodial Rooms shall be provided with a corner floor mounted, enameled cast-iron service sink. Complete with wall-mounted faucet with integral vacuum breaker, male hose thread outlet, wall brace and pail hook.

J. Water Heater:

1. Electric water heaters shall be provided as required and shall be located in the custodial rooms if possible. Electric water heaters (20 gallons or 30 gallons) shall be located above the service sink. Complete with wall mounted framing, platform and seismic strapping.
2. Each water heaters shall be provided with an expansion tank with a wall-mounted expansion tank cage.
3. Circulation pump with 7-day time clock shall be provided as required.

K. Drinking Fountains:

1. Wall-mounted dual-height cast aluminum trough type drinking fountains shall be provided as required.

2.02. Sanitary Sewer and Vent System

- A. All waste and vent shall be no-hub cast iron service weight pipe and fittings; asphaltum coated and shall comply with C.I.S.P.I. Standard 301.
- B. Stainless steel four-band couplings shall be used for sewer piping and vent pipings below grade.
- C. Standard couplings should be used for vent ppings above grade.

2.03. Storm Drainage System

- A. Roof and overflow drains shall be provided at locations indicated on the architectural drawings.
- B. All storm drain shall be no-hub cast iron service weight pipe and fittings, asphaltum coated and shall comply with C.I.S.P.I. Standard 301.
- C. Stainless steel four-band couplings shall be used.
- D. Overflow drains termination at the exterior wall of the building above finish grade.

2.04. Domestic Water Piping:

- A. All water piping shall be Type K copper pipe below grade and Type L copper above grade.
- B. All hot water and hot water return piping shall be insulated.

2.05. Natural Gas System

- A. Concealed gas piping within the building shall be Schedule 40 black steel pipe.
- B. Exposed gas piping outside the building shall be Schedule 40 galvanized steel pipe.
- C. Seismic gas shut-off valve shall be provided and located at the gas meter.

2.06. Condensate Drain Piping

- A. All piping shall be Type M copper.
- B. All condensate drain piping above the ceiling shall be insulated.

END OF DIVISION 22

D R A F T



May 14, 2012

Mr. Bill Koster, AIA
Principal
MVE Institutional, Inc.
1900 Main Street, Suite 800
Irvine, CA 92614

Re: **Dana Point Harbor Dry Boat Storage Deck
Konsortum1 Project #1130903**

Subject: Basis of Design

The following is the electrical portion of the Basis of Design:

1. Project Description

This Basis of Design Narrative is a description and design criteria for the following systems as they impact the Dana Point Harbor Dry Boat Storage Deck project: electrical power, lighting, telecommunication and fire alarm. All these systems shall be designed to provide the user with maximum flexibility and all equipments that form part of these systems shall be selected for durability and maintenance ease.

2. Codes and Standards

All electrical work shall comply with the latest editions of the following codes and standards:

- California Code of Regulations, Title 24
 - Part 3, the California Electrical Code
 - Part 6, the California Energy Code
 - Part 9, the California Fire Code
- National Fire Protection Association (NFPA)
- National Electric Code (NEC), and all local amendments thereto or otherwise
- National Electrical Manufacturer's Association (NEMA)
- Institute of Electrical and Electronic Engineers (IEEE)
- American National Standards Institute (ANSI)
- Underwriters Laboratories, Inc. (UL)
- All local agencies having jurisdiction

In case of conflicts among the referenced codes and standards, the more stringent provision shall govern.

3. Electrical Systems

Based on preliminary load calculations, the building shall be served from a 208Y/120V, 3 phase, 4 wire, main switchboard rated at 800 amperes. The main electrical switchgear shall be located on the site adjacent to the utility transformer housed in a weatherproof enclosure. A 4" concrete pad will be provided for the switchgear to mount on. A distribution switchboard rated at 800A will be located within the structure and will be fed from the main switchboard.



Electrical Basis of Design

Dana Point Harbor Dry Boat Storage Deck

May 14, 2012

Page 2

Design Voltages:

Normal:

- 208Y/120V, 3 phase, 4 wire

Overall Connected Volt-Ampere per Square Foot:

Area	Connection	Volt-Ampere (psf)
First Floor Deck	Lighting	.04
	Receptacle	.01
Second Floor Deck	Lighting	.04
	Receptacle	1.2

The distribution panelboards and lighting control panels shall be located within the electrical rooms. Panelboards shall be surface mounted in the electrical rooms. All panelboards shall be 42 circuit, 3-phase with 25% space and a minimum of six spare circuit breakers.

Proposed Distribution Voltages:

- 120V for lighting
- 120V for receptacles
- 120/208V single and three phase for specific equipment

Power Wiring:

Power wiring to all receptacles shall be provided as part of the electrical construction. All wiring below 120V shall be considered as part of other trades such as mechanical systems. All low voltage devices, where required, shall be provided with raceway only. 20 ampere branch circuits shall be provided for convenience outlets.

Grounding:

A grounding system consisting of a UFER ground system along with bonds to metal cold water piping and other items as required by code shall be established in the building and the main switchboard shall be connected to this grounding system. A central grounding system shall be provided from the building service to electrical panels, metallic conduit and raceways. A separate ground conductor shall be provided for all circuits and feeders.

4. Lighting System

Light fixtures and systems shall be selected for efficiency, durability, and maintenance ease. Indoor lighting shall be tailored to building's needs and theme.

The illumination levels shall conform to the latest edition of Illuminating Engineering Society (IES) guidelines, and shall be as follows:



Electrical Basis of Design

Dana Point Harbor Dry Boat Storage Deck

May 14, 2012

Page 3

<u>Area</u>	<u>Average Foot Candles</u>
First Floor Deck	2FC
Second Floor Deck	1FC
Stairwells	2FC
Electrical Rooms	20FC

The lower deck and electrical rooms shall be illuminated with surface mounted fluorescent fixtures equipped with T8 fluorescent lamps and low harmonic electronic ballasts. The upper deck shall be illuminated with pole mounted LED fixtures.

Fluorescent, LED or metal halide fixtures shall be installed on the outside building perimeter as needed. The perimeter of the building shall be highlighted by wall mounted light fixtures. These fixtures shall also provide coverage for pedestrians in proximity of the buildings. All exterior fixtures shall be dark sky compliant.

Emergency lighting shall be provided utilizing unit battery packs to support emergency egress lighting and exit signs. All exit pathways, and other areas required by code shall be illuminated to the current CBC requirement of a minimum one-foot candle along the egress pathway upon loss of normal power.

Lighting Control System:

The lighting control system shall be comprised of central relay panels with occupancy sensors where required for Title 24 requirements. Bi-level switches shall be provided where required. Exterior lighting shall be controlled by the lighting control system incorporating a photocell and timeclock. All illumination levels shall be verified using a point-by-point photometric analysis. The minimum exterior illumination level shall be one foot-candle at grade level.

6. Fire Alarm System

An addressable fire alarm monitoring system conforming to current California Building, Fire and NFPA 72 Codes shall be installed in the structure. Initiating devices comprising of smoke detectors and water flow detectors shall be installed per current codes. The fire alarm system shall be the standard product of a single manufacturer.

Sincerely,
KONSORTUM 1

Jerry Leonhardt
Project Manager

**DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS
APPENDIX C - COMPARATIVE CONCEPTUAL COST ESTIMATE**

DRAFT

Draft For Review

CUMMING

Dana Point Harbor Revitalization Dana Point, California

Comparative Analysis of Dry Boat Storage Cost Study
June 29, 2012
Cumming Project No. 12-00244.00

D
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A
F
T

Prepared for MVE Institutional

Dana Point Harbor Revitalization

Dana Point, California

Comparative Analysis of Dry Boat Storage Statement of Probable Cost

June 29, 2012

INTRODUCTION

1. Basis Of Estimate

This statement is based on Comparative Analysis of Dry Boat Storage drawing package by MVE Institutional, received on April 17, 2012 along with verbal direction from the Architect.

- | | | |
|---|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A | Civil drawings: | Deck Option - Demolition, Drainage and Water Quality, Grading, Sewer and Water. ; Building Option - Demolition, Drainage and Water Quality, Grading, |
| B | Architectural drawings: | Deck Option - Site Plan, Floor Plans, Ceiling and Enlarged Plans, Elevations and Section. ; Building Option - Site Plan, Floor Plans, Roof Plan, Elevations. |
| C | Structural drawings: | Deck Option - Foundation and Slab Reinforcing Plan. ; Building Option - Foundation Plan / Elevation, Typical Floor Framing Plan / Frame Elevations and Roof Framing Plan. |
| D | Plumbing drawings: | Schedules, Floor Plans and Plumbing Level One & Two. |
| E | Electrical drawings: | Deck Option - Symbol List, Lighting Plan Level 1 & 2, Power Plan Level 1 & 2, Service Bldg Electrical Plan, Single Line Diagram, Fixture Schedule, Central Monitoring System Specs, Central Monitoring System Details, Central Monitoring |
| F | Project Manual dated: | Not Available. |

The information listed above is considered Comparative Analysis of Dry Boat Storage Level for estimating purpose.

2. Items Not Included Within Estimate

The following cost items are excluded from this estimate.

- A Professional fees, inspections and testing.
- B Escalation beyond MOC Jun 2015 - assumed start date Jan 2015 and project completion December 2015.
- C Plan check fees and building permit fees.
- D Costs of hazardous material surveys, abatements, and disposals unless noted in estimate.
- E Construction contingency costs.
- F Blasting or excavation of rock.
- G Fireproofing of structural steel boat storage building.
- H Upgrade / modification / replacement of existing sea wall.

3. Notes

We recommend that the client review this statement, and that any interpretations contrary to those intended by the design documents be fully addressed. The statement is based upon a detailed measurement of quantities when possible, and reasonable allowances for items not clearly defined in the documents.

The statement reflects probable construction costs obtainable in the currently competitive and stable bidding market. This estimate is based on a minimum of four(4) competitive bids from general contractors, bidding to a minimum of three (3) subcontractors per trade. This statement is a determination of current market value for the construction of the project, not a prediction of low bid. Experience indicates that a fewer number of bidders may result in a higher bid amount, and more bidders may result in a lower bid results.

INTRODUCTION

Historical cost data indicates that the number of comparative bids obtained can have the following effect compared to the 4 bid scenario:

1 bidder	add	+15% to +40%
2 to 3 bids	add	+8% to +12%
4 to 5 bids		-4% to +4%
6 to 8 bids	deduct	-5% to -7%
More than 9 bids	deduct	-8% to -25%

D R A F F E T

CONSTRUCTION COST SUMMARY

Element	Area	Cost / SF	Total
<i>Dry Stack Boat Storage Building Option:</i>			
A Sitework	529,964 SF	\$12.03	\$6,376,840
B Dry Stack Boat Storage Building	50,000 SF	\$434.71	\$21,735,169
C Marine Service Building	7,500 SF	\$295.27	\$2,214,513
TOTAL ESTIMATED CONSTRUCTION COST			\$30,326,521

<i>Dry Boat Storage Deck Option:</i>			
A Sitework	529,964 SF	\$13.26	\$7,027,389
B Dry Boat Storage Deck	383,403 SF	\$57.96	\$22,220,630
C Marine Service Building	7,500 SF	\$298.02	\$2,235,164
TOTAL ESTIMATED CONSTRUCTION COST			\$31,483,183

Dry Stack Boat Storage Building Option

DRAFT

Sitework - Dry Stack Boat Storage Building Construction Cost Summary

Element	Subtotal	Total
A Site Construction		\$4,423,463
Hazardous Materials Remediation		
Demolition	\$677,286	
Excavation, Fill and Grading	\$279,240	
Piles and Caissons		
Site Utilities	\$868,812	
Site Electrical	\$555,989	
Paving	\$1,782,343	
Hardscape		
Walls and Fences		
Site Amenities		
Miscellaneous Site Improvements	\$100,500	
Landscape and Irrigation	\$159,294	
B Off-Site Construction		\$208,212
Demolition	\$21,401	
Excavation, Fill and Grading	\$6,090	
Utilities	\$117,320	
Electrical		
Paving	\$63,402	
Hardscape		
Landscape and Irrigation		
Subtotal		<u>\$4,631,675</u>
General Conditions	8.0%	<u>\$370,534</u>
Subtotal		<u>\$5,002,209</u>
General Contractor OH & P	4.0%	<u>\$200,088</u>
Subtotal		<u>\$5,202,298</u>
Bonds & Insurance	2.0%	<u>\$104,046</u>
Subtotal		<u>\$5,306,344</u>
Design Contingency	10.0%	<u>\$530,634</u>
Subtotal		<u>\$5,836,978</u>
Escalation to MOC Jun 2015	9.2%	<u>\$539,861</u>
TOTAL ESTIMATED CONSTRUCTION COST		<u><u>\$6,376,840</u></u>

Sitework - Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
<u>A Site Construction</u>				
<i>Demolition</i>				
Demolition				
Demolish existing two storey buildings	2,500	sf	\$6.40	\$16,000
Demolish existing single storey buildings	6,400	sf	\$4.60	\$29,440
Remove existing CMU wall	760	lf	\$48.22	\$36,647
Remove existing cell tower foundations etc. (Tower to be removed by the utility company), allowance	1	ls	\$10,000.00	\$10,000
Saw-cut existing AC pavement	930	lf	\$4.22	\$3,925
Grind existing AC paving, 2"	200,000	sf	\$0.95	\$190,000
Remove existing AC paving	280,469	sf	\$0.70	\$196,329
Remove existing concrete paving, allowance	32,996	sf	\$1.05	\$34,646
Remove existing landscaping, allowance	16,498	sf	\$0.48	\$7,919
Remove existing stormdrain pipe line, manholes	760	lf	\$28.79	\$21,880
Remove existing underground utilities, allowance	1	ls	\$10,000.00	\$10,000
Remove existing electrical light poles etc	1	ls	\$10,000.00	\$10,000
Remove existing tsunami warning tower, hand over to the harbor authority, allowance	1	ls	\$7,500.00	\$7,500
Remove existing launch crane, allowance	1	ea	\$25,000.00	\$25,000
Miscellaneous demolition	1	ls	\$48,000.00	\$48,000
Protect existing surfaces, structures	1	ls	\$30,000.00	\$30,000
Total - Demolition				<u>\$677,286</u>
<i>Excavation, Fill and Grading</i>				
Excavation / Grading				
Site cut	15,000	cy	\$3.75	\$56,250
Site fill	10,000	cy	\$4.75	\$47,500
Haul-away excess	5,000	cy	\$10.22	\$51,100
Fine grading	329,964	sf	\$0.29	\$95,690
Erosion control				
Gravel bag barrier	2,100	lf	\$5.00	\$10,500
Stormdrain inlet protection, gravel bag barrier	4	ea	\$50.00	\$200
SWPPP, allowance	1	ls	\$18,000.00	\$18,000
Total - Excavation, Fill and Grading				<u>\$279,240</u>
<i>Site Utilities</i>				
Storm Drains				
Pipe, 18" dia, reinforced concrete pipe	480	lf	\$90.26	\$43,325
Pipe, 24" dia, reinforced concrete pipe	490	lf	\$94.22	\$46,168
Pipe, 36" dia, reinforced concrete pipe	40	lf	\$141.21	\$5,648
Storm drain junction structure, w/ manhole	3	ea	\$7,505.00	\$22,515

Dana Point Harbor Revitalization
Sitework - Dry Stack Boat Storage Building
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Sitework - Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Curb drain-inlet w/ grate, 3'-6" long	1	ea	\$2,498.00	\$2,498
Storm drain 18" out-let structure	1	ea	\$95,000.00	\$95,000
Subdrain system, allowance	1	ls	\$72,000.00	\$72,000
Sewer Drains				
Pipe, CI 12" dia	340	lf	\$119.21	\$40,531
Pipe, VCP 4" dia	80	lf	\$69.74	\$5,579
Pipe, VCP 6" dia	60	lf	\$74.22	\$4,453
Pipe, VCP 8" dia	1,420	lf	\$78.26	\$111,129
Pipe, VCP 15" dia	610	lf	\$98.11	\$59,847
Sewer manholes, 48" dia	12	ea	\$6,250.00	\$75,000
Domestic Water				
Pipe, 12" dia, PVC	1,290	lf	\$96.12	\$123,995
Pipe, 6" dia, PVC	130	lf	\$78.26	\$10,174
Pipe, 2" dia, PVC	165	lf	\$46.15	\$7,615
Gate valve, 12" dia	2	ea	\$1,468.20	\$2,936
Water meter (supplied / installed by utility company)				Excluded
Reclaimed Water				
Pipe, 8" dia, PVC, allowance	1,290	lf	\$78.20	\$100,878
Connection to existing	1	ea	\$5,000.00	\$5,000
Fire Water				
Pipe, 8" dia, PVC	140	lf	\$84.26	\$11,796
Post indicator valve	2	ea	\$2,953.47	\$5,907
Fire hydrant	2	ea	\$4,081.80	\$8,164
Double check backflow assembly, 8"	1	ea	\$8,653.03	\$8,653
Total - Site Utilities				<u>\$868,812</u>
Site Electrical				
Site Power and Lighting				
Site Service and Distribution, allowance	1	ls	\$375,000.00	\$375,000
Site Lighting, allowance	469,964	sf	\$0.30	\$140,989
Site Special Electrical, allowance	1	ls	\$40,000.00	\$40,000
Total - Site Electrical				<u>\$555,989</u>
Paving				
AC paving, 6" over 12" AB	64,150	sf	\$4.91	\$314,977
AC paving, 4" over 8" AB	57,050	sf	\$4.12	\$235,046
AC overlay, 2"	200,000	sf	\$2.10	\$420,000
Join existing AC pavement	930	lf	\$12.65	\$11,765

Sitework - Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Concrete curb & gutter	710	lf	\$21.16	\$15,024
Concrete curb, 6"	3,040	lf	\$15.93	\$48,427
Concrete 'v' gutter	1,880	lf	\$32.11	\$60,367
Concrete paving 4", natural grey, broom finish	1,500	sf	\$6.28	\$9,420
Porous concrete paving	111,400	sf	\$5.26	\$585,964
Striping	432,600	sf	\$0.15	\$64,890
Miscellaneous				
Concrete curb-cut ramps	2	ea	\$1,218.00	\$2,436
Concrete wheel stop	5	ea	\$54.90	\$275
Hatched striping	2,160	sf	\$5.45	\$11,772
ADA symbols	5	ea	\$62.27	\$311
Accessible parking sign / post	5	ea	\$228.00	\$1,140
Fire hydrant pad	2	ea	\$265.00	\$530

Total - Paving

\$1,782,343

Miscellaneous Site Improvements

Site Structure				
Automated pay station, allowance	1	ls	\$35,000.00	\$35,000
Transformer compound	1	ea	\$22,500.00	\$22,500
Miscellaneous				
Flag pole	1	ea	\$3,000.00	\$3,000
Miscellaneous signage, furnishing, allowance	1	ls	\$40,000.00	\$40,000

Total - Miscellaneous Site Improvements

\$100,500

Landscape and Irrigation

Shrubs, Groundcover, Vines				
Shrubs, ground cover	28,344	sf	\$4.22	\$119,612
Irrigation				
Irrigation, planting areas	28,344	sf	\$1.40	\$39,682

Total - Landscape and Irrigation

\$159,294

B Off-Site Construction

Demolition

Demolition				
Saw-cut existing AC pavement	380	lf	\$4.22	\$1,604
Remove existing curb & gutter	340	lf	\$6.22	\$2,115
Remove existing concrete driveway	1	ls	\$750.00	\$750
Remove existing AC pavement	4,080	sf	\$0.78	\$3,182

Dana Point Harbor Revitalization
Sitework - Dry Stack Boat Storage Building
Comparative Analysis of Dry Boat Storage Cost Study

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Sitework - Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Provide for diversions etc	1	ls	\$7,500.00	\$7,500
Miscellaneous demolition	1	ls	\$2,500.00	\$2,500
Protect existing surfaces	1	ls	\$3,750.00	\$3,750
Total - Demolition				<u>\$21,401</u>
Excavation, Fill and Grading				
Excavation / Grading				
Site cut, allowance	279	cy	\$3.75	\$1,048
Haul-away excess	279	cy	\$10.22	\$2,855
Fine grading	7,542	sf	\$0.29	\$2,187
Total - Excavation, Fill and Grading				<u>\$6,090</u>
Utilities				
Sewer Drains				
Pipe, CI 8" dia	40	lf	\$98.26	\$3,930
Saw-ct / remove / patch & repair existing AC roadway	40	lf	\$48.22	\$1,929
Temporary steel protection plates	1	ls	\$2,750.00	\$2,750
Connection to existing	1	ea	\$5,000.00	\$5,000
Domestic Water				
Pipe, CI 12" dia	300	lf	\$119.21	\$35,763
Gate valve, 12" dia	1	ea	\$1,468.20	\$1,468
Saw-ct / remove / patch & repair existing AC roadway	320	lf	\$48.22	\$15,430
Temporary steel protection plates	1	ls	\$11,000.00	\$11,000
Connection to existing watermain, Puerto Place	1	ea	\$3,750.00	\$3,750
Connection to existing watermain, Dana Point Harbor Dr.	1	ea	\$5,000.00	\$5,000
Recycled Water				
Pipe, 8" dia, PVC	320	lf	\$78.20	\$25,024
Gate valve, 8" dia	1	ea	\$1,275.00	\$1,275
Connection to existing	1	ea	\$5,000.00	\$5,000
Total - Utilities				<u>\$117,320</u>
Paving				
AC paving, 6" over 12" AB	7,542	sf	\$5.11	\$38,542
Join existing AC pavement	380	lf	\$12.65	\$4,807
Concrete curb & gutter	290	lf	\$27.16	\$7,876
Concrete walkway 4", natural grey, broom finish	1,220	sf	\$8.25	\$10,065
Striping	7,542	sf	\$0.28	\$2,112
Total - Paving				<u>\$63,402</u>

Dry Stack Boat Storage Building Construction Cost Summary

Element		Total	Cost / SF
1 General Conditions (Incl. Below)			
2 Sitework		\$39,586	\$0.79
3 Concrete		\$2,757,852	\$55.16
4 Masonry			
5 Metals		\$4,157,971	\$83.16
6 Wood & Plastics			
7 Thermal & Moisture		\$957,449	\$19.15
8 Doors & Windows		\$243,185	\$4.86
9 Finishes *		\$2,132,369	\$42.65
10 Specialties		\$185,644	\$3.71
11 Equipment			
12 Furnishings			
13 Special Construction **		\$4,301,950	\$86.04
14 Conveying			
15 Mechanical		\$310,124	\$6.20
16 Electrical		\$700,727	\$14.01
Subtotal		\$15,786,856	\$315.74
General Conditions	8.0%	\$1,262,948	\$25.26
Subtotal		\$17,049,804	\$341.00
General Contractor OH&P	4.0%	\$681,992	\$13.64
Subtotal		\$17,731,797	\$354.64
Bonds & Insurance	2.0%	\$354,636	\$7.09
Subtotal		\$18,086,433	\$361.73
Design Contingency	10.0%	\$1,808,643	\$36.17
Subtotal		\$19,895,076	\$397.91
Escalation to MOC Jun 2015	9.2%	\$1,840,093	\$36.80
TOTAL ESTIMATED CONSTRUCTION COST		<u>\$21,735,169</u>	\$434.71

Total Area: 50,000 SF

* - External Walls

** - Dry Stack Building accessories, racks, forklift's, automated crane system, staging docks,

**Dana Point Harbor Revitalization
 Dry Stack Boat Storage Building
 Comparative Analysis of Dry Boat Storage Cost Study**

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Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
2 Sitework				
Earthwork				
Overexcavate and recompact	4,331	cy	\$5.53	\$23,951
Import fill	217	cy	\$20.00	\$4,331
Fine grade	38,980	sf	\$0.29	<u>\$11,304</u>
Total - 2 Sitework				<u>\$39,586</u>
3 Concrete				
Concrete Piles				
Concrete driven piles, 12" sq, 50' deep	17,000	lf	\$32.94	\$559,989
Concrete driven piles, 12" sq, 50' deep, in water	3,550	lf	\$90.82	\$322,429
Continuous Pile Caps				
Concrete	505	cy	\$177.97	\$89,813
Formwork	4,615	sf	\$10.10	\$46,612
Reinforcing steel	135,000	lb	\$1.00	\$135,000
Excavation	505	cy	\$16.58	\$8,367
Spoils removal	505	cy	\$18.81	\$9,493
Continuous Pile Caps and walls, Water front				
Concrete	164	cy	\$226.00	\$36,972
Formwork	3,644	sf	\$22.50	\$81,990
Reinforcing steel	31,000	lb	\$1.75	\$54,250
Temporary sheet piles	2,860	sf	\$44.50	\$127,270
Dewatering during construction	1	ls	\$173,000.00	\$173,000
Protective membrane (fiber warp)	3,644	sf	\$27.40	\$99,846
Grade Beams				
Concrete	362	cy	\$177.97	\$64,481
Formwork	9,783	sf	\$6.12	\$59,869
Reinforcing steel	65,217	lb	\$0.90	\$58,695
Excavation	362	cy	\$16.58	\$6,007
Spoils removal	362	cy	\$18.81	\$6,815
Elevated Slab w/ Beams, Waterfront				
Concrete	216	cy	\$211.00	\$45,584
Formwork	4,299	sf	\$16.80	\$72,223
Reinforcing steel	38,887	lb	\$1.60	\$62,219
Cast-In-Place Concrete Slab-On-Grade				
Concrete slab, 10"	560	cy	\$170.84	\$95,752
Slab thickening	56	cy	\$170.84	\$9,575
Form edge	843	sf	\$6.16	\$5,193
Control joints	1,823	lf	\$3.55	\$6,473

**Dana Point Harbor Revitalization
 Dry Stack Boat Storage Building
 Comparative Analysis of Dry Boat Storage Cost Study**

6/29/2012

Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Reinforcing steel	58,344	lb	\$0.90	\$52,510
Finish	18,233	sf	\$0.75	\$13,674
Aggregate base, sand bed, fine grade	18,233	sf	\$2.80	\$51,051
Compacted aggregate base	23,044	sf	\$3.26	\$75,123
Concrete Stem Walls				
Concrete	49	cy	\$176.80	\$8,690
Formwork	3,185	sf	\$11.98	\$38,156
Reinforcing steel	15,974	lb	\$1.55	\$24,760
Finish	1,592	sf	\$0.86	\$1,370
Galvanized Reinforcing Steel				
Additional cost for galvanized reinforcing steel	424,338	lb	\$0.60	\$254,603
Total - 3 Concrete				<u>\$2,757,852</u>
5 Metals				
Structural Steel (Galvanized)				
Steel columns	94.0	tn	\$3,800.25	\$357,155
Steel brace framing	51.6	tn	\$4,030.11	\$207,890
Floor Deck				
Steel framing	484.8	tn	\$3,930.11	\$1,905,191
Roof Deck				
Steel framing	239.4	tn	\$3,930.11	\$941,023
Metal deck, 1 1/2" 18 ga	69,310	sf	\$5.18	\$359,027
Miscellaneous plates, connections	87.0	tn	\$4,083.65	\$355,185
Miscellaneous				
Miscellaneous blocking, backing, anchors etc	50,000	sf	\$0.65	\$32,500
Total - 5 Metals				<u>\$4,157,971</u>
7 Thermal & Moisture Protection				
Roofing				
Standing seam metal roofing	69,310	sf	\$10.11	\$700,727
Ridge vent	461	lf	\$184.00	\$84,885
Insulation				
Batt insulation, roof	69,310	sf	\$1.22	\$84,558
Sheet Metalwork				
Metal fascia	2,627	lf	\$18.22	\$47,858
Metal gutters	723	lf	\$15.14	\$10,941
Metal downspouts	665	lf	\$15.76	\$10,480

Dana Point Harbor Revitalization
 Dry Stack Boat Storage Building
 Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Miscellaneous				
Caulking & sealants	50,000	sf	\$0.36	<u>\$18,000</u>
Total - 7 Thermal & Moisture Protection				<u>\$957,449</u>
8 Doors & Windows				
Exterior Doors				
Miscellaneous Doors				
Metal roll-up door, 50'-0" x 15'-0" high	1	ea	\$39,750.00	\$39,750
Steel sliding door, 50'-0" x 40'-0" high	1	ea	\$45,250.00	\$45,250
Exterior Glazing				
Aluminum clearstory windows	1,721	sf	\$55.22	\$95,034
Stainless steel mesh screen, 18" high	1,480	sf	\$42.67	<u>\$63,151</u>
Total - 8 Doors & Windows				<u>\$243,185</u>
9 Finishes				
Exterior Walls				
Metal stud framing, 6" walls	51,941	sf	\$10.05	\$522,007
Exterior sheathing	50,461	sf	\$3.68	\$185,697
Metal wall panels	50,461	sf	\$24.22	\$1,222,167
Paint exposed structure	50,000	sf	\$4.05	<u>\$202,498</u>
Total - 9 Finishes				<u>\$2,132,369</u>
10 Specialties				
Miscellaneous				
Trench drain w/ heavy duty grating	678	lf	\$248.00	\$168,144
Miscellaneous building specialties, signage	50,000	sf	\$0.35	<u>\$17,500</u>
Total - 10 Specialties				<u>\$185,644</u>
13 Special Construction				
Boat House Accessories				
Bunk boards, clamps (quote provided by Dream Harbours Consultants LLC)	1	ls	\$540,625.00	\$540,625
Work racks, maintenance area (quote provided by Dream Harbours Consultants LLC)	1	ls	\$22,470.00	\$22,470

Dana Point Harbor Revitalization
Dry Stack Boat Storage Building
Comparative Analysis of Dry Boat Storage Cost Study

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Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Boat House Equipment				
Fork lift (quote provided by Dream Harbours Consultants LLC)	1	ls	\$322,000.00	\$322,000
Fork lift stop (quote provided by Dream Harbours Consultants LLC)	1	ls	\$16,355.00	\$16,355
Automated boat handling crane system with 3 elevators (quote provided by Dream Harbours Consultants LLC)	1	ls	\$2,812,500.00	\$2,812,500
Boat Launch and Staging Decks				
Launch docks (quote provided by Dream Harbours Consultants LLC)	1	ls	\$288,000.00	\$288,000
Staging docks (quote provided by Dream Harbours Consultants LLC)	1	ls	\$300,000.00	\$300,000
Total - 13 Special Construction				<u>\$4,301,950</u>
15 Mechanical				
Plumbing				
Fixtures				
Floor drain	8	ea	\$480.00	\$3,840
Hose bibb	12	ea	\$258.00	\$3,096
Rough-ins				
Local rough-in at fixture	12	ea	\$667.00	\$8,004
Rough-in at floor sink or floor drain	8	ea	\$837.00	\$6,696
Waste / Vent				
2" pipe, ci, below grade	120	lf	\$45.00	\$5,400
3" pipe, ci, below grade	120	lf	\$54.00	\$6,480
4" pipe, ci, below grade	360	lf	\$68.00	\$24,480
3-4" vent through roof	6	ea	\$560.00	\$3,360
Domestic Water				
1-1/4 to 2" Distribution piping	1,020	lf	\$36.60	\$37,332
Trap primer w/piping to drain	2	ea	\$626.00	\$1,252
Fire Fighting System				
Wet pipe automatic sprinkler system	50,000	sf	\$4.20	<u>\$210,184</u>
Total - 15 Mechanical				<u>\$310,124</u>
16 Electrical				
Power and Lighting				
Service and Distribution				
Mainservice "MSA Boat" 400a 277/480v 3ph 4w 3R	1	ea	\$8,500.00	\$8,500
Crane connection 100a 277/480v 3ph 4w	1	ea	\$2,360.00	\$2,360
Panel 100a 277/480v 3ph 4w	1	ea	\$2,560.00	\$2,560
Transformer 45kva 480-120/208v 3ph 4w	1	ea	\$2,850.00	\$2,850

**Dana Point Harbor Revitalization
 Dry Stack Boat Storage Building
 Comparative Analysis of Dry Boat Storage Cost Study**

6/29/2012

Dry Stack Boat Storage Building Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Transformer 30kva 480-120/208v 3ph 4w	1	ea	\$2,250.00	\$2,250
Panel 100a 120/208v 3ph 4w	3	ea	\$2,450.00	\$7,350
Grounding electrode, 3/0	4	ea	\$1,200.00	\$4,800
Conduit 1", emt	80	lf	\$6.52	\$522
Conduit 2", emt	300	lf	\$12.78	\$3,834
Conduit 2-1/2", emt	300	lf	\$17.64	\$5,292
Conduit (2) 4", pvc w spare	400	lf	\$33.28	\$13,312
Conduit (2) 4", grc	20	lf	\$146.40	\$2,928
Copper wire #6, thhn	6.3	clf	\$145.22	\$915
Copper wire #4, thhn	6.3	clf	\$163.01	\$1,027
Copper wire #2/0, thhn	8.4	clf	\$365.28	\$3,068
Copper wire #4/0, thhn	25.2	clf	\$520.75	\$13,123
Copper wire #500mcm, thhn	16.8	clf	\$1,511.57	\$25,394
Convenience Power	50,000	sf	\$1.50	\$74,999
Lighting				
Lighting control panel LCPA,B,C	3	ea	\$5,600.00	\$16,800
Fixture 5, 2x4 high bay 6 lamp surface enclosed wp fluorescent	84	ea	\$688.00	\$57,792
Fixture 3, surface mount self luminous Exit sign	12	ea	\$301.00	\$3,612
Emergency ballast (allowance)	25	ea	\$135.00	\$3,375
Switch, low voltage override	6	ea	\$422.00	\$2,532
Conduit 3/4", emt	9,000	lf	\$4.62	\$41,580
Conduit 1", emt	2,450	lf	\$6.52	\$15,974
Copper wire #12, thhn	25.0	clf	\$59.56	\$1,489
Copper wire #10, thhn	360.0	clf	\$66.75	\$24,030
Copper wire #8, thhn	540.0	clf	\$87.50	\$47,250
LV cable	6,500	lf	\$1.40	\$9,100
Special Electrical				
Fire Alarm System	50,000	sf	\$1.74	\$86,805
Telephone / Data System	50,000	sf	\$0.75	\$37,500
PA System	50,000	sf	\$0.45	\$22,500
Security System rough conduit only	50,000	sf	\$1.10	\$54,999
Miscellaneous				
Fire seal penetrations,	50,000	sf	\$0.03	\$1,500
Temp Power and Lighting	1	ls	\$9,500.00	\$9,500
Seismic support and assemblies	50,000	sf	\$0.05	\$2,500

Total - 16 Electrical

\$700,727

Marine Service Building Construction Cost Summary

Element		Total	Cost / SF
1 General Conditions (Incl. Below)			
2 Sitework		\$16,875	\$2.25
3 Concrete		\$136,500	\$18.20
4 Masonry			
5 Metals		\$153,000	\$20.40
6 Wood & Plastics			
7 Thermal & Moisture		\$106,500	\$14.20
8 Doors & Windows		\$93,750	\$12.50
9 Finishes		\$286,500	\$38.20
10 Specialties		\$93,750	\$12.50
11 Equipment			
12 Furnishings		\$16,500	\$2.20
13 Special Construction			
14 Conveying		\$91,050	\$12.14
15 Mechanical		\$316,650	\$42.22
16 Electrical		\$297,387	\$39.65
Subtotal		\$1,608,462	\$214.46
General Conditions	8.0%	\$128,677	\$17.16
Subtotal		\$1,737,139	\$231.62
General Contractor OH&P	4.0%	\$69,486	\$9.26
Subtotal		\$1,806,625	\$240.88
Bonds & Insurance	2.0%	\$36,132	\$4.82
Subtotal		\$1,842,757	\$245.70
Design Contingency	10.0%	\$184,276	\$24.57
Subtotal		\$2,027,033	\$270.27
Escalation to MOC Jun 2015	9.2%	\$187,480	\$25.00
TOTAL ESTIMATED CONSTRUCTION COST		<u>\$2,214,513</u>	\$295.27

Total Area: 7,500 SF

Dry Boat Storage Deck Option

DRAFT

Sitework - Dry Boat Storage Deck Construction Cost Summary

Element	Subtotal	Total
A Site Construction		\$4,751,676
Hazardous Materials Remediation		
Demolition	\$577,116	
Excavation, Fill and Grading	\$483,180	
Piles and Caissons		
Site Utilities	\$1,160,148	
Site Electrical	\$386,479	
Paving	\$1,577,441	
Hardscape		
Walls and Fences	\$133,000	
Site Amenities		
Miscellaneous Site Improvements	\$100,500	
Landscape and Irrigation	\$333,813	
B Off-Site Construction		\$352,512
Demolition	\$25,181	
Excavation, Fill and Grading	\$9,965	
Utilities	\$224,995	
Electrical		
Paving	\$92,372	
Hardscape		
Landscape and Irrigation		
Subtotal		<u>\$5,104,188</u>
General Conditions	8.0%	<u>\$408,335</u>
Subtotal		<u>\$5,512,523</u>
General Contractor OH & P	4.0%	<u>\$220,501</u>
Subtotal		<u>\$5,733,024</u>
Bonds & Insurance	2.0%	<u>\$114,660</u>
Subtotal		<u>\$5,847,685</u>
Design Contingency	10.0%	<u>\$584,768</u>
Subtotal		<u>\$6,432,453</u>
Escalation to MOC Jun 2015	9.2%	<u>\$594,936</u>
TOTAL ESTIMATED CONSTRUCTION COST		<u><u>\$7,027,389</u></u>

Dana Point Harbor Revitalization
Sitework - Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Sitework - Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
<u>A Site Construction</u>				
<i>Demolition</i>				
Demolition				
Demolish existing two storey buildings	2,500	sf	\$6.40	\$16,000
Demolish existing single storey buildings	6,400	sf	\$4.60	\$29,440
Remove existing CMU wall	760	lf	\$48.22	\$36,647
Remove existing cell tower foundations etc. (Tower to be removed by the utility company), allowance	1	ls	\$10,000.00	\$10,000
Saw-cut existing AC pavement	930	lf	\$4.22	\$3,925
Remove existing AC paving	423,369	sf	\$0.70	\$296,359
Remove existing concrete paving, allowance	52,996	sf	\$1.05	\$55,646
Remove existing landscaping, allowance	26,498	sf	\$0.48	\$12,719
Remove existing stormdrain pipe line, manholes	760	lf	\$28.79	\$21,880
Remove existing underground utilities, allowance	1	ls	\$10,000.00	\$10,000
Remove existing electrical light poles etc	1	ls	\$10,000.00	\$10,000
Remove existing tsunami warning tower, hand over to the harbor authority, allowance	1	ls	\$7,500.00	\$7,500
Miscellaneous demolition	1	ls	\$41,000.00	\$41,000
Protect existing surfaces, structures	1	ls	\$26,000.00	\$26,000
Total - Demolition				<u>\$577,116</u>
<i>Excavation, Fill and Grading</i>				
Excavation / Grading				
Site cut	34,000	cy	\$3.75	\$127,500
Site fill	32,000	cy	\$4.75	\$152,000
Haul-away excess	2,000	cy	\$10.22	\$20,440
Fine grading	529,964	sf	\$0.29	\$153,690
Erosion control				
Gravel bag barrier	2,100	lf	\$5.00	\$10,500
Stormdrain inlet protection, gravel bag barrier	21	ea	\$50.00	\$1,050
SWPPP, allowance	1	ls	\$18,000.00	\$18,000
Total - Excavation, Fill and Grading				<u>\$483,180</u>
<i>Site Utilities</i>				
Storm Drains				
Pipe, 12" dia, reinforced concrete pipe	636	lf	\$84.55	\$53,774
Pipe, 18" dia, reinforced concrete pipe	1,530	lf	\$90.26	\$138,098
Pipe, 24" dia, reinforced concrete pipe	165	lf	\$94.22	\$15,546
Pipe, 36" dia, reinforced concrete pipe	40	lf	\$141.21	\$5,648
Pipe, 18" dia, reinforced concrete pipe, encased in 36" RCP sleeve	250	lf	\$185.26	\$46,315
Storm drain junction structure, w/ manhole	6	ea	\$7,505.00	\$45,030

Dana Point Harbor Revitalization
Sitework - Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Sitework - Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Storm drain junction structure, w/o manhole	3	ea	\$6,628.00	\$19,884
Modify existing storm drain junction structure	1	ea	\$3,711.00	\$3,711
Low-flow interceptor	1	ea	\$2,126.00	\$2,126
Curb drain-inlet w/ grate, 3'-6" long	9	ea	\$2,498.00	\$22,482
Bio retention basin	13,500	sf	\$6.77	\$91,395
Storm drain 36" out-let structure	1	ea	\$95,000.00	\$95,000
Connection to existing	1	ea	\$2,798.00	\$2,798
Subdrain system, allowance	1	ls	\$82,000.00	\$82,000
Sewer Drains				
Pipe, CI 12" dia	735	lf	\$119.21	\$87,619
Pipe, VCP 4" dia	100	lf	\$69.74	\$6,974
Pipe, VCP 6" dia	60	lf	\$74.22	\$4,453
Pipe, VCP 8" dia	480	lf	\$78.26	\$37,565
Pipe, VCP 15" dia	610	lf	\$98.11	\$59,847
Sewer manholes, 48" dia	7	ea	\$6,250.00	\$43,750
Domestic Water				
Pipe, 12" dia, PVC	1,200	lf	\$96.12	\$115,344
Pipe, 6" dia, PVC	130	lf	\$78.26	\$10,174
Pipe, 2" dia, PVC	285	lf	\$46.15	\$13,153
Gate valve, 12" dia	2	ea	\$1,468.20	\$2,936
Water meter (supplied / installed by utility company)				Excluded
Recycled Water				
Pipe, 8" dia, PVC	1,200	lf	\$78.20	\$93,840
Connection to existing	1	ea	\$5,000.00	\$5,000
Fire Water				
Pipe, 8" dia, PVC	205	lf	\$84.26	\$17,273
Post indicator valve	3	ea	\$2,953.47	\$8,860
Fire hydrant	3	ea	\$4,081.80	\$12,245
Double check backflow assembly, 8"	2	ea	\$8,653.03	\$17,306
Total - Site Utilities				<u>\$1,160,148</u>
Site Electrical				
Site Power and Lighting				
Site Service and Distribution, allowance	1	ls	\$245,000.00	\$245,000
Site Lighting, allowance	338,262	sf	\$0.30	\$101,479
Site Special Electrical, allowance	1	ls	\$40,000.00	\$40,000
Total - Site Electrical				<u>\$386,479</u>

Dana Point Harbor Revitalization
Sitework - Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Sitework - Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Paving				
AC paving, 6" over 12" AB	62,100	sf	\$4.91	\$304,911
AC paving, 4" over 8" AB	57,150	sf	\$4.12	\$235,458
Join existing AC pavement	930	lf	\$12.65	\$11,765
Concrete curb & gutter	1,285	lf	\$21.16	\$27,191
Concrete curb, 6"	1,920	lf	\$15.93	\$30,586
Concrete 'v' gutter	645	lf	\$32.11	\$20,711
Concrete paving 4", natural grey, broom finish	12,500	sf	\$6.28	\$78,500
Porous concrete paving	125,935	sf	\$5.26	\$662,418
Concrete ramp	5,100	sf	\$28.11	\$143,361
Striping	245,185	sf	\$0.15	\$36,778
Miscellaneous				
Concrete curb-cut ramps	8	ea	\$1,218.00	\$9,744
Concrete wheel stop	10	ea	\$54.90	\$549
Hatched striping	2,160	sf	\$5.45	\$11,772
ADA symbols	10	ea	\$62.27	\$623
Accessible parking sign / post	10	ea	\$228.00	\$2,280
Fire hydrant pad	3	ea	\$265.00	\$795
Total - Paving				<u>\$1,577,441</u>
Walls and Fences				
Walls				
Concrete retaining walls, ramp	350	lf	\$380.00	\$133,000
Total - Walls and Fences				<u>\$133,000</u>
Miscellaneous Site Improvements				
Site Structure				
Automated pay station, allowance	1	ls	\$35,000.00	\$35,000
Transformer compound	1	ea	\$22,500.00	\$22,500
Miscellaneous				
Flag pole	1	ea	\$3,000.00	\$3,000
Miscellaneous signage, furnishing, allowance	1	ls	\$40,000.00	\$40,000
Total - Miscellaneous Site Improvements				<u>\$100,500</u>

Dana Point Harbor Revitalization
Sitework - Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Sitework - Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
<i>Landscape and Irrigation</i>				
Shrubs, Groundcover, Vines				
Shrubs, ground cover	59,397	sf	\$4.22	\$250,657
Irrigation				
Irrigation, planting areas	59,397	sf	\$1.40	\$83,156
Total - Landscape and Irrigation				<u>\$333,813</u>
<u>B Off-Site Construction</u>				
<i>Demolition</i>				
Demolition				
Saw-cut existing AC pavement	685	lf	\$4.22	\$2,891
Remove existing curb & gutter	500	lf	\$6.22	\$3,110
Remove existing concrete driveway	1	ls	\$750.00	\$750
Remove existing AC pavement	6,000	sf	\$0.78	\$4,680
Provide for diversions etc	1	ls	\$7,500.00	\$7,500
Miscellaneous demolition	1	ls	\$2,500.00	\$2,500
Protect existing surfaces	1	ls	\$3,750.00	\$3,750
Total - Demolition				<u>\$25,181</u>
<i>Excavation, Fill and Grading</i>				
Excavation / Grading				
Site cut, allowance	457	cy	\$3.75	\$1,714
Haul-away excess	457	cy	\$10.22	\$4,672
Fine grading	12,342	sf	\$0.29	\$3,579
Total - Excavation, Fill and Grading				<u>\$9,965</u>
<i>Utilities</i>				
Sewer Drains				
Pipe, CI 8" dia	390	lf	\$98.26	\$38,321
Sewer manholes, 48" dia	1	ea	\$6,250.00	\$6,250
Saw-ct / remove / patch & repair existing AC roadway	370	lf	\$48.22	\$17,841
Temporary steel protection plates	1	ls	\$9,000.00	\$9,000
Connection to existing	1	ea	\$3,750.00	\$3,750
Domestic Water				
Pipe, CI 12" dia	470	lf	\$119.21	\$56,029
Gate valve, 12" dia	1	ea	\$1,468.20	\$1,468
Saw-ct / remove / patch & repair existing AC roadway	450	lf	\$48.22	\$21,699

Dana Point Harbor Revitalization
Sitework - Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Sitework - Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Temporary steel protection plates	1	ls	\$11,000.00	\$11,000
Connection to existing watermain, Puerto Place	1	ea	\$3,750.00	\$3,750
Connection to existing watermain, Dana Point Harbor Dr.	1	ea	\$5,000.00	\$5,000
Recycled Water				
Pipe, 8" dia, PVC	440	lf	\$78.20	\$34,408
Gate valve, 8" dia	1	ea	\$1,275.00	\$1,275
Connection to existing	1	ea	\$5,000.00	\$5,000
Fire Water				
Gate valve, 6" dia	1	ea	\$1,021.00	\$1,021
Fire hydrant	1	ea	\$4,181.80	\$4,182
Connection to existing, allowance	1	ls	\$5,000.00	\$5,000
Total - Utilities				<u>\$224,995</u>
Paving				
AC paving, 6" over 12" AB	12,342	sf	\$5.11	\$63,070
Join existing AC pavement	685	lf	\$12.65	\$8,665
Concrete curb & gutter	505	lf	\$27.16	\$13,716
Concrete walkway 4", natural grey, broom finish	420	sf	\$8.25	\$3,465
Striping	12,342	sf	\$0.28	\$3,456
Total - Paving				<u>\$92,372</u>

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Dry Boat Storage Deck Construction Cost Summary

Element	Total	Cost / SF
1 General Conditions (Incl. Below)		
2 Sitework	\$204,418	\$0.53
3 Concrete	\$12,737,684	\$33.22
4 Masonry	\$236,602	\$0.62
5 Metals	\$142,681	\$0.37
6 Wood & Plastics		
7 Thermal & Moisture	\$388,020	\$1.01
8 Doors & Windows	\$4,000	\$0.01
9 Finishes *	\$481,184	\$1.26
10 Specialties	\$256,549	\$0.67
11 Equipment		
12 Furnishings		
13 Special Construction		
14 Conveying	\$119,000	\$0.31
15 Mechanical	\$581,343	\$1.52
16 Electrical	\$987,981	\$2.58
Subtotal	\$16,139,462	\$42.10
General Conditions 8.0%	\$1,291,157	\$3.37
Subtotal	\$17,430,619	\$45.46
General Contractor OH&P 4.0%	\$697,225	\$1.82
Subtotal	\$18,127,843	\$47.28
Bonds & Insurance 2.0%	\$362,557	\$0.95
Subtotal	\$18,490,400	\$48.23
Design Contingency 10.0%	\$1,849,040	\$4.82
Subtotal	\$20,339,440	\$53.05
Escalation to MOC Jun 2015 9.2%	\$1,881,190	\$4.91
TOTAL ESTIMATED CONSTRUCTION COST	<u>\$22,220,630</u>	\$57.96

Total Area: 383,403 SF

* - External Walls

Dana Point Harbor Revitalization
Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
2 Sitework				
Earthwork				
Overexcavate and recompact	22,365	cy	\$5.53	\$123,679
Import fill	1,118	cy	\$20.00	\$22,365
Fine grade	201,287	sf	\$0.29	\$58,373
Total - 2 Sitework				<u>\$204,418</u>
3 Concrete				
Concrete Piles				
Concrete driven piles, 12" sq, 50' deep	51,650	lf	\$32.94	\$1,701,380
Continuous Pile Caps				
Concrete	1,248	cy	\$162.97	\$203,347
Formwork	14,418	sf	\$10.10	\$145,622
Reinforcing steel	450,000	lb	\$1.00	\$450,000
Excavation	1,248	cy	\$16.58	\$20,688
Spoils removal	1,248	cy	\$18.81	\$23,470
Cast-In-Place Concrete Slab-On-Grade				
Concrete slab, 6"	3,550	cy	\$160.84	\$570,986
Slab thickening	178	cy	\$160.84	\$28,549
Form edge	2,147	sf	\$6.16	\$13,223
Control joints	19,170	lf	\$3.55	\$68,054
Reinforcing steel	345,063	lb	\$0.90	\$310,556
Finish	191,702	sf	\$0.75	\$143,776
Aggregate base, sand bed, fine grade	191,702	sf	\$1.90	\$364,233
Concrete Columns				
Concrete	257	cy	\$172.47	\$44,408
Formwork	13,904	sf	\$12.10	\$168,238
Reinforcing steel	122,304	lb	\$0.96	\$117,412
Finish	13,904	sf	\$0.86	\$11,957
Concrete Retaining Walls				
Concrete	194	cy	\$166.80	\$32,372
Formwork	10,960	sf	\$13.08	\$143,352
Reinforcing steel	63,075	lb	\$1.90	\$119,842
Finish	10,960	sf	\$3.26	\$35,728
Concrete Shear Walls				
Concrete	465	cy	\$166.80	\$77,587
Formwork	17,343	sf	\$13.08	\$226,852
Reinforcing steel	151,174	lb	\$0.96	\$145,127
Finish	17,343	sf	\$0.86	\$14,915

Dana Point Harbor Revitalization
Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Concrete Beams				
Concrete	1,396	cy	\$172.47	\$240,838
Formwork	51,860	sf	\$12.10	\$627,504
Reinforcing steel	223,425	lb	\$0.96	\$214,488
Post tension tendons	69,820	lb	\$2.29	\$159,889
Finish	51,860	sf	\$0.86	\$44,599
Post Tensioned Slab	191,702	sf	\$25.90	\$4,964,345
Galvanized Reinforcing Steel				
Additional cost for galvanized reinforcing steel	2,131,006	lb	\$0.60	\$1,278,603
Miscellaneous				
Perimeter drain	877	lf	\$29.35	<u>\$25,740</u>
Total - 3 Concrete				<u>\$12,737,684</u>
4 Masonry				
CMU Block Work				
CMU walls, 8" thick	11,447	sf	\$20.67	<u>\$236,602</u>
Total - 4 Masonry				<u>\$236,602</u>
5 Metals				
Metal Stairs				
Concrete filled metal pan stair, landing including handrails, perforated metal enclosure	2	flt	\$33,000.00	\$66,000
Miscellaneous				
Miscellaneous blocking, backing, anchors etc	383,403	sf	\$0.20	<u>\$76,681</u>
Total - 5 Metals				<u>\$142,681</u>
7 Thermal & Moisture Protection				
Waterproofing				
Retaining walls	6,272	sf	\$4.46	\$27,973
Miscellaneous				
Seismic joint	1,065	lf	\$152.00	\$161,929
Expansion joint including cover	1,145	lf	\$146.20	\$167,446
Caulking & sealants	191,702	sf	\$0.16	<u>\$30,672</u>
Total - 7 Thermal & Moisture Protection				<u>\$388,020</u>

Dana Point Harbor Revitalization
Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
8 Doors & Windows				
Exterior Doors				
Hollow metal doors, frames, finish hardware, paint				
Single	3	ea	\$1,333.38	<u>\$4,000</u>
Total - 8 Doors & Windows				<u>\$4,000</u>
9 Finishes				
Exterior Walls				
Cement plaster, walls	22,909	sf	\$10.09	\$231,155
Paint walls, soffits	308,678	sf	\$0.81	<u>\$250,029</u>
Total - 9 Finishes				<u>\$481,184</u>
10 Specialties				
Miscellaneous				
Metal pipe bollards	240	ea	\$398.00	\$95,520
Striping	383,403	sf	\$0.22	\$84,349
Miscellaneous building specialties, signage	383,403	sf	\$0.20	<u>\$76,681</u>
Total - 10 Specialties				<u>\$256,549</u>
14 Conveying				
Hydraulic 2-stop elevator including enclosure	1	ea	\$119,000.00	<u>\$119,000</u>
Total - 14 Conveying				<u>\$119,000</u>
15 Mechanical				
Plumbing				
Fixtures				
Floor drain	12	ea	\$480.00	\$5,760
Hose bibb	26	ea	\$258.00	\$6,708
Rough-ins				
Local rough-in at fixture	26	ea	\$667.00	\$17,342
Rough-in at floor sink or floor drain	12	ea	\$837.00	\$10,044
Waste / Vent				
4" pipe, ci, below grade	840	lf	\$68.00	\$57,120
12" pipe, ci, below grade	370	lf	\$94.55	\$34,984
3-4" vent through roof	6	ea	\$560.00	\$3,360

Dana Point Harbor Revitalization
Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Domestic Water				
1-1/4 to 2" Distribution piping	1,711	lf	\$36.60	\$62,623
Fire Fighting System				
Wet pipe automatic sprinkler system	191,702	sf	\$2.00	<u>\$383,403</u>
Total - 15 Mechanical				<u>\$581,343</u>
16 Electrical				
Power and Lighting				
Service and Distribution				
Mainservice "MSA" 800a 120/208v 3ph 4w	1	ea	\$16,800.00	\$16,800
Panel 225a 120/208v 3ph 4w	6	ea	\$2,750.00	\$16,500
Grounding and UFER and Testing	2	ea	\$1,850.00	\$3,700
Conduit 2-1/2", emt	2,860	lf	\$17.64	\$50,450
Conduit (2) 4", pvc	400	lf	\$33.28	\$13,312
Conduit (2) 4", grc	20	lf	\$146.40	\$2,928
Copper wire #4, thhn	4.0	clf	\$163.01	\$652
Copper wire #2, thhn	24.6	clf	\$231.94	\$5,706
Copper wire #2/0, thhn	8.4	clf	\$365.28	\$3,068
Copper wire #4/0, thhn	16.0	clf	\$520.75	\$8,332
Copper wire #250mcm, thhn	98.4	clf	\$849.39	\$83,580
Copper wire #500mcm, thhn	33.6	clf	\$1,511.57	\$50,789
Convenience Power				
Undefined power allowance	1	ls	\$25,600.00	\$25,600
Duplex dedicated 20amp 120volt	2	ea	\$125.00	\$250
Duplex GFI 20amp 120volt wp	4	ea	\$165.00	\$660
Elect car charger pedestal unit 20a device wp	168	ea	\$522.00	\$87,696
Double duplex outlet, 20a 120v	6	ea	\$60.00	\$360
Conduit 3/4", emt	4,800	lf	\$4.62	\$22,176
Conduit 1", emt	16,200	lf	\$6.52	\$105,624
Copper wire #12, thhn	288.0	clf	\$59.56	\$17,153
Copper wire #10, thhn	972.0	clf	\$66.75	\$64,881
Lighting and Light Control				
Fixture 1, 1x4 surface fiberglass enclosed wp fluorescent T5	133	ea	\$636.00	\$84,588
Fixture 2, 15' pole led parking lot 285w	22	ea	\$4,060.00	\$89,320
Fixture 3, surface mount self luminous Exit sign	6	ea	\$322.00	\$1,932
Fixture 4, 1x4 surface wall enclosed wp fluorescent	2	ea	\$436.00	\$872
Switch 1P, wall occupancy sensor OS1	3	ea	\$305.00	\$915
Lighting control panel LCP	2	ea	\$5,600.00	\$11,200
Switch, low voltage override	4	ea	\$422.00	\$1,688
Conduit 3/4", emt	6,880	lf	\$4.62	\$31,786
Conduit 3/4", grc	1,200	lf	\$13.31	\$15,972
Conduit 1", emt	2,120	lf	\$6.52	\$13,822

Dana Point Harbor Revitalization
Dry Boat Storage Deck
Comparative Analysis of Dry Boat Storage Cost Study

6/29/2012

Dry Boat Storage Deck Detail Elements

Element	Quantity	Unit	Unit Cost	Total
Copper wire #12, thhn	56.0	clf	\$59.56	\$3,335
Copper wire #10, thhn	272.0	clf	\$66.75	\$18,156
Copper wire #8, thhn	199.2	clf	\$87.66	\$17,462
LV cable	5,600	lf	\$1.40	\$7,840
Special Electrical				
Fire Alarm System	191,702	sf	\$0.23	\$43,434
Telephone / Data System	383,403	sf	\$0.05	\$19,170
Security System rough conduit only				Excluded
Miscellaneous				
Fire seal penetrations,	191,702	sf	\$0.06	\$11,502
Temp Power and Lighting	1	ls	\$15,600.00	\$15,600
Seismic support and assemblies	191,702	sf	\$0.10	\$19,170
Total - 16 Electrical				<u>\$987,981</u>

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Marine Service Building Construction Cost Summary

Element		Total	Cost / SF
1 General Conditions (Incl. Below)			
2 Sitework		\$16,875	\$2.25
3 Concrete		\$136,500	\$18.20
4 Masonry			
5 Metals		\$153,000	\$20.40
6 Wood & Plastics			
7 Thermal & Moisture		\$106,500	\$14.20
8 Doors & Windows		\$93,750	\$12.50
9 Finishes		\$301,500	\$40.20
10 Specialties		\$93,750	\$12.50
11 Equipment			
12 Furnishings		\$16,500	\$2.20
13 Special Construction			
14 Conveying		\$91,050	\$12.14
15 Mechanical		\$316,650	\$42.22
16 Electrical		\$297,387	\$39.65
Subtotal		\$1,623,462	\$216.46
General Conditions	8.0%	\$129,877	\$17.32
Subtotal		\$1,753,339	\$233.78
General Contractor OH&P	4.0%	\$70,134	\$9.35
Subtotal		\$1,823,473	\$243.13
Bonds & Insurance	2.0%	\$36,469	\$4.86
Subtotal		\$1,859,942	\$247.99
Design Contingency	10.0%	\$185,994	\$24.80
Subtotal		\$2,045,936	\$272.79
Escalation to MOC Jun 2015	9.2%	\$189,228	\$25.23
TOTAL ESTIMATED CONSTRUCTION COST		<u>\$2,235,164</u>	\$298.02

Total Area: 7,500 SF

**DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS
APPENDIX D - CONCEPT DRAWINGS**

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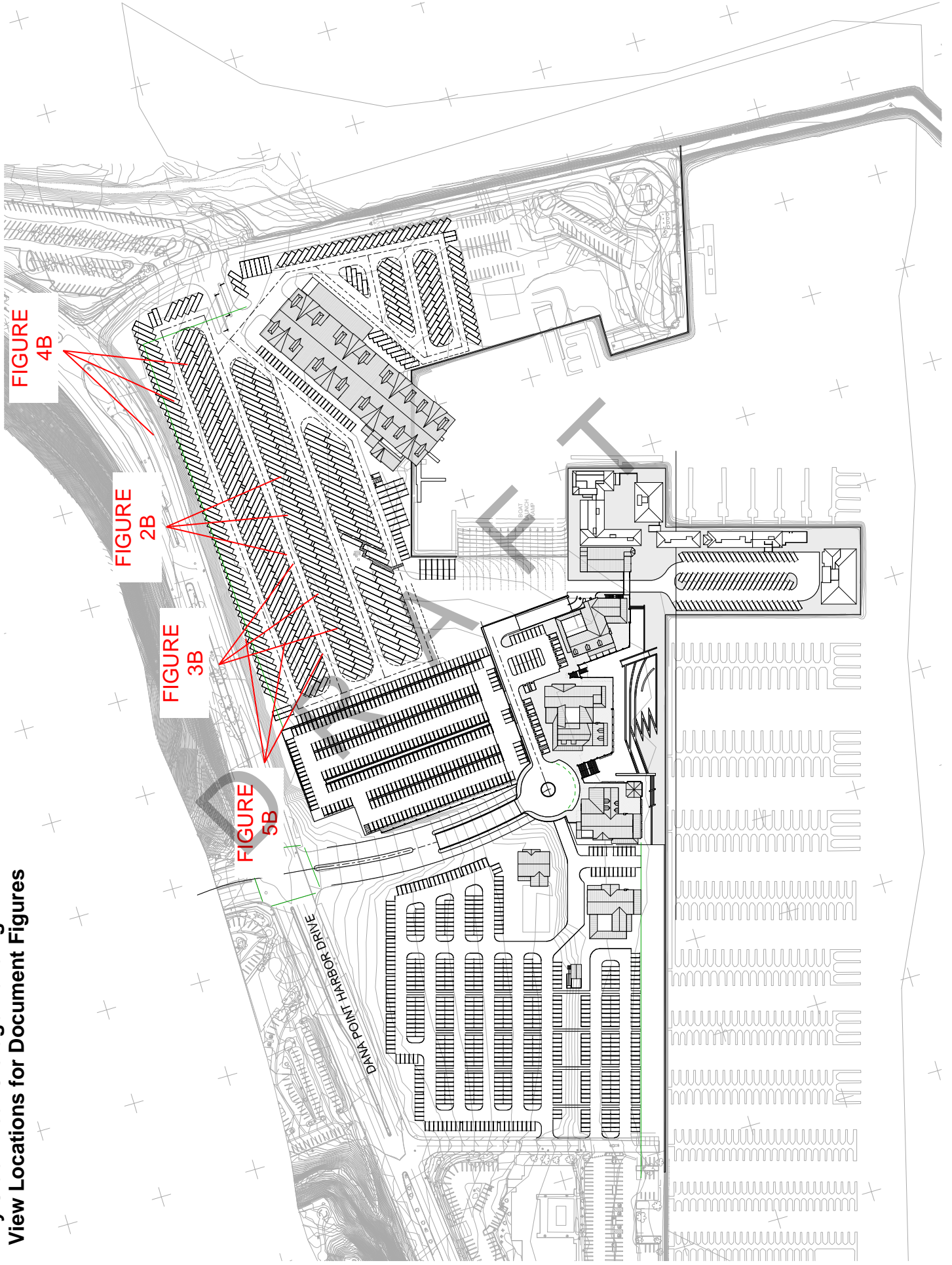
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**DANA POINT HARBOR DRY BOAT STORAGE ANALYSIS
APPENDIX E - VIEW LOCATIONS FOR DOCUMENT FIGURES**

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**Dry Stack Boat Storage Building
View Locations for Document Figures**



**Dry Boat Storage Deck
View Locations for Document Figures**

