Scenarios 5 through 7 (see Figures 3.9 through 3.11) results indicate that by 2025, a majority of the parcels on Balboa Island will be at risk of flooding and impact to over 400 buildings is possible. Scenario 5 (Figure 3.9) shows overtopping of the southwest and northwest seawalls, and ponding west of Collins Avenue. Flood water depths exceeding 2 feet are predicted for Park Avenue near Pearl Avenue. Scenario 5 also shows overtopping along the southern seawall at Marine Avenue, and the spread of water north to Balboa Avenue with depths exceeding 0.5 feet.

Scenario 6 (Figure 3.10) shows more widespread flooding of Balboa Island than Scenario 5, which is attributed to wave overtopping all along the southern boundary of Balboa Island (South Bay Front). As in Scenario 4, flood water is predicted to progress north across the island and to gradually spread west towards lower topography. Depths exceeding 2 feet are predicted for Park Avenue, near Pearl Avenue, and depths exceeding 1 foot are predicted for Marine Avenue.

Scenario 7 (Figure 3.11) shows widespread flooding on Balboa Island from overtopping along the southwest, south, and northern seawalls. Depths exceeding 3 feet are predicted for Park Avenue, near Pearl Avenue, and depths exceeding 1.5 feet are predicted for Marine Avenue. Comparing Scenarios 6 and 7, Table 3.4 shows that the number of impacted parcels is about the same in both scenarios, however almost twice the number of buildings is impacted in Scenario 7. This difference can be attributed to the deeper flood depth predictions for Scenario 7. As shown in Table 3.4, the average flood depth for Scenario 7 is 1.16 feet compared to 0.79 feet for Scenario 6.

Flooding of Little Balboa Island is not predicted in Scenarios 5 through 7, suggesting a low risk of tide and wave-driven flooding through 2025.

Scenarios 8 and 9 (Figures 3.12 and 3.13) reveal the flood risk through 2050, and Scenario 10 reveals the flood risk predicted for 2100. The 2050 scenarios, even in the absence of waves, show complete flooding of both islands with impacts to most of the buildings. By 2100, all of the buildings will be at risk of impact based on Scenario 10 (Figure 3.14) results.

3.5.2 Sandbagging Scenarios

Scenarios 11 (Figure 3.15) shows no significant flood impacts to either island from 1% exceedance-probability tides and wind waves for Year 2010, and Scenario 12 (Figure 3.16) shows only a small flood zone near the bridge to Collins Island and an impact of 0 to 1 buildings for Year 2025. These results suggest that if the existing seawall were sandbagged to provide an additional six inches of flood protection, the flood risk to Balboa and Little Balboa Islands will be minimal through 2025.

3.5.3 10-foot (MLLW) Seawall Scenarios

Scenarios 13 through16 (Figures 3.17 through 3.20) shows no flooding from the combined effects of a 1% exceedance-probability tide and wind waves through 2050, assuming a new 9.8 ft NAVD88 (10 feet MLLW) seawall encircles both islands. However, Scenario 17 (Figure 3.21) shows complete inundation of the island from a 1 in 100 year (1%) event for Year 2100. A 1 in 10 year (10%) tide was not modeled, but total flooding can also be expected based on tide height data. Considering sea level projections shown in Figure 3.4, a 10 ft MLLW seawall is not likely to offer protection far beyond year 2050. Sea level rise projections are subject to change as new climate change data becomes available, so all flood risk projections for the future should be re-examined as better data becomes available.

4 SEAWALL CONDITION ASSESSMENT

4.1 Overview

This chapter provides a summary of existing seawall conditions and assessment of the useable life of the seawall based on site observations and review of available documents, reports and drawings. Detail of the assessment is provided in Appendix C. The review of older drawings and reports provide the historical background, as well as types and modifications of the seawalls on Balboa and Little Balboa Islands. Site observation included visual observations of the conditions of the current seawalls, and cataloguing of obstructions, modifications, utility lines, storm drains, and gangways and platforms as they relate to the seawalls. In addition to assessing the conditions of the seawall, special attention was given to the Balboa Island Ferry Boat Landing and its surroundings and the three bridges on the islands. If an extension or reconstruction of the existing seawalls are to be performed, these four locations would need to be modified to prevent them from acting as openings in an otherwise solid seawall protection around the islands.

4.2 Document Review

4.2.1 Record Drawings

Design drawings from 1929 and 1935 were reviewed. Drawings show that in 1929 over 60% of the walls along the Grand Canal, as well as the returns along the north beach of Balboa Island and the south beaches of both Balboa and Little Balboa Island, were replaced. These walls used a concrete soldier pile and concrete panel design in which soldier piles were driven to a depth of approximately -3.0 feet MLLW[4] along the length of the Grand Canal and to approximately -8.0 feet MLLW[5] at the corners as measured in 1929 and in accordance with City Drawing No. STD-115-L. The concrete wall panels span between the soldier piles. This particular wall relies on tie-backs comprised of 1-inch-diameter steel tie-rods attached to 9-foot-long by 10-inch-diameter timber pile deadmen (approximately 8.0 to 8.5 feet back from the face of the outside seawall) and a structural cap to counteract the overturning moment. The tie-rods are shown to be placed at every other soldier pile at 22 feet on-center.

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[4] MLLW is used in the Drawing No. STD-115-L but there is no information on the referenced tidal epoch. For the rest of the report, MLLW is referenced to NTDE 1983-2001.

[5] See footnote No. 4

Although the design drawings for the remaining and majority of the seawalls around Balboa Island were dated 1935, construction was not performed until 1938 as part of the National Recovery Act. These seawalls replaced older substandard walls and tied into the existing seawalls along the Grand Canal and along a 500-foot-long section on the western tip of Balboa Island. The new seawalls, as designed and constructed, used a concrete soldier pile and concrete panel design similar to the seawalls built along the Grand Canal in 1929. Soldier piles were driven to a depth of approximately -5.0 feet MLLW[6] as measured in 1938 and in accordance with City Drawing No. STD-115-L. However, the new design placed a tie-back at each soldier pile at 11.67 feet on-center, and according to the design, these tie-backs provide all the resistance to counteract overturning. These tie-backs are comprised of 1¼-inch-diameter steel tie-rods attached to 10-foot-long by 12-inch-diameter timber pile deadmen (approximately 8.0 to 8.5 feet back from the face of the outside seawall). The cap does not have a structural connection to the solider piles or to the concrete panels and relates to an architectural finish to the seawall structure. Since extending the cap is one of the major considerations to be assessed to mitigate flooding, the fact that there is either no, or a substandard connection, between the cap and the wall below for the majority of the Balboa seawall is considered significant.

It is assumed that the aforementioned 500-foot-long section at the western end of Balboa Island predates the 1935 seawall design drawings since the cap of this 500-foot-long seawall was slated to be replaced in said drawings. The 500-foot-long section of wall on the west end of Balboa Island is a sheet pile design similar to the wall surrounding Collins Island and is believed to have been constructed in the late 1920's or early 1930's. This design consists of interconnecting vertical concrete sheet piles and a structural concrete cap with tie-backs extending some distance behind the seawall. This section of seawall was upgraded with a rock revetment as a result of the findings in a 1985 report discussed later in this section.

Both sets of drawings show "square" symbols next to the rebar dimensions indicating that the rebar used was of the square, dimpled type, as opposed to deformed round bars currently used in modern construction. The distances between rebar and the outside face of concrete as shown on the drawings is narrow compared to a modern standard of 3.0 inches for construction in the marine environment. Furthermore, neither drawing construction notes nor specifications were available identifying concrete and/or rebar material type and strength. Based on common practice of design and construction in the late 1920's and 1930's, it is assumed that the existing seawall concrete is of lower strength compared to modern concrete mix designs.

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[6] See footnote No. 4

4.2.2 Reports and Studies

Cash & Associates (now part of URS) provided condition survey reports for the Balboa seawall to the City in 1985 and 2005. The 1985 report included a description of the unearthing of tie-rods at the west end of Balboa Island and at various locations around Little Balboa and discussion of opinions regarding seawall stability. Work performed for the 2005 report consisted of a visual inspection of the wall for signs of obvious distress as well as suggested repairs.

In all cases where tie-rods were uncovered, the rods did not have a corrosion protection system (coatings or wrappings) and all rods showed evidence of at least 50% loss of cross-sectional area, with several rods completely severed. Preliminary calculations noted that the walls around Balboa Island would be stable without tie-rods for gravity loads, if the exposed height of support (i.e., the difference in elevation between top of boardwalk and top of mudline) was no greater than 5 feet.

The 1985 Report prompted the City to stabilize the toe of the seawall at four critical locations around the Island by constructing rock revetments as shown in Figure 4.1. Observations also noted a separate seawall stabilization project performed along the seawall east of the Balboa Island Ferry Boat Landing. Earth anchors were installed, as shown in Figure 4.2, and a submerged concrete block revetment was placed at the toe of the seawall.

Figure 4.1 Rock Revetment Stabilization at Western End of Balboa Island

Figure 4.2 Earth Anchors and Concrete Block Revetment (Submerged) at Balboa Island Ferry Boat Landing

The City also responded by pursuing a repair and maintenance program. Most of the noted distresses in the seawall cap and soldier piles were repaired. An example of a typical repair is shown in Figure 4.3.

Figure 4.3 Use of Elastomeric Filler to Seal Cracks to Prevent Seawater Intrusion

4.3 Site Observation

In addition to the seawall and boardwalk elevation surveys described in Chapter 2, a visual survey of Balboa Island was conducted on May 25, and June 6, 2010 to assess the condition of the seawall and to examine Balboa Island Ferry Boat Landing and three bridges of concern. The findings are presented in the following section.

4.3.1 Seawall Cap Visual Survey

During the visual survey of the seawall, seawall cap extensions were observed in the Little Balboa Island. The extension raises the top of wall elevation by between 6 and 12 inches depending on location around Little Balboa. An example of this cap extension is shown in Figure 4.4. Although this extension provides a defense against high water events, the limited remaining useful life and the existing condition of the underlying seawall make further extensions questionable.

Figure 4.4 Little Balboa Seawall Cap Extension

The visual survey also found universal distresses in the cap, specifically multiple cracks, coinciding with the locations of the soldier piles. The development of these cracks at the specific locations of the soldier piles is likely due to a reduced structural cross-section and a concentration of load ultimately relating to concrete stress. Despite a concentration of cracks at the soldier piles, cracking also can be found at many locations along the concrete cap including the structural cap along the Grand Canal. Coupled with similar cracks found on the exposed portions of the soldier piles and panels, the evidence portends to universal distress throughout the seawall. The shot-creted piles and panels along the Grand Canal walls (see Figure 4.5) are of particular concern because the condition of the original concrete is hidden by the shot-crete repairs. Despite repairs to cracks over the years, cracks are still prevalent in the seawall cap (see Figures 4.6 and 4.7).

Figure 4.5 Shot-crete on Grand Canal Seawall

Figure 4.6 Typical Crack and Spall Repairs

Figure 4.7 Crack Repairs with Corroding Rebar

Another common and continuous distress point along the seawall is parallel to and approximately 2 to 4 inches above the boardwalk. As part of the drainage mitigation project performed in the 1980's, the boardwalk was lowered several inches from its original design elevation in order to facilitate drainage away from private properties. This placed the boardwalk below the bottom of the existing cap and it is assumed a patch was done to fill the gap between the boardwalk and the cap. Therefore, the continuous crack appears to be non-structural and related to the patchwork as shown in Figure 4.8. This assumption should be confirmed as part of a subsequent study.

Figure 4.8 Sidewalk Separation from Seawall

In addition to visual observations, we utilized what is known as a “chain-drag” test by impacting the concrete with a heavy metal object to detect holidays (voids caused by concrete chemical reactions or rebar corrosion) and de-laminations in the structure. A hollow sound, typically associated with de-laminations and holidays was heard throughout the cap on both islands, but were particularly evident along the portion of the Grand Canal seawall constructed in 1929. Weathering, settling, and seismic events coupled with porous concrete elements have allowed seawater to seep into the seawall and corrode the rebar within. As the rebar corrodes, the rust expands putting pressure on the concrete from within causing voids and separation, or de-lamination of the concrete from the rebar, thus weakening the structure. These actions lead to cracks and breaking off of chunks of concrete, known as spalling.

Although many major cracks and spalls have been repaired over the past several years by the City, the “chain-drag” test found additional locations needing repair. The results were noted in the field survey, and should be confirmed as part of a subsequent investigation through the use of more invasive testing procedures.

Storm drain outlets that drain through the seawall and into the Bay (see Figure 4.9) have existed for decades at the street ends of Balboa Island, based on the 1935 record drawings and the recent visual survey. In the 1980's as part of the boardwalk reconstruction, a storm water drainage system with 4- to 6-inch diameter drains was constructed landward of and parallel to the seawall. These drains connect to the City's storm drain system outlets at the street ends and were designed to keep water from ponding along the seawall and from spilling onto private property.

This drainage system would not have functioned without the installation of gate valves at all storm water outlets on Balboa Island, as shown in Figures 4.10 and 4.11. These valves are closed during high water events to prevent seawater from flooding low lying spots on the Island. Prior to the valve installation, the storm drain outlets were a major source of flooding during high water events.

Figure 4.9 Storm Drain Outlet Through Seawall

Figure 4.10 Hand-Operated Gate Valve in Storm Drain Manhole

Figure 4.11 Actuated Gate Valve in Storm Drain Vault

4.3.2 Bridges and Ferry Boat Landing

In addition to the visual survey and measurements of the Balboa Island seawall, special attention was given to the Balboa Island Ferry Boat Landing and its surroundings and the three bridges on the Island - the Marine Avenue Bridge, the Park Avenue Bridge, and the Collins Island Bridge. If an extension or reconstruction of the existing seawall is to be performed, these four areas need to be modified to prevent them from acting as openings in an otherwise solid seawall fortification around the Island. Any openings in the bridges that would allow seawater to seep onto the roadway should be sealed, and waterproofing should be performed on surfaces exposed to rising sea level. Any reconstruction or modification of the existing bridges should include modifications to ensure a waterproof structure. The goal is to allow water to escape but not to enter the fortified Island.

Bridges

The Marine and Park Avenue bridges have solid concrete parapet (side) walls that tie into the existing seawall (see Figure 4.12) and have peak roadway elevations about the current Base Flood Elevation of 9.0 feet NAVD88 (9.18 feet MLLW). The Collins Island Bridge cuts through the seawall, has an open metal rail wall (see Figure 4.13) and a peak roadway elevation of approximately 7.3 feet NAVD88 (7.5 feet MLLW), which is below BFE. This bridge will require thorough waterproofing as well as solid concrete parapet (side) walls sealed to the seawall to prevent it from becoming a source of flooding. The seawalls on Collins Island will need to be retrofitted or replaced in concert with Balboa Island, to prevent flooding of that island and to prevent seawater from flanking the Balboa Island barriers.

Figure 4.12 Park Avenue Bridge Interface at Big Balboa Seawall

Figure 4.13 Collins Island Bridge Interface at Seawall Abutment

<u>*Balboa Island Ferry Boat Landing*</u>

The approach to the Balboa Island Ferry Boat Landing also breaches the seawall, as shown in Figure 4.14, allowing a path for water to enter the Island. In addition, the Ferry Boat Launch Ramp is particularly low in its current configuration as shown in Figure 4.15. The approach elevation is 6.6 feet NAVD88 (6.8 feet MLLW) at the seawall opening and 7.0 feet NAVD88 (7.2 feet MLLW) at the ramp leading to the ferry boat dock. During high water events, the launch ramp must be shut-down until water recedes.

Figure 4.14 Balboa Island Ferry Boat Landing Approach

Figure 4.15 Balboa Island Ferry Boat Landing as Viewed from Side

If the dock and launch ramp are left in their basic current location, a major effort would be required to raise the launch ramp and the approach street, Agate Avenue. This would impact adjacent buildings and the intersecting boardwalk. Two options of raising the launch ramps are provided in Chapter 5.

4.4 Predicted Lifespan and Remaining Useful Life of Existing Seawalls

The lifespan of structural concrete depends on many factors including the design, construction, quality control and environmental conditions of the structure. Based on a review of the construction documents and an understanding of design and construction practices in the 1920's and 1930's, the lifespan of a reinforced concrete structure would be judged by today's standards, to have a realistic lifespan of between 75 to 100 years.

The condition of the Balboa seawall is somewhat better than the condition of the Little Balboa seawall. Little Balboa, which is aligned with the main channel and harbor entrance, is particularly susceptible to ocean swells. The long fetch also allows for larger wind waves to impact Little Balboa seawalls during storm events. Balboa is somewhat more sheltered and has a shorter fetch, except for its exposed western tip.

The sections of seawall supporting greater gravity loads due to erosion and dredging (i.e., greater exposed seawall height) and exposed to greater wave and swell activity are expected to have a lifespan closer to the lower end of the range, or between 75 and 90 years. Those sections of the seawall protected by beaches and fronting calmer waters are expected to have a lifespan closer to the upper end of the range, or between 85 and 100 years. Since the seawalls are in a corrosive marine environment, none are expected to have a lifespan exceeding much more than 100 years.

In summary, since most of the seawalls on Balboa and Little Balboa Islands were constructed in the 1920s and 1930s, it is estimated that the remaining useful life of the seawalls is between 10 and 25 years, depending on location.

5 PROPOSED SEAWALL REPAIR AND REPLACEMENT ALTERNATIVES AND INUNDATION SOLUTIONS

5.1 Seawall

Given the existing seawall's condition and remaining useful life and an understanding of construction techniques used in the late 1920's and 1930's, major seawall retrofit does not appear to be a feasible option. Installation of earth anchors and rock revetments may provide an increase in overturning resistance and toe support, respectively. However, for most of the seawalls, the primary concern is degradation of the concrete and rebar within the structure. Therefore, the following sections provide interim short-term alternatives to prevent flooding of Balboa Island and long-term seawall replacement and extension options.

5.1.1 Cap Replacement/Extension Alternatives

In the interim, prior to full replacement of the Island seawalls, the Balboa Island seawalls may be extended by an incremental amount of 6 to 8 inches to prevent overtopping from waves during high water levels. Based on the existing seawall age, predicted lifespan, condition, and design, two alternatives were developed for increasing the height of the existing seawall.

Alternative 1: Replace the existing cap with a taller cap that is mechanically attached to the soldier piles and concrete panels using dowels.

Alternative 2: Extend the existing cap to a calculated height that will not undermine the seawall or seawall cap structural integrity. This extension may consist of either:

- Option 1 – Mechanically connecting a reinforced concrete extension to the existing seawall cap using dowels,
- Option 2 – Deploying polypropylene sandbags on the seawall cap and other floodwater entry points (i.e., bridges and ferry boat landing) during high water events, or
- Option 3 – Placing geotextile (Longard) bags or tubes on the seawall cap and other floodwater entry points until the seawalls are replaced.

If a mechanical extension (Alternative 2, Option 1) of the seawall cap is chosen, there is precedent for an extension of up to 8 inches, since the Little Balboa seawall was previously extended by this amount. This extension is referred to as a mechanical extension because it utilizes rebar dowels to mechanically connect the new extension to the existing cap. First, the top surface of the existing cap would be roughened. Then, the existing cap would be drilled at distances and to depths to be determined pending tests of the existing cap and a decision on the final extension height. Rebar dowels would epoxy-set in these holes. A reinforced concrete extension would then be built on top of the existing cap incorporating the rebar dowels. The roughened surface of the existing cap would allow for the new concrete to better bind with the original concrete. Any extension beyond 6 to 8 inches may compromise the structural integrity of the Balboa Island seawall cap. For this reason, any mechanical extension of the already-extended Little Balboa seawall should include demolition of the existing extension and reconstruction of a new extension.

The other two extension alternative options use sandbags to extend the protective height of the seawall. Sandbags are provided as options since the Balboa Island seawalls are nearing the end of the useful life and are recommended for replacement between 10 and 25 years. In addition, sandbags are commonly used to protect against flooding in all kinds of weather and water conditions. Typical sandbags (Alternative 2, Option 2) consist of 2-foot-long polypropylene bags filled with sand and tied at one end. Although these bags may be left in place for extended durations, they are primarily designed to be deployed when needed. Two stacks of sandbags will extend the seawall by about 6 inches, providing adequate flood protection for Balboa Island for the next 10 to 25 years based on the flood modeling results described in Chapter 3.

The other sandbag-type option (Alternative 2, Option 3) consists of geotextile (Longard) bags or tubes. An example of using geotextile bags for flood protection is shown in Figure 5.1. These geotextile bags are made of thicker and stronger material than the traditional polypropylene sandbag (Alternative 2, Option 2). These bags can be left in place until the seawalls are replaced, and given their thickness, only one bag will be needed to meet the required height. Just like any other plastic material, ultraviolet (UV) degradation is a concern. The use of UV inhibitors in the geotextile material or the placement of a protective tarp overtop the geotextile bags may be sufficient to shield the bags from UV light.

Figure 5.1 Geotextile Sandbags Used as a Seawall Along a Beach

5.1.2 New Seawall Options

To increase the seawall height beyond a 6- to 8-inch extension, the seawall will have to be replaced. Two conceptual options for replacement of the seawall were developed. The two options differ in the seawall design but share a similar implementation plan with the five phases graphically illustrated in Figure 5.2.

Phase 1: Short-term augmentation of the seawall by 6 to 8 inches as discussed in the last section.

Phase 2: Begin replacement of the existing seawalls between 10 to 25 years of baseline year 2010. This initial phase will consist of a seawall constructed to 9.8 feet NAVD88 (10 feet MLLW), which would place the new wall 0.8 foot above the current Base Flood Elevation height of 9.0 feet NAVD88 (9.2 feet MLLW) for Balboa Island.

Phase 3: If necessary, extend the seawalls by an additional several feet up to an elevation of 14.0 feet NAVD88 (14.2 feet MLLW) within 40 to 50 years from baseline year 2010, or as required by rising sea levels.

Phase 4: If necessary, construct a deep well groundwater dewatering system to protect the Island from subsequent high water tables associated with high water levels. If sea levels rise as predicted, then dewatering will be required within 40 to 50 years of baseline year 2010.

Phase 5: Establish appropriate minimum lowest floor elevation in accordance with the federal Base Flood Elevation (BFE). The City must continue to adhere to this requirement since Balboa Island is in a Flood Insurance Rate Map (FIRM) Zone A, which is considered a Special Flood Hazard Area. If sea levels rise as predicted, then the BFE may be higher in year 2100 compared to the current BFE of 9.0 feet NAVD88 (9.2 feet MLLW).

The implementation of Phases 3 and 4, which are common to both options, are discussed in Section 5.4. The two seawall replacement options outlined below include the seawall replacement and the future cap extension.

Replacement Option 1 - “H” Piles with Reinforced Concrete Wall (Lag) Panels

Install steel “H” soldier piles at approximately 10 feet on center. Insert prestressed reinforced concrete wall (lag) panels (similar to the existing wall) in a tongue-and-groove fashion in the space between soldier piles. Cast a reinforced concrete structural cap, designed to be extended in the future if and when required, on top of this assembly. This conceptual option is shown in Figure 5.3. An example of this kind of reinforced concrete wall is shown in Figure 5.4.

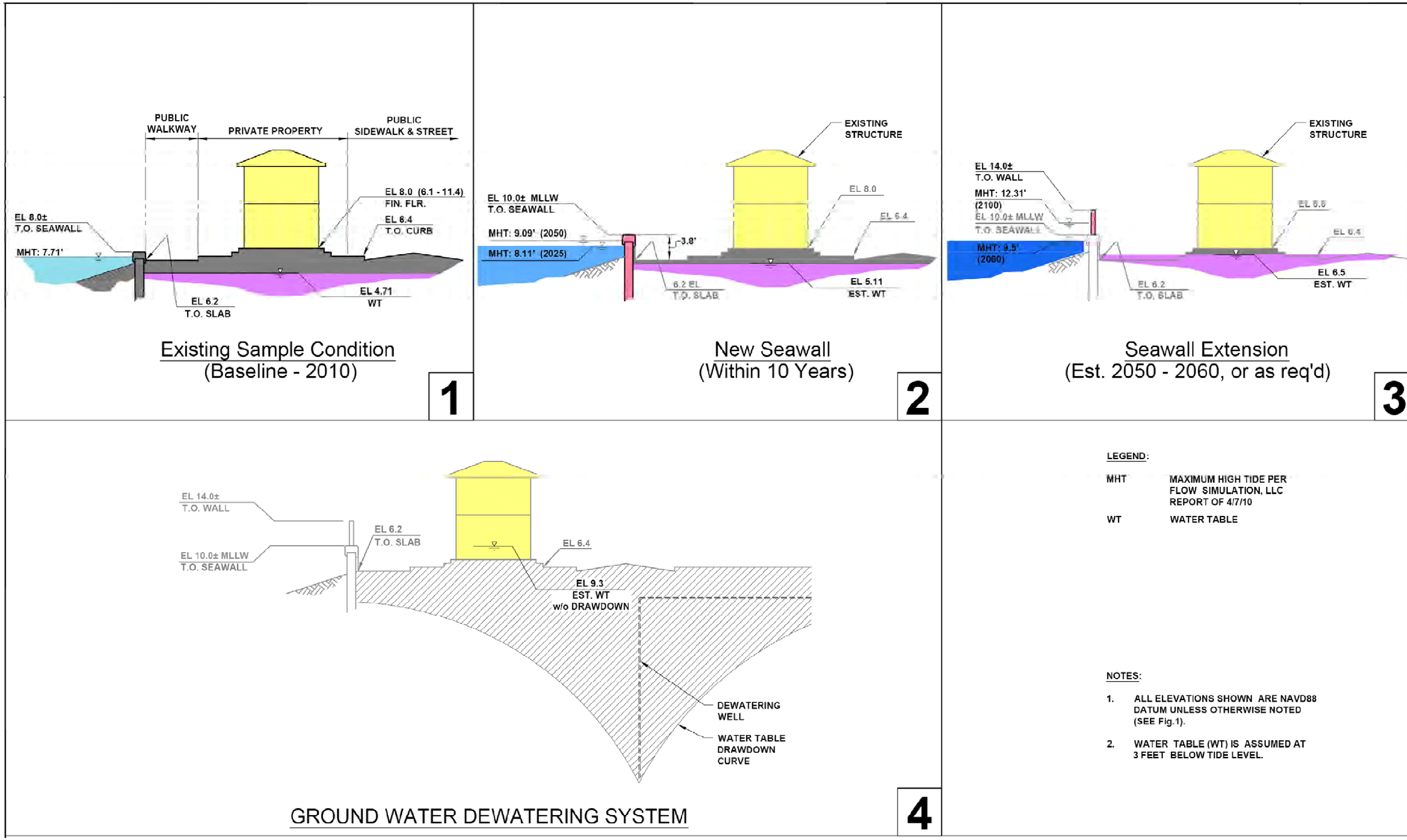


Figure 5.2 Conceptual Seawall Replacement Implementation Plan

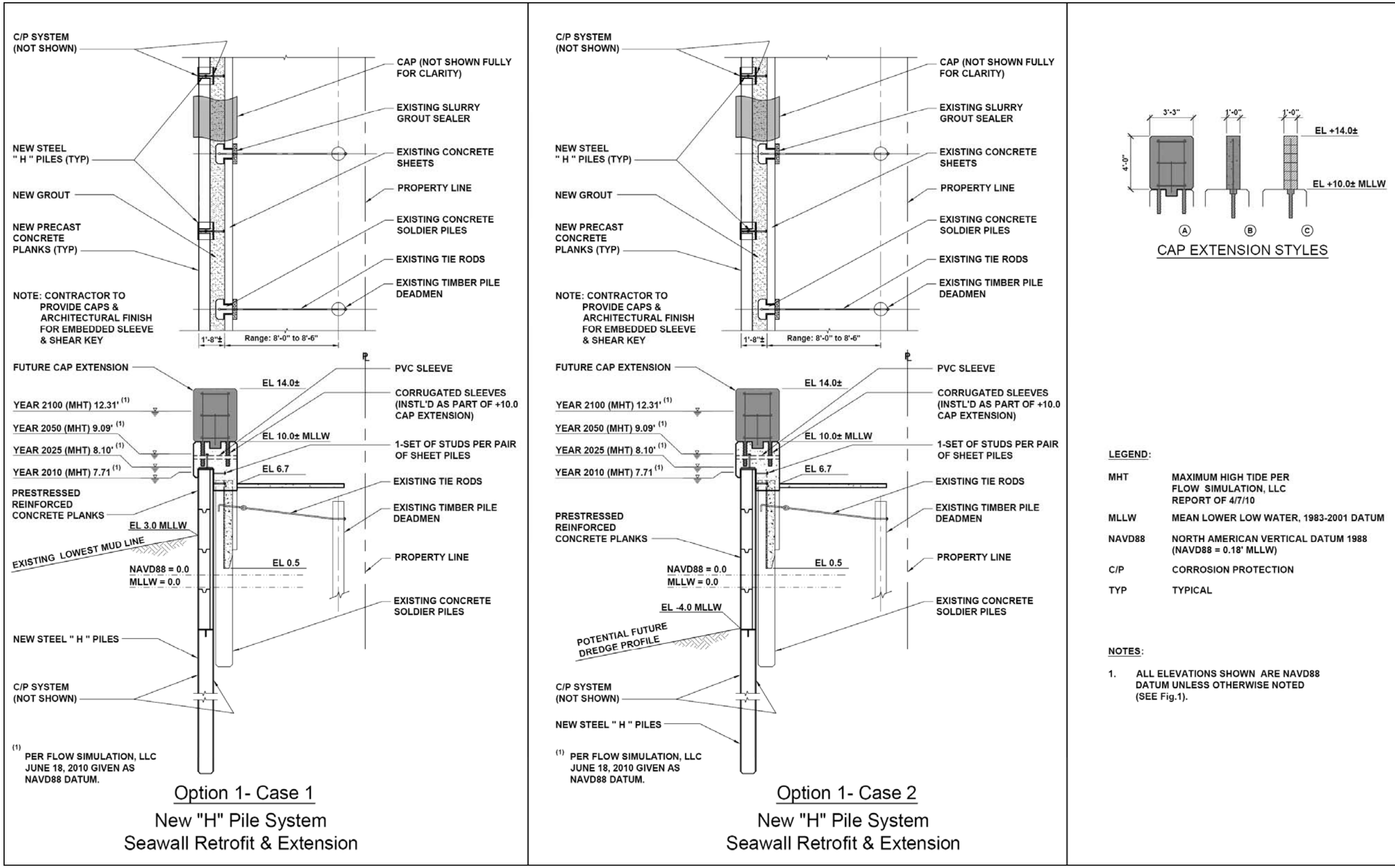
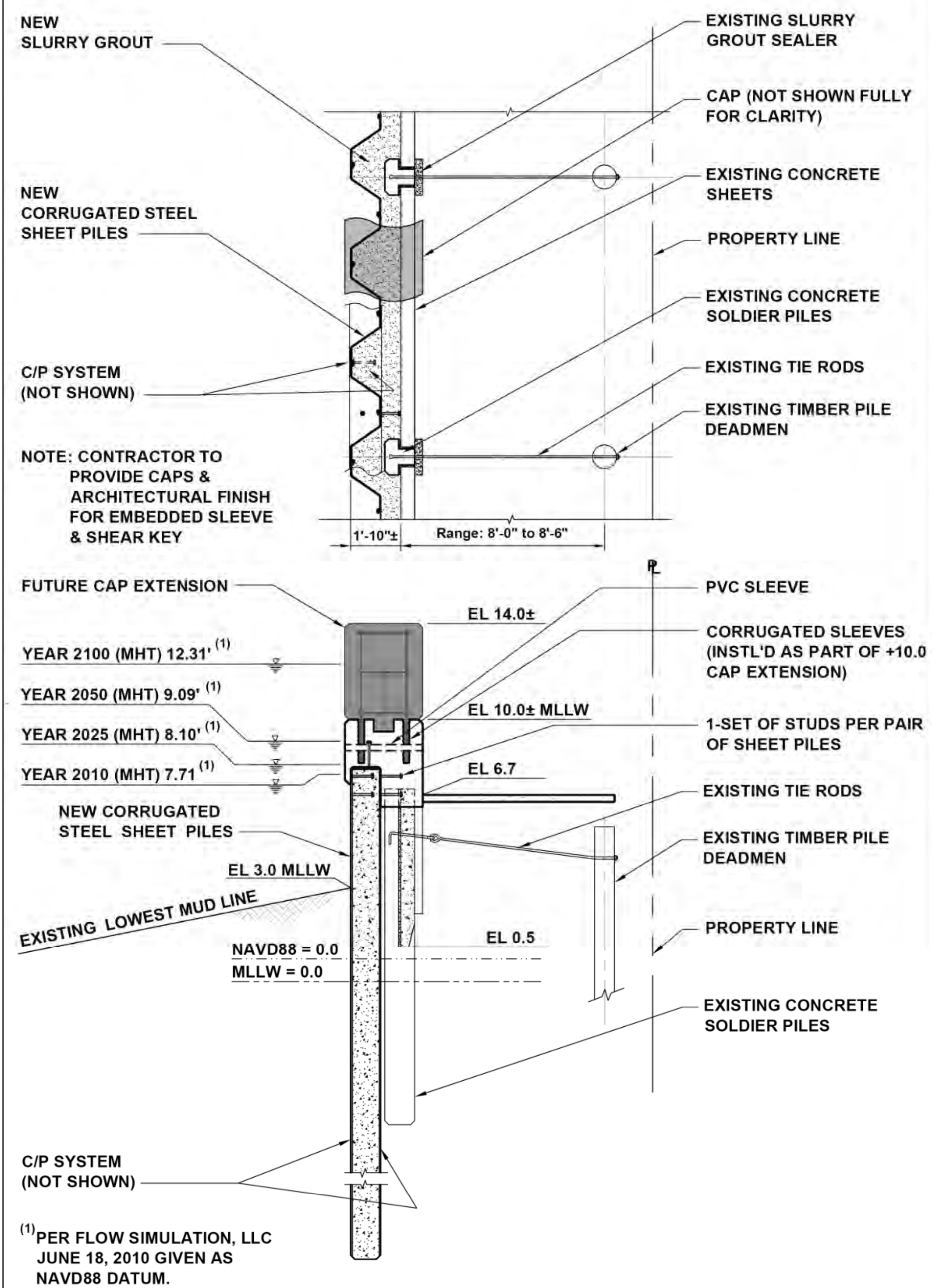


Figure 5.3 New "H" Pile System Seawall Retrofit and Extension

Figure 5.4 Construction of Retaining Wall Using H-piles and Concrete Wall (Lag) Panels

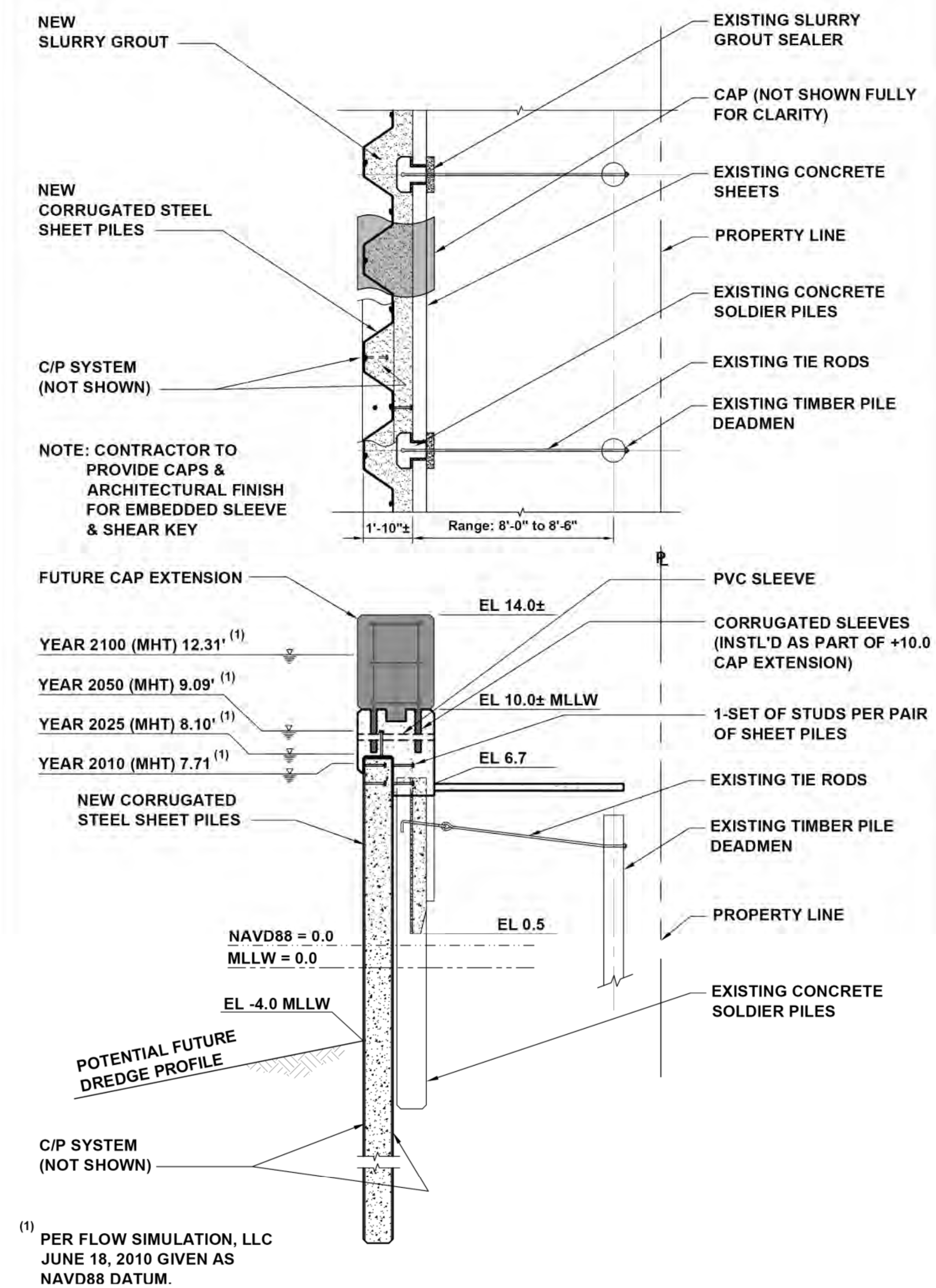
Replacement Option 2 - Continuously-driven Steel Sheet Piles

Install continuous steel sheet piles. Cast a reinforced concrete structural cap, designed to be extended in the future if and when required, on top of this assembly. This conceptual option is shown in Figure 5.5 and a picture for this kind of seawall is shown Figure 5.6. Both options are based on installing the new seawall waterside of the existing wall, and then grouting the void between the two walls for a seal. Both State and Federal permitting agencies typically do not promote projects that contain impacts to tidal wetlands. Taking into account the entire length of the Balboa Island seawall and the offset between the face of the existing seawalls and the face of the proposed seawall, approximately 0.5 acre of tidelands would be lost. For either of the proposed seawall replacement options, discussions will be necessary with State and Federal permitting agencies to illustrate the impracticality of other alternatives which carry more risks to utility lines and private properties as well as higher construction costs.



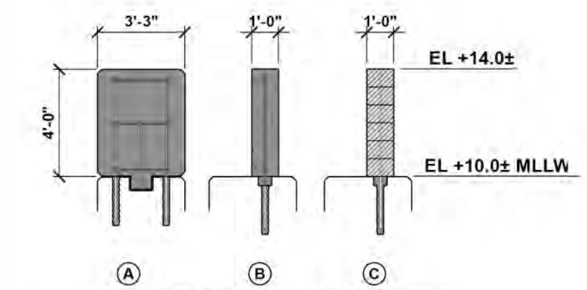
Option 2- Case 1

New Steel Sheet Pile System
Seawall Retrofit & Extension



Option 2- Case 2

New Steel Sheet Pile System
Seawall Retrofit & Extension



CAP EXTENSION STYLES

LEGEND:

MHT	MAXIMUM HIGH TIDE PER FLOW SIMULATION, LLC REPORT OF 4/7/10
MLLW	MEAN LOWER LOW WATER, 1983-2001 DATUM
NAVD88	NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88 = 0.18' MLLW)
C/P	CORROSION PROTECTION
TYP	TYPICAL

NOTES:

1. ALL ELEVATIONS SHOWN ARE NAVD88 DATUM UNLESS OTHERWISE NOTED (SEE Fig.1).

Figure 5.5 New Steel Sheet Pile System Seawall Retrofit and Extension

Figure 5.6 Steel Sheet Pile Bulkhead

Both replacement seawall designs are also cantilevered, meaning they do not require tie-rods, deadmen, or earth anchors to be drilled into the earth behind the wall. The ability to cantilever the seawall is a function of the depth of seawall embedment, of the exposed height of the wall (difference between top of boardwalk on the landside and top of mudline on the waterside), and of the type of structure desired. With cathodic protection and a rigorous maintenance and repair schedule, both replacement options have a lifespan of up to 150 years.

It is assumed that either seawall option selected will be designed to one of two mudline conditions depending on the location on the Island and based on anticipated City and community desires. The majority of the rebuilt seawall (approximately 9,200 feet of shoreline) would be designed using a mudline elevation of 3.0 feet NAVD88 (3.2 feet MLLW) allowing continuing use of existing beaches around Balboa Island. The remaining 4,000 feet would have a rebuilt seawall designed with a mudline elevation of approximately 4.0 feet NAVD88 (4.2 feet MLLW) to allow for dredging for boat berthing and navigation.

5.2 Balboa Island Ferry Boat Landing

With the replacement of the seawalls on Balboa Island, the dock and launch ramp at the Balboa Island Ferry Landing would also need to be modified. If the dock and launch ramp are left in their basic current location, a major effort would be required to raise the launch ramp and the approach street, Agate Avenue. Two options for raising the launch ramp were developed; they are shown in Figure 5.7. As shown in the figure, both options would impact adjacent buildings and the intersecting boardwalk.

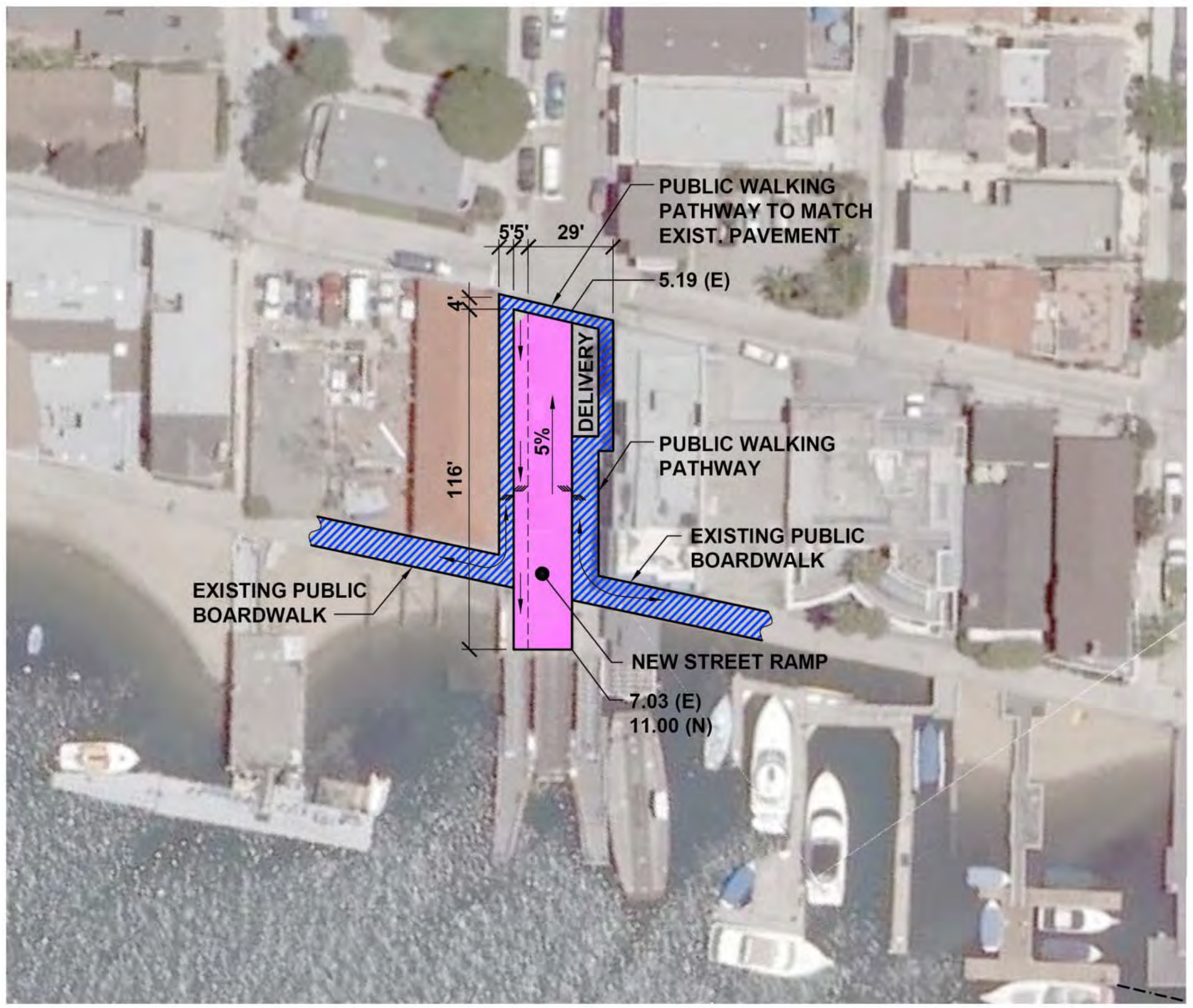
<u>Option 1</u> blocks the boardwalk at the intersection with the proposed ferry boat landing approach ramp. Pedestrians have to travel an additional 200 feet around the approach ramp to get from one side of the boardwalk to the other side. This option only allows one-way traffic from the ferry to the intersection of the approach ramp and alleyway. Existing grade-level sidewalk and delivery access are maintained on Agate Avenue.

<u>Option 2</u> allows continuous boardwalk access by constructing 5% grade ramps on either side of the approach ramp. These ramps are ADA-compliant and do not require handrails. However, the ramps do extend beyond the Agate Avenue right-of-way and impact access to six waterfront properties. The proposed approach ramp and adjacent sidewalks are widened to the full right-of-way width allowing for two-way traffic on Agate but blocking access to two structures on Agate.

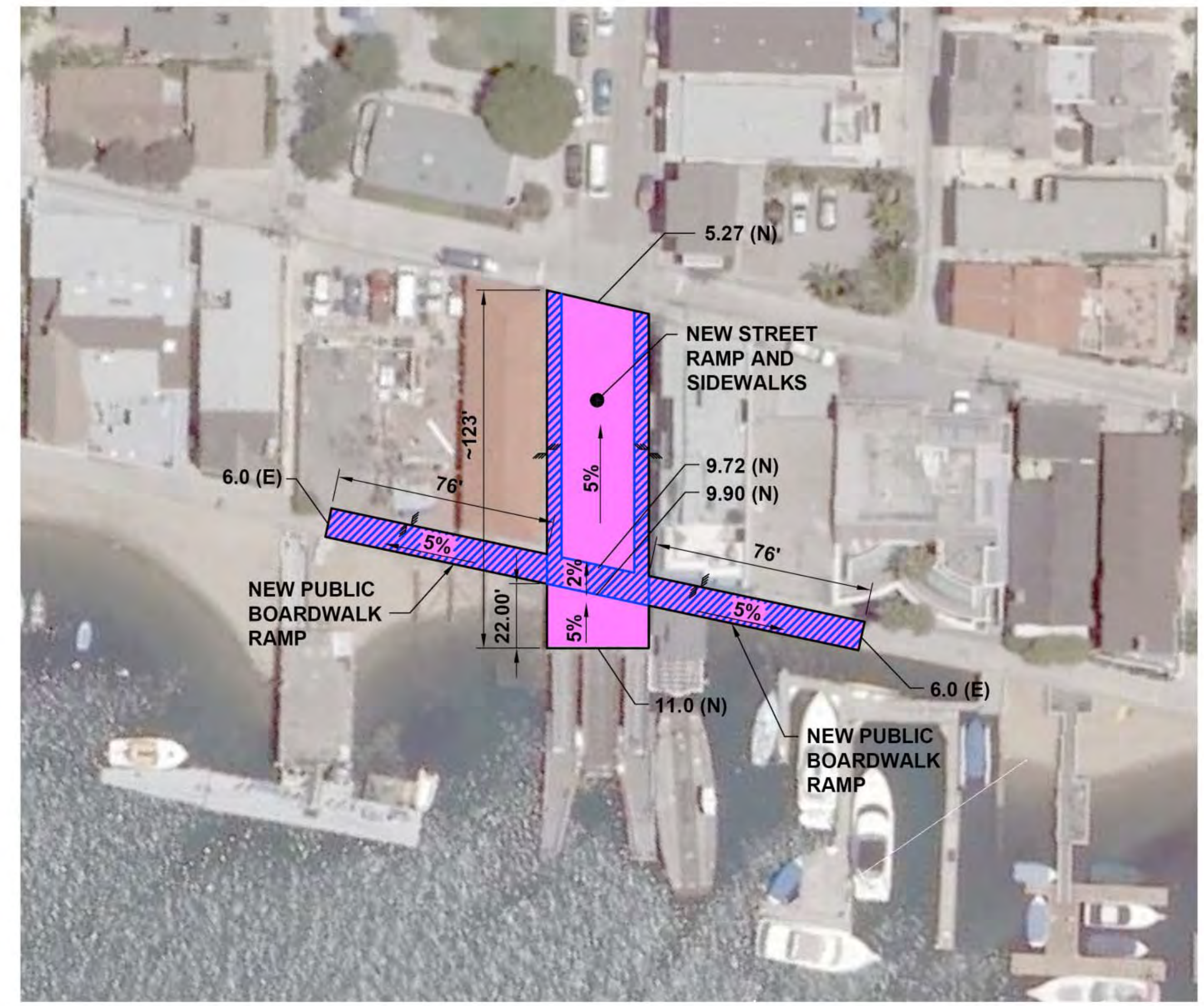
It is hard to envision raising the launch ramp without requiring the reconstruction of the two buildings on either side of Agate Avenue adjacent to the launch ramp, one of which, the J.A. Beek Building, may be considered a historic structure. Despite the impacts to surrounding properties and pedestrian access, Options 1 and 2 are land-based and only require the ferry launch ramp and float to be raised in concert with the new approach ramp. Additionally, these options do not impact existing navigation in the main channel.

An option to shift the launch ramp further into the main channel so that existing properties can remain unchanged was also developed. This proposed option (Option 3) is shown in Figure 5.8. To account for the effect of sea level rise to the Balboa Peninsula and to show the full extent of anticipated channel width reduction, a similar redevelopment of the ferry landing and launch ramp on the Balboa Peninsula side of the channel will be required. After some assessment of navigational clearances, which included incursions on both sides of the channel, the proposal appears feasible, although additional study would be necessary as well as discussions with the City Harbor Resources Department, the U.S. Coast Guard, California Coastal Commission, California Fish & Game, and the U.S. Army Corps of Engineers. Such a shift would likely require a similar extension of the adjacent fuel dock to prevent any reduction to ingress and egress into this facility. These changes would affect the existing pierhead lines.

Any reconstruction of this facility, regardless of the type, will take time. The facility could be inactive for nine months or more during construction of a new approach and launch ramp including installation, testing, and activation of all utility and mechanical systems. Furthermore, if this channel-ward approach were taken, a similar structure should be required on the Balboa Peninsula.



Option 1
Street Approach Ramp with Diverted Walking Path
@ 8% : ELEV. 14.0



Option 2
Street Approach & Boardwalk Ramps
@ 8% : ELEV. 12.5

Datum: NAVD 88

Figure 5.7 Two Options to Raise the Launch Ramp at Balboa Island Ferry Landing

Figure 5.8 Balboa Island Ferry Modification

5.3 Solutions for Groundwater-Caused Inundation of Balboa Island and Little Balboa Island

Based on the sea level rise scenarios discussed in Chapter 3, the mean sea level (MSL) could be as high as 7.3 feet NAVD88 (7.5 feet MLLW) by 2100. This water level is higher than many of the finished floor elevations of buildings in the Balboa Island. Therefore if sea levels rise as modeled, widespread flooding is predicted by 2100 as groundwater percolates through finished surfaces onto Balboa Island streets. Assuming that the water table lags the tide by approximately 3 feet adjacent to the seawall, it can be assumed that flooding may become a common occurrence between the interval Years 2050 and 2100 as the predicted high water level (with one percent probability of occurrence) increases from 9.1 feet to 12.3 feet NAVD88 (9.3 to 12.5 feet MLLW). If the predicted high water level and MSL occur, then a deep well groundwater dewatering system, coupled with seawall reconstruction, most likely would be necessary to prevent widespread flooding with current Island ground elevations.

The risks and benefits associated with a groundwater dewatering system should be assessed in further detail. The primary benefit is that existing infrastructure, except for the seawall (which is proposed to be reconstructed) and piers, may remain in their current state. However, operations of such a system may be high over time and disposal of groundwater may be problematic. Regional Water Quality Control Board does not allow direct discharge into Newport Bay. Additional pump redundancy and power backup will be required to prevent any failure of the system, which would likely result in extensive flooding and damage. Therefore, it is recommended that other long-term solutions be investigated. As part of any chosen solution, the City should continue adopting revisions to the Base Flood Elevation for Balboa Island as determined by FEMA. The Base Flood Elevation is likely to increase in the future to account for sea level rise.

Residents of Balboa Island have lived with the risk of floods since it was first constructed. Ever since then, individual residents, the Balboa Island Improvement Association (BIIA), and the City have investigated various solutions to flooding of Balboa Island during high water events. With the potential introduction of groundwater induced flooding, the risks of flooding and associated measures to combat these conditions become more complex.

5.4 Conceptual Costs

A conceptual level costs for each of the recommended flood inundation mitigation components are summarized in the following. These costs are based on 1st quarter 2011 construction costs with no escalation. These values should be adjusted for inflation and material and labor cost increases (i.e., contingency) if these values are projected to some future date. Details of the cost estimates can be found in Appendix C.

5.4.1 Short-term Seawall Extension Alternatives

Alternative 1: Cap Replacement

The cost to replace the existing seawall cap is estimated to be between $625 and $725 per lineal foot for a total cost of between $8.25 and $9.57 million. This estimate includes costs of design, permitting, and construction management and inspection.

Alternative 2: Cap Extension

The estimated construction cost to extend the existing seawall cap using a doweled-in concrete extension (Option 1) is between $250 and $300 per linear foot for a total cost of between $3.30 and $3.63 million. This estimate includes costs of design, permitting, and construction management and inspection.

For the use of polypropylene sandbags (Option 2), the estimated cost is between $170 and $190 per linear foot for a total cost of between $2.26 and $2.52 million over twenty years. This estimate includes operation and maintenance costs and assumes the sandbags need to be replaced once every five years.

For the use of geotextile (Longard) bags/tubes (Option 3), the estimated cost is between $130 and $160 per linear foot for a total cost of between $1.72 and $2.11 million over twenty years. This estimate includes projected maintenance items such as repair of damaged bags, replacement of lost or destroyed bags, and upkeep of UV-protection measures.

5.4.2 New Seawall

Seawall Replacement Option 1 consists of steel "H" piles with concrete panels placed between the piles to form a panel wall. The major cost components include demolition of the existing boardwalk, construction of a new boardwalk and drainage system, construction of the seawall and cap to 9.8 feet NAVD88 (10 feet MLLW), and cathodic protection of the steel "H" piles. The seawall, including all piles, panels, the seawall cap, and all associated costs such as corrosion protection and design, costs between $3,800 and $4,000 per lineal foot. The total construction cost is estimated to be between $50.2 and $52.8 million.

Seawall Replacement Option 2 consists of continuous steel sheet piles with a grout seal pumped between the existing seawall and this new seawall. Installation of the seawall sheet piles and cap, including all associated costs such as corrosion protection and design, is estimated to cost between $4,100 and $4,300 per lineal foot with a total construction cost of between $54.1 and $56.8 million.

Potential Cap Extension: Extending the seawall cap several feet up to 14.0 feet NAVD88 (14.2 feet MLLW) if needed as sea level rise in the future as modeled is estimated to cost between $400 to $500 per lineal foot for a total between $5.3 and $6.6 million.

The new seawall including the extended cap (14.0 feet NAVD88, 14.2 feet MLLW) and all associated soft costs is estimated to cost between $55.5 and $59.4 million for Option 1 and between $59.4 and $63.4 million for Option 2.

5.4.3 Balboa Island Ferry Boat Landing

Three options were presented in Section 5.2 to retrofit the Balboa Island Ferry Boat Landing. Options 1 and 2 are similar in that they propose to retrofit the existing Ferry Boat Landing approach structure and construct an approach ramp on Agate Avenue. These two options differ in how pedestrians cross the interface between the Ferry Boat Landing and the boardwalk. However, given the similarities and differing impacts of adjacent structures, the anticipated cost of these two retrofit options is estimated to be between $3.5 and $5.0 million. This includes the cost for retrofitting the existing restroom and mechanical building serving the Ferry Boat.

Option 3 calls for both the Balboa Island Ferry Boat Landing and the fuel dock to be moved further into the Main Channel. In addition, the fixed structures such as the restroom building and approach structure for the ferry boat landing and the tackle and supply shop for the fuel dock will need to be raised. The cost associated with the ferry boat landing is approximately $2.0 and $3.0 million. The cost associated with the fuel dock is approximately between $1.5 and $2.0 million. These costs includes all demolition, new bulkheads as needed, fill behind new bulkheads as needed, reconstruction of approach structures and fixed piers and gangways, and construction of new wharves and buildings as needed. It is assumed that the owners of both facilities will bear the cost of raising existing or driving new guidepiles and providing all new connections for their respective floating docks.

5.4.4 Retrofitting Bridges

The cost to waterproof and retrofit the Island bridges is estimated to be $250,000 to $350,000 per bridge. Although the Collins Island Bridge requires additional work such as construction of solid wall parapets, its cost is similar to the other bridges since it is relatively short. If any bridge is reconstructed in the near future, savings may be found by incorporating the long-term planning measures in the design.

5.4.5 Long-term Solutions

The cost of measures associated with installation of deep groundwater dewatering wells and pump stations cannot be determined at this time since the number of wells and pump stations are dependent on a through geotechnical report and soil permeability testing program. Additionally, the costs associated with meeting revisions to the Base Flood Elevation (BFE) cannot be calculated since the ultimate BFE is unknown as is the integration of associated costs into the typical structure design, permitting, and construction process.

5.4.6 Total Estimated Cost

A summary of the conceptual cost estimates is provided in Table 5.1. Assuming the proposed seawall is eventually extended to a final height of 14.0 feet NAVD88 (14.2 feet MLLW), the total projected cost of the short-term protection measures and long-term Balboa Island seawall replacement and fortification is anticipated to be between $61.5 and $79.0 million.

Table 5.1 Estimated Conceptual Construction Costs

MITIGATION COMPONENT	UNIT PRICE ($/LF) [1]	CONCEPTUAL COST [2]
Interim Seawall Height Extension		
Alt. 1: New Seawall Cap	$625 - $725	$8.25 - $9.57 million
Alt. 2: Existing Seawall Cap Extension		
Option 1: Mechanical Extension	$250 - $300	$3.30 - $3.63 million
Option 2: Polypropylene Sandbags	$170 - $190	$2.26 - $2.52 million
Option 3: Geotextile Bags/Tubes	$130 - $160	$1.72 - $2.12 million
New Seawall		
Option 1: Steel H-Piles w/ Conc. Panels	$3,800 - $4,000	$50.20 - $52.80 million
Option 2: Steel Sheet Piles	$4,100 - $4,300	$54.10 - $56.80 million
Subsequent Seawall Extension: 3 – 4 feet (When/If Required)	$400 - $500	$5.30 - $6.60 million
Ferry Landing and Bridges		
Ferry Boat Landing and Fuel Dock Retrofit (All 3 Options)		$3.50 -$5.00 million
Bridge Retrofit (3 bridges)	$250,000 - $350,000 per bridge	$0.75 - $1.05 million
Total Estimated Program Cost [3]		**$61.47 - $79.02 million**

1 All prices provided as $ per lineal foot, LF, unless noted otherwise. Range in unit prices includes design, permitting, and construction costs as described in the preceding paragraphs.

2 Engineer's Conceptual Cost Estimate is based on 1st quarter 2011 construction costs with no escalation.

3 Assumes the proposed seawall is extended to a final height of 14.0 feet NAVD88 (14.18 feet MLLW NTDE 83-01).

5.5 Funding Mechanisms

Given the scope of the proposed seawall project, the City of Newport Beach is likely to issue bonds to fund the project. The formation of a Special Assessment District likely will be needed to pay off these bonds. Formation of these assessment districts are governed by Propositions 13 and 218. Prior to the formation of an assessment district, Proposition 218, which is now incorporated as Section 4, Article XIII D of the California Constitution, requires a report detailing 1) the total project cost, 2) how the total cost was calculated, 3) the individual project cost to each parcel, 4) the parcels of record within the assessment district, 5) the duration of the assessment, and 6) the reasons for the assessment. In addition, Proposition 13 prevents the calculation of an assessment calculated as a percentage of the property value. In other words, assessment districts must base their fees on either 1) parcel area, 2) relative benefit, or 3) a flat rate.

There are a few assessment district mechanisms that may apply to the seawall project. These are:

1) Geological Hazard Abatement District

2) Seismic Safety Assessment District

3) Reclamation District

4) Facilities Benefit Assessment District

A Geological Hazard Abatement District and/or a Seismic Safety Assessment District may be formed since the seawalls were not designed to handle seismic loads and rising sea level will erode the land in front of the seawall. Given that Balboa Island is subject to flooding and is below the Base Flood Elevation, formation of a Reclamation District may be another option. Finally, since the seawall is a public facility, a Facilities Benefit Assessment may be used to repay the bonds. These Special Assessment Districts are easier to approve if they are brought to the City as a petition from the residents as this appears to be the least legally challenging avenue.

The City may consider seeking assistance from the U.S. Army Corps of Engineers (USACE) in addressing the flooding problems at Balboa Island. The USACE has five core missions, they are: commercial navigation, flood damage reduction, hurricane and storm damage reduction, ecosystem restoration, and comprehensive watershed planning. This project is most likely to fall under the flood damage reduction and the hurricane and storm damage reduction missions.

Section 103 of the 1962 River and Harbor Act (Hurricane and Storm Reduction Program) authorizes the Corps of Engineers to study, design, and construct small coastal storm damage reduction projects in partnership with non-federal government agencies, such as cities. Hurricane and storm damage reduction projects are not limited to any particular type of improvement. The maximum federal cost for planning, design, and construction of any one project is $5,000,000. Final design and construction costs are 65% Federal and 35% non-federal.

The USACE Floodplain Management Services (FPMS) Program's authority stems from Section 206 of the 1960 Flood Control Act (PL 86-645). Goals of the program include: 1) improving the capabilities to collaboratively deliver and sustain flood damage reduction and flood hazard mitigation services to the nation, and 2) identifying and assessing flood hazards posed by aging flood damage reduction infrastructure. Upon request, program services may be provided to state, regional, and local governments, and other non-federal public agencies without charge.

6 RECOMMENDATIONS

The existing seawalls at Balboa and Little Balboa Islands are between 72 and 83 years old and are near their expected useful lifespan of 75 to 100 years. They are showing extensive signs of distress and over the next 25 years, these walls will exhibit advanced deterioration which will be quite costly to repair. Furthermore, they are frequently being overtopped during extreme tide and high wave events. Therefore, instead of continually spending large sums of money for significant repairs for the seawalls with estimated remaining usable life of between 10 to 25 years, we recommend the City to begin implementing a plan to replace the existing seawalls with higher ones, as well as other mitigation solutions to address potential flood inundation of the two islands due to projected future sea level rise. Our recommendations include the following:

1. Begin replacement of the existing seawall within 10 years from baseline year 2010. This initial stage will consist of a perimeter seawall constructed to 9.8 feet NAVD88 (10 ft MLLW) which would place the new wall 0.8 feet about the current Base Flood Elevation of 9.0 feet NAVD88 (9.18 feet MLLW). In the interim, augment the exiting seawalls by 6 to 8 inches either by adding a cap extension, or by being prepared to deploy sandbags around the Balboa and Little Balboa Islands. A cap extension would be more aesthetically pleasing but would cost more than deploying sandbags.

2. When necessary, extend the seawall by an additional 3 to 4 feet during a timeframe spanning Years 2050 and 2060 (i.e., 40 to 50 years from baseline year 2010).

3. When necessary, construct a deep well groundwater dewatering system to protect the islands from subsequent high water tables associated with highest extreme water levels. If sea levels rise as predicted, this would need to be done during a timeframe spanning Years 2050 and 2060 (i.e., 40 to 50 years from baseline Year 2010).

4. Establish appropriate minimum lowest floor elevation in accordance with the federal Base Flood Elevation (BFE). The City of Newport Beach must continue to adhere to this requirement since Balboa Island is in a Flood Insurance Rate Map (FIRM) Zone A, which is considered a Special Flood Hazard Area. If sea levels rise as predicted, then in the future, the BFE may be higher than the current BFE of 9.0 feet NAVD88 (9.18 feet MLLW).

5. Start planning for reconstruction of the Ferry Boat Landing infrastructure. This study recommends two options for raising the launch ramps and one solution of moving the approach ramp further into the main channel. Any of these options will take time to implement, and the facility could be inactive for nine months or more during construction. The City may want to further investigate other alternatives.

6. The City should develop and implement a community awareness program. Inclusion of Collins Island and its residents in the Balboa Island seawall process is critical to the success of any Balboa Island mitigation measure, since Collins Island needs to raise their seawalls in concert with the Balboa Island program.

7. The City should undertake opportunities to coordinate with other Federal, State and County agencies to draw upon as a large pool of expertise that will be needed to address the complex and unprecedented issues associated with sea level issue. The City may be able to utilize the resources of other agencies which may have been working on addressing regional sea level rise impacts. In addition, the City should start investigating potential funding sources from other agencies that may help the City to develop a regional plan to mitigate sea level rise impacts.

The recommendations on replacement of existing seawalls, interim extension of the seawall cap and the deep well groundwater dewatering system were analyzed based on the current projection of future sea level rise. Recommendations could change when there is better certainty in the projected sea level rise. Hence, we recommend the City periodically revisit mitigation.

7 REFERENCES

U.S. Army Corps of Engineers. 2009. Water Resources Policies and Authorities Incorporating Sea-Level Change Considerations in Civil Works Programs.

Veri-Tech, Inc. 2009. Coastal Engineering Design and Analysis System (CEDAS) 4.03. http://www.veritechnic.com/products/cedas/index.php.

Vermeer, M and Rahmstorf, S. 2009. Global Sea Level Linked to Global Temperature. Proceedings of the National Academy of Sciences, 106(51), 21527–21532.

ATTACHMENT 6

Construction Access Plan

The City of Newport Beach recognizes that Balboa Island is a lively residential community with maritime activities year round, and understands the importance of implementing the project in a manner least inconvenient to those living and enjoying the recreational and aesthetic resources in and around Balboa Island. Per California Coastal Act Section 30212(b)(4), the project is not considered "new development," and is consistent with the aforementioned description in that all repair and maintenance work will not result in seaward extension of the existing boundary of the seawall.

Construction plans have been developed such that the project site consists of a total of 17 consecutive work areas along the perimeter of Balboa Island (Figure 1). Contractors would occupy and work in three work areas during each of the first five rotations, and two work areas during the final rotation. The work areas included in each rotation would be cleaned and cleared of any and all construction debris upon completion of construction-related activities, prior to beginning work in the next rotation. Work areas within each rotation would be spaced apart (with five unoccupied work areas between each active area), which would minimize interference with public access to the boardwalk and docks on the perimeter of Balboa Island.

There are four public piers located on Balboa Island:

- South end of Coral Avenue
- South end of Opal Avenue
- North end of Emerald Avenue
- North End of Sapphire Avenue

The construction rotations have been determined such that at least three of the four public piers would remain open to public access during active construction.

<u>Public Access in Construction Staging Areas</u>

A total of 16 construction staging areas are identified for the project. With the exception of Marine Avenue, all of the streets leading to the 16 construction staging areas are residential streets, lined with residential homes. A majority of the traffic in the vicinity of the project site consists of residential traffic with recreational public access to the boardwalks and docks on the perimeter of Balboa Island. There are no public parking lots in the vicinity of the project site along the alleys of North/South Bay Front; street parking spaces are permitted for public use in these residential areas.

In recognition of the limited public street parking spaces on the perimeter of Balboa Island, the Construction Management Plan (Attachment 8) has been developed to ensure contractors would occupy and work in up to three non-consecutive work areas during each construction rotation, thereby limiting potential loss of parking at the ends of the streets where construction staging areas would be placed (Figure 1). An average of six street parking spaces at the ends of the streets identified to be used as staging areas would be temporarily unavailable while a work area is in use. The rest of the boardwalk and street ends at Balboa Island would remain accessible for use. Based on the dominance of residential traffic along North/South Bay Front, the City of Newport Beach and COWI Marine determined the average of six street parking spaces that would be temporarily unavailable due to construction staging areas throughout the project would have no impact since street parking would still be available in the vicinity.

As stated in the Construction Management Plan (Attachment 8), sidewalks on both sides of the staging area shall remain clear of debris and construction equipment, and remain publicly accessible to the boardwalk, unless that work areas is temporarily completely closed, proper notification procedures have been followed, and appropriate signage posted to reroute public access.

Public Access in Work Areas

A total of 17 work areas are identified for the project, along the North/South Bay Front boardwalk. Public access would be temporarily limited in a small portion (a distance of approximately 450 feet) of the boardwalk for each active work area while the rest of the boardwalk would remain open and accessible. Figure 2 provides a boundary of the typical staging and construction areas. Figures 3 through 5 provide boundaries for each of the 16 staging areas and 17 work areas.

In active work areas, the contractor would have exclusive use of half of the boardwalk and would provide fencing or other suitable barrier parallel from the seawall, creating an active work space of no more than five feet from the seawall into the boardwalk. The protected boardwalk would remain open during periods of active construction, thereby allowing a temporary limitation on contiguous public access around Balboa Island.

There may be times when the entire boardwalk within an active work site must be temporarily closed to public access in order for the contractor to complete specific tasks in a timely manner. Additional actions to be undertaken by the contractor, in the event of such temporary full closures of a work site, are provided in the Construction Management Plan (Attachment 8).

Figure 2 Typical Staging and Construction Areas

Imagery provided by Google and its licensors © 2017.

Panel Installations during High Tide Events

Three-foot long gaps in the seawall coping would be constructed near street ends to provide enhanced public access over the seawall and to the beach. These gaps would be located where the beach sand elevation is higher to preserve ease of entry for those wishing to access the beach. These gaps are designed to accommodate a removable, nine-inch high barrier that would fit and lock into the gaps to provide flood protection during high tide events.

To determine the appropriate timing for installation of the nine-inch high barrier, the Harbor Resources Division of the City of Newport Beach Public Works Department will continuously monitor weather reports in anticipation of high tide or storm events. The Harbor Resources Division will assemble a team to bring the three-foot long barriers out of storage and will install the barriers into the seawall gaps along North/South Bay Front, at least 48 hours in advance of anticipated high tide or storm events as a preventative safety measure to provide flood protection and deter potential beach goers from being exposed to rough waters.

Within 48 hours after the high tide or storm event, the Harbor Resources Division team will reassemble to uninstall the three-foot long barriers, conduct a visual check of each barrier piece and seawall gap for damage or breach, and place all in-tact barriers back into storage. Any barriers and seawall gaps that may have been damaged or breached during the high tide or storm event will be immediately reported to the City's Public Works Department for assessment and repair, if needed.

Figure 3 Staging and Construction Areas (A1 through A7)

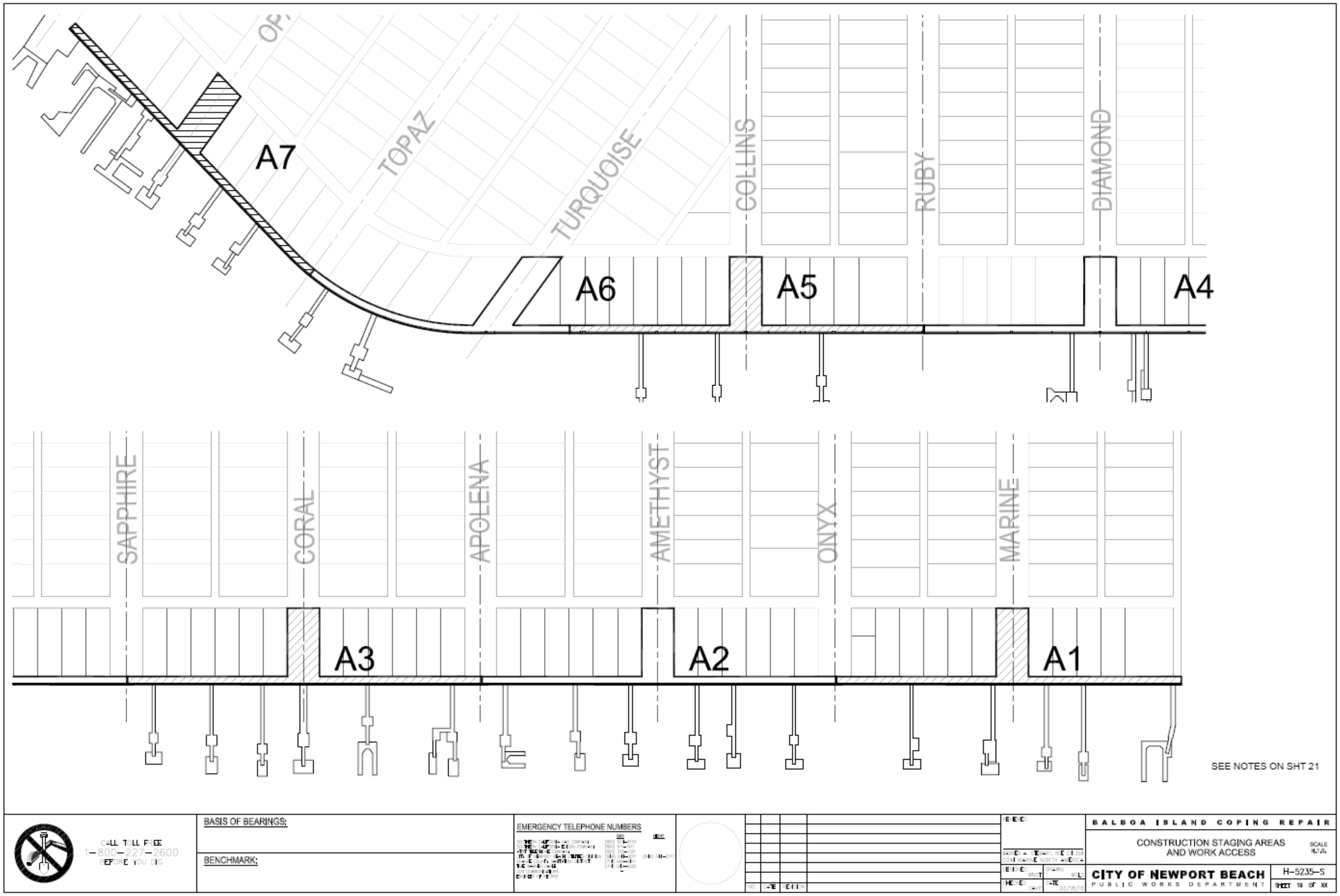


Figure 4 Staging and Construction Areas (A8 through A11)

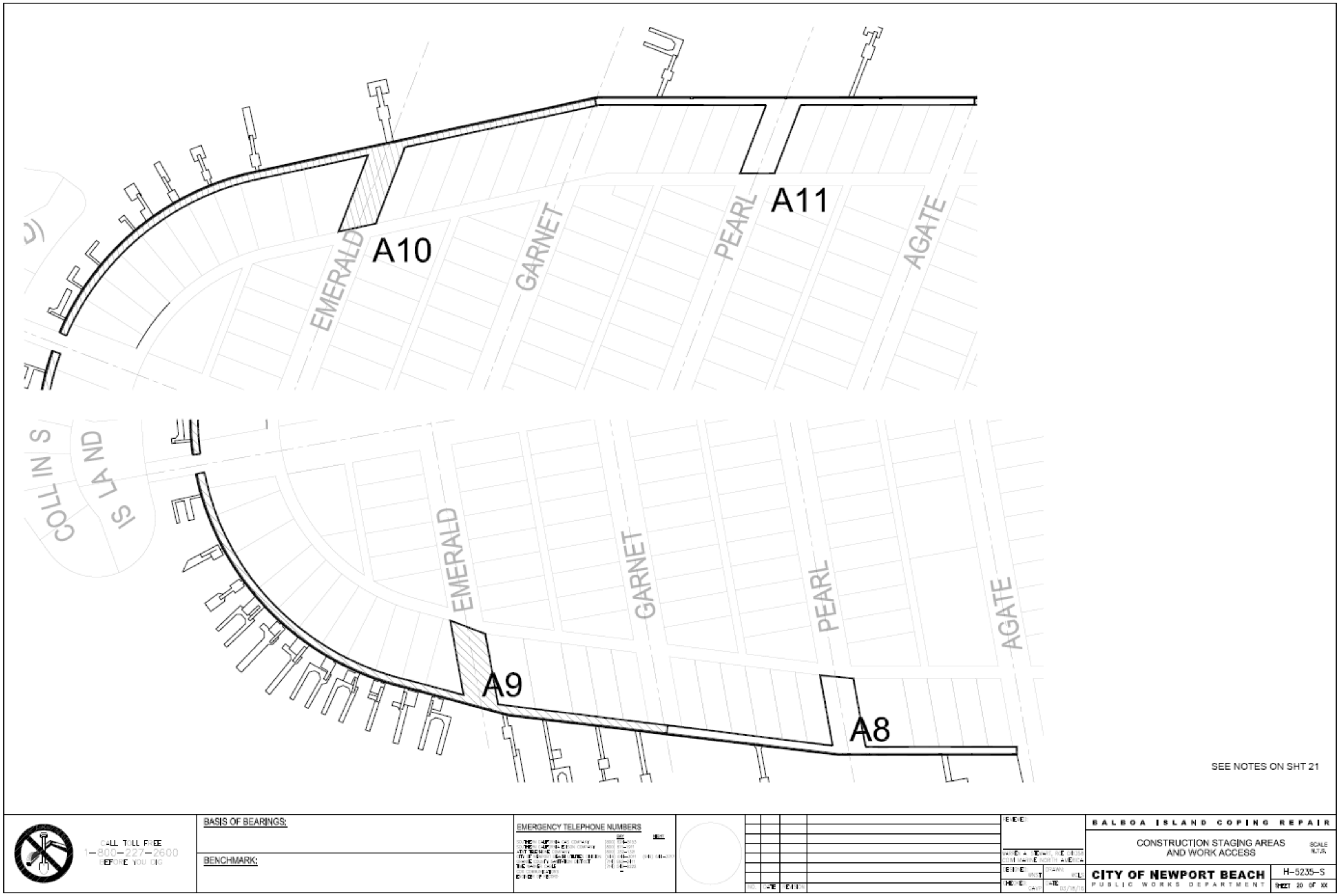
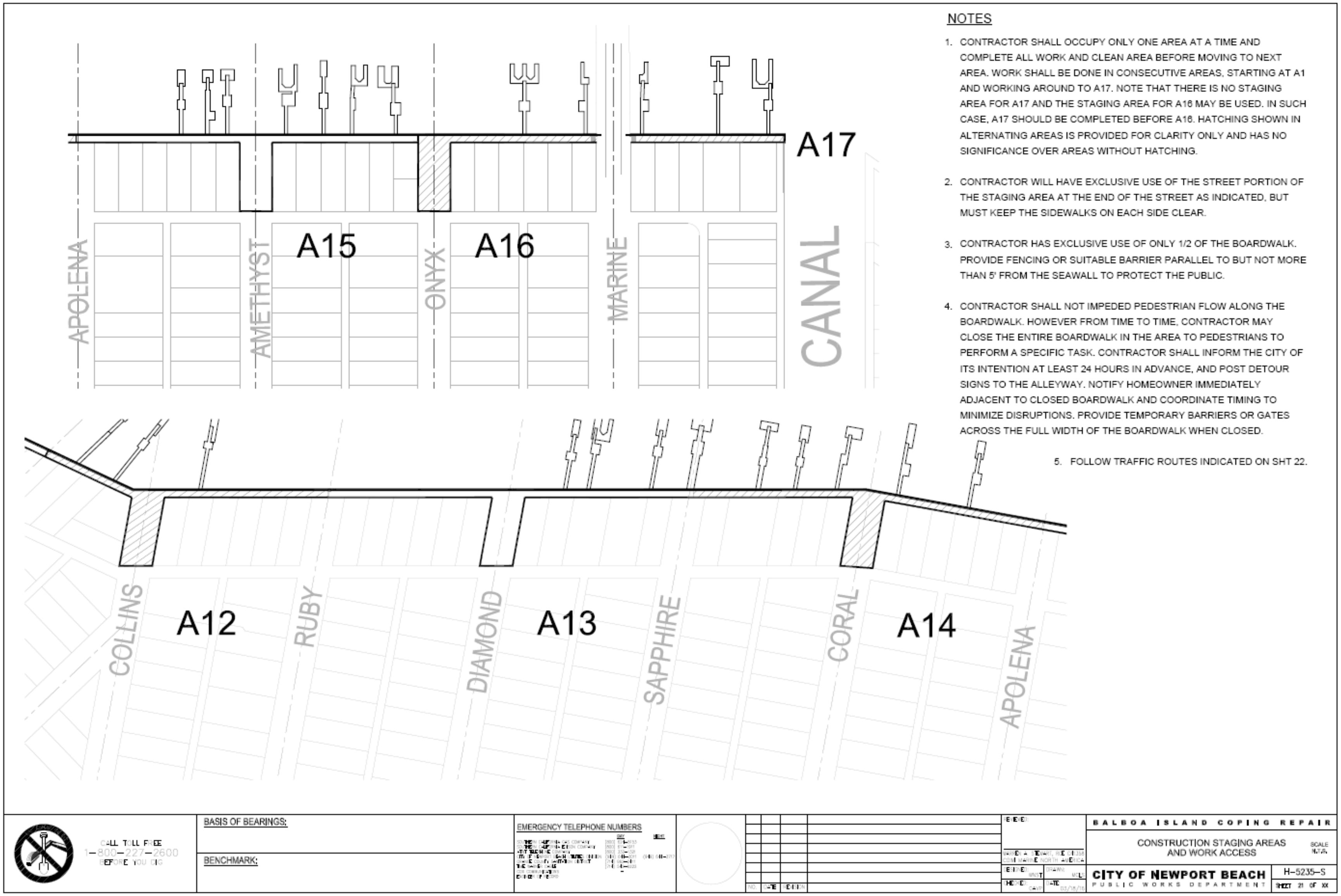


Figure 4 Staging and Construction Areas (A12 through A17)



ATTACHMENT 7

Bird Survey Protocol

Balboa Island does not contain any environmentally sensitive habitat areas (ESHA) as defined in California Coastal Act Sections 30107.5 and 30240. There are no areas on or in the immediate vicinity of Balboa Island that are recognized as Environmental Study Areas, according to Map 4-1 of the City's LUP. Eelgrass meadows exist in the coastal waters along much of the perimeter of Balboa Island and are recognized as Marine Resources on Map 4-2 of the City's LUP. However, all construction activities would be limited to the boardwalk side of North/South Bay Front and beach-side, with no activities occurring in harbor waters. Beach-side construction activities would avoid high tide events when feasible. Therefore, no encroachment into Eelgrass meadows would occur.

A majority, if not all, of the vegetation present at Balboa Island are ornamental in nature. Tree species on Balboa Island are primarily composed of *Ficus* varieties, palm tree varieties, and coral trees. Of these primary tree species present on Balboa Island, the *Ficus* varieties and coral tree (*Erythrina caffra*, Kaffirbloom) are considered "Problem Trees" under City of Newport Beach Council Policy G-1 Retention or Removal of City Trees[1]. According to the City, the only significant trees located on Balboa Island are designated as "Neighborhood Trees," a sub-classification of "Special Trees" due to their "unusual size, number, species, or location" which provide a special character to the area, and constitute the 39 eucalyptus trees along Marine Avenue. These trees are located more than 300 feet from the project area.

The project site and vicinity on Balboa Island, as it exists in its current state, does not support biological productivity as defined in California Coastal Act Section 30231 due to the highly fragmented nature of vegetation and potential habitat area. Though areas with dense vegetation and wetland habitats in Newport Bay exist within a 5-mile radius of the project site, the immediate vicinity of Balboa Island (such as along Balboa Peninsula, Lido Isle, Harbor Island, and along Bayside Drive) is completely developed with moderate to high levels of automobile traffic on land and boat traffic in the Bay, which would further deter birds and wildlife populations from becoming better established on Balboa Island.

A one-mile radius search of the California Natural Diversity Database (CNDDB) revealed records of three bird species that were listed as threatened or endangered under federal or State status designations. Table 1 provides a summary of the findings. Though all three species could potentially nest on Balboa Island, none of the records found in CNDDB were directly from Balboa Island. Therefore, the project would not have a significant impact on birds, bird nests, or trees as all construction-related activities are limited to the perimeter of Balboa Island and any disturbance or removal of trees are not a part of the project.

Table 1 CNDDB Records of Special Status Species within a 1-Mile Radius of the Project Site

Species	Federal Status	State Status	State Rank	CDFW SSC or FP
Chloropyron maritimum ssp. maritimum salt marsh bird's-beak	Endangered	Endangered	S1[1]	1B.2[3]
Polioptila californica californica coastal California gnatcatcher	Threatened	None	S2[2]	SSC[4]

[1] City of Newport Beach. 2016. *G-1: Retention, Removal, and Maintenance of City Trees*. http://www.newportbeachca.gov/home/showdocument?id=2464. Accessed December 2016.

Species	Federal Status	State Status	State Rank	CDFW SSC or FP
Riparia riparia bank swallow	None	Threatened	S2	NA

Source: CNDDB, 2016 (Accessed 8 December 2016)
[1] S1 = Less than 6 element occurrences (EOs), or less than 1,000 individuals, or less than 2,000 acres
[2] S2 = 6-20 EOs, or 1,000-3,000 individuals, or 2,000-10,000 acres
[3] 1B.2 = Rare or endangered in California and elsewhere; fairly endangered in California (20-80 percent occurrences threatened)
[4] SSC = Species of Special Concern

The ornamental tree and plant species found on Balboa Island generally do not provide ideal nesting habitats for herons, egrets, or other native California birds. However, it is possible for nests to exist on Balboa Island, though unlikely for a robust population to be established. Balboa Island is highly developed primarily with residential uses and the waterways of Newport Bay extend beyond 300 feet from the perimeter of the Island. Existing vegetation on Balboa Island does not provide substantial habitat area appropriate to maintain optimum populations of marine organisms, to support migratory bird populations, nor to maintain natural vegetation buffer areas to protect marine habitats in the vicinity.

As a result, no direct impacts to sensitive species and habitat areas in the project site and vicinity are anticipated. However, in line with the City's LUP policy 4.1.1-2, pre-construction bird nesting surveys would be conducted by a qualified project biologist prior to initiation of construction activities to further reduce the likelihood of disturbing sensitive bird species within 300 feet of the project site. If nesting birds are identified, noise-intensive construction activities would be performed outside of the bird breeding season over the anticipated construction period, totaling approximately four months.

While highly unlikely to have nesting sites on Balboa Island, sensitive bird species that may occur on Balboa Island include, but are not limited to, the black-crowned night herons, snowy egrets, great egrets, great blue herons, raptors. If construction noise is determined to be harmful, alternative methods of construction and maintenance activities or additional sound attenuation devices (such as sound shields) shall be used as necessary to achieve the desired reduction of noise levels to the extent determined by the qualified biologist. If these sound attenuation techniques do not sufficiently reduce noise levels or if birds are identified and observed to be negatively affected, the biologist will have the authority to halt construction within 300 feet of the nest sites and work shall not commence until either new sound mitigation can be employed or nesting season is complete, as determined by the qualified project biologist.

ATTACHMENT 8

Construction Management Plan

Construction Management Plan

City of Newport Beach Island Coping Repair Project (C-7066-1)
Balboa Island, Newport Beach, California

prepared for
City of Newport Beach
100 Civic Center Drive
Newport Beach, California 92660

prepared by
Rincon Consultants
180 North Ashwood Avenue
Ventura, California 93003

June 2017

Rincon Consultants, Inc.
Environmental Scientists Planners Engineers
www.rinconconsultants.com

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Table of Contents

Figures

Appendices

1.0 Project Introduction

Owner: City of Newport Beach
100 Civic Center Drive
Newport Beach, CA 92660

Engineer: COWI North America, Inc.
3780 Kilroy Airport Way, Suite 200
Long Beach, CA 90806

1.1 Project Location

The project site is located along the boardwalk of the southern, western, and northern perimeter of Balboa Island, starting from Grand Canal and North Bay Front and ending at Grand Canal and South Bay Front.

1.2 Project Description

The proposed project involves the repair and maintenance of the existing seawall located along the perimeter of North/South Bay Front boardwalk on Balboa Island in conformance with the proposed City of Newport Beach Balboa Island Coping Repair project (C-7066-1) and the City of Newport Beach (City) certified Coastal Land Use Plan. The purpose of the repair is to preserve the structural integrity and increase the height of the seawall on Balboa Island. These improvements would reduce the potential for water overtopping the walls during high tides, local wind waves, storm surges, and periods of larger ocean swells by increasing the height of the seawalls by 9 inches. The project would also be one of the City's first steps toward implementing plans to reduce the impact of sea level rise.

1.3 Scope of Work

This Construction Management Plan is designed to minimize the project's construction-related environmental effects, and to ensure public safety and coast access during project construction. The project applicant, contractor, and all sub-contractors must adhere to all provisions stated in this Construction Management Plan. Please refer to Appendix B (Construction Plan and Seawall Sections) for additional information.

2.0 Project Implementation

2.1 Dates of Construction

The construction of the proposed project is anticipated to occur over approximately eight months, from October through May to avoid active bird nesting and peak tourism seasons. See Appendix A for Construction Schedule.

2.2 Hours of Construction

Construction activities will be restricted to non-holiday weekdays from 7:00 A.M. to 5:00 P.M., per City of Newport Beach Municipal Code Section 10.28.040, or as specified by any conditions of approval adopted for this project. Any activity outside of the specified hours shall be authorized in writing by the City with sound mitigation measures (such as deactivating the back-up alert on trucks, and installing sound blankets around the perimeter of active work sites).

2.3 Construction Personnel Trip Generation and Parking

The total number of construction personnel at the site will vary depending on the construction activity. It is expected that during the initial pre-construction phase, an average of five workers daily will be at each active project site, for a total of 15 workers. During the construction phase, an average of eight workers daily will be at each active project site, for a total of 24 workers.

2.4 Construction Schedule / Process

The estimated Construction Schedule is expected to commence in October 2017 and continue for the duration of eight months, into 2018. Please refer to Appendix A for the Construction Schedule.

- Initial Pre-Construction Phase (2 months). This phase will involve equipment mobilization and minor demolition of the corners and tops of the seawall segments and roughening the existing exterior concrete surface of the seawall segments to create a proper bonding surface for construction of the reinforced concrete seawall cap. Existing cracks along the seawall segments would also be repaired or patched during the pre-construction phase.
- Construction Phase (6 months). The construction phase will involve:
    1. The construction of a reinforced 9-inch high concrete cap on top of the existing seawall;
    2. The construction of new concrete steps along portions of the seawall base fronting the North/South Bay Front boardwalk to preserve ease of access to each public or private doc; and,
    3. The construction of 3-foot wide "gaps" at pre-defined locations within the tops of the seawall segments fronting North/South Bay Front to preserve a sufficient level of vertical access to the waterside beaches.

A total of six construction rotations are anticipated for the 17 work areas identified along the North/South Bay Front boardwalk. Construction of the seawall segments will be phased such that no more than three non-contiguous segments will be constructed during the first five rotations, and the final rotation will consist of two work areas. Construction of each segment will take approximately ten days to complete, and all work is to be completed between the months of October through May.

Rotation	Anticipated Timeframe	Work Areas
1st	Mid-December – Late December	A1, A7, A13
2nd	Early January – Mid-January	A2, A8, A14
3rd	Mid-January – Late January	A3, A9, A15
4th	Early February – Mid February	A4, A10, A16
5th	Mid-February – Late February	A5, A11, A17
6th	Early March – Mid March	A6, A12

2.5 Construction Equipment

Anticipated construction equipment to be utilized for the various phases of the project is as follows:

Phase	Equipment
Initial Pre-Construction: • Minor demolition • Roughening exterior seawall segment surfaces • Repair and/or patch of existing cracks	• Light-weight jackhammer • Drill • Compressor • Pneumatic impact tools • Concrete saw • Light trucks & wheeled vehicles • Lifting equipment
Construction: • Drilling and grouting rebar dowels • Placing rebar cages • Concrete forming and placement	• Compressor • Pneumatic impact tools • Utility Crane • Concrete mixer & pump • Concrete forms • Hand tools

3.0 Parking Management

3.1 Construction Parking Details

Construction workers will be prohibited from parking outside of the active staging area. All construction-related vehicles will be parking within the staging area, thereby not detracting from any additional street parking spaces for residents or visitors. Active staging areas will be located in proximity to active project sites, and will be inaccessible for public parking or use for the duration of the construction phase (up to ten days per segment).

3.2 Staging Areas

The contractor shall have exclusive use of the street portion of the staging area, and maintain clear sidewalks on both sides of the street for public access to the boardwalk. Figure 1 provides a boundary of the typical staging and construction areas.

Figure 1 Typical Staging and Construction Areas

Imagery provided by Google and its licensors © 2017.

Staging areas are limited to the following:

1. For work areas A1 through A9, the staging area is bounded by:

    a. The south side of South Bay Front
    b. Only the street portion of the avenue identified as a staging area
2. For work areas A9 through A17, the staging area is bounded by:
    a. The north side of North Bay Front
    b. Only the street portion of the avenue identified as a staging area

A temporary street closure permit will be required for short durations (less than two weeks) to allow temporary use of street ends identified as staging areas. Closures of lanes or Public Right of Ways will not extend beyond two week periods.

The contractor shall have exclusive use of only half of the boardwalk for a total work area distance of approximately 450 feet along the seawall to up to, and no more than, five feet from the seawall into the boardwalk for each active work site. The contractor shall also have exclusive use of the beach-side of the seawall, and avoid construction during high tide events when feasible.

Section 5.1, *Pedestrian Protection*, of this Construction Management Plan provides additional information pertaining to public access and safety measures.

3.3 Construction Office, Materials Storage, and Waste Management

A construction office will not be provided on the project site. Temporary toilet facilities will be provided in the staging area for construction worker use only. Active staging areas will be fenced and locked to secure equipment and construction materials for the duration of the construction phase.

4.0 Traffic Control

4.1 Haul Routes

Haul operations shall be monitored by the contractor. Additional restrictions may be imposed by the Public Works Department if traffic congestion problems arise. The project's haul route shall follow the route depicted in Figure 2, below.

Figure 2 Staging Areas and Construction Routes

Imagery provided by Google and its licensors © 2017.
Additional data provided by City of Newport Beach, 2017.

No road closures would occur as a result of the project, and circulation around Balboa Island would not be impacted as a result of construction-related traffic, since all construction-related vehicles would be limited to traveling on the access routes identified in Figure 2, and all construction-related vehicles would be parked in active staging areas, thereby not detracting from any additional street parking spaces for residents or visitors.

Primary access roads are identified as being the most efficient way in routing construction-related traffic from Marine Avenue to the respective secondary access roads leading to active staging and work areas by time and distance to reduce, to the greatest extent possible, potential traffic congestion on Balboa Island. As such, all construction vehicles shall enter and leave Balboa Island via the Balboa Island Bridge to Marine Avenue.

Secondary access roads are the roads that directly lead to the respective work and staging areas where active construction would take place. Access routes for the work areas and respective staging areas are as follows:

Work Area	**Primary Access Roads**			**Secondary Access Road**
	Marine Ave	**Balboa Ave**	**Park Ave**	
A1	●			Marine Avenue
A2	●	●		Amethyst Avenue
A3	●	●		Coral Avenue
A4	●	●	●	Diamond Avenue
A5	●	●	●	Collins Avenue
A6	●	●	●	Turquoise Avenue
A7	●	●	●	Opal Avenue
A8	●	●	●	Pearl Avenue
A9	●	●	●	Emerald Avenue
A10	●	●	●	Emerald Avenue
A11	●	●	●	Pearl Avenue
A12	●	●		Collins Avenue
A13	●	●		Diamond Avenue
A14	●	●		Coral Avenue
A15	●	●		Amethyst Avenue
A16 and A17	●	●		Onyx Avenue

The following pertain to speed limits and controls for construction-related vehicles:

1. All construction-related vehicles are prohibited from driving, parking, or idling in any and all alleys present on Balboa Island, including North/South Bay Front.
2. All construction-related vehicles shall be limited to traveling in and out of the staging area via the primary and secondary access roads identified for each respective work Figure 2. Vehicles may travel against traffic on one-way streets directly to work areas with flagmen.
3. All construction-related vehicles shall be limited to a maximum of 15 miles per hour (mph) on the Balboa Island Bridge, as per City of Newport Beach Municipal Code Section 12.32.015 Balboa Island Bridge Speed Restrictions.
4. Though the speed limit on Balboa Island is 25 mph on streets, all construction-related vehicles shall be limited to a maximum of 20 mph in order to reduce potential noise impacts due to the size of the vehicles and construction equipment carried on the vehicles, and as an added precaution to street and pedestrian traffic.
5. All construction-related vehicles shall comply with the traffic control regulations provided in City of Newport Beach Municipal Code Section 12.32.050 should traffic control points be in the path of any and all primary and secondary roads used to access the staging and work area or to leave Balboa Island.

4.2 Delivery Requirements

All deliveries will use the Haul Route identified in Figure 2.

As mentioned in Section 3.2, the contractor shall request a temporary street and sidewalk closure permit for no more than two weeks. Loading and unloading of all construction materials, equipment, and/or construction vehicles will take place on site or within the staging area as identified in Figure 2. Loading and unloading will be managed by the construction team and overseen by the contractor. Trucks that arrive at the site will not be allowed to queue in public streets or rights-of-way. The contractor shall be responsible for optimizing space available to queue construction-related vehicles to provide sufficient capacity for all vehicles, operations, and workers. Once the pickup or delivery is complete, trucks will exit the staging area using the haul route depicted in Figure 2. All trucks will be required to shut off their engines during the loading/unloading process.

The majority of the trucks used for construction of the seawall cap will be cement mixers, flatbed trucks, and vans.

To prevent obstruction of through traffic lanes adjacent to an active site, a flag person shall be retained to maintain safety adjacent to existing roadways.

4.3 Traffic Control Plan

Traffic control will be coordinated with the Police Department and Public Works Department, Traffic and Development Services Division, so that street traffic is not obstructed. A temporary street and sidewalk closure permit is required for the closure of any portion of the public right-of-way.

5.0 Safety and Security

5.1 Pedestrian Protection

For Construction Staging Areas:

1. Sidewalks on both sides of the staging area shall remain clear of debris and construction equipment, and remain publicly accessible to the boardwalk, unless the work area is temporarily completely closed, proper notification procedures have been followed, and appropriate signage posted to reroute public access.
2. The contractor shall provide fencing or suitable barriers around the staging area in order to contain use of the staging area while protecting public access on the sidewalks.
3. Appropriate signage shall be posted at the staging area to inform the public that access and use of the street is limited during active construction at the work area.
4. Signage and fencing/barriers shall be removed upon completion of work and clean-up of the work area, prior to beginning construction activities at an adjacent work area.

For Active Work Sites:

1. The contractor shall have exclusive use of only half of the boardwalk for a total work area distance of approximately 450 feet along the seawall up to, and no more than, five feet from the seawall into the boardwalk. The contractor shall also have exclusive use of the beach-side area along the seawall, and shall avoid construction activities during high tide events when feasible.
2. Equipment, debris, construction materials, or vehicles shall not obstruct the sidewalks parallel to identified staging areas or accessible portions of the boardwalks and beach within an active work area.
3. The contractor shall provide fencing or suitable barriers around the active work area that are highly visible to clearly differentiate active work areas closed to public access from the portion of the boardwalk that is open for public access. Public access signs and fencing materials shall not protrude into the pedestrian walkway. Furthermore:
    a. A-frames used for defining path of travel shall be placed end-to-end without spacing, and shall be connected and maintained to ensure stability such that the pathway is safe and navigable for those who are blind and/or using a cane.
    b. Caution tape alone shall not be used to delineate the public access boardwalk and beach, or to create a barricade.
    c. Signposts and fencing supports shall be placed entirely outside of the public access boardwalk.
    d. Construction barriers shall be maintained in a sound, neat, and clean condition.
4. The public access boardwalk shall be at least five feet wide whenever feasible, and shall conform to ADA Accessibility Guidelines. It shall not be less than four feet wide at any single point of contact or obstruction.
5. Should potential tripping hazards be present in the public access boardwalk within the work area, temporary walking surfaces, steel plates, or other surface materials of the like shall be put

in place to provide a smoothly finished, firm walking surface to ensure pedestrian safety. Such temporary walking surfaces shall lie flush and even with surrounding walkways to prevent gaps, and prevent potential trips and falls.

6. If necessary, the contractor or City shall install and maintain temporary wood ramps to provide a safe path for public access for mobility-impaired pedestrians at all locations within the active work area where existing ramps may have been temporarily removed or needed to route pedestrians.
    a. Temporary ramps shall be constructed such that installation and removal will not damage existing pavement, curb, and/or gutters in the vicinity of the temporary ramp.
    b. Ramps shall have a minimum four foot width for the walking surface and a slope not to exceed eight percent in grade.
    c. Ramps shall snugly fit and meet existing surfaces without gaps.
    d. Ramp design shall incorporate drainage as needed to prevent slips and falls from wet surfaces that may potentially result as a result of construction activities.
    e. Transitions between ramps and the public access boardwalk surface shall be smooth such that no lip exists at the base of the ramp.
    f. The sides of a rap shall be protected where there is any drop-off.
7. An alternative path of travel shall be clearly identified if the public access boardwalk must be temporarily closed due to construction activities.

Temporary Closures to Public Access:

1. Temporary closures of designated public access routes shall be allowed only after the following actions:
    a. The contractor shall inform the City of closing the entire active work site at least 24 hours in advance of the work site closure.
    b. The contractor shall post appropriate signage indicating any and all detour routes at least 24 hours in advance of the work site closure.
    c. The contractor or City shall notify homeowners immediately adjacent to closed boardwalk areas within the work site at least 24 hours in advance of the work site closure.
    d. The contractor shall place temporary barriers or gates across the full width of the boardwalk with appropriate signage to indicate closure of the work site to public access and maintain public safety, upon completion of any and all notification procedures, and before work begins.

5.2 Project Fencing

Active project sites will be temporarily fenced with 7-foot high construction fence prior to the start of any construction activities. More specifically, polyethylene mesh covered chain link fencing compliant with STD 230-L-A and STD 230-L-B will be installed on three sides of an active staging area, within the street area with both sides of the sidewalks open and accessible for pedestrian access. Mesh covered chain link fencing will be installed within the active work area, and provide at least five feet in width of boardwalk space for pedestrian access.

5.3 Safety and Security

Appropriate signage will be posted at active sites and staging areas, including "Hard Hat Area," and other visitor and delivery information. Daily safety inspections will be done by the onsite project manager. A site-specific safety plan will be provided prior to mobilization.

The following provides additional protocols for all construction activities to ensure public and worker safety for the duration of the project:

1. The contractors shall complete all work and clean the work area prior to moving to the next work area, such that:
    a. The surface of public access boardwalks and beaches shall be restored and free of any and all construction debris.
    b. Temporary ramps, barricades, and/or walkway surfaces that may have been placed and used during construction activities shall be removed as soon as construction and clean up are completed.
    c. Any damage incurred on the public access boardwalk as a result of construction activities shall be restored to its original condition upon completion of work within the work site, prior to allowing public access in order ensure safe surfaces and conditions.
2. The size, maximum number posted, duration, and any and all additional requirements for temporary notification signs shall be consistent with City of Newport Beach Municipal Code Section 20.42.090 Standards for Temporary Signs. All temporary notification signs are exempt from City review prior to posting, per the provisions of Municipal Code Section 20.42.100 (d).
3. The contractor shall provide appropriate signage to indicate the following for the work areas:
    a. Staging area for the active work area, with precautions to keep the public away from the staging area and on designated public access sidewalks.
    b. Work area by the seawall to clearly differentiate the active construction area from public access boardwalk, with barriers previously noted.
    c. Temporarily closed work areas that limit public access on the boardwalk and beach due to construction activities and the need to further maintain public safety, following the 24 hour prior notification.
    d. Any and all detour routes for pedestrian access where sidewalks leading from the staging area to the boardwalk may lead to a temporarily closed boardwalk.
    e. Detour signs shall contain a clearly visible street map (no less than 8.5 x 11 in size), showing clearly labeled publicly accessible detour routes that can be used to access other open areas of the boardwalk in the event of a temporarily closed work area.
    f. Detour signs shall contain contact information for the contractor and City.

6.0 Air Quality Control, Fugitive Dust Control, Noise Suppression, and Vibration Monitoring

A project specific plan will be provided in accordance with the Conditions of Approval and mitigation measures approved with project entitlements with regard to each of the following:

6.1 Emissions/Air Quality Control

- Vehicle maintenance logs for all construction-related vehicles
- Limit allowable idling to 30 minutes for trucks and heavy equipment

6.2 Fugitive Dust Control

- Water all active construction areas at least twice daily
- Cover all haul trucks and maintain at least two feet of freeboard
- Sweep or wash any site access points within two hours of any visible dirt deposits on any public walkway or roadway
- Cover, sweep and gather, or water twice daily, any on-site stockpiles of debris, dirt, or other dusty material
- Suspend all operations if winds exceed 25 mph, or construct temporary enclosures to contain fugitive dust.

6.3 Noise Control

- Construction contractor shall provide residents living within 100 feet of the active project site with a construction schedule for the prior to the commencement of construction, and shall keep residents informed of any material changes to the schedule. The notification shall also include the name and phone number of a contact person with whom to register any and all complaints.
- Deactivate back-up alerts on construction vehicles if construction staging is proposed outside of designated construction hours (before 7:00 A.M. or after 5:00 P.M.)
- Install sound dampening blankets at the perimeter of the site

6.4 Vibration Monitoring

- Encouraging construction works to carpool to staging and work areas to minimize construction-related traffic and vehicle movement
- Park construction vehicles only in active staging areas
- Sweep access points daily
- Encourage movement of materials during non-peak traffic hours, when possible

7.0 Environmental Compliance & Protection

7.1 Construction Pollution Prevention Plan

Pursuant to the City's Coastal Development Permit requirements, the project is required to prepare a Construction Pollution Prevention Plan (CPPP) to ensure that construction activities do not impact stormwater or other receiving waters (e.g., Newport Bay and the Pacific Ocean). In summary, the CPPP requires the implementation of the following most relevant best management practices:

- EC-1, Scheduling
- SE-5, Fiber Rolls
- SE-6, Gravel Bag Berm
- SE-7, Street Sweeping
- SE-10, Storm Drain inlet Protection
- WE-1, Wind Erosion Control
- WM-5, Solid Waste Management
- WM-8, Concrete Waste Management
- WM-10, Liquid Waste Management
- NS-3, Paving and Grinding Operation
- NS-6, Illicit Connection/Discharge
- NS-15, Demolition Adjacent to Water

Please refer to the CPPP prepared by Rincon Consultants for more detailed information and additional required BMPs.

8.0 Special Conditions of Approval

8.1 City of Newport Beach Conditions of Approval:

9.0 Consultants & References

9.1 Consultants

Construction & Engineering Consultant:

COWI Marine

3780 Kilroy Airport Way, Suite 200

Long Beach, CA 90806

Environmental & Planning Consultant:

Rincon Consultants, Inc.

180 North Ashwood Avenue

Ventura, California 93003

9.2 References

Rincon Consultants, Inc. Construction Pollution Prevention Plan for City of Newport Beach Balboa Island Seawall Coping Repair Project. June 2017.

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Appendix A

Construction Schedule

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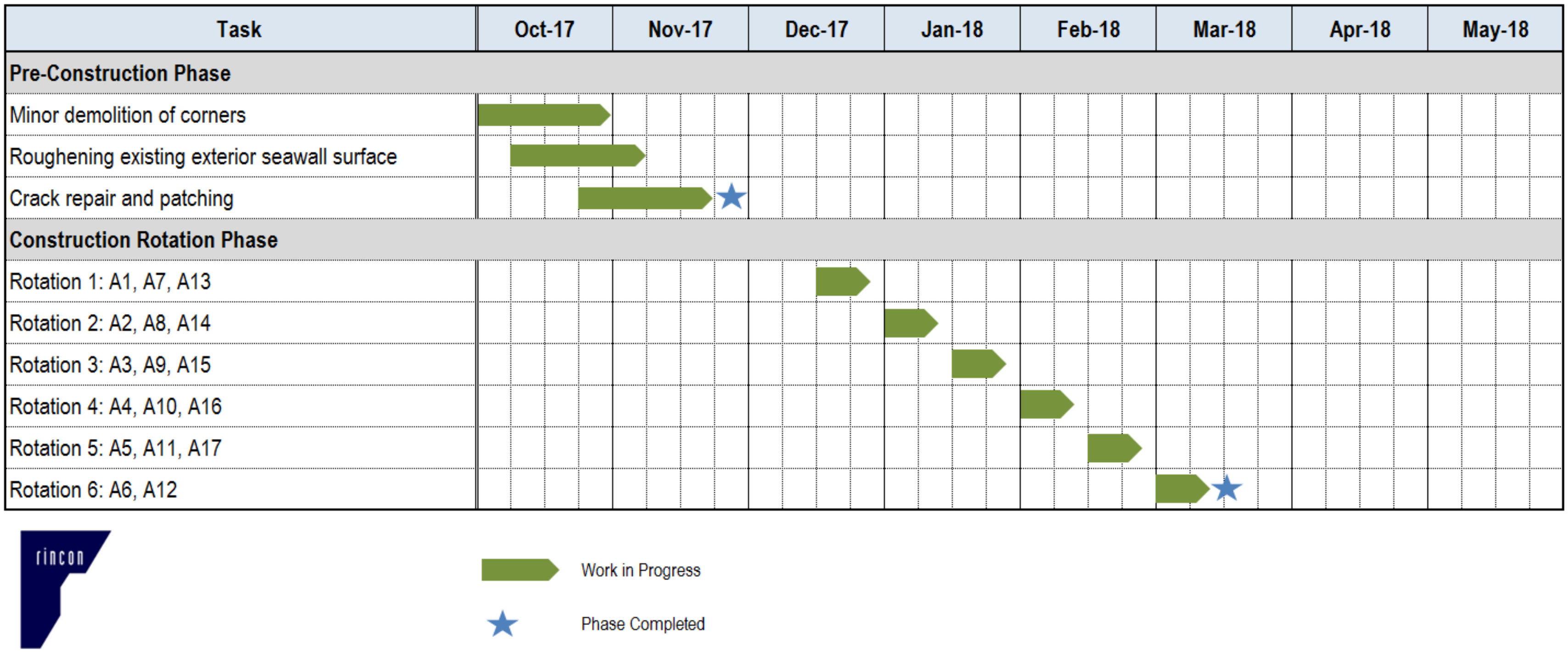
City of Newport Beach

Balboa Island Seawall Coping Repair Project

Construction Schedule



Appendix B

Construction Plan and Seawall Sections

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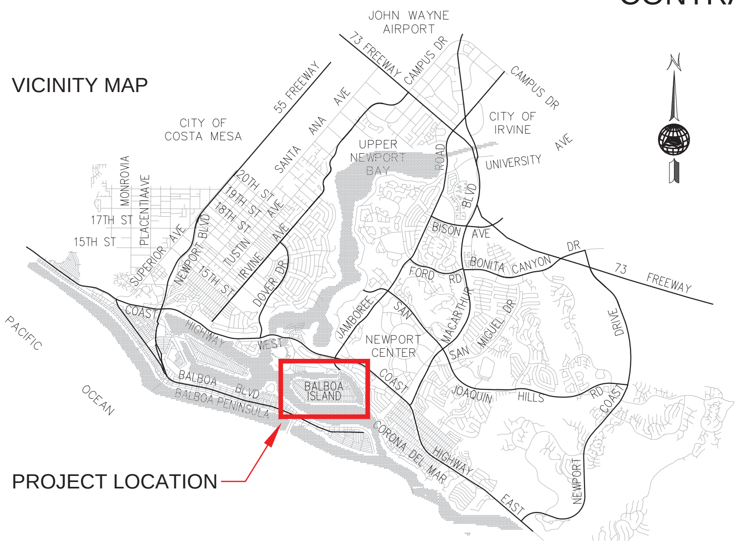
CITY OF NEWPORT BEACH
PUBLIC WORKS DEPARTMENT

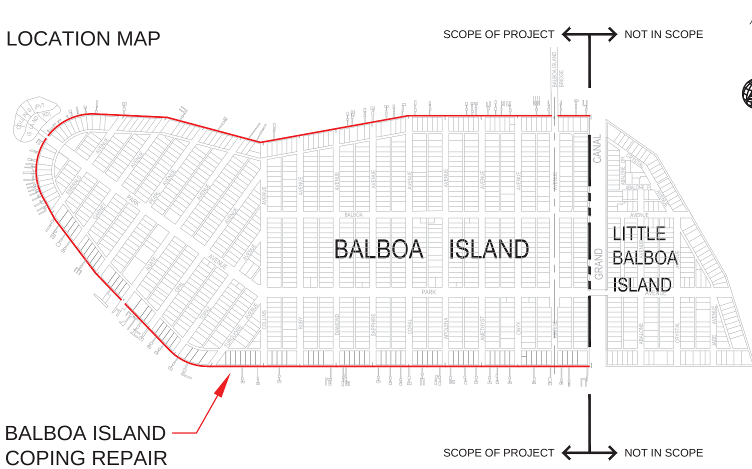
BALBOA ISLAND COPING REPAIR

CONTRACT NO. C-7066-1

VICINITY MAP



LOCATION MAP



DRAWING INDEX

SHEET	SHEET TITLE
1	TITLE SHEET, VICINITY MAP, LOACTION MAP, DRAWING INDEX
2	GENERAL NOTES
3	OVERALL PLAN
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16	DETAILS
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18	DETAILS

SHEET	SHEET TITLE

80% REVIEW SUBMITTAL NOT FOR CONSTRUCTION

CALL TOLL FREE
1-800-227-2600
BEFORE YOU DIG

BASIS OF BEARINGS:

BENCHMARK:

EMERGENCY TELEPHONE NUMBERS

	DAY	NIGHT
SOUTHERN CALIFORNIA GAS COMPANY	(800) 624-8153	
SOUTHERN CALIFORNIA EDISON COMPANY	(800) 611-1911	
AT&T TELEPHONE COMPANY	(800) 332-1321	
CITY OF NEWPORT BEACH UTILITIES DIVISION	(949) 644-3011	(949) 644-3717
ORANGE COUNTY SANITATION DISTRICT	(714) 962-2411	
TIME WARNER CABLE	(714) 542-6222	
COX COMMUNICATIONS	-	
ENGINEER OF RECORD		

NO.	DATE	REVISION

REVIEWED:

WARREN A. STEWART, RCE C41358
COWI MARINE NORTH AMERICA

DESIGNED: WNST	DRAWN: MCLS
CHECKED: GAVP	DATE: 03/18/16

BALBOA ISLAND COPING REPAIR

TITLE SHEET, VICINITY MAP, LOCATION MAP, DRAWING INDEX

CITY OF NEWPORT BEACH
PUBLIC WORKS DEPARTMENT

H-5235-S

SHEET 1 OF XX

GENERAL NOTES

SECTION 1 : GENERAL

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SITE CONDITIONS BEFORE STARTING WORK . THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCY.
2. THE CITY OF NEWPORT BEACH AND/OR THE ENGINEER SHALL BEAR NO RESPONSIBILITY FOR EXPENSES INCURRED AS A RESULT OF FAILURE ON THE PART OF THE CONTRACTOR TO VERIFY DIMENSIONS AND/OR VERIFIABLE SITE CONDITIONS PRIOR TO BEGINNING WORK.
3. NOTES AND DETAILS ON THE DRAWINGS SHALL TAKE PRECEDENCE OVER THESE GENERAL NOTES.
4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ALL EXISTING UTILITIES WHETHER SHOWN HERE ON OR NOT AND TO PROTECT THEM FROM DAMAGE. THE CONTRACTOR SHALL BEAR ALL EXPENSE OF REPAIR OR REPLACEMENT IN CONJUNCTION WITH THE EXECUTION OF THIS WORK.
5. DIMENSIONS TAKE PRECEDENCE OVER SCALE.
6. SUBSTITUTIONS: NO SUBSTITUTIONS SHALL BE MADE WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
7. DAMAGE TO EXISTING FACILITIES: THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE TO EXISTING STRUCTURES, PAVEMENT, CONCRETE SIDEWALK, UNDERGROUND UTILITIES, LANDSCAPING, CONCRETE PILES, LANDINGS, BULKHEAD AND FACILITIES ON OR ADJACENT TO THE PROJECT AND SHALL REPAIR ANY DAMAGE AT NO COST AND TO THE SATISFACTION OF THE HOMEOWNER AND ENGINEER.
8. THE CONTRACTOR SHALL NOT USE THE SIDEWALK OR THE AREA BEHIND THE BULKHEAD FOR EQUIPMENT AND/OR MATERIAL STORAGE.
9. CLEAN-UP: ALL TRADES SHALL, AT ALL TIMES, KEEP THE PREMISES FREE FROM ACCUMULATION OF WASTE MATERIALS OR RUBBISH CAUSED BY THE WORK DURING CONSTRUCTION, AND AT THE COMPLETION OF THE WORK SHALL REMOVE ALL RUBBISH AND DEBRIS.
10. SCHEDULE: CONTRACTOR SHALL SUBMIT A DETAILED SCHEDULE OF WORK INDICATING THE SEQUENCE OF ALL CONSTRUCTION PHASES FOR APPROVAL BY THE ENGINEER.
11. DATUM: ALL ELEVATIONS SHOWN ARE BASED ON A DATUM OF MEAN LOWER LOW WATER -0.00.

SECTION 2 : REGULATORY REQUIREMENTS

1. THE CONTRACTOR SHALL, AT ALL TIMES, COMPLY WITH ALL OSHA AND STATE SAFETY ORDERS.
2. ALL WORK SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2015 EDITION, INCLUDING SUPPLEMENTS (SSPWC).

SECTION 3 : CONCRETE

1. ALL CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF ACI 301, "SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS" AND THE "2013 CALIFORNIA BUILDING CODE", CHAPTER19A, EXCEPT AS MODIFIED BY THE SUPPLEMENTAL REQUIREMENTS HEREIN AND IN THE PROJECT SPECIFICATIONS.
2. CAST IN PLACE CONCRETE SHALL BE HARD ROCK CONCRETE AND SHALL COMPLY WITH SSPWC SECTION 201-1.1.3
   A. CONCRETE TYPE 750-CSE-5000P
   B. MAX WATER-CEMENT RATIO = 0.40
   C. HIGH RANGE WATER REDUCER REQUIRED
   D. PUMP MIX ONLY IF PUMPING CONCRETE
3. ALL EXPOSED EDGES AND CORNERS SHALL BE ROUND WITH A 1-1/2" RADIUS, UNLESS OTHERWISE NOTED.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH ALL TRADES TO ENSURE THAT ALL EMBEDDED BOLTS, ANCHORS, BLOCKOUTS, PLATES, ETC. ARE PROPERLY LOCATED AND INSTALLED BEFORE POURING CONCRETE.
5.. REINFORCING STEEL SHALL CONFORM TO THE FOLLOWING:
   TYPICAL REINFORCING...................ASTM A-615, GR. 60
   BARS TO BE WELDED....................ASTM A-706
6. ALL REINFORCING STEEL DETAILING, FABRICATION, ACCESSORIES AND PLACEMENT SHALL CONFORM TO ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT". PROVIDE 3 INCHES MINIMUM COVER FOR REINFORCING BARS UNLESS OTHERWISE NOTED. WHERE NEW CONCRETE IS TO BE POURED AGAINST EXISTING, MIN CLEARANCE SHALL BE 2".
7. CONTINUOUS REINFORCING STEEL SHALL BE DETAILED IN AS LONG A LENGTH AS PRACTICAL AND SHALL HOOK AROUND CORNERS FROM BOTH DIRECTIONS TO FORM A SPLICE LENGTH.
8. ALL LAP SPLICES SHALL BE TENSION CLASS "B" LAP SPLICES WHERE NO CALL OUT IS MADE ON THE DRAWINGS.
9. WELDING ELECTRODES FOR WELDED SPLICES SHALL BE E70XX. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS. ALL WELDED JOINTS SHALL BE AWS PREQUALIFIED.
10. HOOKS SHOWN BUT NOT DIMENSIONED SHALL CONFORM TO THE REQUIREMENTS FOR A "STANDARD HOOK" PER ACI 315.
11. ALL INSERT HOLES, SHE-BOLTS, ETC. AND OTHER IMPERFECTIONS ON THE SURFACES OF THE CONCRETE SHALL BE FILLED WITH GROUT, BRUSHED AND SACKED TO A UNIFORM FINISH.
12. TOP HORIZONTAL SURFACES OF CONCRETE SHALL BE FINISHED WITH A FLOAT FINISH.
13. GROUTED REBAR DOWELS AND ANCHOR RODS
   A. EPOXY GROUTING SHALL BE USED IN ALL LOCATIONS WHERE REINFORCING STEEL BARS AND ANCHOR RODS ARE BEING EMBEDDED INTO EXISTING CONCRETE. DESIGN IS BASED UPON SIMPSON STRONG-TIE SET ADHESIVE ANCHORS AS DEFINED IN C-A-2016. OTHER MANUFACTURES MAY BE APPROVED PROVIDING SIMILAR PERFORMANCE CAN BE DEMONSTRATED. COMPLY WITH THE FOLLOWING UNLESS MANUFACTURER'S RECOMMENDATIONS ARE MORE STRINGENT. SUBMIT TESTING INFORMATION FOR SYSTEM SELECTED. MIN EMBEDMENT FOR BARS IS SHOWN ON THE DRAWINGS.
   B. PRIOR TO DRILLING HOLES, LOCATE AND FIELD MARK ALL EXISTING REINFORCING. USE JAMES-METER OR 1/4" PILOT HOLES TO LOCATE BARS. ADJUST LOCATION OF BAR OR BOLT TO MISS REINFORCING BUT GENERALLY MAINTAIN SPACING AND EDGE DISTANCES SHOWN ON THE DRAWING. NOTIFY ENGINEER IF NOT POSSIBLE PRIOR TO DRILLING HOLE AND FOLLOW INSTRUCTIONS.
   C. HOLES FOR ANCHOR RODS AND BARS SHALL BE OF A DIAMETER RECOMMENDED BY THE MANUFACTURER AND DRILLED WITH A CARBIDE-TIP IMPACT DRILL. IMMEDIATELY BEFORE APPLYING EPOXY GROUT, HOLES SHALL BE REAMED WITH A CIRCULAR WIRE BRUSH ATTACHED TO DRILL MOTOR AND THEN BLOWN OUT WITH OIL FREE COMPRESSED AIR.
   D. EPOXY GROUT FOR DOWNWARD HOLES MAY BE EITHER NON-SAG OR LIQUID TYPE, NORMAL SET. EPOXY GROUT FOR HORIZONTAL OR OVERHEAD HOLES SHALL BE NON-SAG TYPE, NORMAL SET. LIQUID EPOXY SHALL BE POURED SLOWLY INTO THE HOLE TO AVOID TRAPPED AIR. NON-SAG EPOXY SHALL BE INJECTED INTO THE HOLE USING AN EXTENSION NOZZLE TO REACH THE BOTTOM OF THE HOLE. HOLES SHALL BE FILLED APPROXIMATELY HALF FULL WITH EPOXY.
   E. THE BAR OR ROD SHALL BE INSERTED SLOWLY INTO THE HOLE AND THEN ROTATED. DO NOT MOVE THE BAR OR ROD UP AND DOWN WHEN INSTALLING. REMOVE ANY EPOXY GROUT AROUND THE HOLE BEFORE IT HAS SET.
   F. ALL WORK SHALL BE PERFORMED UNDER FULL TIME SPECIAL INSPECTION. DO NOT INSTALL BARS OR RODS UNLESS INSPECTOR IS PRESENT.

SECTION 4 : REPAIRS TO EXISTING CAPS

1. CONTRACTOR SHALL REPAIR CRACKS NOTED AS "1/8 CRACKS" AND SPALLED CONCRETE IN THE EXISTING CONCRETE CAP AT LOCATIONS NOTED ON THE DRAWINGS. SIKA PRODUCTS OR APPROVED EQUAL ARE LISTED. CONTRACTOR SHALL MEASURE CRACK WIDTH WIDTH AND REPAIR AS FOLLOWS:

   A. FOR EXISTING CRACKS 1/8" WIDE OR GREATER

   ROUT OUT ANY LOOSE MATERIAL, FLUSH WITH FRESH WATER AND INJECT WITH SIKADUR 52 EPOXY ADHESIVE. DURING THE CRACK REPAIR EFFORT, IF THE REINFORCING IS EXPOSED AND THE CROSS SECTIONAL AREA OF THE REINFORCING CAN BE DETERMINED TO BE 50% OR LESS OF THE ORIGINAL AREA, CHIP CONCRETE, AND SPLICE WITH NEW LENGTH OF REINFORCING. NEW REINFORCING SHALL BE WELDED TO THE EXISTING REINFORCING AND LAPPED A MINIMUM OF TWELVE (12") INCHES. PATCH CONCRETE WITH DRY PACK TO EXISTING CONTOUR. REFER TO SECTIONS TITLED "CONCRETE PATCHING" AND "REINFORCING" FOR ADDITIONAL INFORMATION.

   B. FOR EXISTING CRACKS LESS THAN 1/8"

   APPLY SIKAPRONTO-19 TF METHACRYLATE JOINT SEALER PER MFR INSTRUCTIONS.

2. EXPANSION JOINTS

   REMOVE ANY LOOSE MATERIAL, PRIME JOINT WITH SIKAFLEX 429 PRIMER. AFTER PRIMER HAS DRIED, INSTALL A CLOSED CELL FOAM BACKER ROD INTO JOINT SUCH THAT THE DEPTH OF THE JOINT IS ½ INCH. ALLOW THE BACKER MATERIAL TO BE EXPOSED TO THE AIR FOR A MINIMUM OF 20 MINUTES THEN APPLY SIKAFLEX 1A SEALANT ACCORDING TO MANUFACTURER'S SPECIFICATIONS.

3. CONCRETE PATCHING (BULKHEAD COPING)

   WHERE THE CONCRETE HAS SPALLED WITH A LOSS OF ONE INCH OR MORE OF CONCRETE, OR AS INDICATED BY THE ENGINEER. THE CONTRACTOR SHALL PATCH THE AREA AS FOLLOWS:

   1. SAW CUT EDGES 1" DEEP, CHIP AND REMOVE ANY LOOSE MATERIAL. CHIP 1" BEYOND EXISTING REBAR.
   2. CLEAN THE AREA OF ALL DUST AND DEBRIS.
   3. DRY AREA TO BE PATCHED.
   4. IMMEDIATELY BEFORE PLACING CONCRETE, COAT THE AREA WITH SIKA ARMATEC 110 EPOCEM.
   5. FOR SPALLS THAT WILL NOT RECEIVE NEW CONCRETE THAT COVERS IT,PATCH CONCRETE WITH SIKATOP 122 PLUS TO EXISTING CONTOURS.

   NOTE: CONTRACTOR SHALL PLAN THE CONCRETE PATCHING EFFORT DURING LOW TIDE CONDITIONS TO PREVENT SALTWATER CONTAMINATION OF THE PREPARED SURFACES.

SECTION 5: METALS

1. STEEL SHALL BE DESIGNED, DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION AISC 360 "SPEDIFICATION FOR STRUCTURAL STEEL BUILDINGS", AND THE AMERICAN WELDING SOCIETY CODE AWS D1.1, "WELDING IN BUILDING CONSTRUCTION".
2. STAINLESS STEEL SHAPES SHALL BE ALLOY 316L, CONDITION A, COLD FINISHED CONFORMING TO STANDARD ASTM A 276.
3. SHEAR STUDS TO BE MADE OF STAINLESS STEEL, ALLOY 316L, CONFORMING TO STANDARD ASTM A 276 OR ASTM A 493, AS MANUFACTURED BY NELSON STUD WELDING OR APPROVED EQUAL. MIN YIELDING STRENGTH 50,000 PSI. MIN TENSILE STRENGTH 75,000 PSI.
4. ANCHOR RODS (ALL THREAD) SHALL CONFORM TO STANDARD ASTM F1554 GR.105; HEAVY HEX NUTS: ASTM A563 GR.DH; WASHERS: ASTM F436.
5. RODS, NUTS AND WASHERS SHALL BE GALVANIZED PER ASTM A-123 OR A-153 AS APPLICABLE.
6. WELDING ELECTRODES FOR CARBON STEEL SHALL BE E70XX. ELECTRODES FOR STAINLESS STEEL SHALL BE BEST SUITABLE FOR 316L STEEL. ALL WELDING SHALL BE PERFORMED BY AWS CERTIFIED WELDERS. ALL WELDED JOINTS SHALL BE AWS PREQUALIFIED. GROOVE AND BUTT WELDS ARE "COMPLETE PENETRATION", UNLESS OTHERWISE NOTED.
7. ALL STRUCTURAL STEEL ACCESSORIES OR INCIDENTAL ITEMS NOT SPECIFICALLY SHOWN OR HEREIN SPECIFIED, BUT NECESSARY TO FULLY CARRY OUT THE OBVIOUS INTENT OF THE PLANS SHALL BE INCLUDED UNDER THIS SECTION WITHOUT ADDITIONAL COST.

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SOUTHERN CALIFORNIA EDISON COMPANY	(800) 611-1911	
AT&T TELEPHONE COMPANY	(800) 332-1321	
CITY OF NEWPORT BEACH UTILITIES DIVISION	(949) 644-3011	(949) 644-3717
ORANGE COUNTY SANITATION DISTRICT	(714) 962-2411	
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ENGINEER OF RECORD		

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REVIEWED:

WARREN A. STEWART, RCE C41358
COWI MARINE NORTH AMERICA

DESIGNED: WNST | DRAWN: MCLS
CHECKED: GAVP | DATE: 03/18/16

BALBOA ISLAND COPING REPAIR

GENERAL NOTES

CITY OF NEWPORT BEACH
PUBLIC WORKS DEPARTMENT

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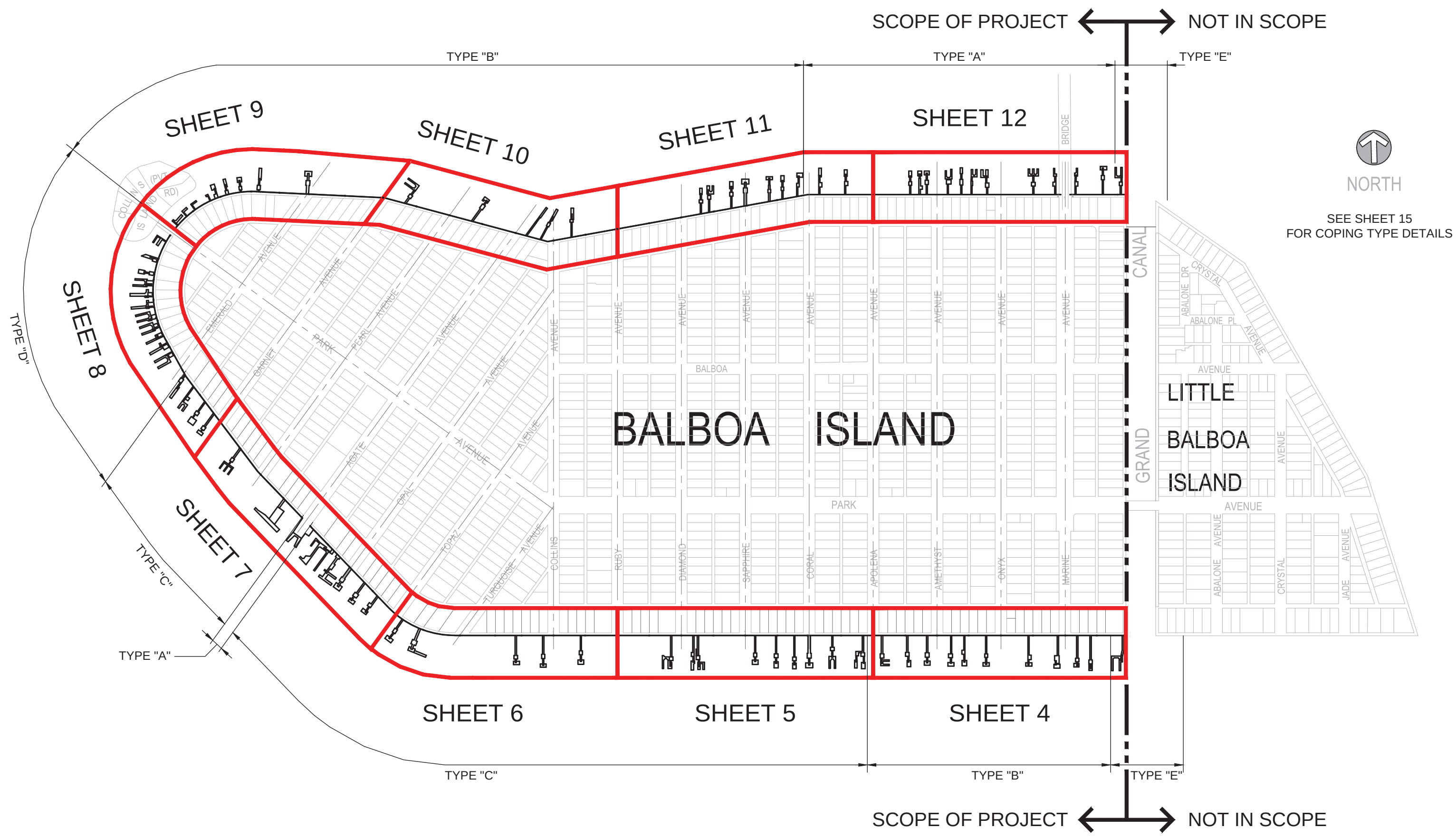
SHEET 2 OF XX



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BALBOA ISLAND COPING REPAIR

OVERALL PLAN

SCALE N.T.S.

CITY OF NEWPORT BEACH
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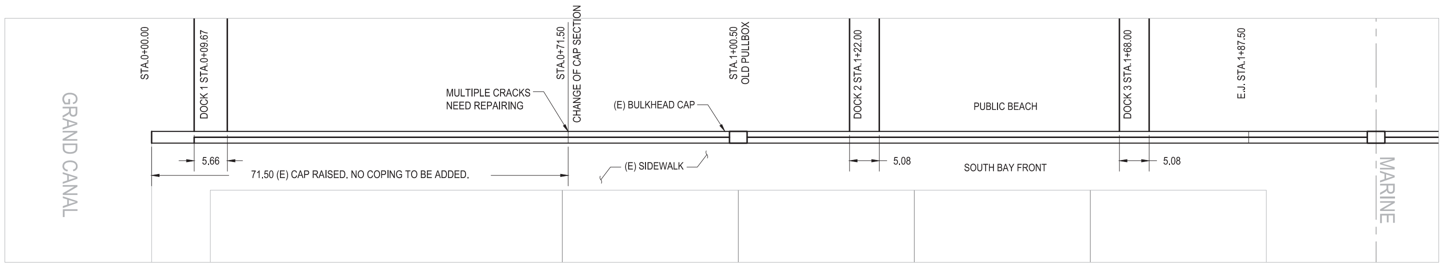
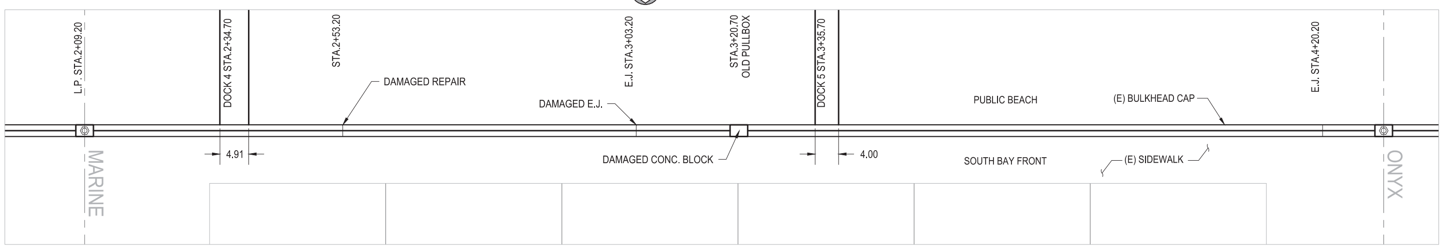
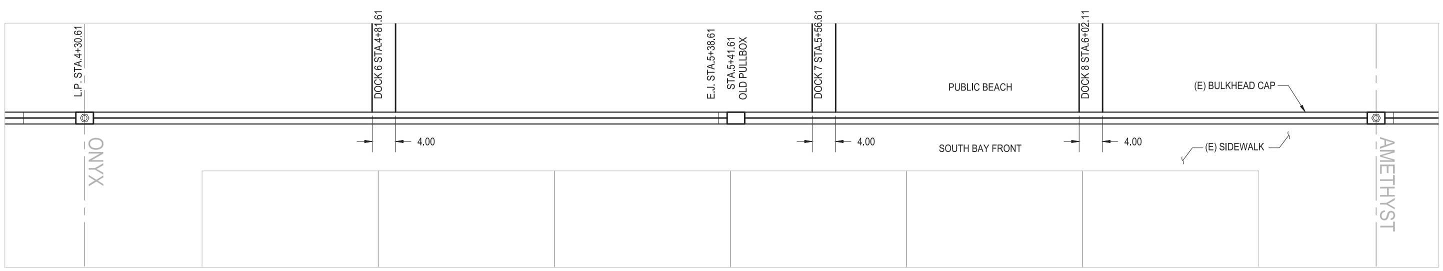
SHEET 3 OF XX



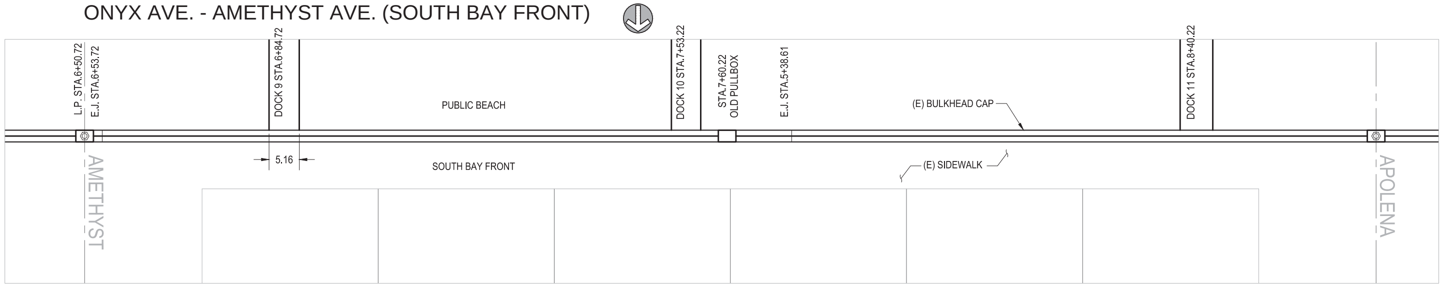
GRAND CANAL - MARINE AVE. (SOUTH BAY FRONT)



MARINE AVE. - ONYX AVE. (SOUTH BAY FRONT)



ONYX AVE. - AMETHYST AVE. (SOUTH BAY FRONT)



AMETHYST AVE. - APOLENA AVE. (SOUTH BAY FRONT)

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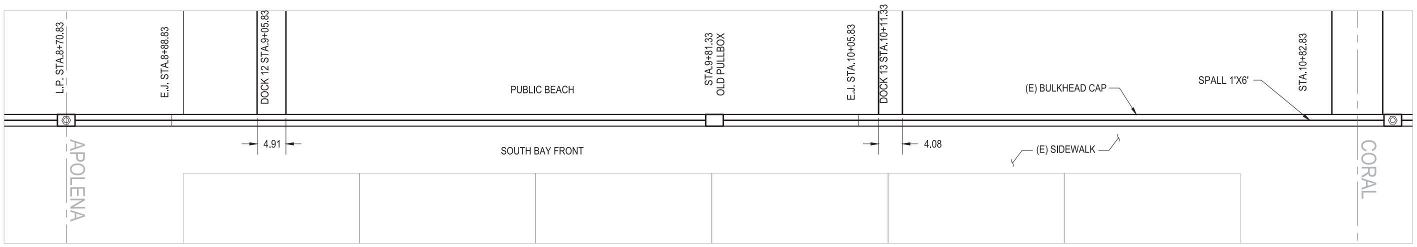
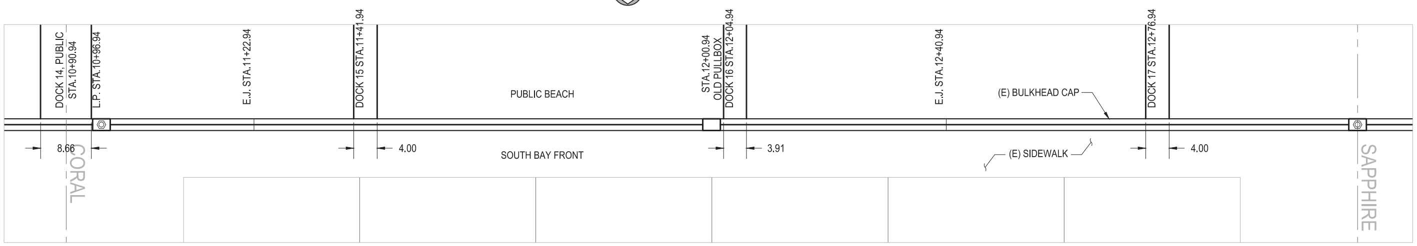
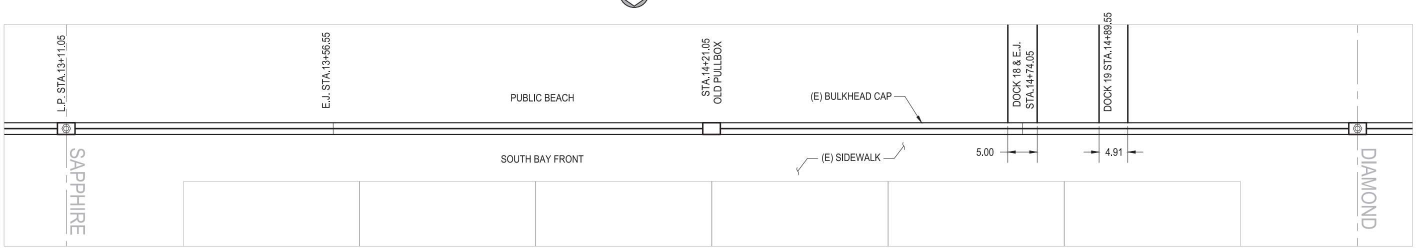


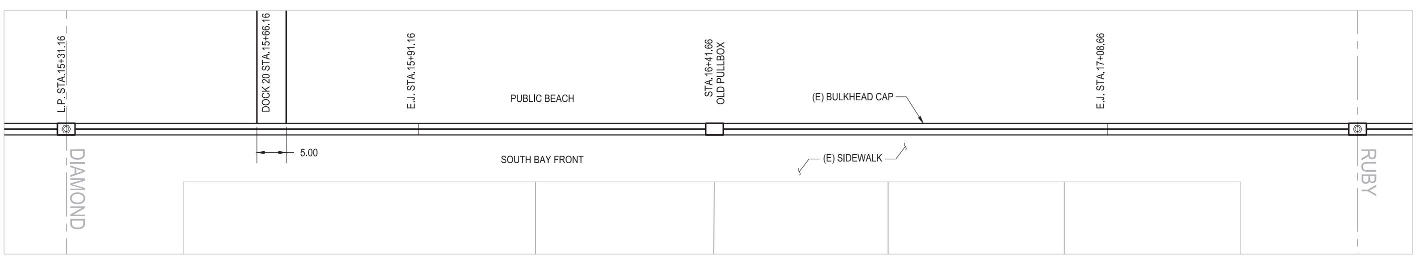
APOLENA AVE. - CORAL AVE. (SOUTH BAY FRONT)



CORAL AVE. - SAPPHIRE AVE. (SOUTH BAY FRONT)



SAPPHIRE AVE. - DIAMOND AVE. (SOUTH BAY FRONT)



DIAMOND AVE. - RUBY AVE. (SOUTH BAY FRONT)

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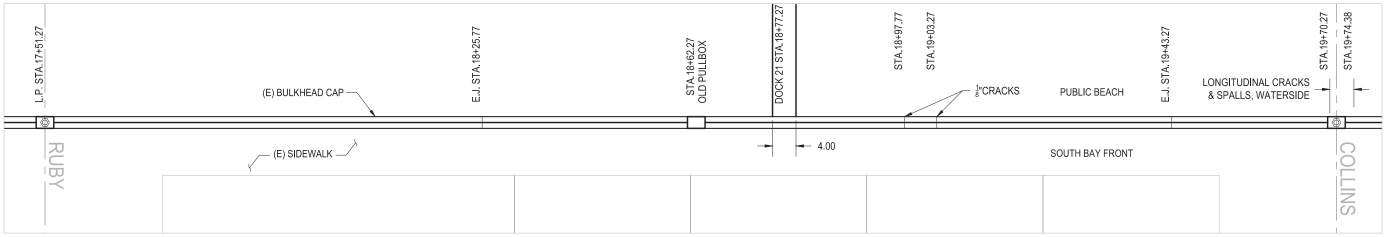
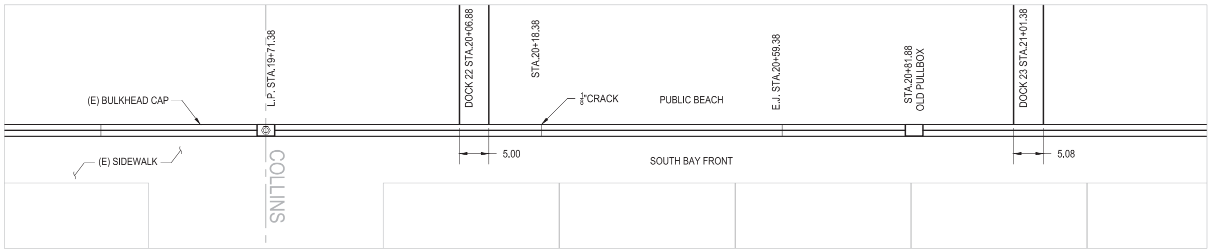
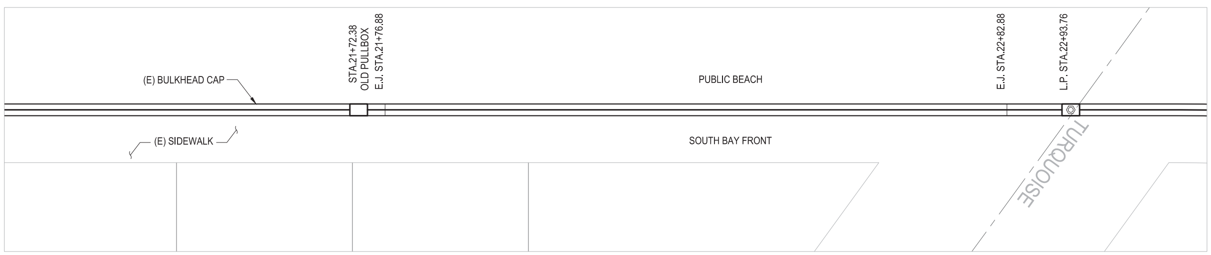


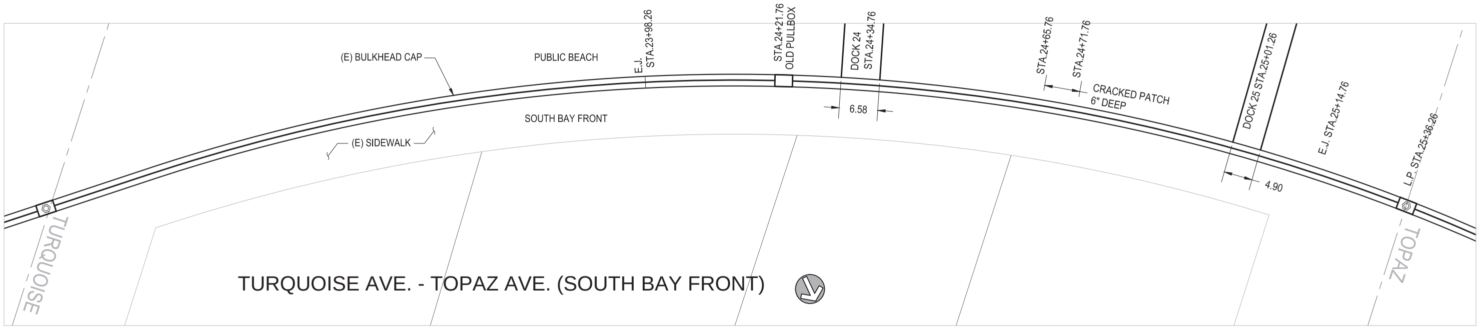
RUBY AVE. - COLLINS AVE. (SOUTH BAY FRONT)



COLLINS AVE. - DOCK 23 (SOUTH BAY FRONT)



DOCK 23 - TURQUOISE AVE. (SOUTH BAY FRONT)



TURQUOISE AVE. - TOPAZ AVE. (SOUTH BAY FRONT)

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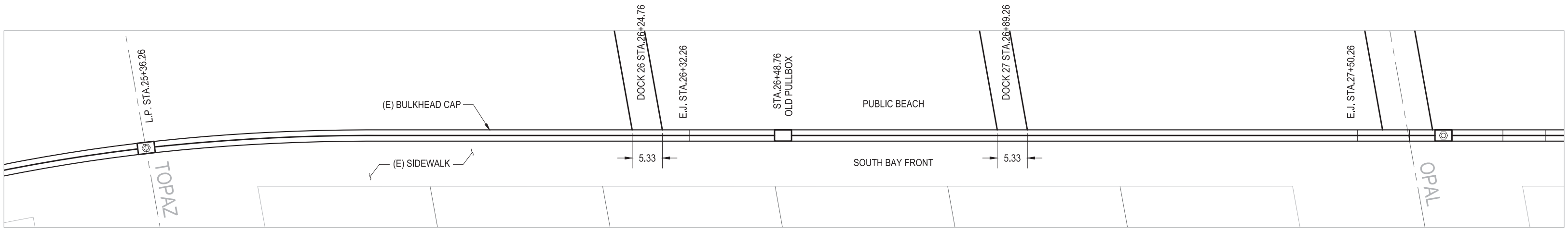
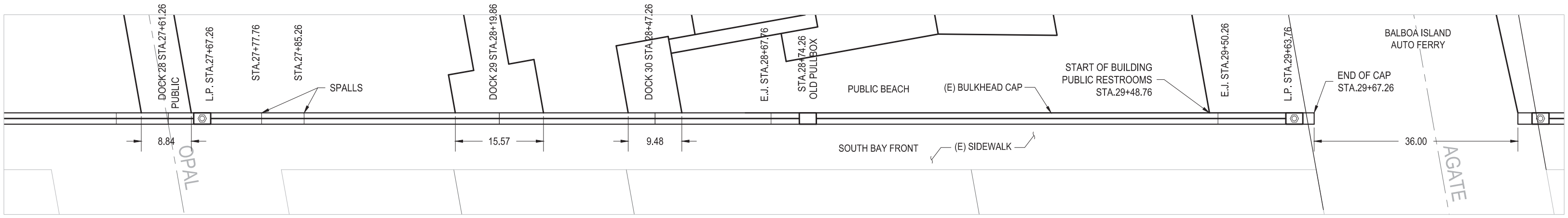
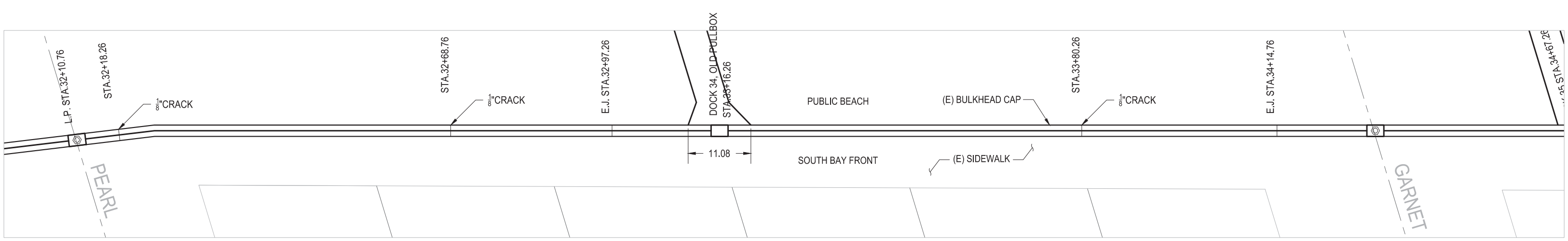


TOPAZ AVE. - OPAL AVE. (SOUTH BAY FRONT)



OPAL AVE. - AGATE AVE. (SOUTH BAY FRONT)

AGATE AVE. - PEARL AVE. (SOUTH BAY FRONT)



PEARL AVE. - GARNET AVE. (SOUTH BAY FRONT)

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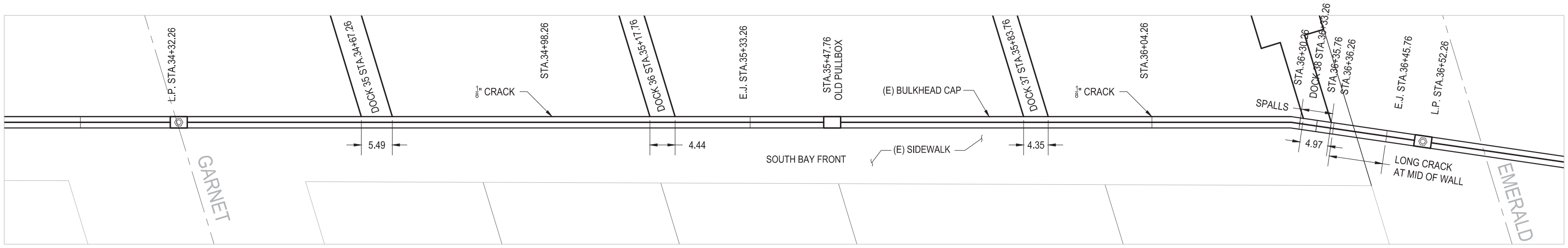
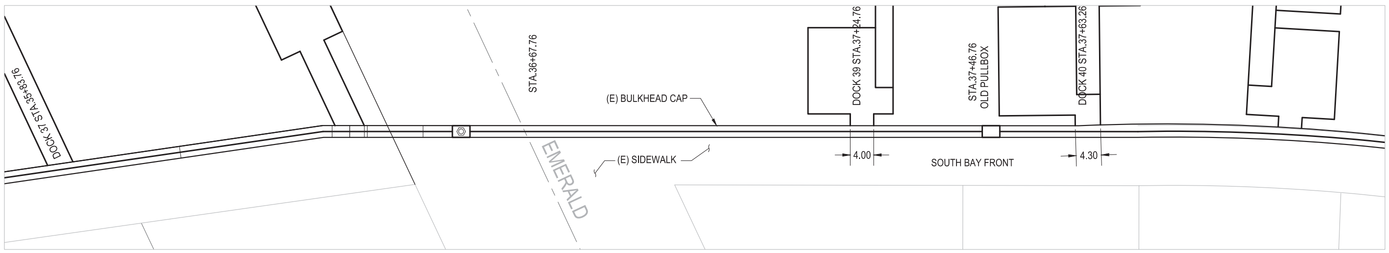
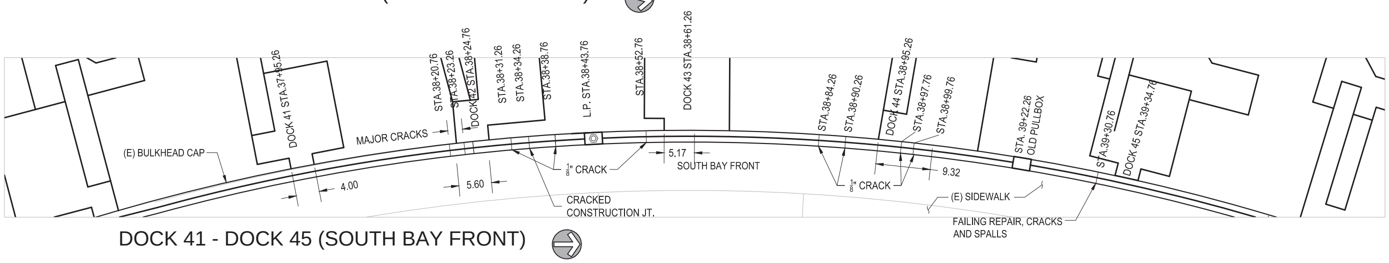


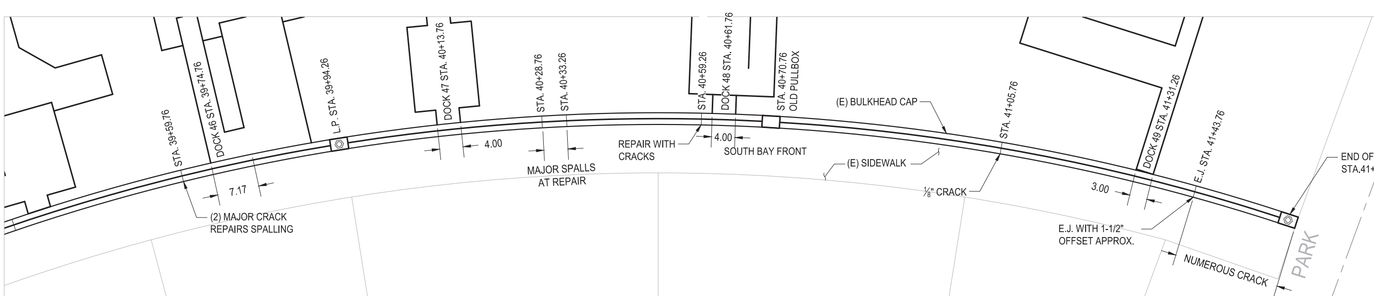
GARNET AVE. - EMERALD AVE. (SOUTH BAY FRONT)



EMERALD AVE. - DOCK 41 (SOUTH BAY FRONT)



DOCK 41 - DOCK 45 (SOUTH BAY FRONT)



DOCK 45 - PARK AVE. (SOUTH BAY FRONT)

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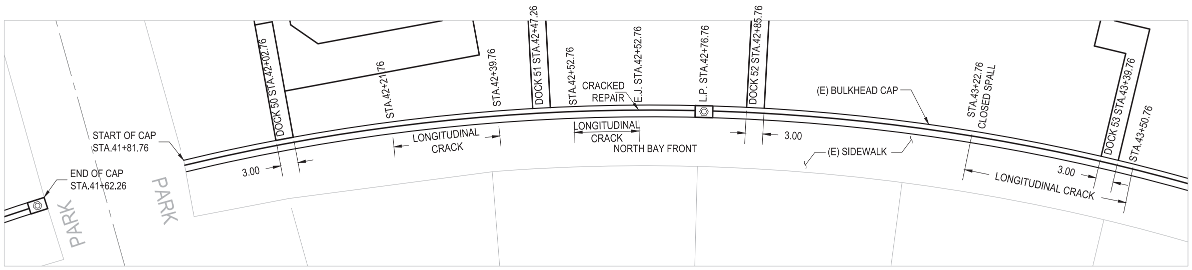
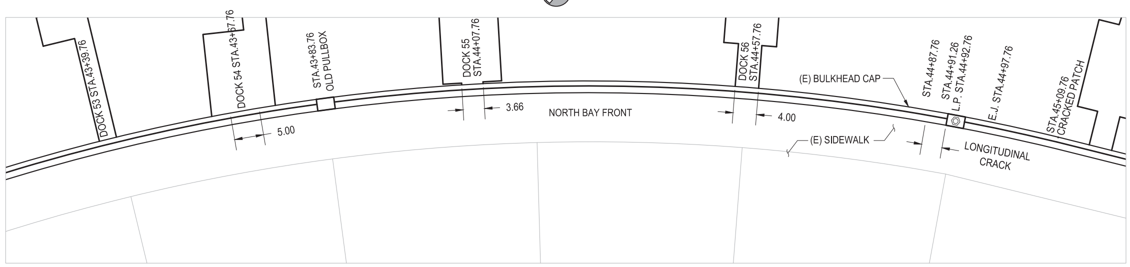
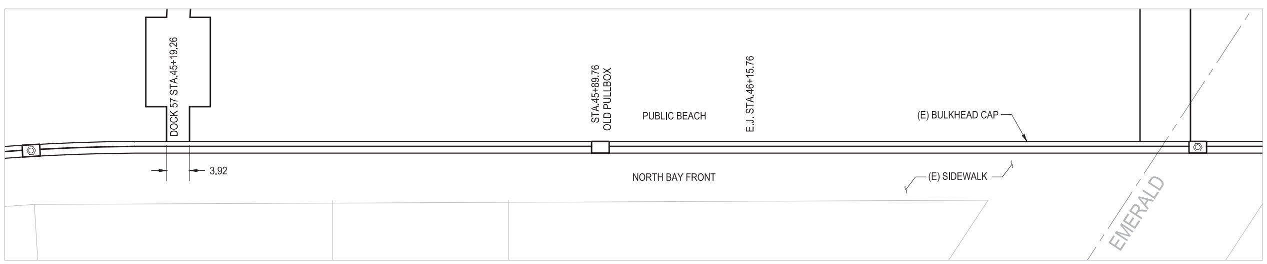


PARK AVE. - DOCK 53 (NORTH BAY FRONT)



DOCK 53 - DOCK 57 (NORTH BAY FRONT)



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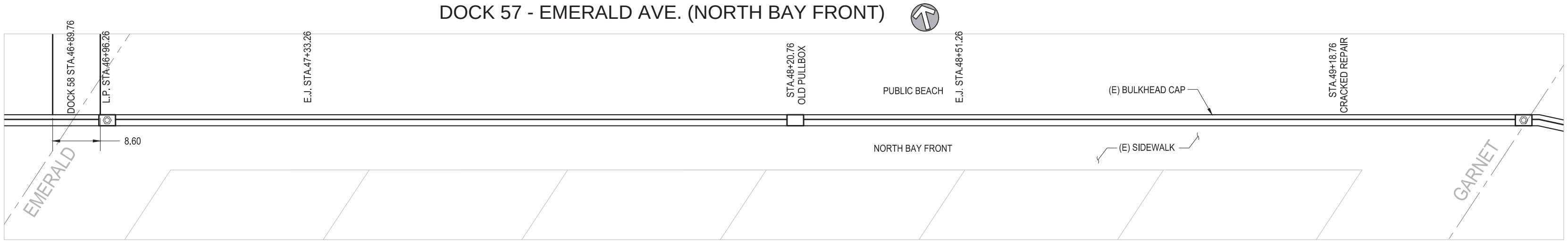

EMERALD AVE. - GARNET AVE. (NORTH BAY FRONT)

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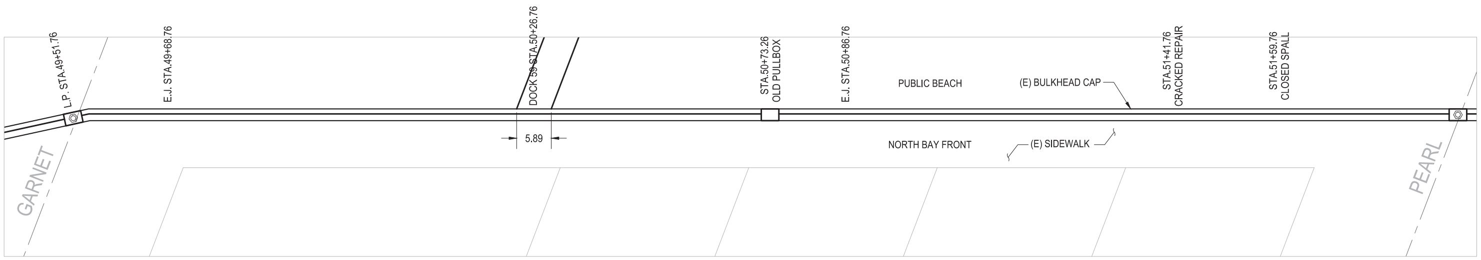
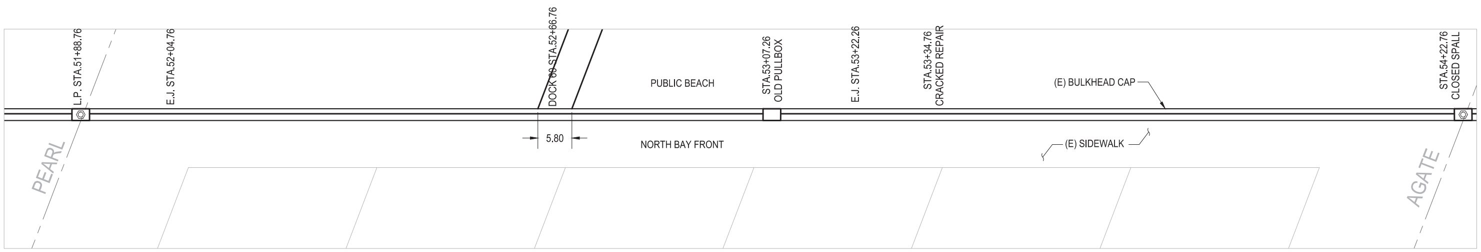
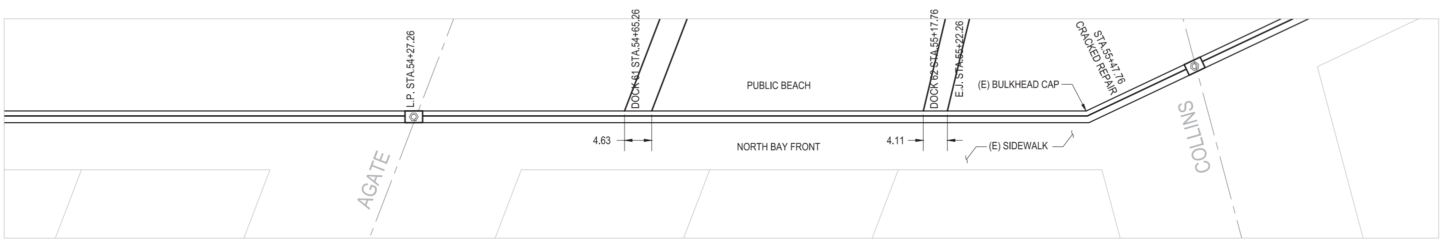


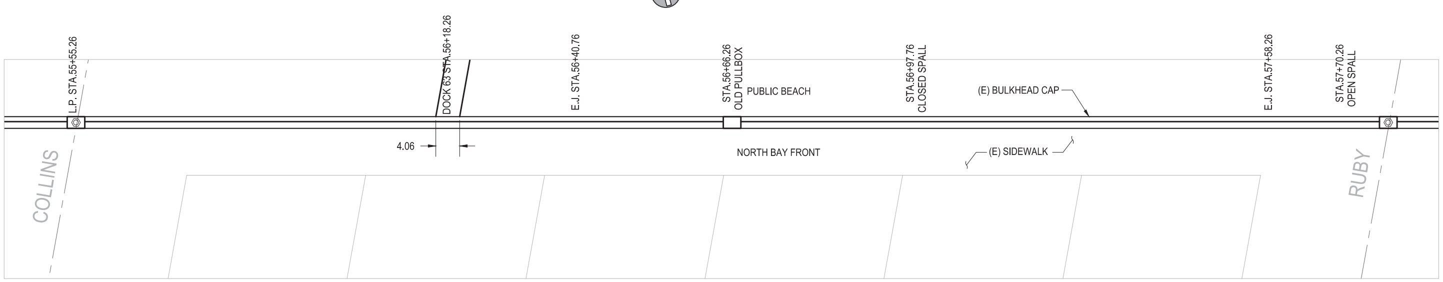
GARNET AVE. - PEARL AVE. (NORTH BAY FRONT)



PEARL AVE. - AGATE AVE. (NORTH BAY FRONT)



AGATE AVE. - COLLINS AVE. (NORTH BAY FRONT)



COLLINS AVE. - RUBY AVE. (NORTH BAY FRONT)

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SOUTHERN CALIFORNIA EDISON COMPANY	(800) 611-1911	
AT&T TELEPHONE COMPANY	(800) 332-1321	
CITY OF NEWPORT BEACH UTILITIES DIVISION	(949) 644-3011	(949) 644-3717
ORANGE COUNTY SANITATION DISTRICT	(714) 962-2411	
TIME WARNER CABLE	(714) 542-6222	
COX COMMUNICATIONS	-	
ENGINEER OF RECORD		

NO.	DATE	REVISION

REVIEWED:

WARREN A. STEWART, RCE C41358
COWI MARINE NORTH AMERICA

DESIGNED: WNST | DRAWN: MCLS
CHECKED: GAVP | DATE: 03/18/16

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SECTION PLANS

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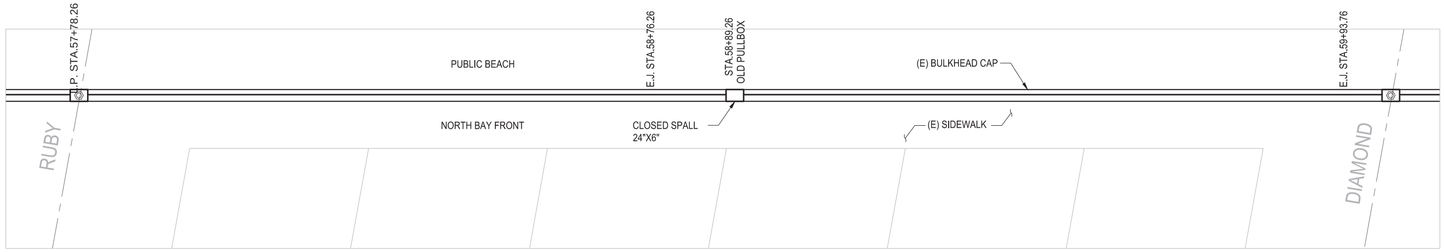
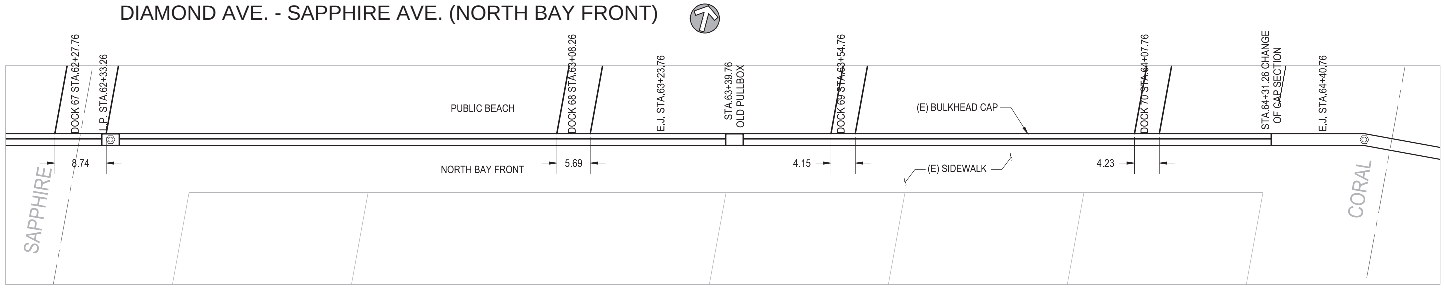
SHEET 10 OF XX



RUBY AVE. - DIAMOND AVE. (NORTH BAY FRONT)

DIAMOND AVE. - SAPPHIRE AVE. (NORTH BAY FRONT)



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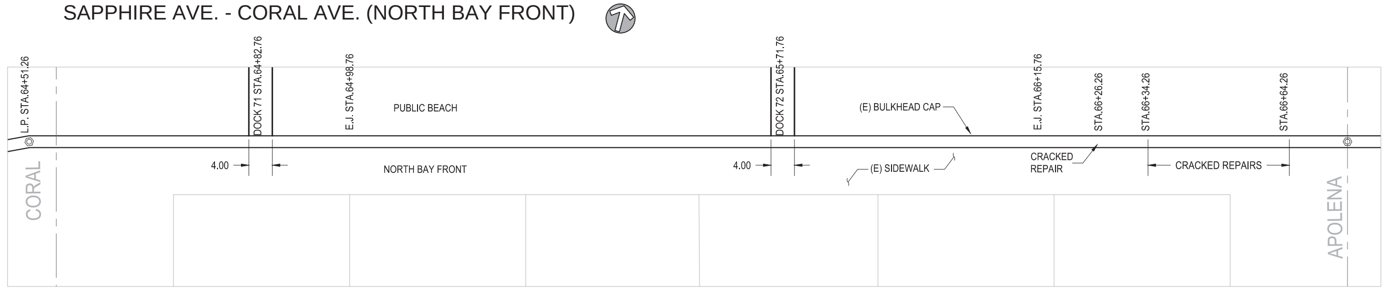

CORAL AVE. - APOLENA AVE. (NORTH BAY FRONT)

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CITY OF NEWPORT BEACH
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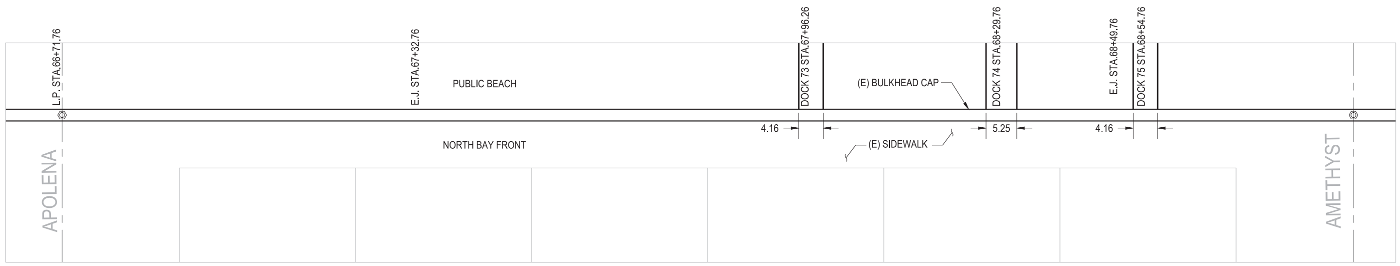
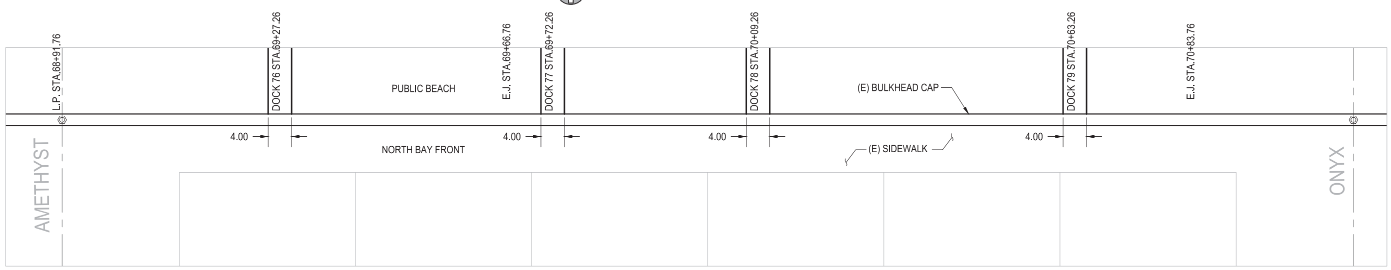
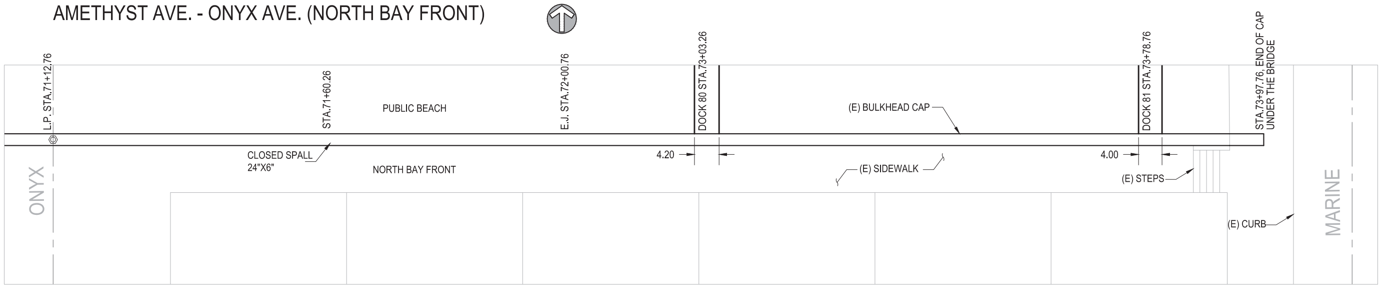
SHEET 11 OF XX



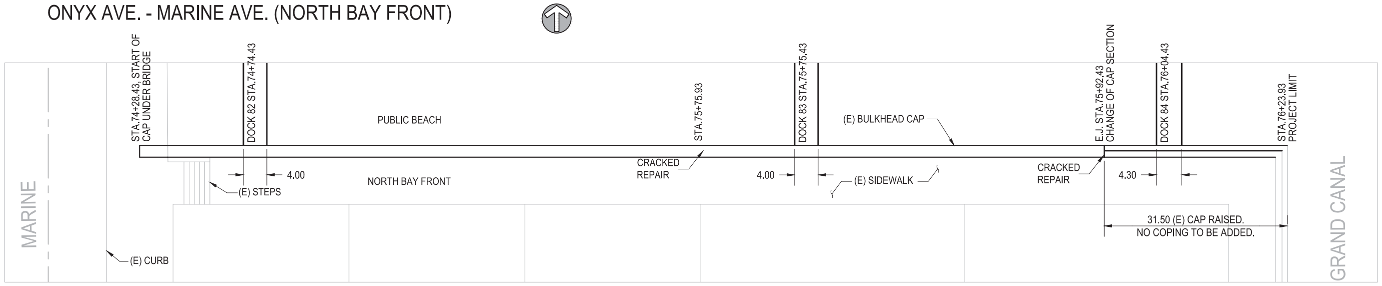
APOLENA AVE. - AMETHYST AVE. (NORTH BAY FRONT)



AMETHYST AVE. - ONYX AVE. (NORTH BAY FRONT)



ONYX AVE. - MARINE AVE. (NORTH BAY FRONT)



MARINE AVE. - GRAND CANAL (NORTH BAY FRONT)

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SECTION PLANS

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CITY OF NEWPORT BEACH
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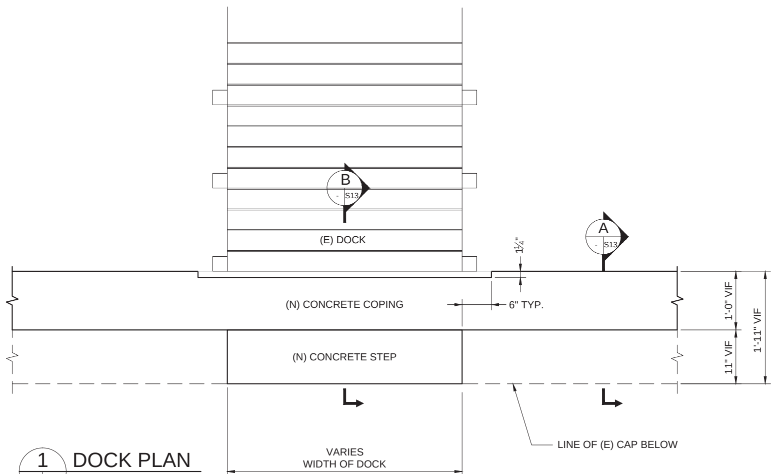
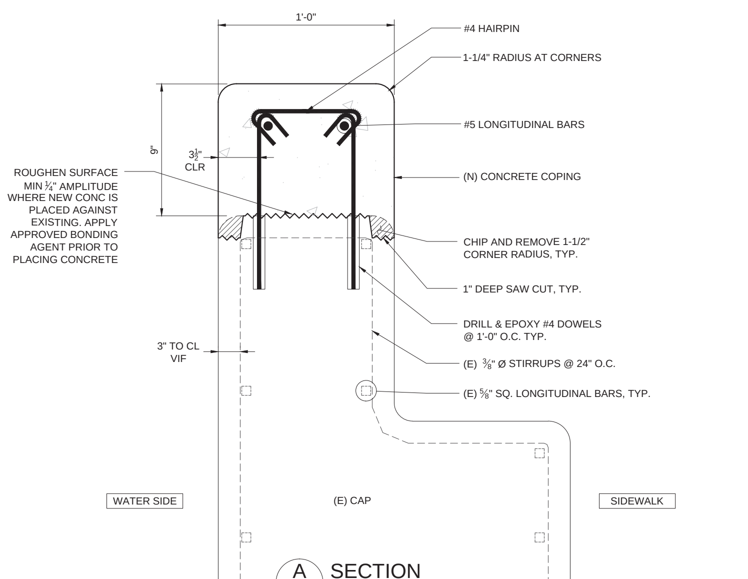
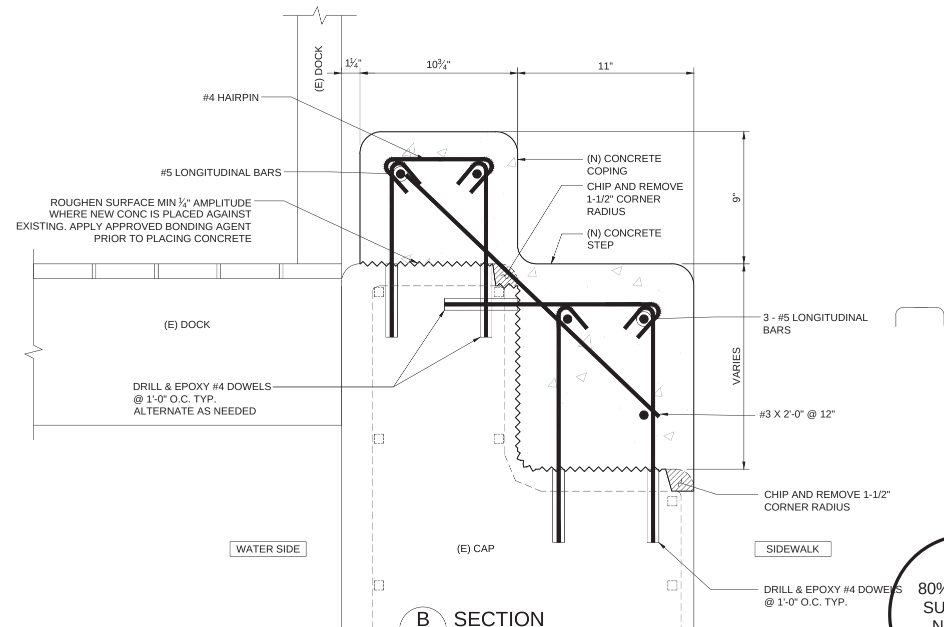
SHEET 12 OF XX



1 DOCK PLAN
S13 1"=1'-0"



A SECTION
S13 3"=1'-0"



B SECTION
S13 3"=1'-0"

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TYPICAL SECTION
DOCK SECTION

SCALE AS SHOWN

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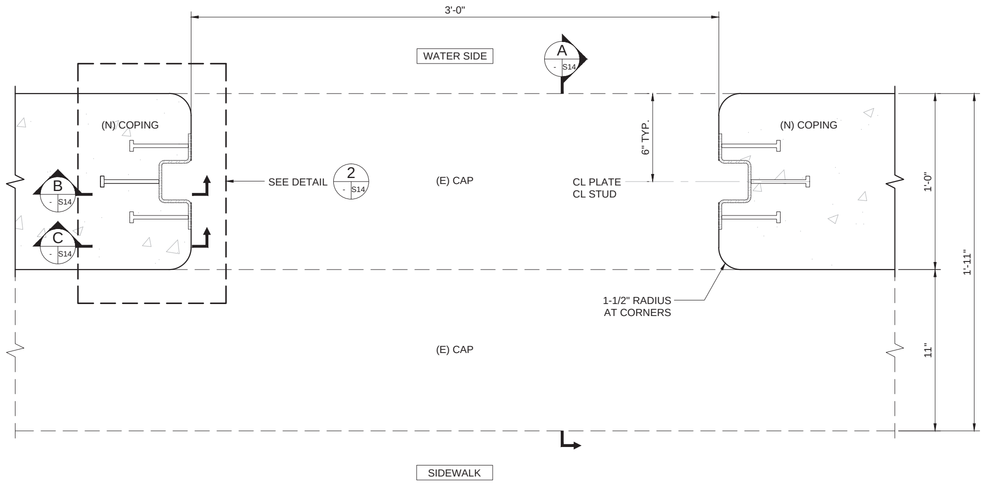
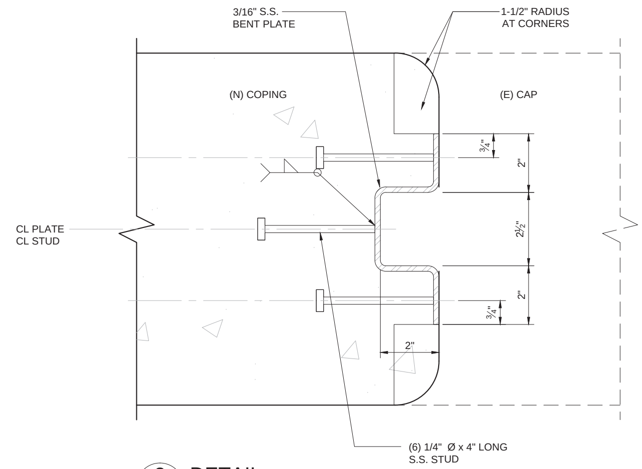
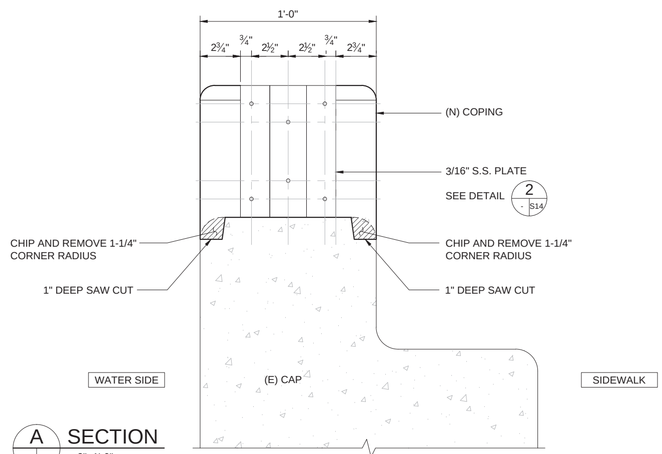
SHEET 13 OF XX



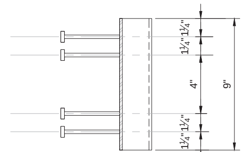
1 PLAN VIEW - PUBLIC ACCESS GAP DETAIL
S14 3"=1'-0"



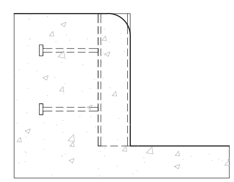
2 DETAIL
S14 6"=1'-0"



A SECTION
S14 3"=1'-0"



B SECTION
S14 3"=1'-0"



C SECTION
S14 3"=1'-0"

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PUBLIC ACCESS
GAP DETAILS

SCALE
AS SHOWN

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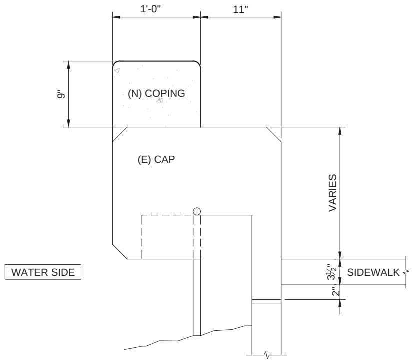
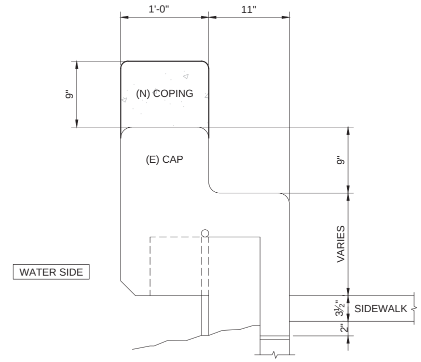
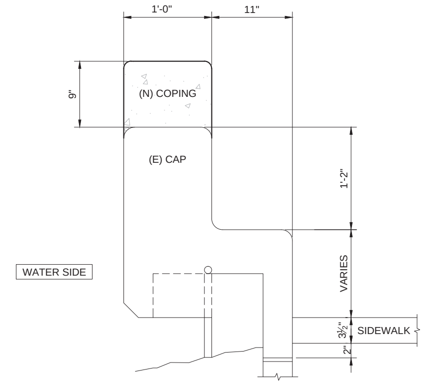


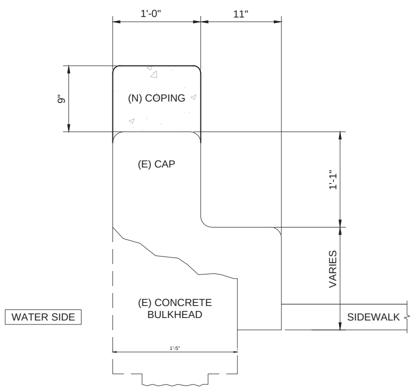
1 TYPE A COPING
- S15 1/1/2"=1'-0"



2 TYPE B COPING
- S15 1-1/2"=1'-0"



3 TYPE C COPING
- S15 1-1/2"=1'-0"



4 TYPE D COPING
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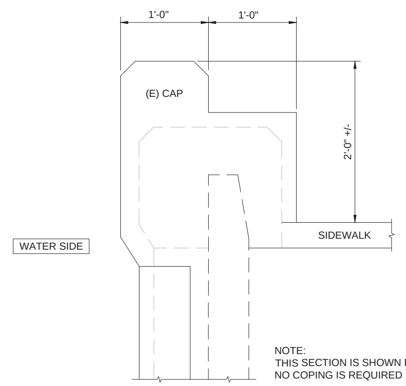

NOTE:
THIS SECTION IS SHOWN FOR REFERENCE ONLY.
NO COPING IS REQUIRED HERE.

5 TYPE E - NO COPING REQUIRED
- S15 1-1/2"=1'-0"

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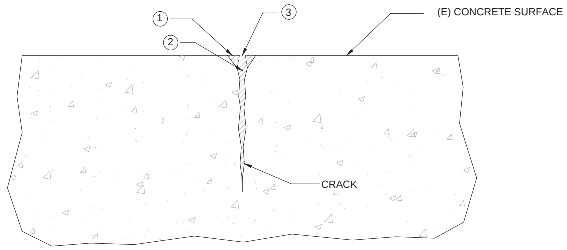
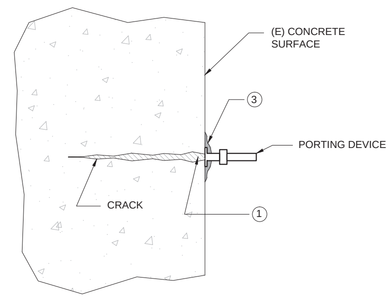
H-5235-S
SHEET 15 OF XX

1. ROUT TOP OF CRACK TO FORM VEE-GROVE. THOROUGHLY CLEAN WITH COMPRESSED AIR AND WIRE-WHEEL TOOL.
2. FOR CRACKS ⅛" WIDE AND GREATER, FILL CRACK WITH OVEN DRIED SILCA SAND
3. APPLY METHACRYLATE SEALER FOLLOWING MANUFACTURER'S RECOMMENDATIONS AND ALLOW TO PENETRATE CRACK.
4. CAST OVEN DRY SILCA SAND ON TOP OF THE CRACK TO ABSORB EXCESS. SCRAPE OFF AFTER INITIAL SET.



TOP SURFACE CRACKS ONLY



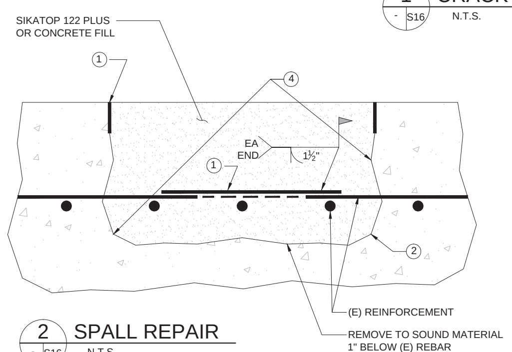
VERTICAL SURFACE CRACKS

1. THOROUGHLY CLEAN WITH COMPRESSED AIR AND WIRE-WHEEL TOOL. REMOVE ALL LOOSE DEBRIS.
2. FOR CRACKS ¼" WIDE AND GREATER, FILL CRACK WITH OVEN DRIED SILCA SAND
3. SEAL SURFACE OF CRACK AND INSTALL INJECTION PORTS AT 8" O.C. USING CRACK SEALING (CAPPING OR PASTE-OVER) EPOXY PER MANUFACTURER'S INSTRUCTIONS.
4. START INJECTION AT THE LOWEST PORT UNTIL EPOXY SHOWS AT AN UPPER PORT, CLOSE LOWER PORT AND CONTINUE FROM UPPER PORT. REPEAT UNTIL ALL PORTS HAVE BEEN INJECTED.
5. WHEN INJECTED EPOXY HAS CURED, REMOVE PORTS AND SEALING EPOXY. GRIND SURFACE SMOOTH.
6. FOR SURFACES THAT WILL BE REMAIN VISIBLE AFTER PROJECT IS COMPLETE, FINISH TO MATCH SURROUNDING SURFACE.

1 CRACK REPAIR

- S16

N.T.S.



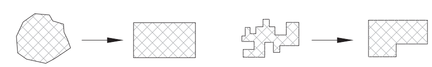
2 SPALL REPAIR

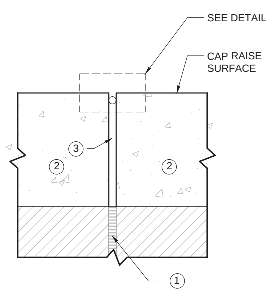
- S16

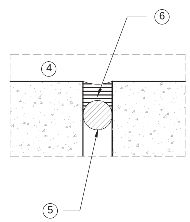
N.T.S.

SPALL REPAIR NOTES:

1. SAW CUT EDGES 1" DEEP.
2. CHIP AND REMOVE ALL LOOSE MATERIAL. CHIP 1" BEYOND EXISTING REBAR. PRESERVE ALL REBAR. USE SMALLEST CHIPPING HAMMER FOR THE WORK. DAMAGED REBAR WILL BE REPLACED AT NO ADDITIONAL COST TO THE CITY.
3. INSPECT REINFORCING REPLACE ANY REINFORCING SHOWING 20% LOSS OF SECTION OR GREATER BY CUTTING OUT DETERIORATED SECTION AND WELDING IN NEW SECTION. USE A706 REBAR OF SAME AREA OR LARGER. IF NEEDED, PRE-HEAT EXISTING STUBS.
3. CLEAN THE AREA OF ALL DUST AND DEBRIS AND DRY AREA TO BE PATCHED.
4. IMMEDIATELY BEFORE PLACING CONCRETE, COAT THE AREA WITH APPROVED BONDING AND ANTI-CORROSION AGENT.
5. FOR SPALLS THAT WILL NOT RECEIVE NEW CONCRETE THAT COVERS IT, PATCH CONCRETE WITH APPROVED CONCRETE PATCHING MATERIAL. MATCH THE EXISTING CONTOURS.
6. PATCH CONFIGURATIONS SHOULD BE KEPT AS SHOWN BELOW







3 EXPANSION JOINTS

- S16

N.T.S.

EXPANSION JOINT NOTES:

1. WHERE INDICATED ON DRAWINGS, COMPLETELY REMOVE EXISTING JOINT MATERIALS BEFORE CONSTRUCTING CAP RAISE AND MAKE ANY CONCRETE REPAIRS NEEDED AT CORNERS AND EDGES TO PROVIDE BASE FOR JOINT SEALANT. OTHERWISE START W/ NOTE #2.
2. CONSTRUCT NEW CAP RAISE WITH GAP FOR EXPANSION JOINTS ON TOP OF EXISTING. MATCH WIDTHS.
3. AFTER CAP RAISE HAS CURED, REMOVE ANY FORM MATERIALS IN GAP AND COMPLETELY CLEAN.
4. APPLY BONDING AGENT RECOMMENDED BY SEALANT MFR. FOLLOW MFR'S INSTRUCTIONS.
5. INSTALL BACKING ROD AS RECOMMENDED BY MFR. ROD SHOULD BE ½" BELOW SURFACE OF JOINT. FOLLOW RECOMMENDATION FOR MAKING 90° CORNERS.
6. FILL JOINTS (NEW & EXISTING IF INDICATED) WITH SEALANT AND ALLOW TO CURE. SEALANT SHALL COVER ENTIRE JOINT WITH NOT VOIDS. SCHEDULE JOINT SEALING SO THAT THEY WILL NOT BE IMPACTED BY HIGH TIDES UNTIL FULLY CURED.

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COWI MARINE NORTH AMERICA

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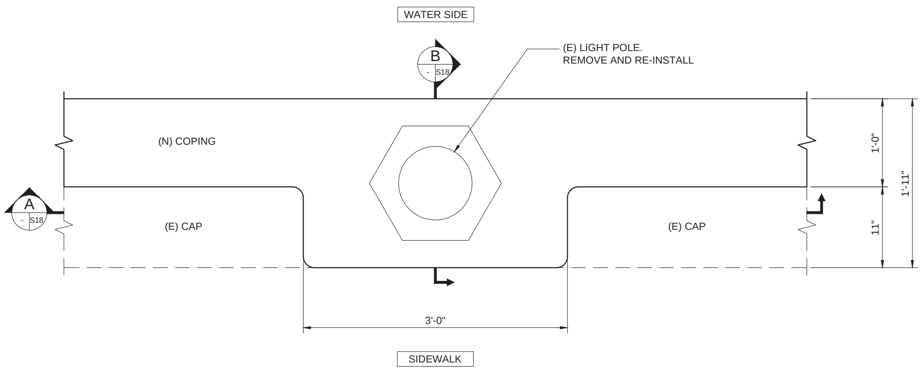
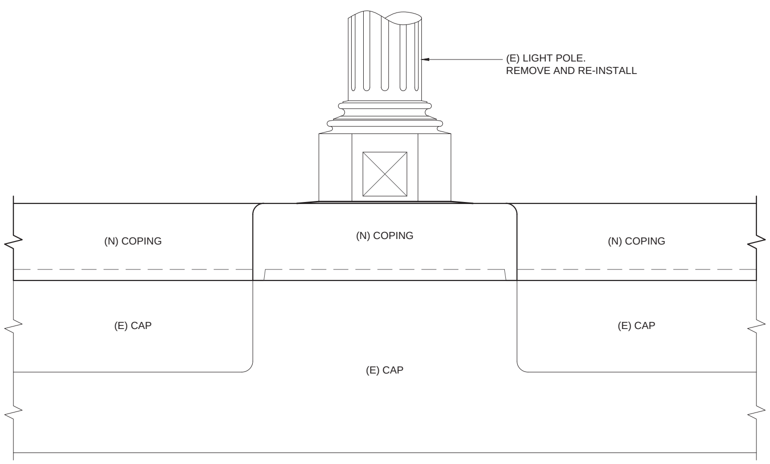
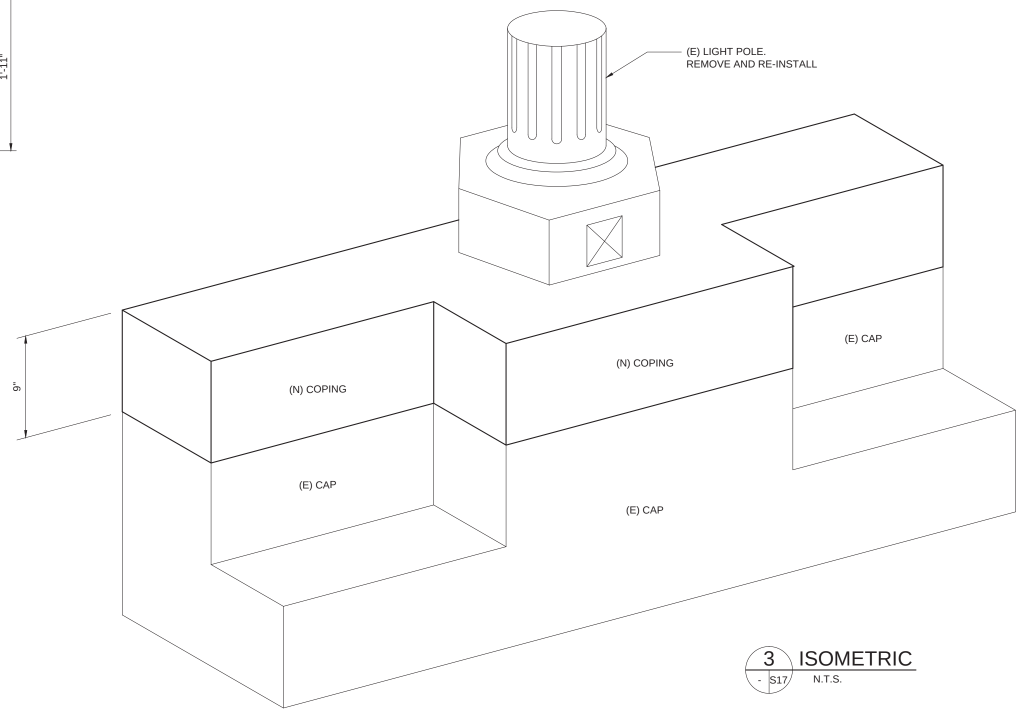


1 PLANVIEW - (N) COPING AT LIGHT POLE
S17 1-1/2"=1'-0"



2 FRONT ELEVATION
S17 1-1/2"=1'-0"



3 ISOMETRIC
S17 N.T.S.

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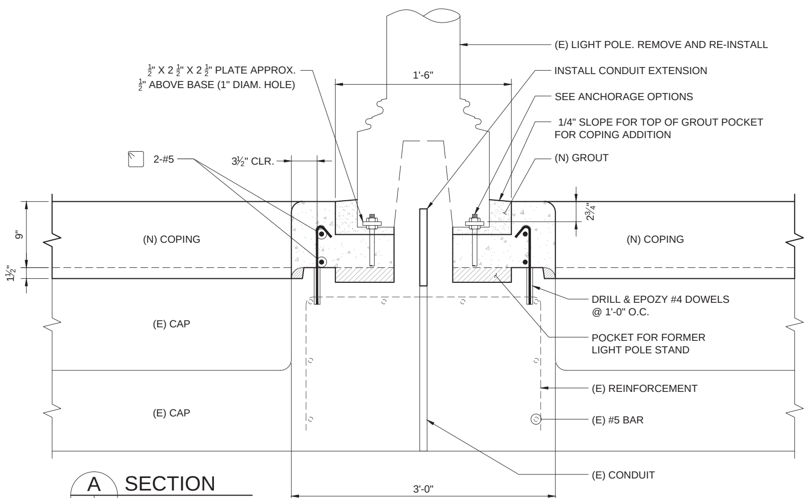
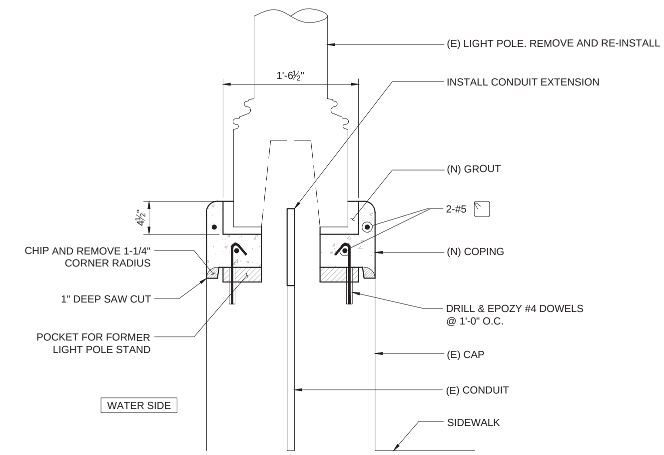
SHEET 17 OF XX



A SECTION

- S18 1-1/2"=1'-0"



B SECTION

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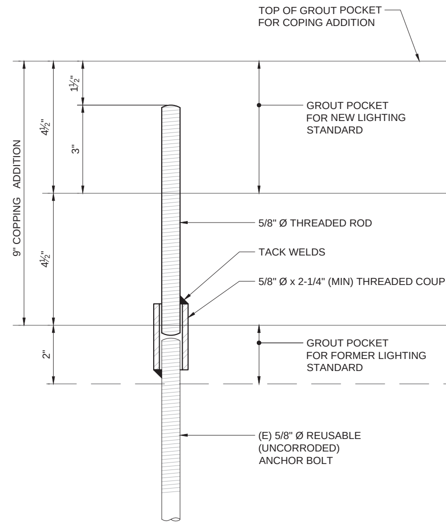
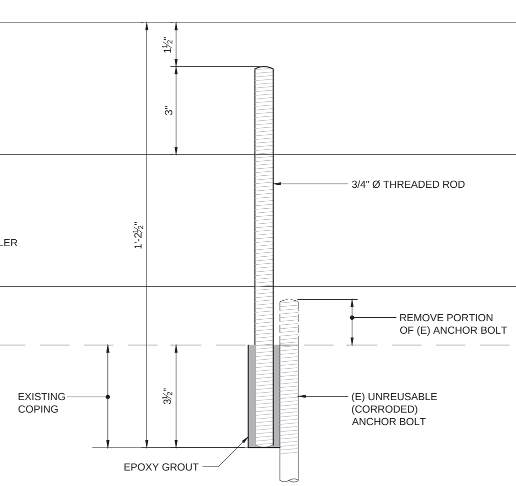


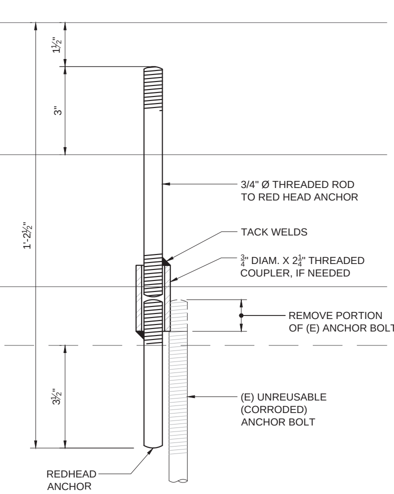
1 ANCHORAGE DETAIL A

- S18 6"=1'-0"



2 ANCHORAGE DETAIL B

- S18 6"=1'-0"



3 ANCHORAGE DETAIL C

- S18 6"=1'-0"

80% REVIEW SUBMITTAL NOT FOR CONSTRUCTION

CALL TOLL FREE
1-800-227-2600
BEFORE YOU DIG

BASIS OF BEARINGS:

BENCHMARK:

EMERGENCY TELEPHONE NUMBERS

	DAY	NIGHT
SOUTHERN CALIFORNIA GAS COMPANY	(800) 624-8153	
SOUTHERN CALIFORNIA EDISON COMPANY	(800) 611-1911	
AT&T TELEPHONE COMPANY	(800) 332-1321	
CITY OF NEWPORT BEACH UTILITIES DIVISION	(949) 644-3011	(949) 644-3717
ORANGE COUNTY SANITATION DISTRICT	(714) 962-2411	
TIME WARNER CABLE	(714) 542-6222	
COX COMMUNICATIONS	-	
ENGINEER OF RECORD		

NO.	DATE	REVISION

REVIEWED:

WARREN A. STEWART, RCE C41358
COWI MARINE NORTH AMERICA

DESIGNED: WNST | DRAWN: MCLS
CHECKED: GAVP | DATE: 03/18/16

BALBOA ISLAND COPING REPAIR

LIGHT POLE DETAILS

SCALE AS SHOWN

CITY OF NEWPORT BEACH
PUBLIC WORKS DEPARTMENT

H-5235-S

SHEET 18 OF XX

ATTACHMENT 9

Construction Pollution Prevention Plan

The project would be limited to the existing seawall around Balboa Island, which totals less than one acre in construction area, measuring between the seawall, temporarily affected portions of the boardwalks within approximately five feet of the seawall, and staging areas to be used during construction. No preconstruction, construction, or project staging activities would occur in coastal waters. As defined in Public Resources Code Section 30121 and consistent with California Coastal Act Section 30233, the project would not entail any fill or disturbance of wetlands, riparian habitats, or mudflats on the seaward side of the existing seawalls. The project would not entail any new or expanded boating facilities; rather, the project would entail installing a nine-inch cap on top of the existing seawalls to reduce potential flood impacts to the beach access pathways, roadways, and existing residential and commercial uses on Balboa Island.

Rincon Consultants has prepared a Construction Pollution Prevention Plan (Attachment 9A), which outlines the contractor requirements for preventing stormwater and ocean water pollution during construction. This plan will be incorporated into the contract specifications for the seawall repair and maintenance contractor.

A General Construction Permit would be obtained as part of the project since the “construction activity is part of a larger common plan of development,” even though the project site would total less than one acre in size (Construction General Permit Order 2009-00090DWQ, §B.1), and per the National Pollutant Discharge Elimination System (NPDES) Permit No. CAS618030 issued by the California Regional Water Quality Control Board (RWQCB), Santa Ana Region, for Orange County, Orange County Flood Control District, and incorporated cities. As such, construction plans pertaining to potential stormwater management and potential wastewater discharge would be consistent with the Construction Pollution Prevention Plan (CPPP) prepared for the General Construction Permit and the Coastal Development Permit, though such stormwater and wastewater discharge would be minimal as a result of the project since:

- There are no septic systems or water wells proposed as part of the project;
- Demolition activities would be limited to the surface of the existing seawall;
- Excavation, grading, and ground clearing would be minimal, since ground-breaking activities are not anticipated; and,
- Land surface disturbance would be minimal, since all construction-related activities are limited to the surface of the existing seawall and no permanent structures or alterations to the beach-side would occur.

The Santa Ana Regional Water Quality Control Board (RWQCB) has reviewed the CDP application. Based on the information reviewed, no permits from RWQCB would be issued for the project (W. Cross, e-mail communication, February 7, 2017 included as Attachment 9B).

The California Department of Fish and Wildlife (CDFW) Region 5 office was provided with information pertaining to the proposed project to seek guidance on any and all project review or permitting requirements. Based on phone and email exchanges, no permits from CDFW would be issued for this project (L. Adams, e-mail communication, January 24, 2017 included as an Attachment 9C).

Pursuant to 33 CFR Part 320, a permit from the Army Corps of Engineers (USACOE) is not required if a proposed project is located above the high tide line and avoids wetlands or other water-bodies, even in the vicinity of tidal waters. The project would not entail any work to occur in the waters of Newport Bay.

Repair and maintenance of the existing seawall would not alter any flow of waters nor interfere with the navigability of Newport Bay. Therefore, no permits from the USACOE would be required.

Furthermore, the tidelands surrounding Balboa Island Channel are under lease grant to the City of Newport Beach, and the City is the managing agency of the tidelands and Tidelands Fund. As such, the City maintains jurisdictional rights to move forward with the proposed project, and written evidence of review and approval of the project by the California State Lands Commission (CSLC) is not required at this time. The City is aware of and will need to file notification of the project to the CSLC 90 days prior to implementing the project since the seawall repairs and maintenance would exceed $250,000 in annual expenditures from the City’s Tidelands Funds (R. Boggiano, e-mail communication, December 12, 2016 included as an Attachment 9D).

ATTACHMENT 9A

Construction Pollution Prevention Plan

Prepared by Rincon Consultants, Inc., June 2017

CONSTRUCTION POLLUTION PREVENTION PLAN

For

City of Newport Beach Balboa Island Seawall Coping Repair Project

RISK LEVEL 2

Owner:
City of Newport Beach
100 Civic Center Drive
Newport Beach, CA

Developer:
COWI Marine North America, Inc.
3780 Kilroy Airport Way, Suite 200
Long Beach, CA 90806

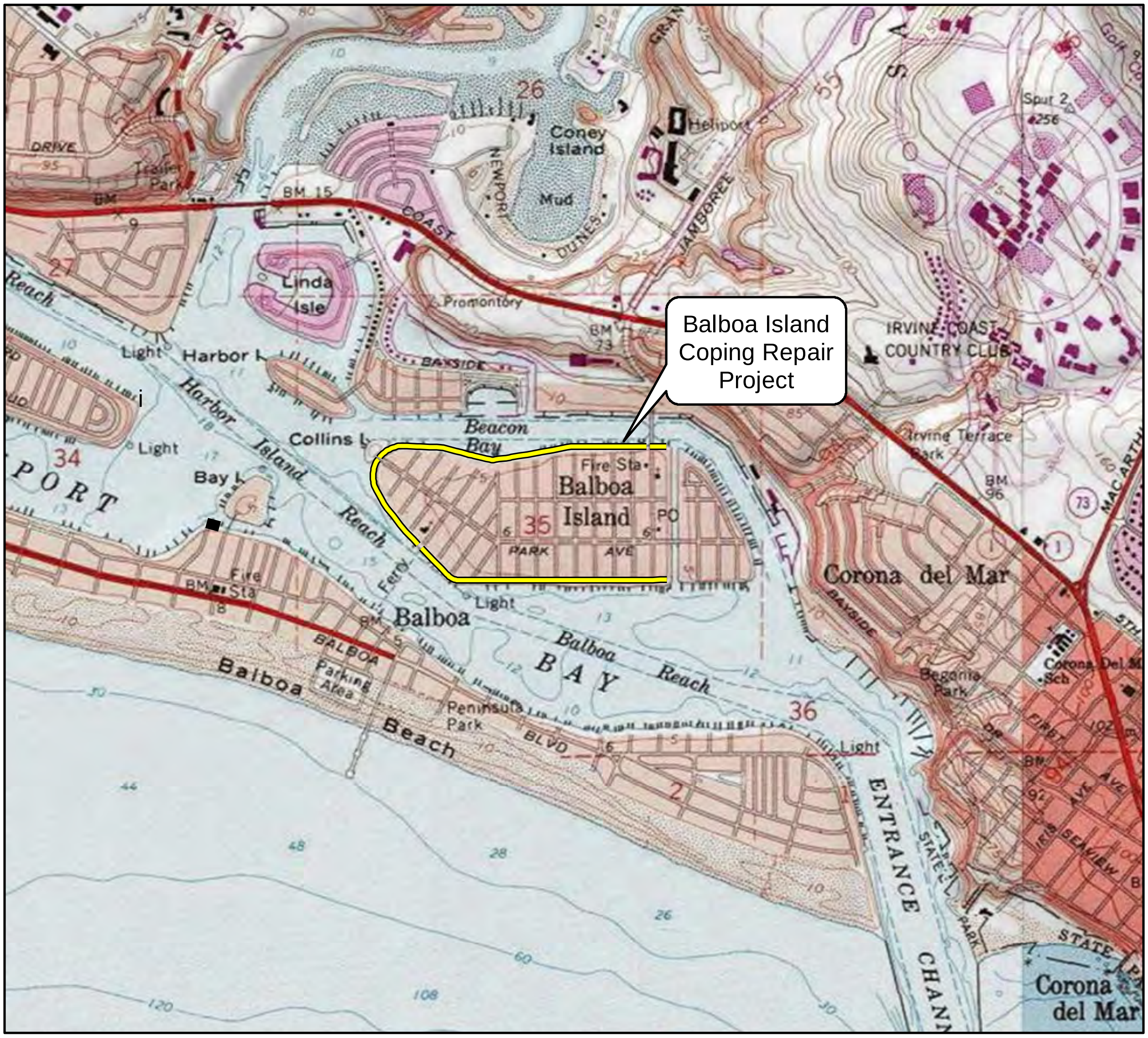
Project Address:
The project site is located along the boardwalk of the southern and northern perimeter of Balboa Island, starting from Marine Avenue and North Bay Front and ending at Marine Avenue and South Bay Front.

CPPP Prepared by:
Rincon Consultants, Inc.
250 East 1st Street Suite 301
Los Angeles, California 90012
213-788-4842

CPPP Preparation Date:
June 2017

Estimated Project Dates:

Start of Construction	**October 1, 2017**	Completion of Construction	**March 23, 2018**



Imagery provided by National Geographic Society, ESRI and its licensors © 2016. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

0 1,000 2,000
Scale in Feet

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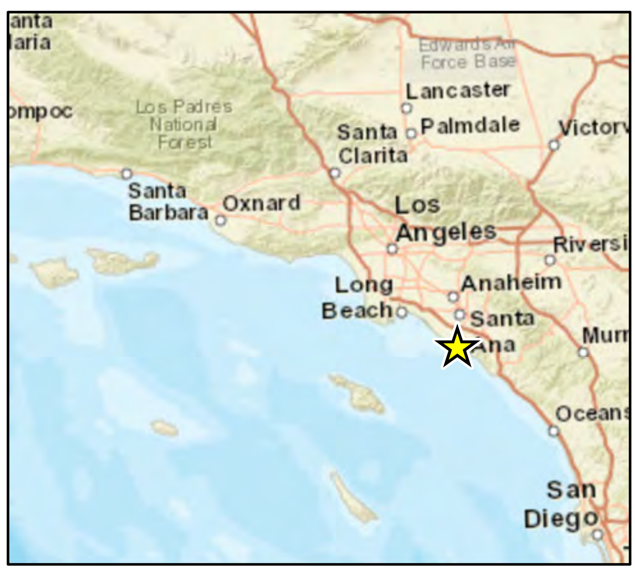


Vicinity Map

Figure 1

Legally Responsible Person

Approval and Certification of the Construction Pollution Prevention Plan (CPPP)

Project Name: City of Newport Beach Balboa Island Seawall Coping Repair Project

"I certify under penalty of law that this document and all Attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

____

Legally Responsible Person

____________________	____________________
Signature of Legally Responsible Person or Approved Signatory	Date
____________________	____________________
Name of Legally Responsible Person or Approved Signatory	Telephone Number

This Construction Pollution Prevention Plan (CPPP) is intended to comply with the City of Newport Beach, Community Development Department Building Division plan check list dated March 24, 2017.

1.1 PERMIT APPLICATION NUMBER (PLANNING PERMIT NUMBER)

The Balboa Island Seawall Coping repair project is under the City of Newport Beach planning permit number : To be determined.

1.2 CPPP AMENDMENT

The CPPP will be amended when:

- There is a change in construction or operations which may affect the discharge of pollutants to surface waters or a municipal separate storm sewer system (MS4);
- There is a change in the project duration that changes the project's risk level; or
- When deemed necessary by the Developer.

Project Name: City of Newport Beach Balboa Island Seawall Coping Repair Project

Amendment No.	Date	Brief Description of Amendment, include section and page number	Prepared and Approved By
			Name:
			Name:
			Name:

1.3 CPPP AVAILABILITY

The developer shall make the CPPP available at the construction site during working hours while construction is occurring and the CPPP shall be made available upon request to a City inspector. When the original CPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original CPPP shall be made available via a request by radio/telephone.

The CPPP shall be implemented concurrently with the start of pre-construction activities.

1.4 RETENTION OF RECORDS

The City of Newport Beach requires that developers maintain a paper or electronic copy of required records for 2 years from the date generated or date submitted, whichever is last.

1.5 ANNUAL REPORTS

The City of Newport Beach requires that permittees prepare an Annual Report no later than September 1 of each year. Annual Reports shall be completed and retained with the onsite CPPP for the duration of the project.

1.6 CHANGE TO PERMIT COVERAGE

The City of Newport Beach requires that permittees notify the City inspector in the event that change to permit coverage is needed. The following activities will require change of permit coverage:

- If disturbed acreage is increased to one acre or greater; or
- When deemed necessary by the City of Newport Beach.

1.7 NOTICE OF TERMINATION

The Notice of Termination (NOT) shall be generated by the developer and retained in the onsite CPPP. A technical NOT memorandum shall be submitted via email to the City of Newport Beach Community Development Department Building Division, within 30 days of completion of construction activities. The NOT will be retained with the CPPP for 2 years as outline in Section 1.4.

2.1 EXISTING CONDITIONS

As of the initial date of this CPPP, the project site is fully developed. The existing seawalls are located along the perimeter of North/South Bay Front boardwalk on Balboa Island. The improvements would reduce the potential for water overtopping the walls during high tides, local wind waves, and storm surges by increasing the height of the seawalls by 9 inches.

2.2 EXISTING DRAINAGE

The project site is at an elevation of approximately 2 feet above mean sea level. Surface drainage at the site currently flows along the developed site and is part of the Santa Ana Region MS4. Stormwater is conveyed through surface run-off that flows into the stormwater conveyance system. This stormwater conveyance system discharges directly into Lower Newport Bay.

Lower Newport Bay is listed for water quality impairments on the most recent 303(d)-list for:

- Chlordane
- Copper
- DDT (Dichlorodiphenyltrichloroethane)
- PCBs (Polychlorinated biphenyls)
- Sediment Toxicity
- Indicator Bacteria *Being addressed with USEPA approved TMDL*
- Nutrients *Being addressed with USEPA approved TMDL*
- Pesticides *Being addressed with USEPA approved TMDL*

2.3 TOPOGRAPHY

Balboa Island is fully developed with minor topographic variations. The seawall coping repair and maintenance project will not require grading or ground disturbance. The final elevation of the seawall will be 9 inches higher that the current seawall.

2.4 GEOLOGY AND GROUNDWATER

The site is underlain by alluvium, lake, playa, and terrace deposits; unconsolidated and semi-consolidated. Construction activities do not require disturbing soil at the site. The historical groundwater elevation is approximately 5 feet below the ground surface and is influence by the ocean tides. Construction activities are not anticipated to occur below the ground surface.

2.5 PROJECT DESCRIPTION

The project involves the repair and maintenance of the existing seawall located along the perimeter of North/South Bay Front boardwalk on Balboa Island in conformance with the City of Newport Beach Seawall Project and the City of Newport Beach certified Coastal Land Use Plan. The purpose of the repairs is to preserve the structural integrity and increase the height of 36 segments of seawall on Balboa Island. These improvements would reduce the potential for water overtopping the walls during high tides, local wind waves, and storm surges by increasing the height of the seawalls by 9 inches.

2.6 DEVELOPMENT CONDITION – DRAINAGE

The current seawall vertical extension is not anticipated to increase or change the drainage patterns of the site. There is no ground-disturbance or grading activities that would occur as a result of the project. Limited construction activity may occur on the seaward side of the boardwalk. No work will occur on the existing stormwater conveyance system.

2.7 PERMIT GOVERNING DOCUMENTS

The seawall repair and maintenance project is under the City of Newport Beach Coastal Land Use Plan.

2.8 STORMWATER RUN-ON FROM OFF-SITE

Ground disturbances are not anticipated for this project. Stormwater run-on to the seawall coping is not anticipated. However, high tides, storm surges, and local wind waves have the potential to impact the construction areas during the rainy months (October-May). During these events the contractor is recommended to not complete concrete pouring activities.

Due to limited space constraints on Balboa Island, a central construction laydown yard is not anticipated. Construction laydown areas will be moved as needed to support the construction activities. Stormwater surface run-on, on to construction laydown areas is recommended to be diverted with the use of temporary Best Management Practices (BMPs).

2.9 RISK DETERMINATION

A construction site risk assessment has been performed for the project and the resultant risk level is Risk Level 2. The risk level was determined through the use of the Global Information System (GIS) map method. The risk level is based on project duration, location, proximity to impaired receiving waters and soil conditions.

The following table summarizes the sediment and receiving water risk factors and document the sources of information used to derive the factors.

Summary of Sediment Risk

RUSLE Factor	**Value**	**Method for establishing value**	
R	33.24	GIS map method	
K	0.32	GIS map method	
LS	0.6	GIS map method	
Total Predicted Sediment Loss (tons/acre)			6.38
Overall Sediment Risk Low Sediment Risk < 15 tons/ acre Medium Sediment Risk >= 15 and < 75 tons/acre High Sediment Risk >= 75 tons/acre			☒ **Low** ☐ **Medium** ☐ **High**

Summary of Receiving Water Risk

Receiving Water Name	303(d) Listed for Sediment Related Pollutant(1)	TMDL for Sediment Related Pollutant(1)	Beneficial Uses of COLD, SPAWN, and MIGRATORY(1)
Lower Newport Bay	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No
Overall Receiving Water Risk			☐ **Low** ☒ **High**
(1) If yes is selected for any option the Receiving Water Risk is High			

This project has been classified as a **Risk Level 2**. Risk Level 2 sites are subject to both the narrative effluent limitations and numeric effluent standards. The narrative effluent limitations require stormwater discharges associated with construction activity to minimize or prevent pollutants in stormwater and authorized non-stormwater through the use of controls, structures and best management practices. Discharges from Risk Level 2 site are subject to Numeric Action Levels (NALs) for pH and turbidity shown in the following table. This CPPP has been prepared to address Risk Level 2 requirements.

Numeric Action Levels

Parameter	Unit	Numeric Action Level Daily Average
pH	pH units	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	NTU	250 NTU

2.10 CONSTRUCTION SCHEDULE

The estimated construction schedule is expected to commence with the pre-construction phase on October 1, 2017 and continue for the duration of six months.

Initial Pre-Construction Phase (2 months)

This phase will involve equipment mobilization and minor demolition of the corners and tops of the seawall segments and roughening the existing exterior concrete surface of the seawall segments to create a proper bonding surface for construction of the reinforced concrete seawall cap. Existing cracks along the seawall segments would also be repaired or patched during the pre-construction phase.

Construction Phase (4 months)

The construction of a reinforced 9-inch high concrete cap on top of the existing seawall.

The construction of new concrete steps along portions of the seawall base fronting the North/South Bay Front boardwalk to preserve ease of access to public or private docks. The construction of a 3-foot wide "gap" at pre-defined locations within the tops of the seawall segments fronting North/South Bay Front to preserve a sufficient level of vertical access to the waterside beaches.

A total of six construction rotations are anticipated for the 17 work areas identified along the North/South Bay Front boardwalk. Construction of the seawall segments will be phased such that no more than three non-contiguous segments will be constructed during the first five rotations, and the final rotation will consist of two work areas. Construction of each segment will take approximately ten days to complete, and all work is to be completed between the months of October through May.

Rotation	Anticipated Timeframe	Work Areas
1st	Mid-December – Late December	A1, A7, A13
2nd	Early December – Mid-January	A2, A8, A14
3rd	Mid-January – Late January	A3, A9, A15
4th	Early February – Mid February	A4, A10, A16
5th	Mid-February – Late February	A5, A11, A17
6th	Early March – Mid March	A6, A12

2.11 POTENTIAL POLLUTANTS FROM CONSTRUCTION ACTIVITIES

The following table lists construction phases and associated equipment that are anticipated to be used onsite. Construction activities and associated equipment could potentially contribute pollutants to stormwater and/or non-stormwater runoff.

The anticipated activities and associated pollutants are used in Section 3 to select the Best Management Practices (BMPs) for the project. Location of anticipated pollutants and associated BMPs are show on the Site Map (Appendix A).

Phase	Activities	Equipment
Pre-Construction:	Minor demolition Roughening exterior seawall segment surfaces Repair and/or patch of existing cracks	Jackhammers Drills Pneumatic impact tools Concrete Saws Concrete Washouts for waste materials Hand tools
Construction:	Concrete casting and placement Concrete pouring	Pneumatic impact tools/ Hand tools Cement mixers/ Cement forms/ Washout

2.12 NON-STORMWATER DISCHARGES

Non-stormwater discharges consist of discharges which do not originate from precipitation events. Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the CPPP, or authorized under a separate National Pollution Discharge Elimination System (NPDES) permit, are prohibited.

Authorized Non-Stormwater

Non-stormwater discharges that are authorized from this project site include the following:

- Use of water for dust control

Authorized non-stormwater discharges will be managed with the stormwater and non-stormwater BMPs described in this CPPP.

Unauthorized Non-Stormwater Discharges

Activities at this site that may result in unauthorized non-stormwater discharges include:

- Illegal connections or discharges
- Vehicle operations and maintenance
- Vehicle fueling

Prohibited (Illicit) Discharges

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized or authorized under a separate NPDES permit, are prohibited. Examples of prohibited discharges common to construction activities include but are not limited to:

- Vehicle and equipment wash water, including concrete washout water
- Slurries from concrete cutting and coring operations, Portland Cement Concrete (PCC) grinding or Asphalt Concrete (AC) grinding operations
- Slurries from concrete or mortar mixing operations
- Slurries from drilling or boring operations
- Blast residue from high-pressure washing of structures or surfaces
- Wash water from cleaning painting equipment
- Sanitary and septic wastes
- Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, and cure compounds

Steps will be taken by the developer, including the implementation of appropriate BMPs, to ensure that unauthorized discharges are eliminated, controlled, disposed, or treated on-site.

2.13 FIGURES

Water Pollution Control Drawings (WPCD) have been generated for the project. WPCD shall be retained with the CPPP for the duration of the project. WPCD can be located in Appendix A.

3.1 SCHEDULE FOR BMP IMPLEMENTATION

Schedule for BMP implementations are included in the following table. All BMP amendments will be approved prior to proceeding with the construction activities. BMPs installation details for each BMP can be located in Appendix B.

BMP Implementation Schedule

	BMP*	Implementation	Duration
Erosion Control	EC-1, Scheduling	Prior to Construction	Entirety of Project
Sediment Control	SE-4, Check Dams	As determined by Inspector	Entirety of Project
	SE-5, Fiber Rolls	Start of Construction	Entirety of Project
	SE-6, Gravel Bag Berm	Start of Construction	Entirety of Project
	SE-7, Street Sweeping	Start of Construction	Entirety of Project
	SE-10, Storm Drain Inlet Protection	Start of Construction	Entirety of Project
Wind Erosion	WE-1, Wind Erosion Control	Start of Construction	Entirety of Project
Waste Management	WM-1, Material Delivery and Storage	Prior to Construction	Entirety of Project
	WM-2, Material Use	Start of Construction	Entirety of Project
	WM-3, Stockpile Management	Start of Construction	Entirety of Project
	WM-4, Spill Prevention and Control	Start of Construction	Entirety of Project
	WM-5, Solid Waste Management	Start of Construction	Entirety of Project
	WM-6, Hazardous Waste Management	Start of Construction	Entirety of Project
	WM-7, Contaminated Soil Management	Start of Construction	Entirety of Project
	WM-8, Concrete Waste Management	When Concrete Activities are Present	Entirety of Project
	WM-9, Sanitary/Septic Waste Management	Prior to Construction	Entirety of Project
	WM-10, Liquid Waste Management	Prior to Construction	Entirety of Project

BMP Implementation Schedule

	BMP*	Implementation	Duration
Non-Stormwater Management	NS-1, Water Conservation Practices	Prior to Construction	Entirety of Project
	NS-3, Paving and Grinding Operation	Start of Construction	Entirety of Project
	NS-6, Illicit Connection/Discharge	Prior to Construction	Entirety of Project
	NS-9, Vehicle and Equipment Fueling	Start of Construction	Entirety of Project
	NS-10, Vehicle and Equipment Maintenance	Start of Construction	Entirety of Project
	NS-12, Concrete Curing	When Concrete Activities are Present	Entirety of Project
	NS-13, Concrete Finishing	When Concrete Activities are Present	Entirety of Project
	NS-15, Demolition Adjacent to Water	When Construction Activities Occur Adjacent to Water	Entirety of Project

*BMP installation details can be located in Appendix B.

3.2 EROSION AND SEDIMENT CONTROL WORKSHEET

Erosion and sediment controls are required by the CPPP to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the project. Applicable BMPs are identified in this section for erosion control, sediment control, tracking control, and wind erosion control.

Erosion and Sediment Control Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
Implement effective wind erosion control.	Yes	WE-1
Provide effective soil cover for inactive areas and finished slopes, open space, utility backfill, and completed lots.	No	N/A
Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the inspector shall consider the use of plastic materials resistant to solar degradation.	Yes	WM-3
Establish and maintain effective perimeter controls and stabilize construction entrances and exits to sufficiently control erosion and sediment discharges from the site.	No, Site is developed	SE-5 SE-7 WM-3

Erosion and Sediment Control Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
On sites where sediment basins are to be used, at a minimum, design sediment basins according to the method provided in *Stormwater BMP Handbook Portal: Construction*.	No	N/A
Implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active construction.	Yes	EC-1 EC-10 SE-4 SE-5 SE-6
Apply linear sediment controls along the toe of the slope; face of the slope; and at the grade breaks of exposed slopes to comply with sheet flow lengths in accordance with CASQA installation guidelines.	No	SE-5 SE-7
Ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.	Yes	SE-7
Ensure that storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire wash-off locations) are maintained and protected from activities that reduce their effectiveness.	Yes	All BMPs
Inspect on a daily basis immediate access roads. At a minimum daily (when necessary) and prior to a rain event. The contractor shall remove sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).	Yes	SE-7
The Regional Water Board may require implementation of additional site-specific sediment control requirements if the implementation of the other requirements in this section is not adequately protecting the receiving waters. If there are additional requirements from the Regional Water Board, insert them into a new row(s) in this table.	No	N/A
Effectively manage run-on, runoff within the site and runoff that discharges off the site.	Yes	SE-5 SE-10 WM-3 WM-8 WM-9

Erosion and Sediment Control Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
Run-on from off-site shall be directed away from disturbed areas or shall collectively be in compliance with the effluent limitation.	No	N/A
Control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.	Yes	WE-1

3.3 TEMPORARY EROSION CONTROL BMPS

Erosion control consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles.

This construction project will implement the following practices to provide effective temporary and final erosion control during construction:

1. Monitor National Oceanic Atmospheric Administration (NOAA) weather daily for the area and schedule work activities accordingly.
2. Apply erosion control BMPs to construction laydown yard.
3. Apply water to work area to reduce wind erosion of concrete materials and prevent fugitive dust emission from being transported offsite.

Sufficient erosion control materials shall be maintained onsite to allow implementation in conformance with this CPPP.

The following temporary erosion control BMP selection table indicates the BMPs that shall be implemented to control erosion on the construction site.

Temporary Erosion Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement (1)	BMP Used		If not used, state reason
			YES	NO	
EC-1	Scheduling	✓	✓		
EC-2	Preservation of Existing Vegetation			✓	Not required for this project.
EC-3	Hydraulic Mulch			✓	Not required for this project.
EC-4	Hydroseed			✓	Not required for this project.
EC-5	Soil Binders			✓	Not required for this project.
EC-6	Straw Mulch			✓	Not required for this project.
EC-7	Geotextiles and Mats			✓	Not required for this project.
EC-8	Wood Mulching			✓	Not required for this project.
EC-9	Earth Dike and Drainage Swales			✓	Not required for this project.
EC-10	Velocity Dissipation Devices			✓	Not required for this project.
EC-11	Slope Drains			✓	Not required for this project.
EC-12	Stream Bank Stabilization			✓	Not required for this project.
EC-14	Compost Blankets			✓	Not required for this project.
EC-15	Soil Preparation-Roughening			✓	Not required for this project.
EC-16	Non-Vegetated Stabilization			✓	Not required for this project.
WE-1	Wind Erosion Control	✓	✓		
Alternate BMPs Used: None					**If used, state reason:** Not applicable.
(1) Applicability to a specific project shall be determined by the site inspector.					

These temporary erosion control BMPs shall be implemented in conformance with the following guidelines and as outlined in the BMP Factsheets provided in Appendix B. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the CPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map.

EC-1 Scheduling

Scheduling will include appropriate work for predicted weather. Work stoppage will occur if necessary.

WE-1 Wind Erosion Control

A water truck/water buffalo will be utilized on an as needed basis to prevent wind erosion. Grinding and chipping of existing seawall is not recommended during high wind or wave action. Stockpiles inactive for greater than 14 days will be covered and have perimeter control to prevent wind erosion.

3.4 TEMPORARY SEDIMENT CONTROL BMPS

Sediment controls are temporary or permanent structural measures that are intended to complement the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.

The following sediment control BMP selection table indicates the BMPs that shall be implemented to control sediment on the construction site. Fact Sheets for temporary sediment control BMPs are provided in Appendix B.

Temporary Sediment Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement [1]	BMP used		If not used, state reason
			YES	NO	
SE-1	Silt Fence			✓	Not applicable for project.
SE-2	Sediment Basin			✓	Not applicable for project.
SE-3	Sediment Trap			✓	Not applicable for project.
SE-4	Check Dams	✓	✓		As directed by inspector.
SE-5	Fiber Rolls	✓[2]	✓		
SE-6	Gravel Bag Berm			✓	Not applicable for project.
SE-7	Street Sweeping	✓[2]	✓		
SE-8	Sandbag Barrier			✓	Not applicable for project.
SE-9	Straw Bale Barrier			✓	Not applicable for project.
SE-10	Storm Drain Inlet Protection	✓[2]	✓		
SE-11	ATS			✓	Not applicable for project.
SE-12	Manufactured Linear Sediment Controls			✓	Not applicable for project.
SE-13	Compost Sock and Berm			✓	Not applicable for project.
SE-14	Biofilter Bags			✓	Not applicable for project.
TC-1	Stabilized Construction Entrance and Exit			✓	Not applicable for project.
TC-2	Stabilized Construction Roadway			✓	Not applicable for project.
TC-3	Entrance Outlet Tire Wash			✓	Not applicable for project.
Alternate BMPs Used: Not Applicable (NA)					**If used, state reason:** NA

[1] Applicability to a specific project shall be determined by the inspector.
[2] The inspector shall ensure implementation of the minimum measures listed above to achieve and maintain the Risk Level 2 requirements.

These temporary sediment control BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix B. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the CPPP or guidance in the BMP Fact Sheets. The narrative in the body of the CPPP prevails over guidance in the BMP Fact Sheets.

Check Dams

Gravel bag check dams will be placed up gradient of drain inlets during concrete pouring activities.

Fiber Rolls

Fiber rolls will be installed as stockpile and laydown perimeter controls. Due to the project area being developed, manufacturer's installation of fiber roll will not be applicable. Fiber rolls can be secured with gravel bags surrounding the laydown perimeter.

Street Sweeping

Street/sidewalk sweeping will occur during active construction and will be provided on daily basis.

Storm Drain Inlet Protection

Storm drain inlet protection will be installed as needed to protect inlets.

3.5 NON-STORMWATER CONTROL WASTE MANAGEMENT BMP WORKSHEET

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the CPPP, are prohibited. Non-stormwater discharges for which a separate NPDES permit is required by the local Regional Water Board are prohibited unless coverage under the separate NPDES permit has been obtained for the discharge. The selection of non-stormwater BMPs is based on the list of construction activities with a potential for non-stormwater discharges.

Non-Stormwater, Construction Materials & Waste Management Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
Prevent disposal of rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.	Yes	NS-1 NS-3 NS-8 NS-12 NS-13 NS-14
Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the stormwater drainage system or receiving water.	Yes	WM-9

Non-Stormwater, Construction Materials & Waste Management Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.	Yes	WM-9
Cover waste disposal containers at the end of every business day and during a rain event.	Yes	WM-1 M-2 WM-4 WM-5 WM-6 WM-10
Prevent discharges from waste disposal containers to the stormwater drainage system or receiving water.	Yes	WM-1 WM-2 WM-4 WM-5 WM-6 WM-9 WM-10
Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.	Yes	WM-3
Implement procedures that effectively address hazardous and non-hazardous spills.	Yes	WM-4
Develop a spill response and implementation element of the CPPP prior to commencement of construction activities. The CPPP shall require that: Equipment and materials for cleanup of spills shall be available onsite and that spills and leaks shall be cleaned up immediately and disposed of properly; and appropriate spill response personnel are assigned and trained.	Yes	WM-4
Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.	Yes	WM-8
Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced.	Yes	EC-1 WM-1
Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).	Yes	EC-1, WM-1

Non-Stormwater, Construction Materials & Waste Management Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
		WM-3
Store chemicals in watertight containers (with appropriate secondary containment to prevent spillage or leakage) or in a storage shed (completely enclosed).	Yes	WM-1 WM-2 WM-4 WM-6
Minimize exposure of construction materials to precipitation.	Yes	WM-1 WM-2 WM-4 WM-5 WM-6 WM-7 WM-10
Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.	Yes	SE-7
Prevent oil, grease, or fuel from leaking into the ground, storm drains or surface waters.	Yes	NS-9 NS-10 WM-4
Place equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.	Yes	WM-4 NS-9 NS-10
Clean leaks immediately and disposing of leaked materials properly.	Yes	WM-4
Implement measures to control non-stormwater discharges during construction.	Yes	NS-3 NS-8 NS-9 NS-10 NS-12 NS-13
Wash vehicles in such a manner as to prevent non-stormwater discharges to surface waters or MS4 drainage systems.	No, Vehicle Washing	N/A

Non-Stormwater, Construction Materials & Waste Management Worksheet		
BMP Requirements	Applicable to Project?	Selected CASQA BMPs
	Prohibited	
Clean streets in such a manner as to prevent non-stormwater discharges from reaching surface water or MS4 drainage systems.	Yes	SE-7

Temporary Non-Stormwater BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement [1]	BMP used		If not used, state reason
			YES	NO	
NS-1	Water Conservation Practices	✓	✓		
NS-2	Dewatering Operation			✓	Not applicable for project.
NS-3	Paving and Grinding Operation	✓	✓		
NS-4	Temporary Stream Crossing			✓	Not applicable for project.
NS-5	Clear Water Diversion			✓	Not applicable for project.
NS-6	Illicit Connection/Discharge	✓	✓		
NS-7	Potable Water/Irrigation			✓	Not applicable for project
NS-8	Vehicle and Equipment Cleaning			✓	Vehicle Washing Prohibited
NS-9	Vehicle and Equipment Fueling	✓	✓		
NS-10	Vehicle and Equipment Maintenance	✓	✓		
NS-11	Pile Driving Operation			✓	Not applicable for project.
NS-12	Concrete Curing		✓		
NS-13	Concrete Finishing		✓		
NS-14	Material and Equipment Use Over Water		✓		
NS-15	Demolition Removal Adjacent to Water		✓		As directed by Inspector.
NS-16	Temporary Batch Plants			✓	Not applicable for project.
Alternate BMPs Used: Not Applicable			**If used, state reason:** Not Applicable		
[1] Applicability to a specific project shall be determined by the Inspector.					

Non-stormwater BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix B. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the CPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map.

Water Conservation Practices

Water equipment shall be well maintained and monitored to prevent leaks and misuse.

Paving and Grinding Operation

Paving/concrete pouring operations shall be avoided if rain is in the forecast. Material and waste shall be stored away from drainage area. Concrete grinding materials shall be removed from work area and be stored pending offsite disposal in approved containers.

Illicit Connection/Discharge

Contractor shall recognize illicit connections or illegally dumped or discharged materials on construction site and report incidents.

Vehicle and Equipment Fueling

All vehicle and equipment fueling will occur within specifically designated areas and will include drip pans or other secondary control measures.

Vehicle and Equipment Maintenance

All vehicle and equipment maintenance will occur within specifically designated areas and will include drip pans or other secondary control measures.

Concrete Curing

Water and/or curing compounds shall be utilized efficiently and prevented from running offsite.

Concrete Finishing

Wastewater from concrete finishing operations shall be collected and disposed per WM-8 Concrete Waste Management.

Demolition Removal Adjacent to Water

Demolition removal adjacent to water practices will be applied and will occur within specifically designated area and will include appropriate BMPs.

3.6 TEMPORARY MATERIALS MANAGEMENT

Materials management control practices consist of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into stormwater discharges. The amount and type of construction materials to be utilized at the site will depend upon the type of construction and the length of the construction period.

Waste management consist of implementing procedural and structural BMPs for handling, storing and ensuring proper disposal of wastes to prevent the release of those wastes into stormwater discharges.

Materials and waste management pollution control BMPs shall be implemented to minimize stormwater contact with construction materials, wastes and service areas and to prevent materials and wastes from being discharged off-site. The primary mechanisms for stormwater contact that shall be addressed include:

- Direct contact with precipitation
- Contact with stormwater run-on and runoff
- Wind dispersion of loose materials
- Direct discharge to the storm drain system through spills or dumping
- Extended contact with some materials and wastes, such as asphalt cold mix and treated wood products, which can leach pollutants into stormwater.

Temporary Materials Management BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement [1]	BMP used		If not used, state reason
			YES	NO	
WM-01	Material Delivery and Storage	✓	✓		
WM-02	Material Use	✓	✓		
WM-03	Stockpile Management	✓	✓		
WM-04	Spill Prevention and Control	✓	✓		
WM-05	Solid Waste Management	✓	✓		
WM-06	Hazardous Waste Management	✓	✓		
WM-07	Contaminated Soil Management			✓	No soil disturbance onsite
WM-08	Concrete Waste Management	✓	✓		
WM-09	Sanitary-Septic Waste Management	✓	✓		
WM-10	Liquid Waste Management	✓	✓		
Alternate BMPs Used: Not Applicable				**If used, state reason:** Not Applicable	
[1] Applicability to a specific project shall be determined by the Inspector.					

Material management BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix B. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the CPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map.

Material Delivery and Storage

Contractor shall prevent, reduce or eliminate the discharge of pollutants from all material delivery and storage to the stormwater system or water courses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area and installing secondary containment.

Material Use

Contractor to prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees.

Stockpile Management

Contractor to use stockpile management procedures and practices to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as PCC rubble, aggregate base, aggregate sub base or pre-mixed aggregate and pressure treated wood.

Spill Prevention and Control

Contractor to prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

Solid Waste Management

Contractors use solid waste management procedures and practices by providing designated waste collection areas and containers, arranging for regular disposal and training employees and subcontractors.

Hazardous Waste Management

Contractor to prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Concrete Waste Management

Contractor to prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

Sanitary-Septic Waste Management

Contractor to use proper sanitary and septic waste management to prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Liquid Waste Management

Contractor to use proper liquid waste management procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

3.7 POST CONSTRUCTION STORMWATER MANAGEMENT MEASURES

Post construction BMPs are permanent measures installed during construction, designed to reduce or eliminate pollutant discharges from the site after construction is completed.

This site is located in the City of Newport Beach, an area subject to a Phase I MS4 permit. The seawall vertical repair and maintenance project will not create any additional surface area. No post construction stormwater measures are needed for this project.

4.1 BMP INSPECTION AND MAINTENANCE

The CPPP requires routine weekly inspections of BMPs, along with inspections before, during, and after qualifying rain events. A BMP inspection checklist (Appendix A) must be filled out for inspections and maintained on-site with the CPPP. The BMP inspections shall be conducted by the contractor.

BMPs shall be maintained regularly to ensure proper and effective functionality. If necessary, corrective actions shall be implemented within 72 hours of identified deficiencies.

4.2 RAIN EVENT ACTION PLANS

The Rain Event Action Plan (REAP) a is written document designed to be used as a planning tool by the contractor to protect exposed portions of project sites and to ensure that the developer has adequate materials, staff, and time to implement erosion and sediment control measures. These measures are intended to reduce the amount of sediment and other pollutants that could be generated during the rain event. It is the responsibility of the contractor to be aware of precipitation forecast and to obtain and print copies of forecasted precipitation from NOAA's National Weather Service Forecast Office.

The CPPP includes REAP templates but the contractor will need to customize them for each rain event. Site-specific REAP templates for each applicable project phase can be found in Appendix D.

The contractor will develop an event specific REAP 48 hours in advance of a precipitation event forecast to have a 50% or greater chance of producing precipitation in the project area. The REAP will be onsite and be implemented 24 hours in advance of any the predicted precipitation event. Contractor shall maintain documentation of the actions implemented as part of the REAP.

At minimum the REAP will include the following site and phase-specific information:

1. Site Address;
2. Calculated Risk Level;
3. Site Stormwater Manager Information including the name, company and 24-hour emergency telephone number;
4. Erosion and Sediment Control Provider information including the name, company and 24-hour emergency telephone number;
5. Stormwater Sampling Agent information including the name, company, and 24-hour emergency telephone number;
6. Activities associated with each construction phase;
7. Trades active on the construction site during each construction phase;
8. Trade contractor information; and
9. Recommended actions for each project phase.

To promote stormwater management awareness specific for this project, periodic training of job-site personnel shall be included as part of routine project meetings (daily/weekly tailgate safety meetings), or task specific trainings as needed.

The contractor shall be responsible for providing this information at the meetings, and subsequently completing the trainings, which identifies the site-specific stormwater topics covered as well as the names of site personnel who attended the meeting. Tasks may be delegated to trained employees by the Developer provided adequate supervision and oversight is provided. Training shall correspond to the specific task delegated including: CPPP implementation; BMP inspection and maintenance; and record keeping.

6.1 RESPONSIBLE PARTIES

Approved Signatory who is responsible for CPPP implementation and have authority to sign permit-related documents is listed below.

Name	Title	Phone Number
TBD	TBD	TBD

6.2 CONTRACTOR/OPERATOR LIST

List of all contractors and subcontractors responsible for the implementation of the CPPP is provided in below and shall be updated and maintained on-site as appropriate.

Name	Title	Phone Number
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD
TBD	TBD	TBD

7.1 SAMPLING AND ANALYSIS PLAN FOR NON-VISIBLE POLLUTAN STORMWATER RUNOFF DISCHARGES

This Sampling and Analysis Plan for Non-Visible Pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater runoff discharges from the project site.

Sampling for non-visible pollutants will be conducted when (1) a breach, leakage, malfunction, or spill is observed; and (2) the leak or spill has not been cleaned up prior to the rain event; and (3) there is the potential for discharge of non-visible pollutants to surface waters or drainage system.

The following construction materials, wastes, or activities, are anticipated sources of non-visible pollutants to stormwater discharges from the project. Storage, use, and operational locations are shown on the Site Maps.

- Portable toilet products/sanitary waste
- Vehicle oils/fluids
- Concrete materials
- Concrete washout materials

Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Portable Toilet	Chemicals and waste	Fecal Coliform, BOD
Vehicle Fluids	Gasoline, Diesel, Motor Oil	Total Petroleum Hydrocarbons
Concrete/Masonry Work	Curing compounds, sealant	Semi volatile organic compounds, volatile organic compounds, pH

Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Containers	Sample Preservation	Reporting Limit	Maximum Holding Time
pH	Field test with calibrated portable instrument	1x100mL	Poly-bottle	Store at 4°C	+/- 0.1	immediate
Turbidity	Field test / EPA 180.1	500mL	Poly-bottle	Store at 4°C	1 NTU	48 hours
Phenol	EPA 420.1	1x1L	Glass-amber	Store at 4°C, H_2SO_4 to pH<2	0.1mg/L	28 days
VOCs- Solvents	EPA 8260B	2x40 mL	VOA	HCl at 4°C	0.5 µg/L	14 days
SVOCs	EPA 8270C	1x1L	Glass-amber	Store at 4°C	10 µg/L	7 days
Total Petroleum Hydrocarbons	EPA 8015B	3x40mL	VOA	HCl at 4°C	1 mg/L	14 days
Total Extractable Petroleum Hydrocarbons	EPA 8015B	3x40mL	VOA	HCl at 4°C	10 mg/L	14 days
Oil and Grease	EPA 1664A	2x1L	Glass-amber	HCl at 4°C	10 mg/L	28 days
Metals	EPA 6010B/7470A	1x250mL	Poly-bottle	Nitric acid at 4°C	0.1 mg/L	180 days
Nitrate	EPA 300.0	500mL	Poly-bottle	Store at 4°C	10 mg/L	48 hours
Alkalinity	SM2320B	500mL	Poly-bottle	Store at 4°C	1 mg/L	14 days

Notes:

VOC - volatile organic compounds
SVOCs – semi-volatile organic compounds
mL – milliliter
L - liter
µg/L – micrograms per liter
mg/L – milligrams per liter
NTU - nephelometric turbidity units

For samples collected for field analysis, collection, analysis and equipment calibration shall be in accordance with the field instrument manufacturer’s specifications.

7.2 NUMERIC ACTION LEVELS

This project is subject to NALs for pH and turbidity. Compliance with the NAL for pH and turbidity is based on a weighted daily average. Upon receiving the field log sheets, the contractor shall immediately calculate the weighted arithmetic average of the turbidity samples, and the weighted logarithmic average of the pH samples to determine if the NALs, shown in the table below, have been exceeded.

Numeric Action Levels

Parameter	Unit	Daily Average
pH	pH units	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	NTU	250 NTU

In the event that the pH or turbidity NAL is exceeded, the developer shall immediately notify the City of Newport Beach and investigate the cause of the exceedance and identify corrective actions.

7.3 SAMPLING AND ANALYSIS PLAN FOR NON-STORMWATER DISCHARGES

This Sampling and Analysis Plan for non-stormwater discharges describes the sampling and analysis strategy and schedule for monitoring pollutants in authorized and unauthorized non-stormwater discharges from the project site in accordance with the requirements of the CPPP.

Sampling of non-stormwater discharges will be conducted when an authorized or unauthorized non-stormwater discharge is observed discharging from the project site. In the event that non-stormwater discharges run-on to the project site from offsite locations, and this run-on has the potential to contribute to a violation of a NAL, the run-on will also be sampled.

The following authorized non-stormwater discharges have the potential to be discharged from the project site.

- Water for dust control
- Concrete washout water
- Slurries from concrete cutting, coring, grinding, and mixing operations
- Equipment maintenance or cleaning
- Rinsing or washing of tools or equipment
- Sanitary and septic wastes
- Chemical leaks and/or spills of any kind, including but not limited to, petroleum, paints, cure compounds.

7.4 SAMPLING AND ANALYSIS PLAN FOR OTHER POLLUTANTS REQUIRED BY THE REGIONAL WATER BOARD

The Regional Water Board has not specified monitoring for additional pollutants.

CASQA 2009, *Stormwater BMP Handbook Portal: Construction*, November 2009, www.casqa.org

City of Newport Beach, *Community Development Department Building Division Construction Pollution Prevention Plan Review Checklist for Coastal Development Permit*, April 24, 2017

Legend

Project Boundary

Erosion Control BMPs:

EC-1 Scheduling

Temporary Sediment Control BMPs:

—CD— SE-4 Check Dam
SE-5 Fiber Rolls
SE-7 Street Sweeping and Vacuuming
SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

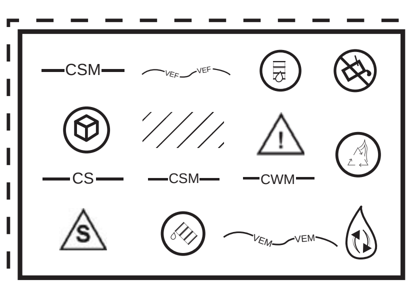
WM-1 Material Delivery and Storage
WM-2 Material Use
—CS— WM-3 Stockpile Management
WM-4 Spill Prevention and Control
WM-5 Solid Waste Management
WM-6 Hazardous Waste Management
WM-9 Sanitary/Septic Waste Management
WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

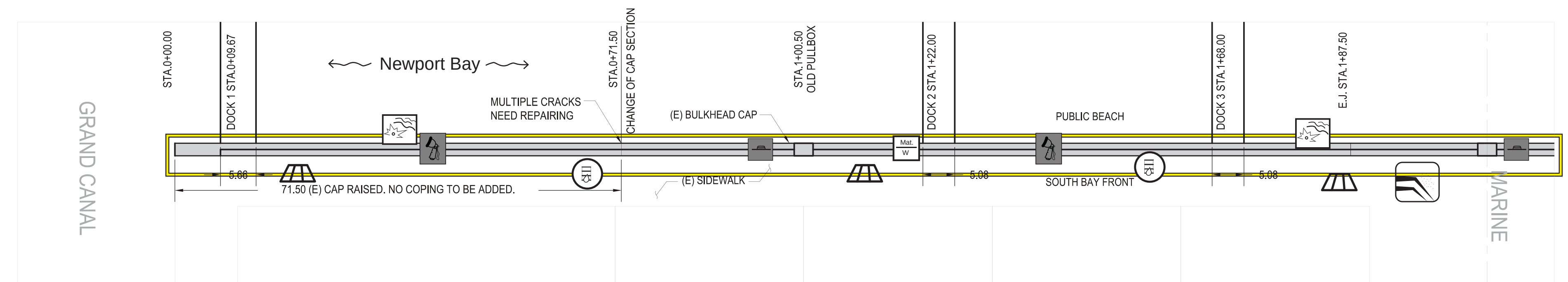
NS-1 Water Conservation Practices
NS-3 Paving and Grinding Operations
NS-6 Illicit Connection/Dishcarge
NS-9 Vehicle and Equipment Fueling
NS-10 Vehicle and Equipment Maintenance
NS-12 Concrete Curing
NS-13 Concrete Finishing
NS-14 Material Over Water
NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

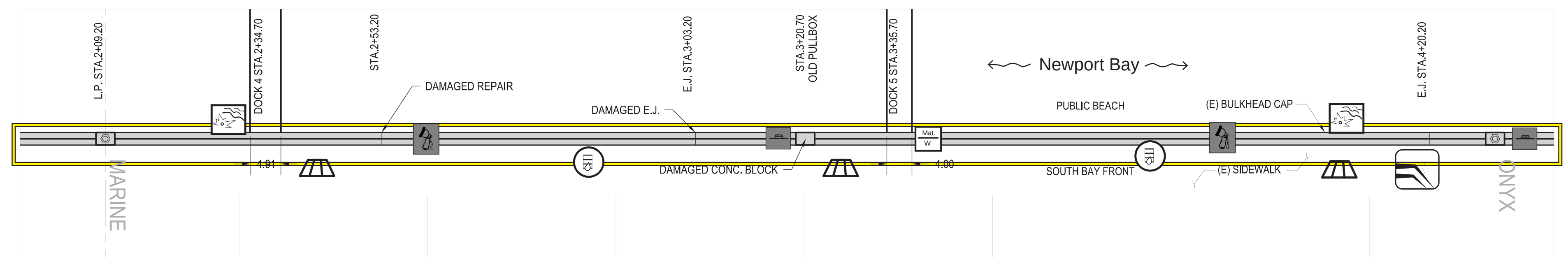
WE-1 Wind Erosion Control



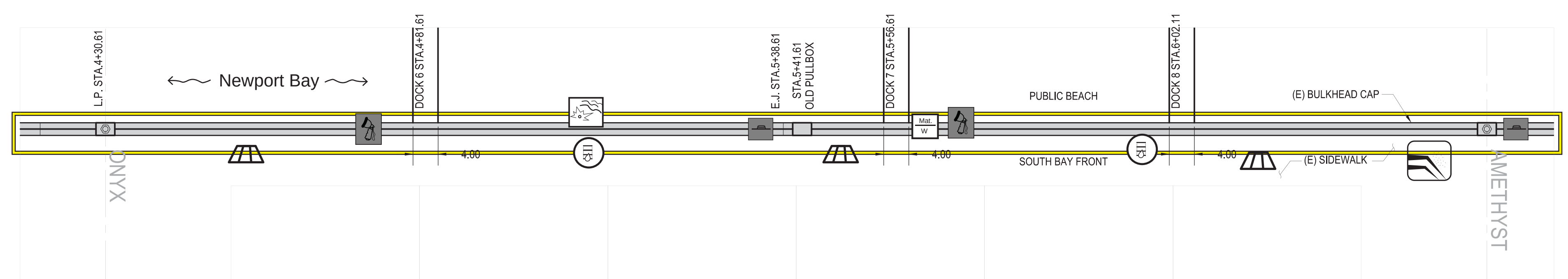
*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



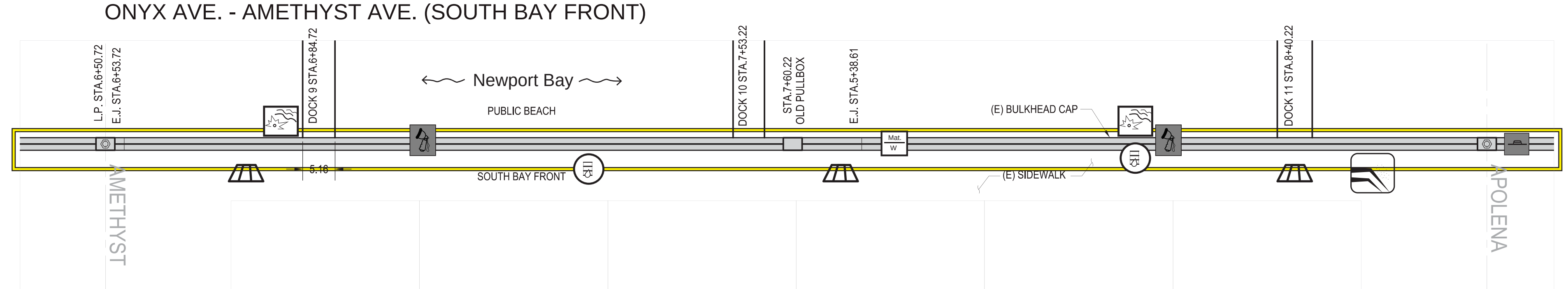
GRAND CANAL - MARINE AVE. (SOUTH BAY FRONT)



MARINE AVE. - ONYX AVE. (SOUTH BAY FRONT)



ONYX AVE. - AMETHYST AVE. (SOUTH BAY FRONT)



AMETHYST AVE. - APOLENA AVE. (SOUTH BAY FRONT)

Not to Scale

N

Source: WNST, March 2016

Figure 2

Legend

- Project Boundary

Erosion Control BMPs:

- EC-1 Scheduling

Temporary Sediment Control BMPs:

- SE-4 Check Dam
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

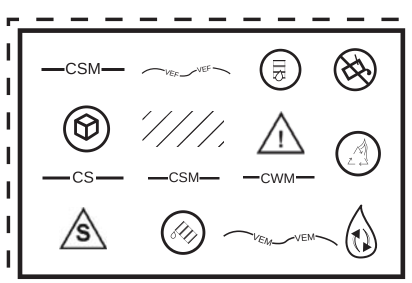
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

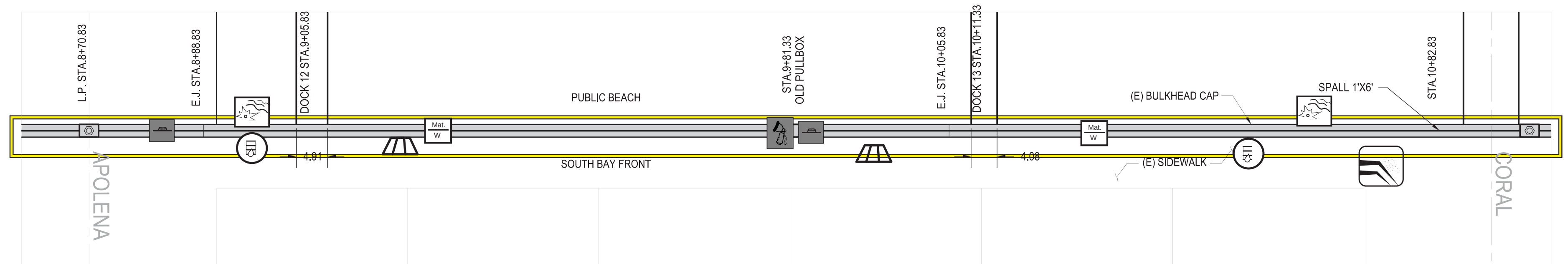
- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-6 Illicit Connection/Dishcarge
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

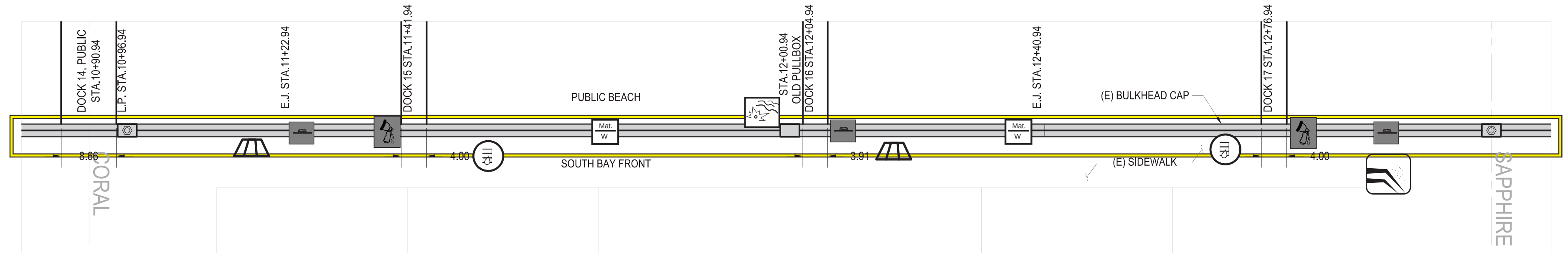
- WE-1 Wind Erosion Control



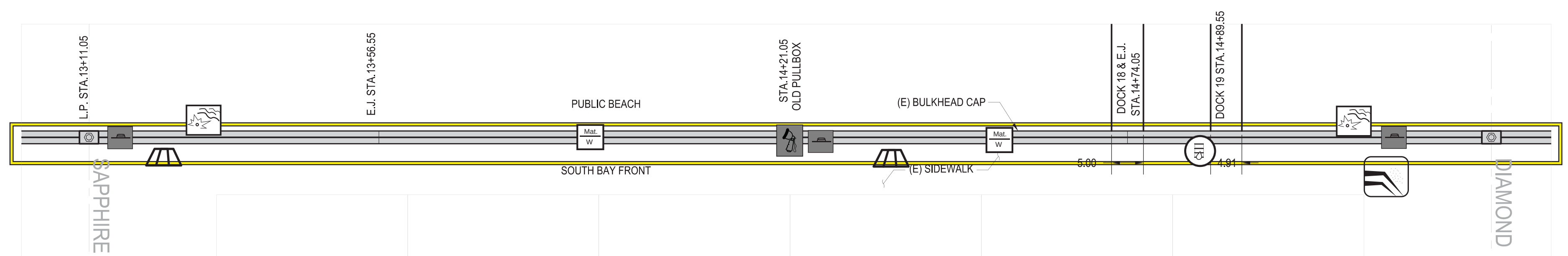
*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



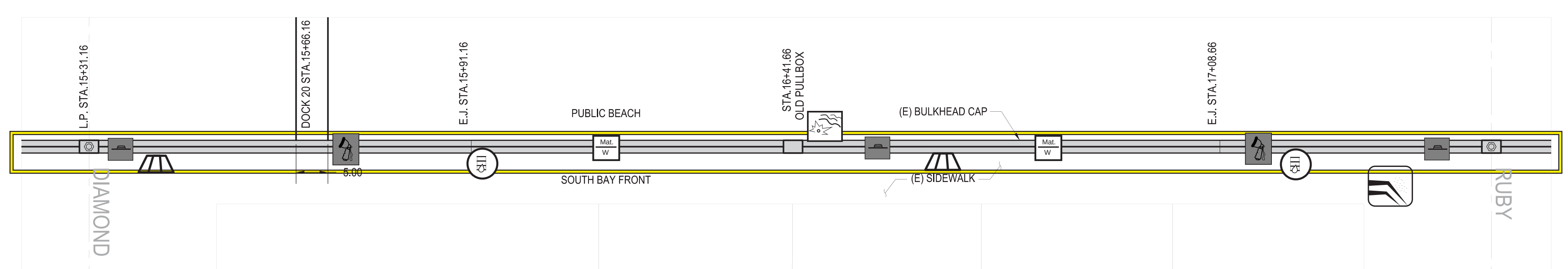
APOLENA AVE. - CORAL AVE. (SOUTH BAY FRONT)



CORAL AVE. - SAPPHIRE AVE. (SOUTH BAY FRONT)



SAPPHIRE AVE. - DIAMOND AVE. (SOUTH BAY FRONT)



DIAMOND AVE. - RUBY AVE. (SOUTH BAY FRONT)

Not to Scale

N

Source: WNST, March 2016

Figure 3

Legend

Project Boundary

Erosion Control BMPs:

EC-1 Scheduling

Temporary Sediment Control BMPs:

SE-4 Check Dam
SE-5 Fiber Rolls
SE-7 Street Sweeping and Vacuuming
SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

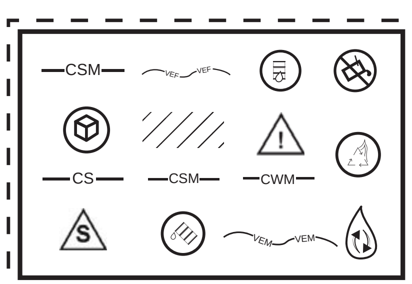
WM-1 Material Delivery and Storage
WM-2 Material Use
WM-3 Stockpile Management
WM-4 Spill Prevention and Control
WM-5 Solid Waste Management
WM-6 Hazardous Waste Management
WM-9 Sanitary/Septic Waste Management
WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

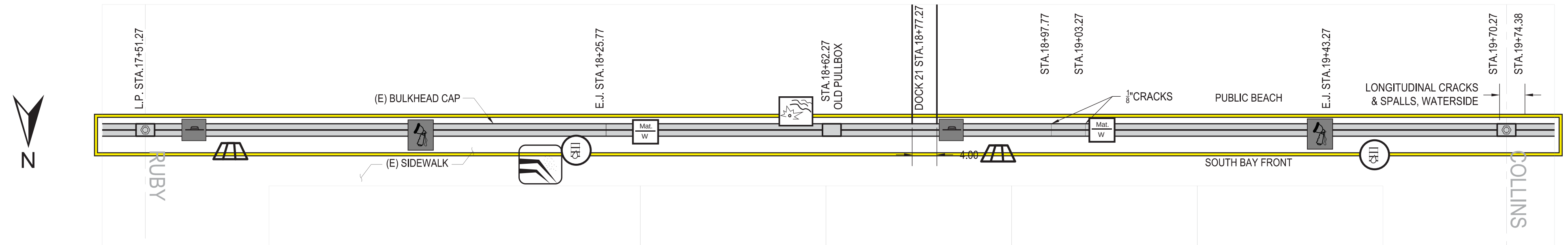
NS-1 Water Conservation Practices
NS-3 Paving and Grinding Operations
NS-6 Illicit Connection/Dishcharge
NS-9 Vehicle and Equipment Fueling
NS-10 Vehicle and Equipment Maintenance
NS-12 Concrete Curing
NS-13 Concrete Finishing
NS-14 Material Over Water
NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

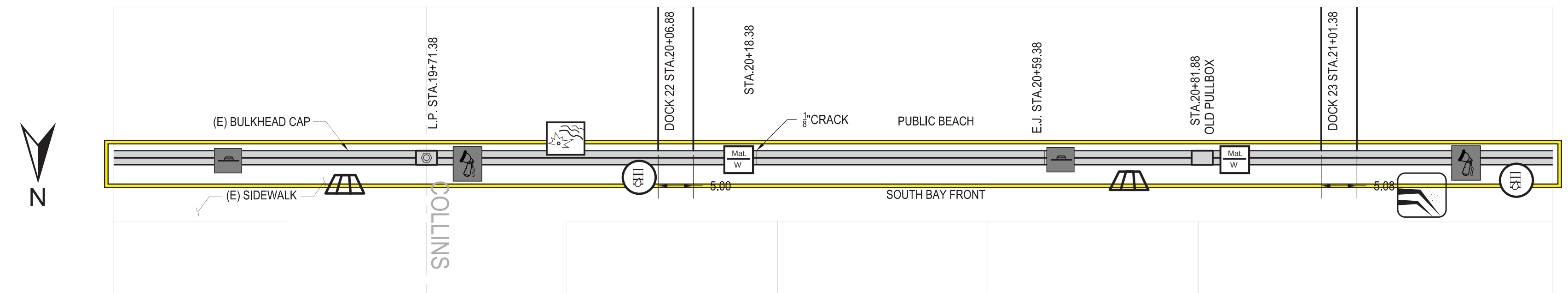
WE-1 Wind Erosion Control



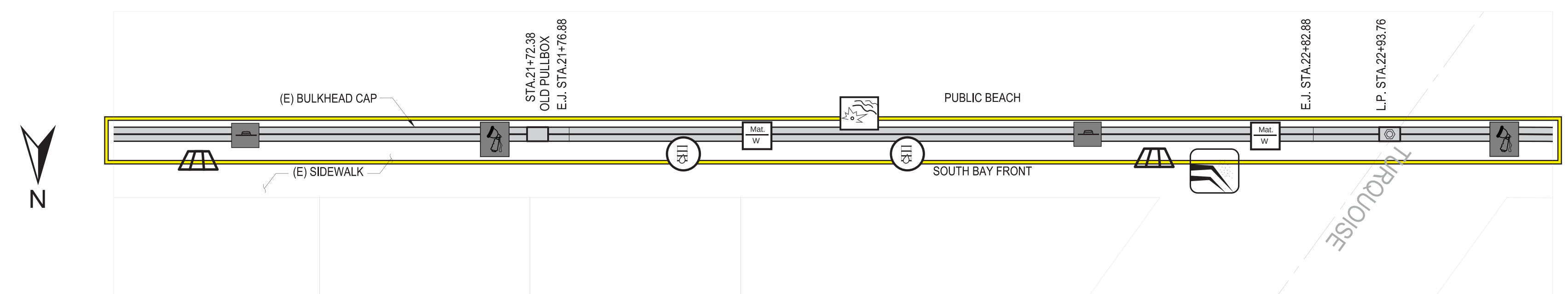
*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



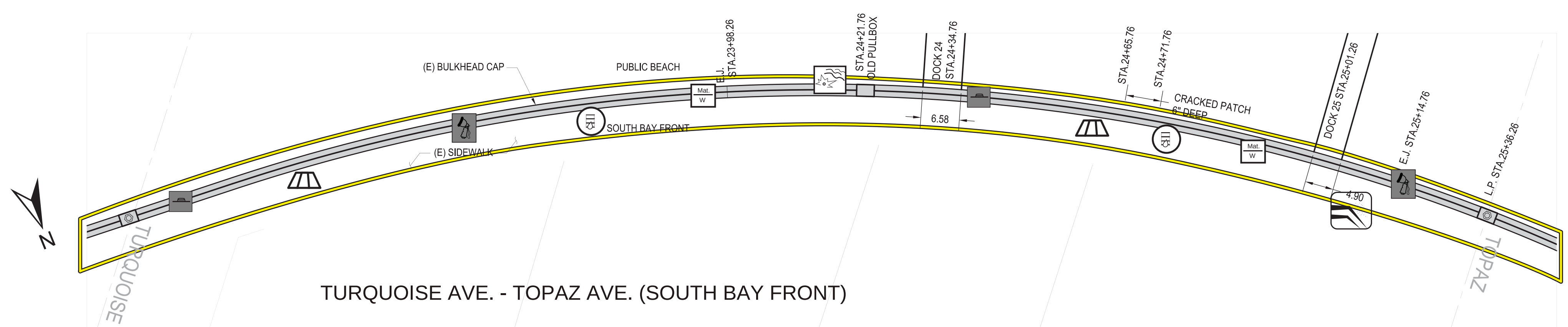
RUBY AVE. - COLLINS AVE. (SOUTH BAY FRONT)



COLLINS AVE. - DOCK 23 (SOUTH BAY FRONT)



DOCK 23 - TURQUOISE AVE. (SOUTH BAY FRONT)



TURQUOISE AVE. - TOPAZ AVE. (SOUTH BAY FRONT)

Not to Scale

Source: WNST, March 2016

Figure 4

Legend

Project Boundary

Erosion Control BMPs:

- EC-1 Scheduling

Temporary Sediment Control BMPs:

- SE-4 Check Dam
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

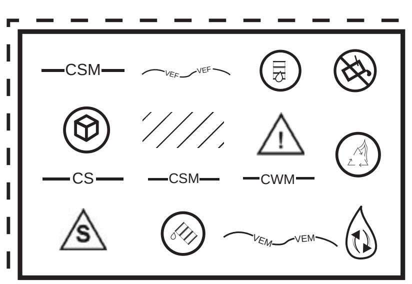
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

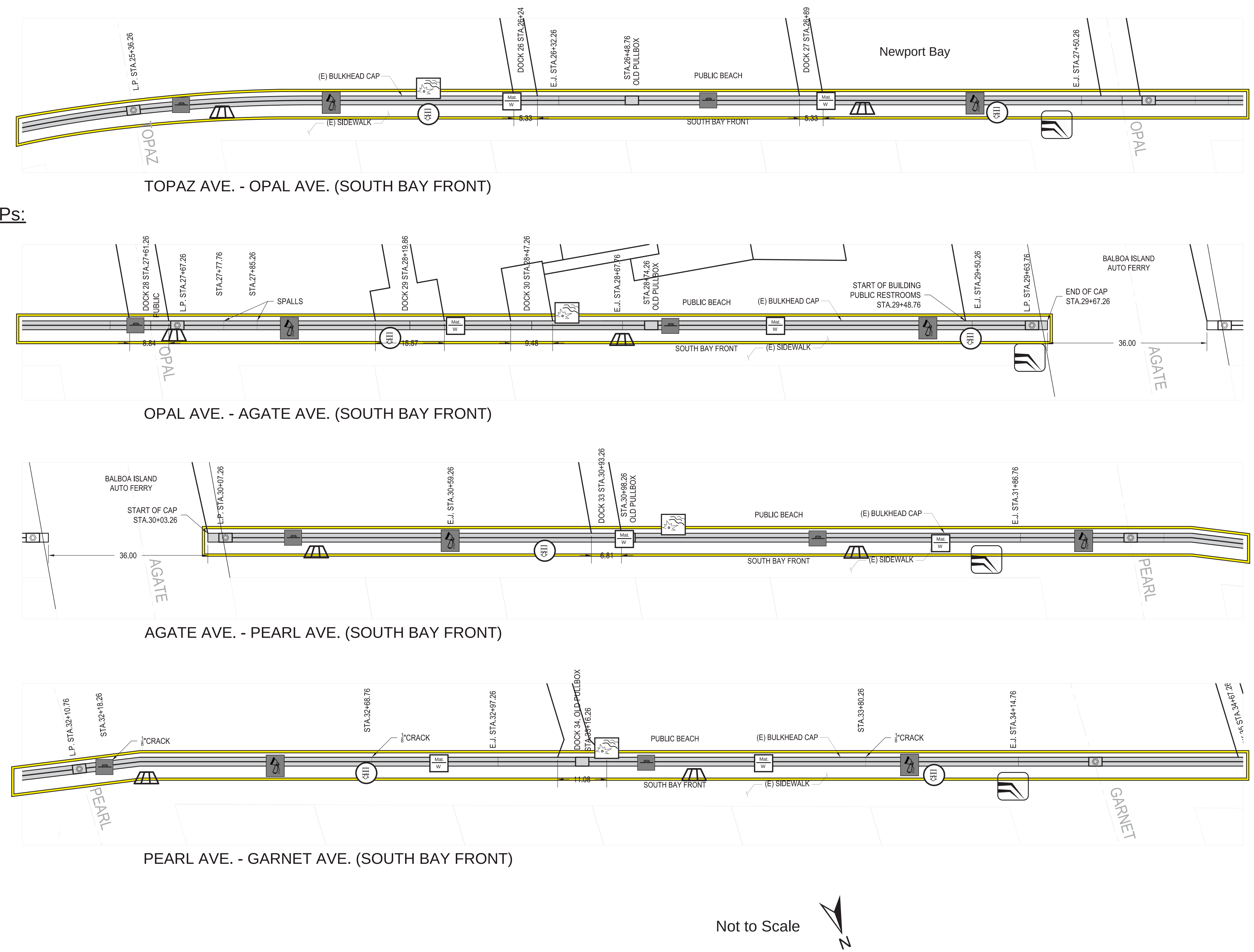
- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-6 Illicit Connection/Dishcarge
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

- WE-1 Wind Erosion Control



*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



Source: WNST, March 2016

Figure 5

Legend

Project Boundary

Erosion Control BMPs:

- EC-1 Scheduling

Temporary Sediment Control BMPs:

- SE-4 Check Dam
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

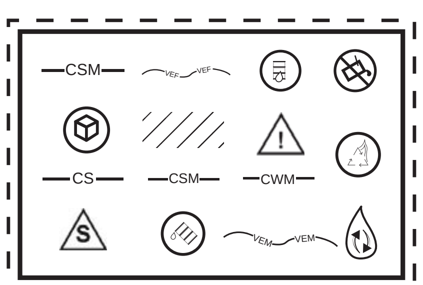
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

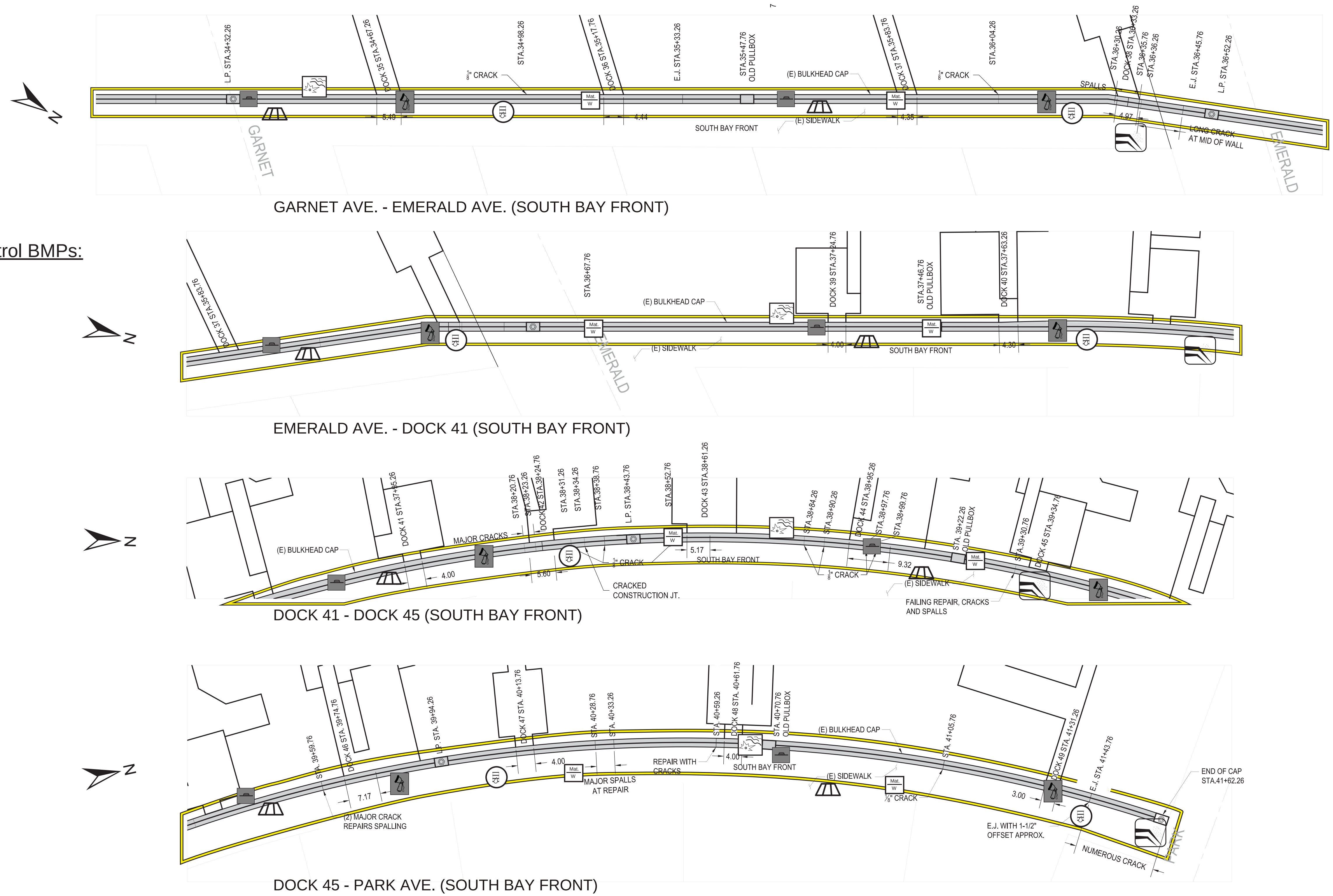
- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-6 Illicit Connection/Dishcarge
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

- WE-1 Wind Erosion Control



*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



GARNET AVE. - EMERALD AVE. (SOUTH BAY FRONT)

EMERALD AVE. - DOCK 41 (SOUTH BAY FRONT)

DOCK 41 - DOCK 45 (SOUTH BAY FRONT)

DOCK 45 - PARK AVE. (SOUTH BAY FRONT)

Not to Scale

Source: WNST, March 2016

Figure 6

Legend

Project Boundary

Erosion Control BMPs:

- EC-1 Scheduling

Temporary Sediment Control BMPs:

- SE-4 Check Dam
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

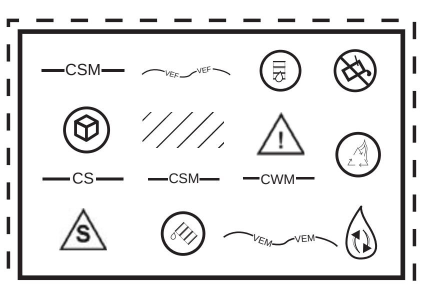
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

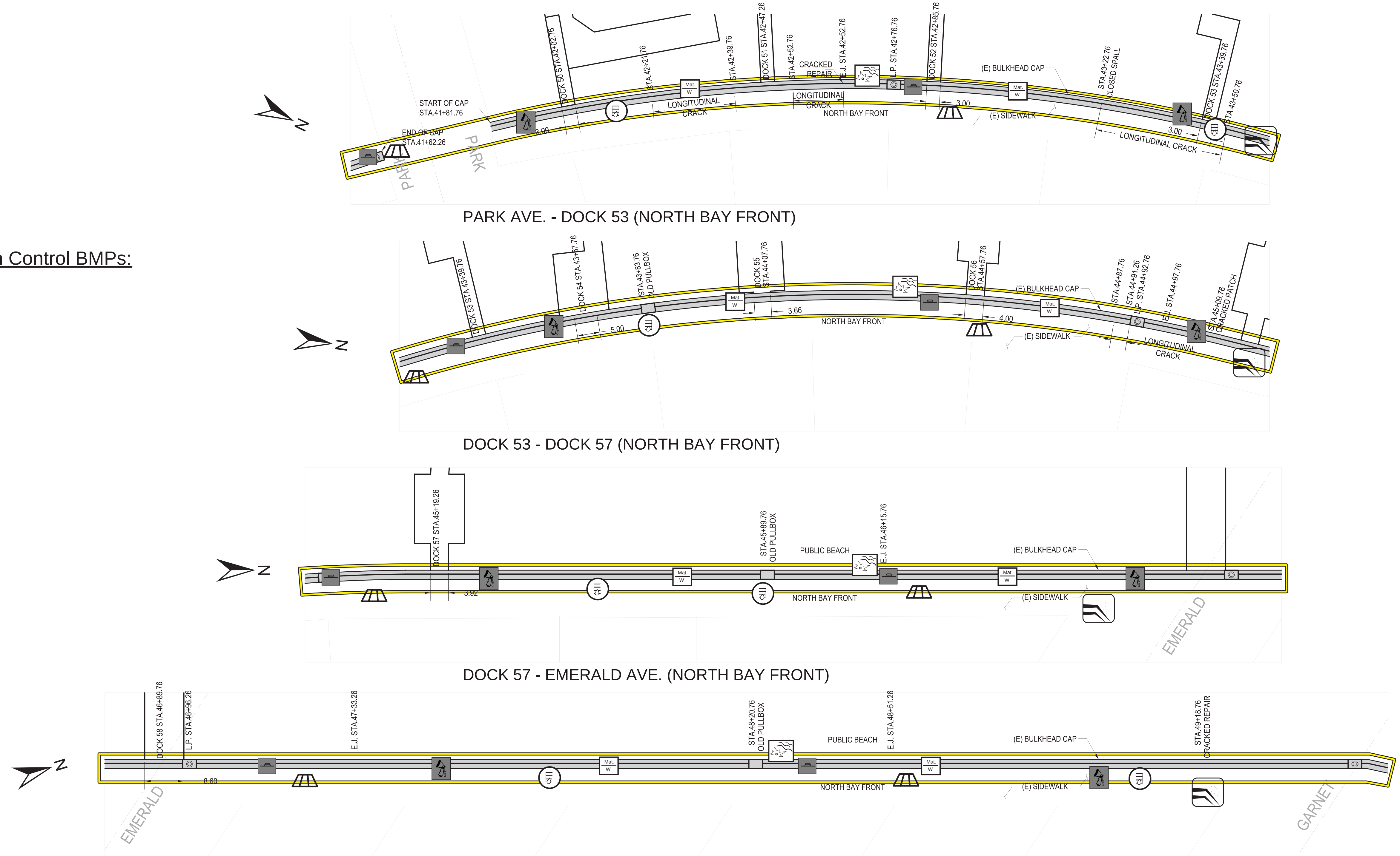
- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-6 Illicit Connection/Dishcarge
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

- WE-1 Wind Erosion Control



*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



Not to Scale

Legend

Project Boundary

Erosion Control BMPs:

EC-1 Scheduling

Temporary Sediment Control BMPs:

- SE-4 Check Dam
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

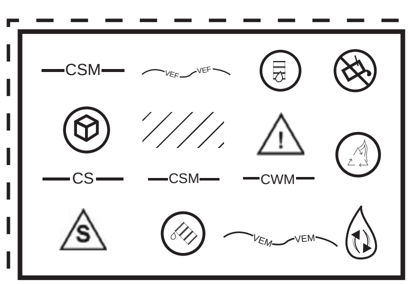
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-6 Illicit Connection/Dishcarge
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

WE-1 Wind Erosion Control



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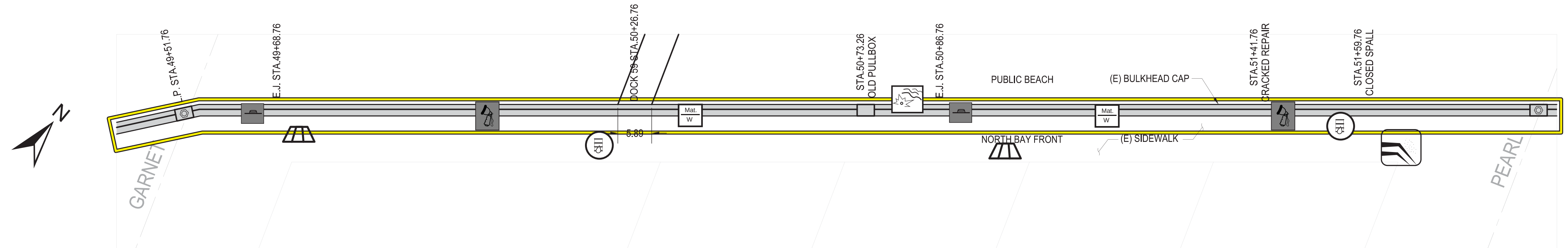
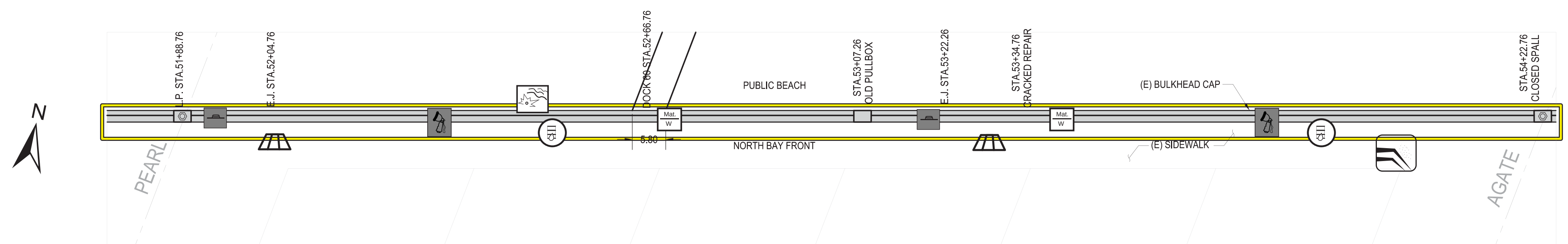
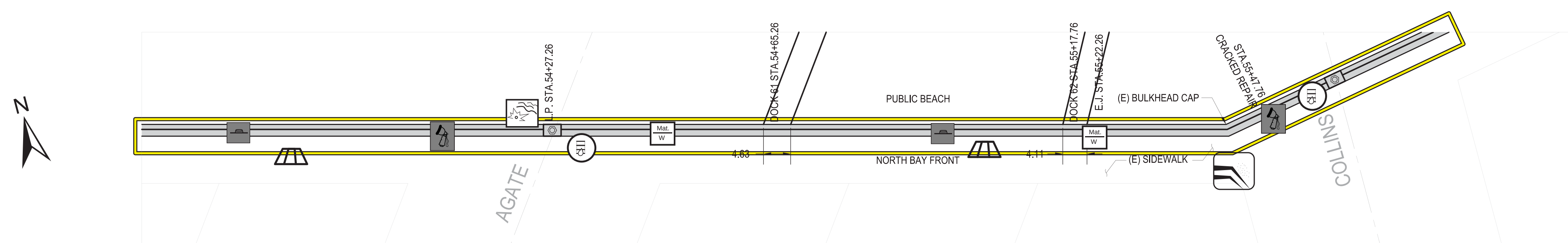


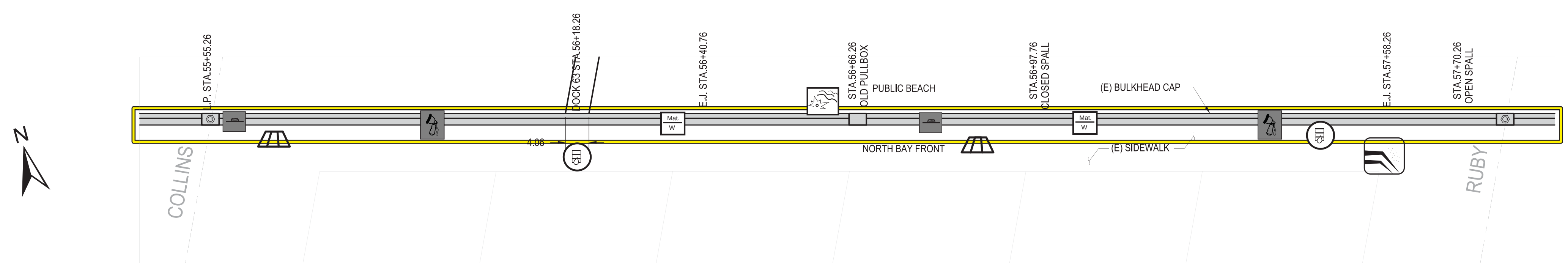
GARNET AVE. - PEARL AVE. (NORTH BAY FRONT)



PEARL AVE. - AGATE AVE. (NORTH BAY FRONT)



AGATE AVE. - COLLINS AVE. (NORTH BAY FRONT)



COLLINS AVE. - RUBY AVE. (NORTH BAY FRONT)

Not to Scale

Source: WNST, March 2016

Figure 8

Legend

Project Boundary

Erosion Control BMPs:

EC-1 Scheduling

Temporary Sediment Control BMPs:

- SE-4 Check Dam
- SE-5 Fiber Rolls
- SE-7 Street Sweeping and Vacuuming
- SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

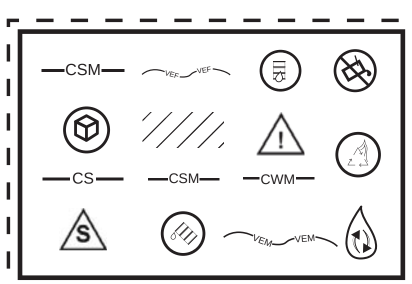
- WM-1 Material Delivery and Storage
- WM-2 Material Use
- WM-3 Stockpile Management
- WM-4 Spill Prevention and Control
- WM-5 Solid Waste Management
- WM-6 Hazardous Waste Management
- WM-9 Sanitary/Septic Waste Management
- WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

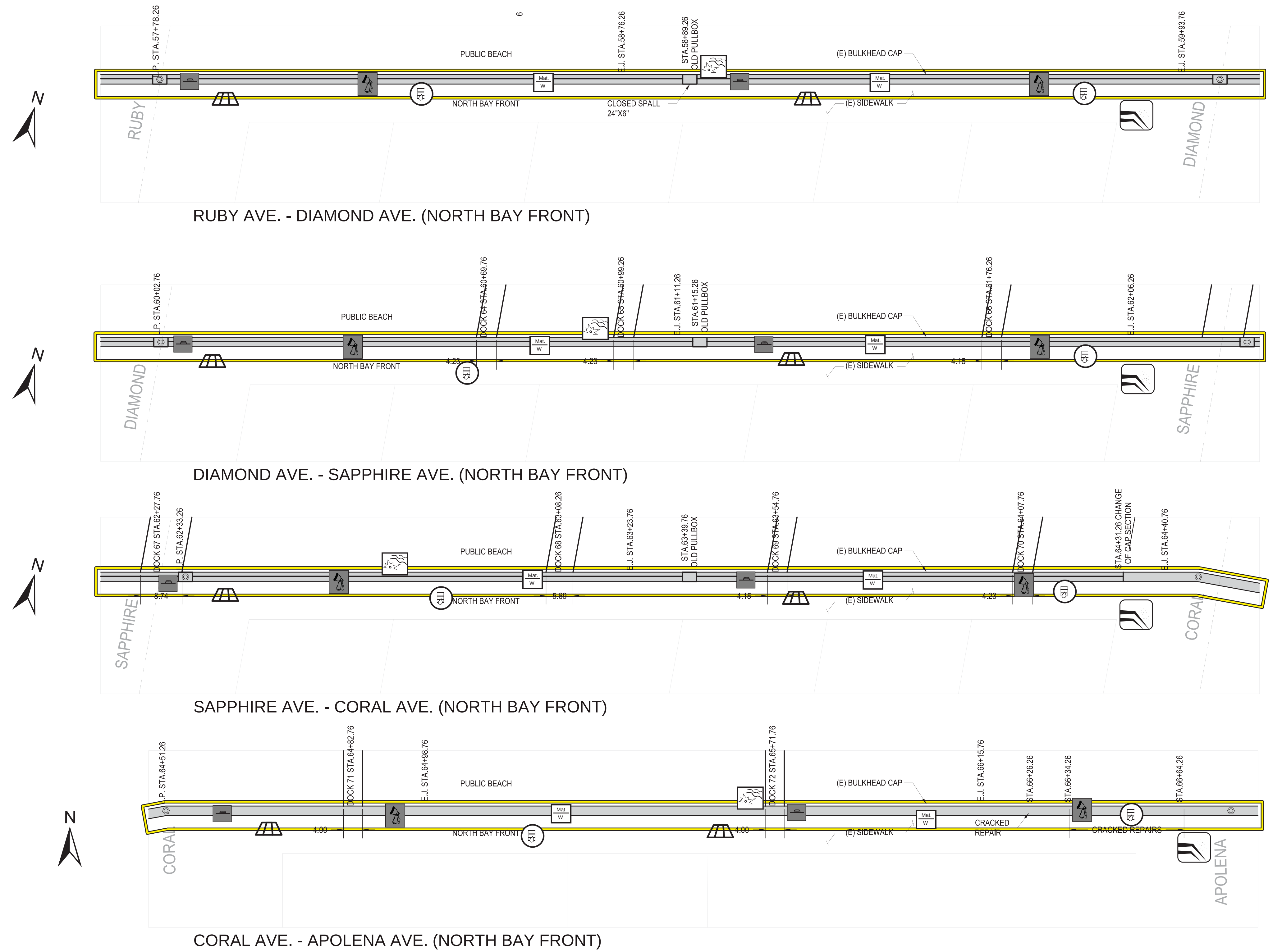
- NS-1 Water Conservation Practices
- NS-3 Paving and Grinding Operations
- NS-6 Illicit Connection/Dishcarge
- NS-9 Vehicle and Equipment Fueling
- NS-10 Vehicle and Equipment Maintenance
- NS-12 Concrete Curing
- NS-13 Concrete Finishing
- NS-14 Material Over Water
- NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

WE-1 Wind Erosion Control



*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



Not to Scale

Source: WNST, March 2016

Figure 9

Legend

Project Boundary

Erosion Control BMPs:

EC-1 Scheduling

Temporary Sediment Control BMPs:

SE-4 Check Dam
SE-5 Fiber Rolls
SE-7 Street Sweeping and Vacuuming
SE-10 Storm Drain Inlet Protection

Waste Management & Materials Pollution Control BMPs:

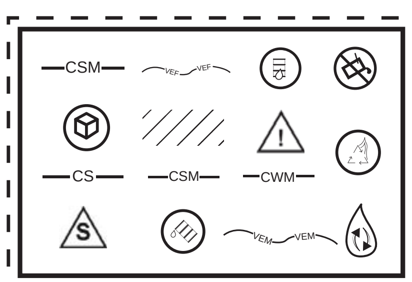
WM-1 Material Delivery and Storage
WM-2 Material Use
WM-3 Stockpile Management
WM-4 Spill Prevention and Control
WM-5 Solid Waste Management
WM-6 Hazardous Waste Management
WM-9 Sanitary/Septic Waste Management
WM-10 Liquid Waste Management

Non-Stormwater Management BMPs:

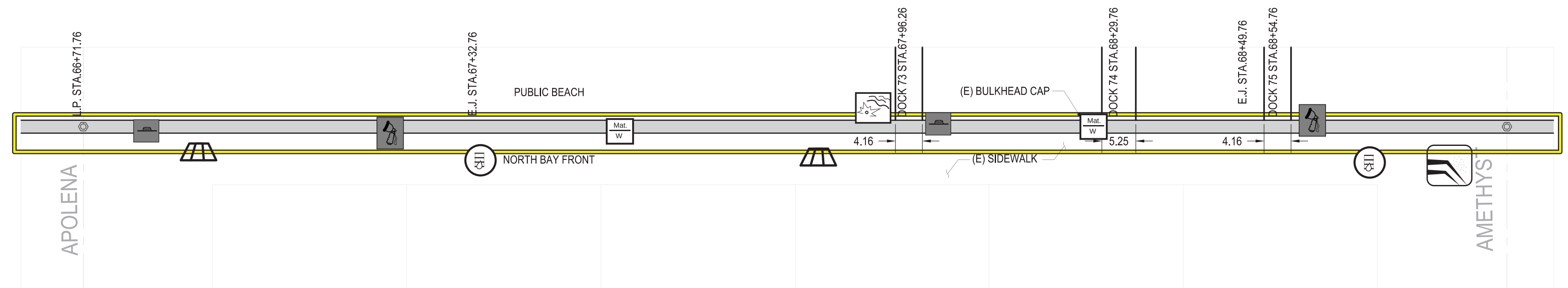
NS-1 Water Conservation Practices
NS-3 Paving and Grinding Operations
NS-6 Illicit Connection/Dishcarge
NS-9 Vehicle and Equipment Fueling
NS-10 Vehicle and Equipment Maintenance
NS-12 Concrete Curing
NS-13 Concrete Finishing
NS-14 Material Over Water
NS-15 Demolition Adjacent to Water

Wind Erosion Control BMPs:

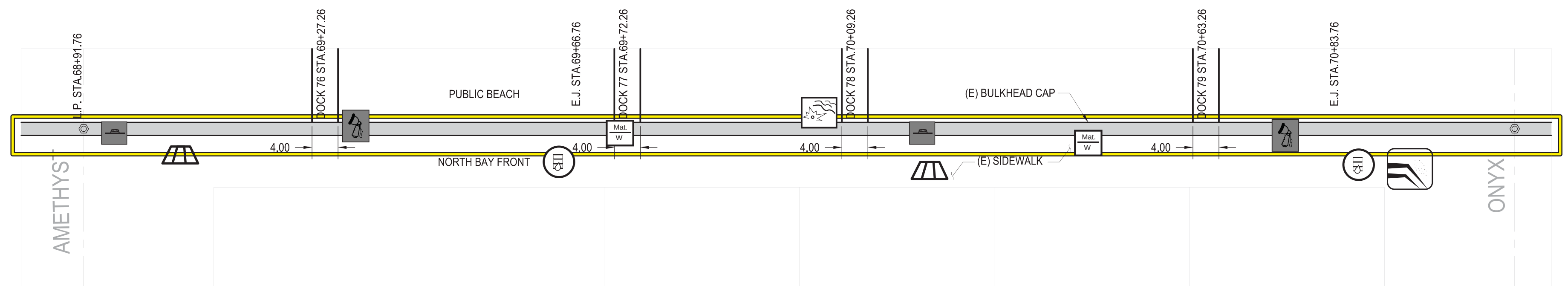
WE-1 Wind Erosion Control



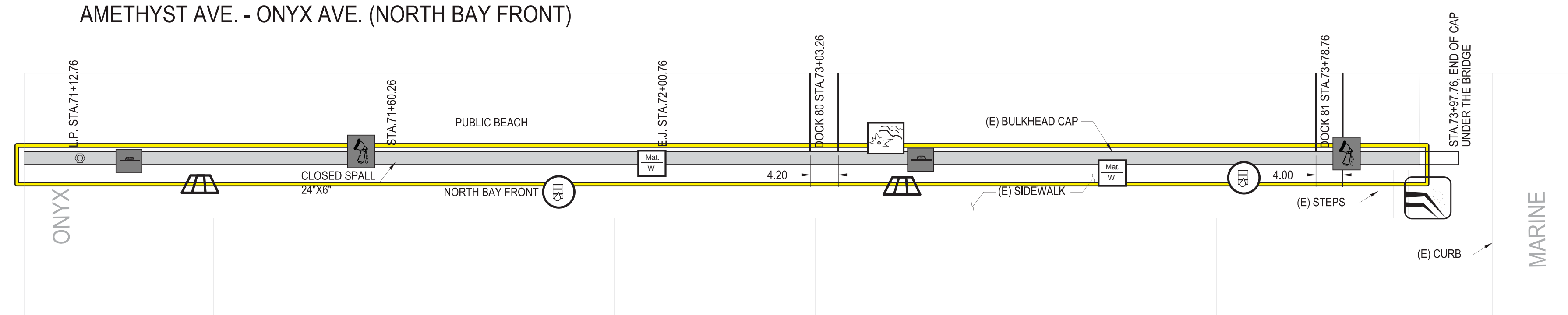
*RECOMMENDED BMPs FOR CONTRACTOR'S STORAGE YARD/STAGING AREA. LOCATION TO BE DETERMINED BY CONTRACTOR UPON START OF CONSTRUCTION.



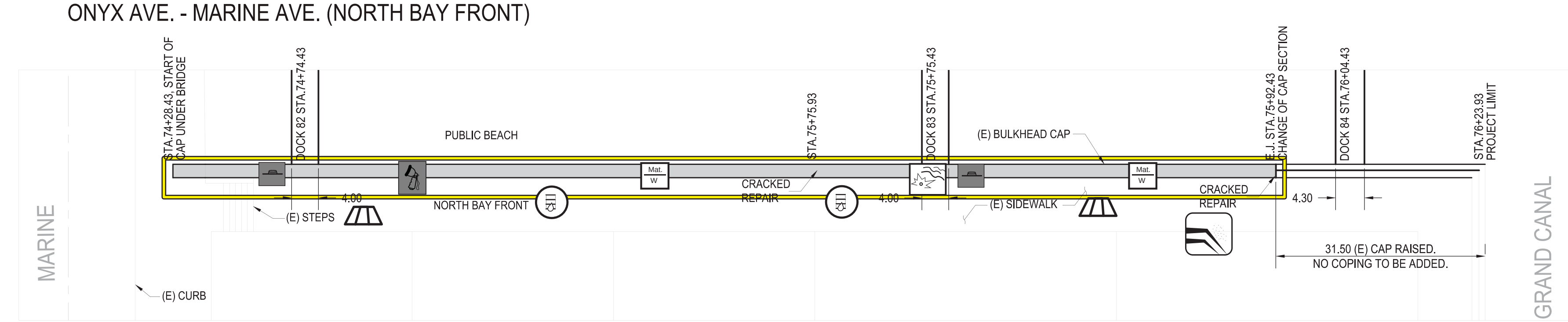
APOLENA AVE. - AMETHYST AVE. (NORTH BAY FRONT)



AMETHYST AVE. - ONYX AVE. (NORTH BAY FRONT)



ONYX AVE. - MARINE AVE. (NORTH BAY FRONT)



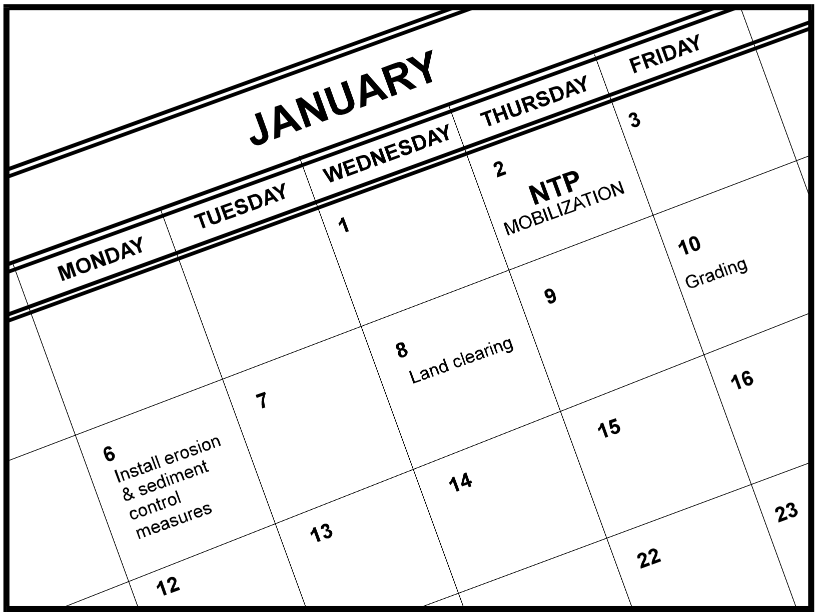
MARINE AVE. - GRAND CANAL (NORTH BAY FRONT)

Not to Scale

N

Source: WNST, March 2016

Figure 10



Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.

- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates

Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs
  - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
  - Sequence trenching activities so that most open portions are closed before new trenching begins.
  - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

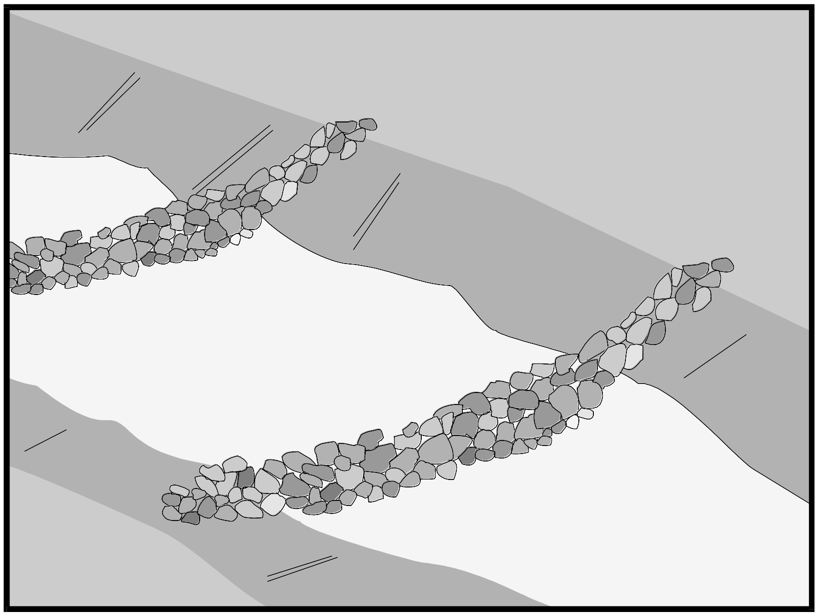
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Check Dams SE-4



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

Description and Purpose

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle.

Suitable Applications

Check dams may be appropriate in the following situations:

- To promote sedimentation behind the dam.
- To prevent erosion by reducing the velocity of channel flow in small intermittent channels and temporary swales.
- In small open channels that drain 10 acres or less.
- In steep channels where stormwater runoff velocities exceed 5 ft/s.
- During the establishment of grass linings in drainage ditches or channels.
- In temporary ditches where the short length of service does not warrant establishment of erosion-resistant linings.
- To act as a grade control structure.

Limitations

- Not to be used in live streams or in channels with extended base flows.
- Not appropriate in channels that drain areas greater than 10 acres.
- Not appropriate in channels that are already grass-lined unless erosion potential or sediment-laden flow is expected, as installation may damage vegetation.
- Require extensive maintenance following high velocity flows.
- Promotes sediment trapping which can be re-suspended during subsequent storms or removal of the check dam.
- Do not construct check dams with straw bales or silt fence.
- Water suitable for mosquito production may stand behind check dams, particularly if subjected to daily non-stormwater discharges.

Implementation

General

Check dams reduce the effective slope and create small pools in swales and ditches that drain 10 acres or less. Using check dams to reduce channel slope reduces the velocity of stormwater flows, thus reducing erosion of the swale or ditch and promoting sedimentation. Thus, check dams are dual-purpose and serve an important role as erosion controls as well as as sediment controls. Note that use of 1-2 isolated check dams for sedimentation will likely result in little net removal of sediment because of the small detention time and probable scour during longer storms. Using a series of check dams will generally increase their effectiveness. A sediment trap (SE-3) may be placed immediately upstream of the check dam to increase sediment removal efficiency.

Design and Layout

Check dams work by decreasing the effective slope in ditches and swales. An important consequence of the reduced slope is a reduction in capacity of the ditch or swale. This reduction in capacity should be considered when using this BMP, as reduced capacity can result in overtopping of the ditch or swale and resultant consequences. In some cases, such as a "permanent" ditch or swale being constructed early and used as a "temporary" conveyance for construction flows, the ditch or swale may have sufficient capacity such that the temporary reduction in capacity due to check dams is acceptable. When check dams reduce capacities beyond acceptable limits, either:

- Don't use check dams. Consider alternative BMPs, or.
- Increase the size of the ditch or swale to restore capacity.

Maximum slope and velocity reduction is achieved when the toe of the upstream dam is at the same elevation as the top of the downstream dam (see "Spacing Between Check Dams" detail at the end of this fact sheet). The center section of the dam should be lower than the edge sections (at least 6 inches), acting as a spillway, so that the check dam will direct flows to the center of the ditch or swale (see "Typical Rock Check Dam" detail at the end of this fact sheet). Bypass or side-cutting can occur if a sufficient spillway is not provided in the center of the dam.

Check dams are usually constructed of rock, gravel bags, sandbags, and fiber rolls. A number of products can also be used as check dams (e.g. HDPE check dams, temporary silt dikes (SE-12)), and some of these products can be removed and reused. Check dams can also be constructed of logs or lumber, and have the advantage of a longer lifespan when compared to gravel bags, sandbags, and fiber rolls. Check dams should not be constructed from straw bales or silt fences, since concentrated flows quickly wash out these materials.

Rock check dams are usually constructed of 8 to 12 in. rock. The rock is placed either by hand or mechanically, but never just dumped into the channel. The dam should completely span the ditch or swale to prevent washout. The rock used should be large enough to stay in place given the expected design flow through the channel. It is recommended that abutments be extended 18 in. into the channel bank. Rock can be graded such that smaller diameter rock (e.g. 2-4 in) is located on the upstream side of larger rock (holding the smaller rock in place); increasing residence time.

Log check dams are usually constructed of 4 to 6 in. diameter logs, installed vertically. The logs should be embedded into the soil at least 18 in. Logs can be bolted or wired to vertical support logs that have been driven or buried into the soil.

See fiber rolls, SE-5, for installation of fiber roll check dams.

Gravel bag and sand bag check dams are constructed by stacking bags across the ditch or swale, shaped as shown in the drawings at the end of this fact sheet (see "Gravel Bag Check Dam" detail at the end of this fact sheet).

Manufactured products, such as temporary silt dikes (SE-12), should be installed in accordance with the manufacturer's instructions. Installation typically requires anchoring or trenching of products, as well as regular maintenance to remove accumulated sediment and debris.

If grass is planted to stabilize the ditch or swale, the check dam should be removed when the grass has matured (unless the slope of the swales is greater than 4%).

The following guidance should be followed for the design and layout of check dams:

- Install the first check dam approximately 16 ft from the outfall device and at regular intervals based on slope gradient and soil type.
- Check dams should be placed at a distance and height to allow small pools to form between each check dam.
- For multiple check dam installation, backwater from a downstream check dam should reach the toes of the upstream check dam.
- A sediment trap provided immediately upstream of the check dam will help capture sediment. Due to the potential for this sediment to be resuspended in subsequent storms, the sediment trap should be cleaned following each storm event.

- High flows (typically a 2-year storm or larger) should safely flow over the check dam without an increase in upstream flooding or damage to the check dam.

- Where grass is used to line ditches, check dams should be removed when grass has matured sufficiently to protect the ditch or swale.

Materials

- Rock used for check dams should typically be 8-12 in rock and be sufficiently sized to stay in place given expected design flows in the channel. Smaller diameter rock (e.g. 2 to 4 in) can be placed on the upstream side of larger rock to increase residence time.

- Gravel bags used for check dams should conform to the requirements of SE-6, Gravel Bag Berms.

- Sandbags used for check dams should conform to SE-8, Sandbag Barrier.

- Fiber rolls used for check dams should conform to SE-5, Fiber Rolls.

- Temporary silt dikes used for check dams should conform to SE-12, Temporary Silt Dikes.

Installation

- Rock should be placed individually by hand or by mechanical methods (no dumping of rock) to achieve complete ditch or swale coverage.

- Tightly abut bags and stack according to detail shown in the figure at the end of this section (pyramid approach). Gravel bags and sandbags should not be stacked any higher than 3 ft.

- Upper rows or gravel and sand bags shall overlap joints in lower rows.

- Fiber rolls should be trenched in, backfilled, and firmly staked in place.

- Install along a level contour.

- HDPE check dams, temporary silt dikes, and other manufactured products should be used and installed per manufacturer specifications.

Costs

Cost consists of labor costs if materials are readily available (such as gravel on-site). If material must be imported, costs will increase. For other material and installation costs, see SE-5, SE-6, SE-8, SE-12, and SE-14.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Replace missing rock, bags, rolls, etc. Replace bags or rolls that have degraded or have become damaged.

- If the check dam is used as a sediment capture device, sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.

- If the check dam is used as a grade control structure, sediment removal is not required as long as the system continues to control the grade.

- Inspect areas behind check dams for pools of standing water, especially if subjected to daily non-stormwater discharges.

- Remove accumulated sediment prior to permanent seeding or soil stabilization.

- Remove check dam and accumulated sediment when check dams are no longer needed.

References

Draft – Sedimentation and Erosion Control, and Inventory of Current Practices, USEPA, April 1990.

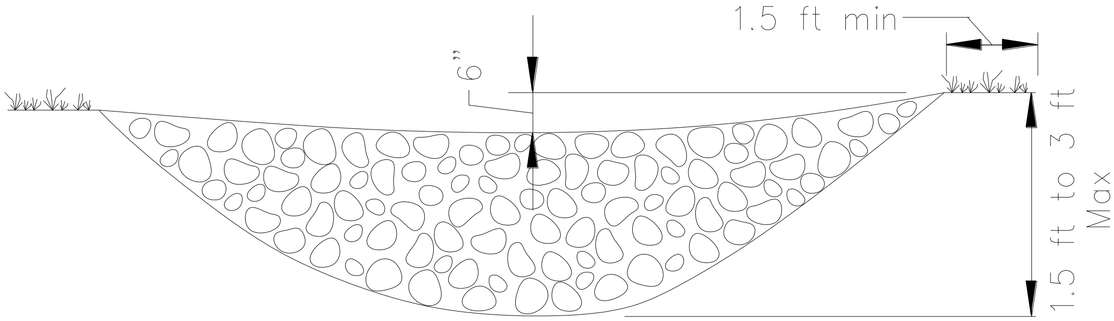
Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

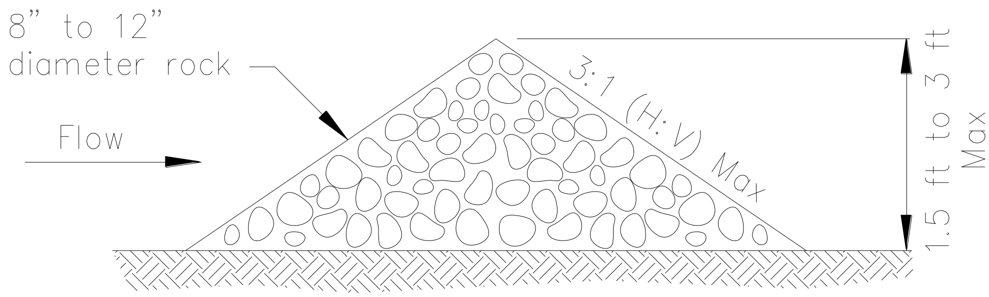
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: http://anrcatalog.ucdavis.edu/pdf/8125.pdf

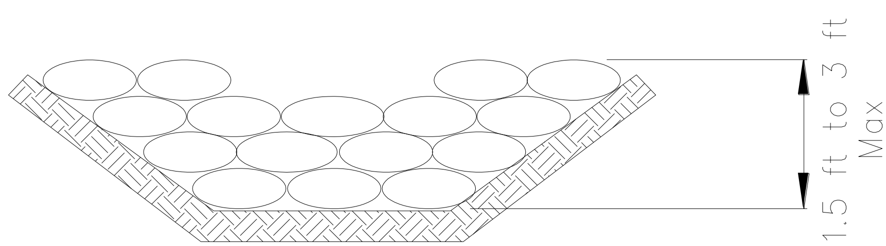


ELEVATION

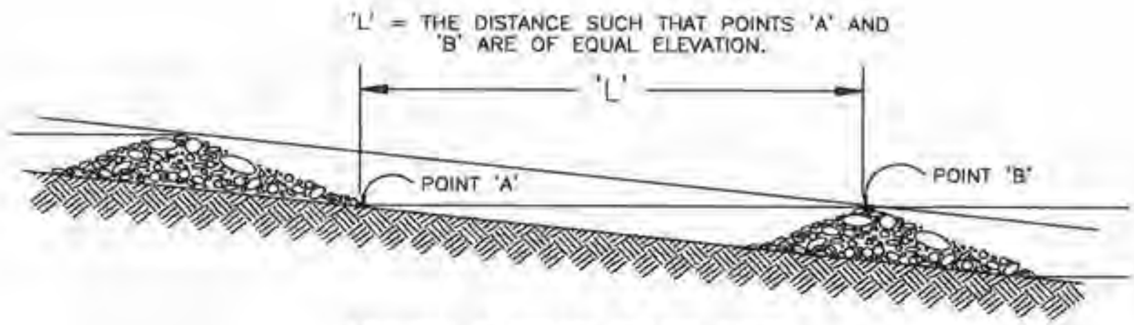


TYPICAL ROCK CHECK DAM SECTION

ROCK CHECK DAM
NOT TO SCALE

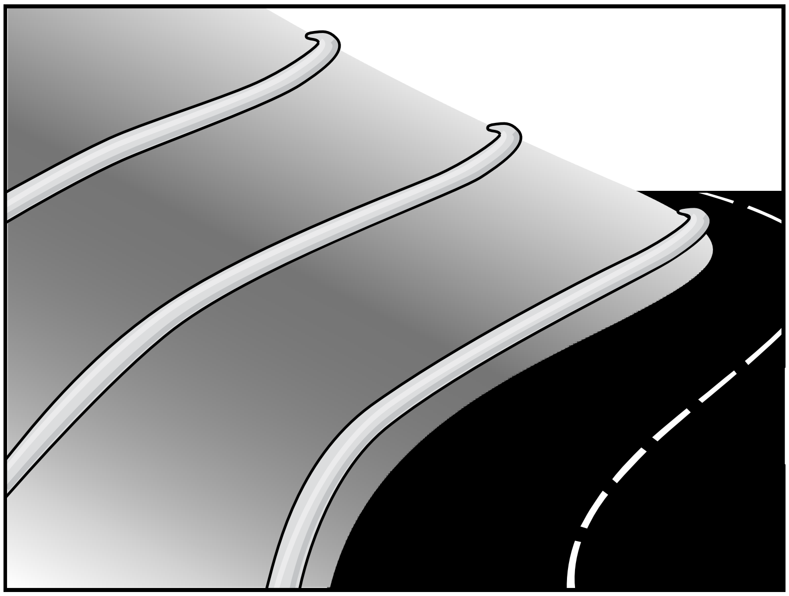


GRAVEL BAG CHECK DAM ELEVATION
NOT TO SCALE



SPACING BETWEEN CHECK DAMS

Fiber Rolls SE-5



Categories		
EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

Description and Purpose

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). When fiber rolls are placed at the toe and on the face of slopes along the contours, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff (through sedimentation). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
- At the end of a downward slope where it transitions to a steeper slope.
- Along the perimeter of a project.
- As check dams in unlined ditches with minimal grade.
- Down-slope of exposed soil areas.
- At operational storm drains as a form of inlet protection.

- Around temporary stockpiles.

Limitations

- Fiber rolls are not effective unless trenched in and staked.
- Not intended for use in high flow situations.
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months depending upon local conditions.

Implementation

Fiber Roll Materials

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed free rice straw, flax, or a similar agricultural material bound into a tight tubular roll by netting.
- Typical fiber rolls vary in diameter from 9 in. to 20 in. Larger diameter rolls are available as well.

Installation

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Prepare the slope before beginning installation.
- Dig small trenches across the slope on the contour. The trench depth should be ¼ to 1/3 of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.
- Start building trenches and installing rolls from the bottom of the slope and work up.
- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into the trench.
  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.
- See typical fiber roll installation details at the end of this fact sheet.

Removal

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Typically, fiber rolls encased with plastic netting are used for a temporary application because the netting does not biodegrade. Fiber rolls used in a permanent application are typically encased with a biodegradeable material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance.
- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But, they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

Costs

Material costs for regular fiber rolls range from $20 - $30 per 25 ft roll.

Material costs for PAM impregnated fiber rolls range between 7.00-$9.00 per linear foot, based upon vendor research.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed

in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.

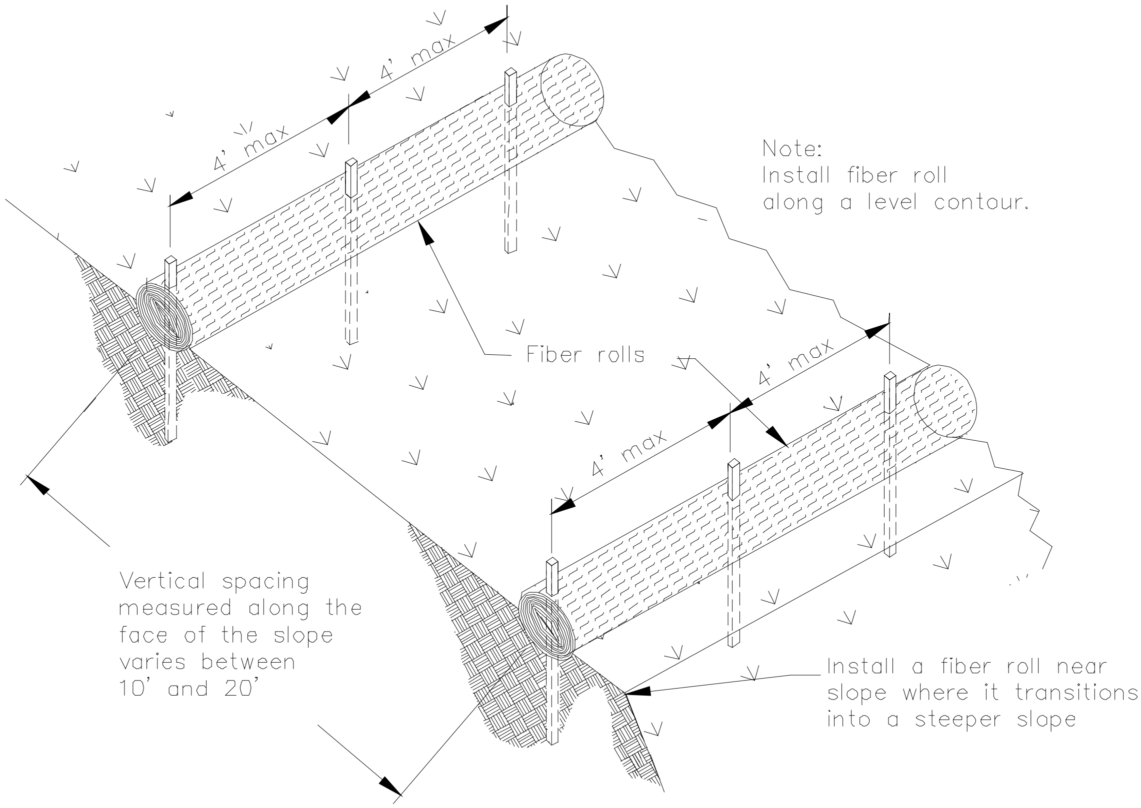
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

- Repair any rills or gullies promptly.

References

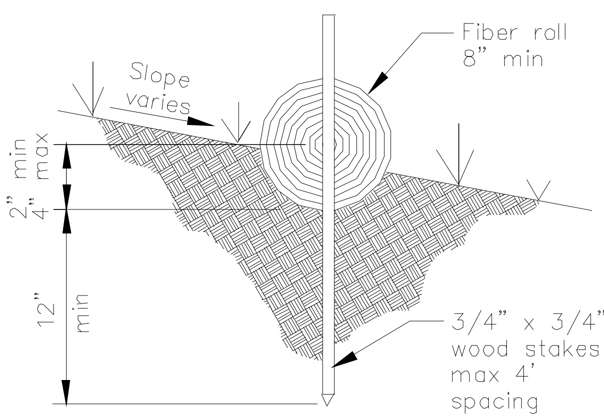
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



TYPICAL FIBER ROLL INSTALLATION

N.T.S.



ENTRENCHMENT DETAIL

N.T.S.

Street Sweeping and Vacuuming SE-7

Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Suitable Applications

Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Limitations

Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).

Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused, and perhaps save money.

- Inspect potential sediment tracking locations daily.

- Visible sediment tracking should be swept or vacuumed on a daily basis.

- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $58/hour (3 yd^3 hopper) to $88/hour (9 yd^3 hopper), plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

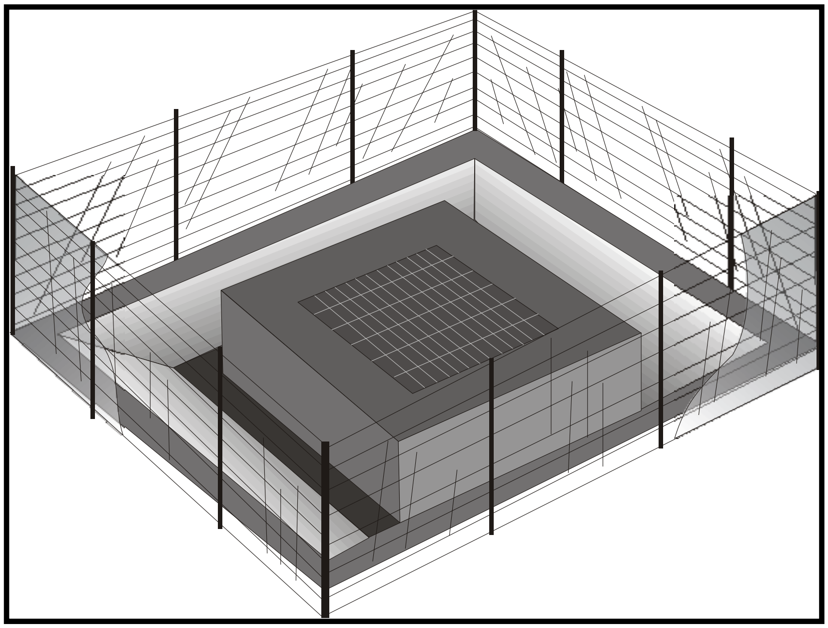
Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in use, points of ingress and egress must be inspected daily.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed at least daily. More frequent removal, even continuous removal, may be required in some jurisdictions.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.



Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☒
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

SE-13 Compost Socks and Berms

Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Suitable Applications

- Every storm drain inlet receiving runoff from unstabilized or otherwise active work areas should be protected. Inlet protection should be used in conjunction with other erosion and sediment controls to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.

Limitations

- Drainage area should not exceed 1 acre.
- In general straw bales should not be used as inlet protection.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Sediment removal may be inadequate to prevent sediment discharges in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are expected, use

other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- Limit drainage area to 1 acre maximum. For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap and/or used in conjunction with other drainage control, erosion control, and sediment control BMPs to protect the site. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Alternative methods are available in addition to the methods described/shown herein such as prefabricated inlet insert devices, or gutter protection devices.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- The key to successful and safe use of storm drain inlet protection devices is to know where runoff that is directed toward the inlet to be protected will pond or be diverted as a result of installing the protection device.
  - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
  - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.
- Seven types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
- Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
- Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
- Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
- Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.
- Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.
- Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.

- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
- Provide area around the inlet for water to pond without flooding structures and property.
- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Silt Fence -*** Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced and water flow through the grate will be blocked resulting in flooding. See typical Type 1 installation details at the end of this fact sheet.

  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.
  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

5. Backfill the trench with gravel or compacted earth all the way around.

- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap -*** Install filter fabric fence in accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd^3/acre of drainage area. See typical Type 2 installation details at the end of this fact sheet.

- ***DI Protection Type 3 - Gravel bag -*** Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability. See typical Type 3 installation details at the end of this fact sheet.

1. Construct on gently sloping street.

2. Leave room upstream of barrier for water to pond and sediment to settle.

3. Place several layers of gravel bags – overlapping the bags and packing them tightly together.

4. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.

- ***DI Protection Type 4 – Block and Gravel Filter -*** Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction. See typical Type 4 installation details at the end of this fact sheet.

1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place woven geotextile over the wire mesh.

2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.

3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.

4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

- ***DI Protection Type 5 – Temporary Geotextile Insert (proprietary)*** – Many types of temporary inserts are available. Most inserts fit underneath the grate of a drop inlet or inside of a curb inlet and are fastened to the outside of the grate or curb. These inserts are removable and many can be cleaned and reused. Installation of these inserts differs between manufacturers. Please refer to manufacturer instruction for installation of proprietary devices.

- ***DI Protection Type 6 - Biofilter bags*** – Biofilter bags may be used as a substitute for gravel bags in low-flow situations. Biofilter bags should conform to specifications detailed in SE-14, Biofilter bags.

    1. Construct in a gently sloping area.

    2. Biofilter bags should be placed around inlets to intercept runoff flows.

    3. All bag joints should overlap by 6 in.

    4. Leave room upstream for water to pond and for sediment to settle out.

    5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.

- ***DI Protection Type 7 – Compost Socks*** – A compost sock can be assembled on site by filling a mesh sock (e.g., with a pneumatic blower). Compost socks do not require special trenching compared to other sediment control methods (e.g., silt fence). Compost socks should conform to specification detailed in SE-13, Compost Socks and Berms.

Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one year useful life) is $200 per inlet.

- Temporary geotextile inserts are proprietary and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from $50-75 plus installation, but costs can exceed $100. This cost does not include maintenance.

- See SE-13 for Compost Sock cost information.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.

- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

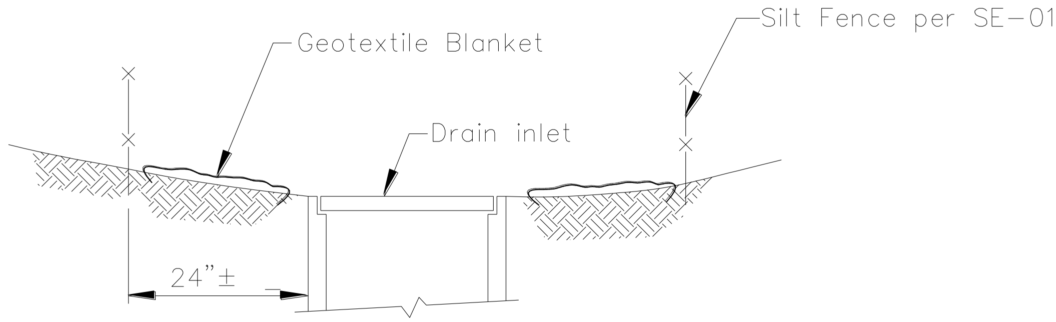
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.
- Remove storm drain inlet protection once the drainage area is stabilized.
  - Clean and regrade area around the inlet and clean the inside of the storm drain inlet, as it should be free of sediment and debris at the time of final inspection.

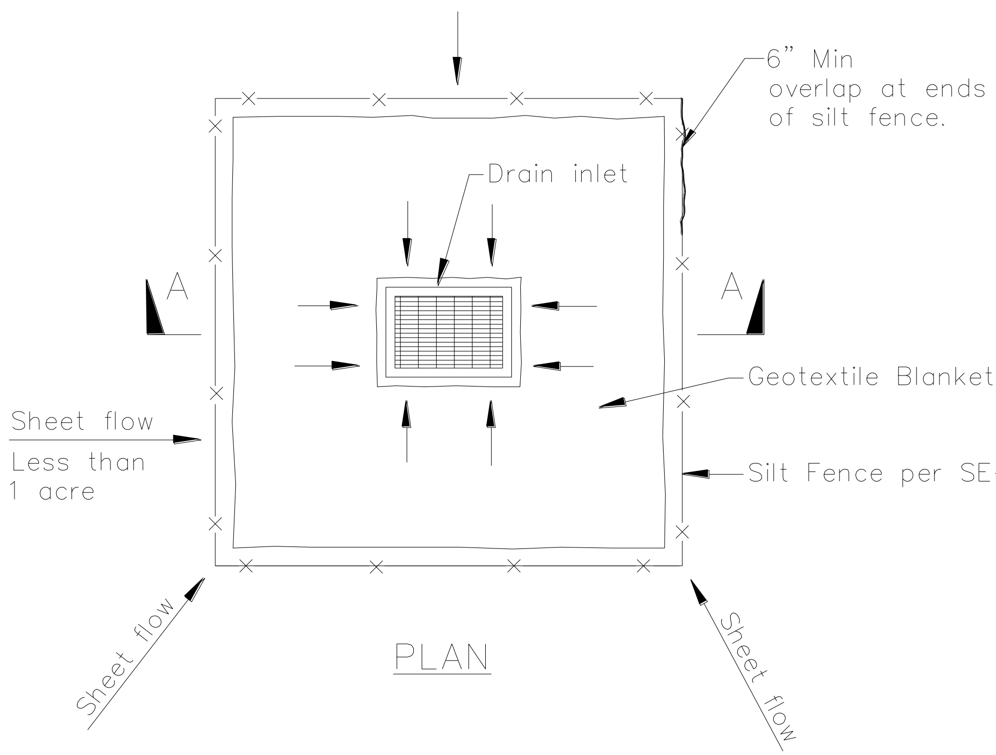
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



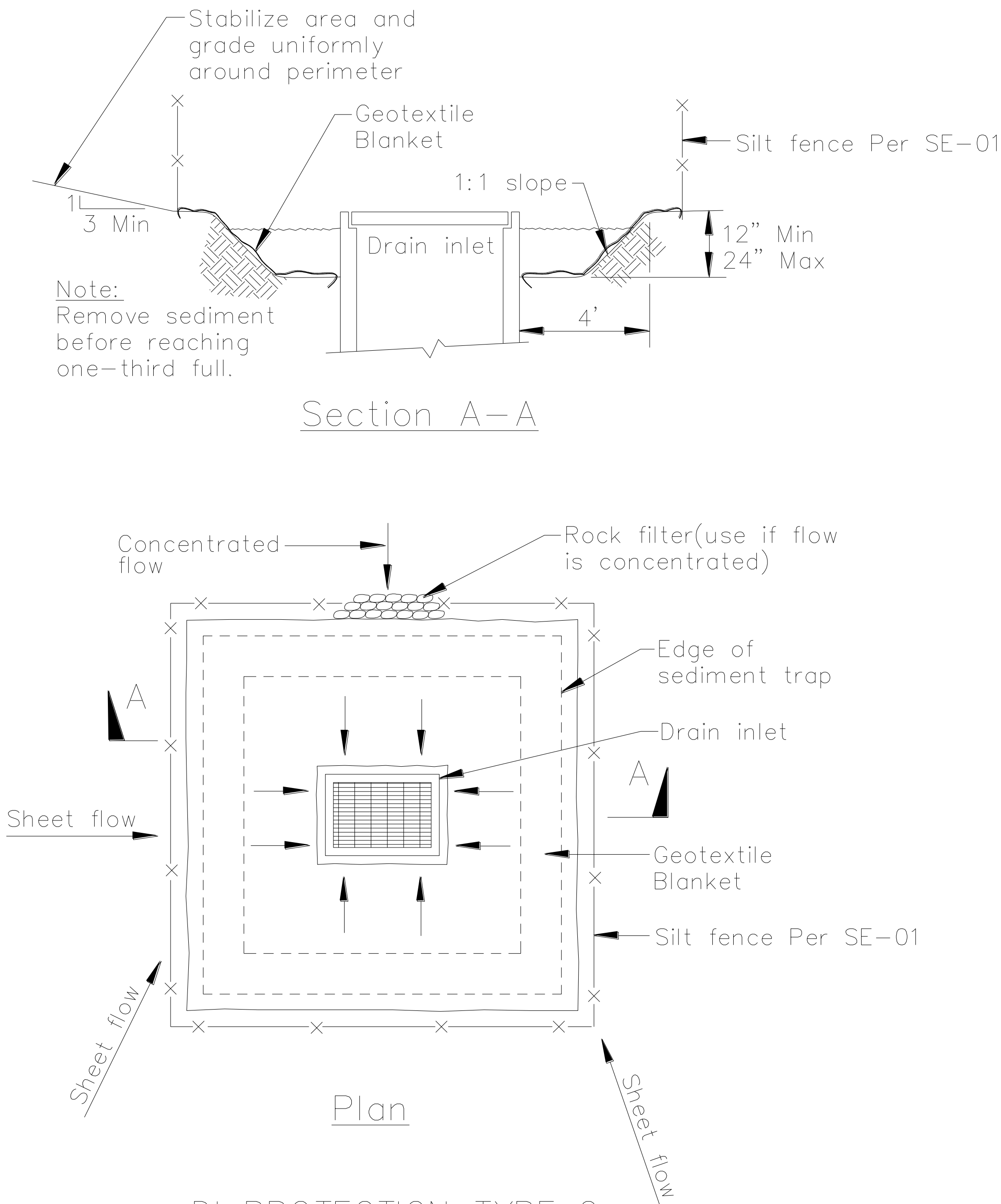


DI PROTECTION TYPE 1

NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.

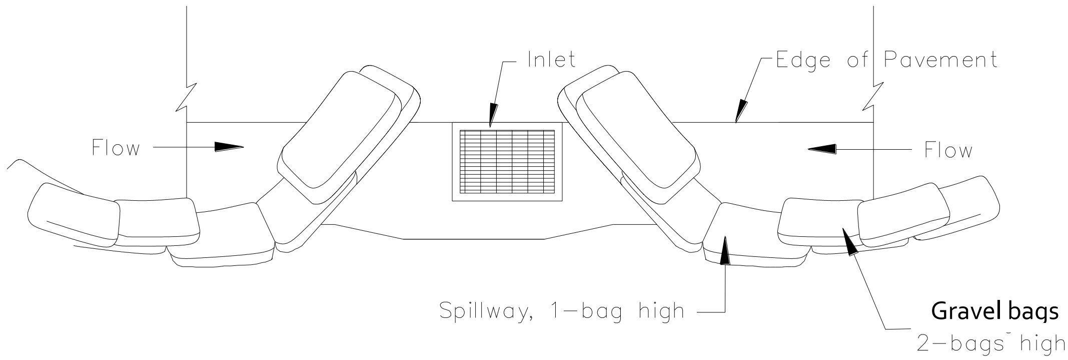


DI PROTECTION TYPE 2

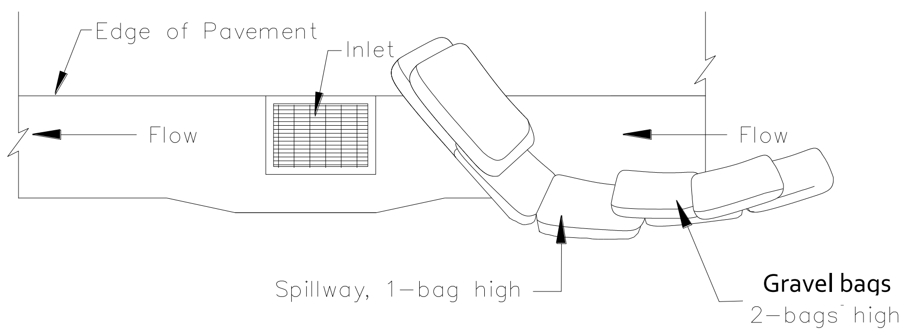
NOT TO SCALE

Notes

1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



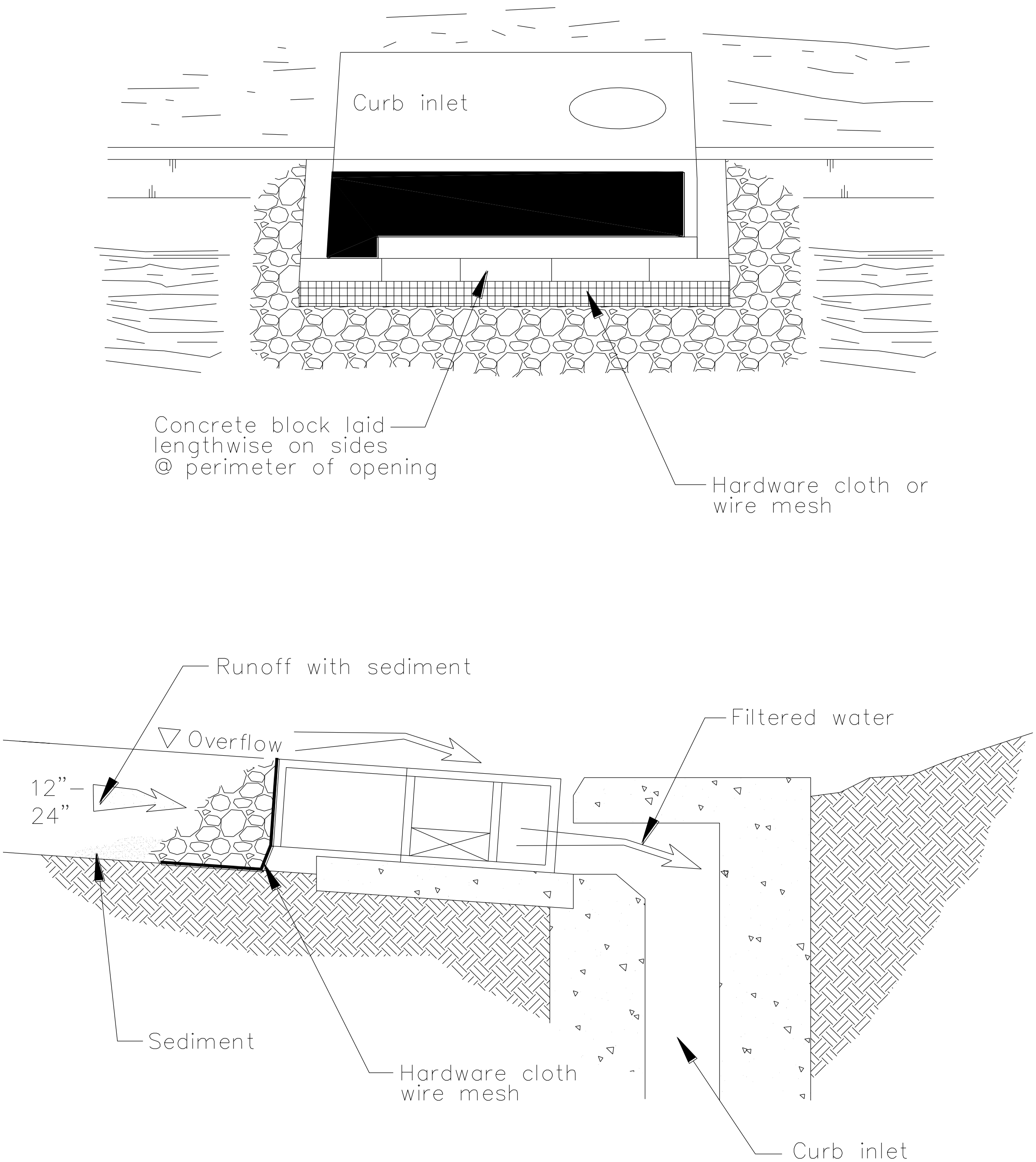
TYPICAL PROTECTION FOR INLET ON SUMP



TYPICAL PROTECTION FOR INLET ON GRADE

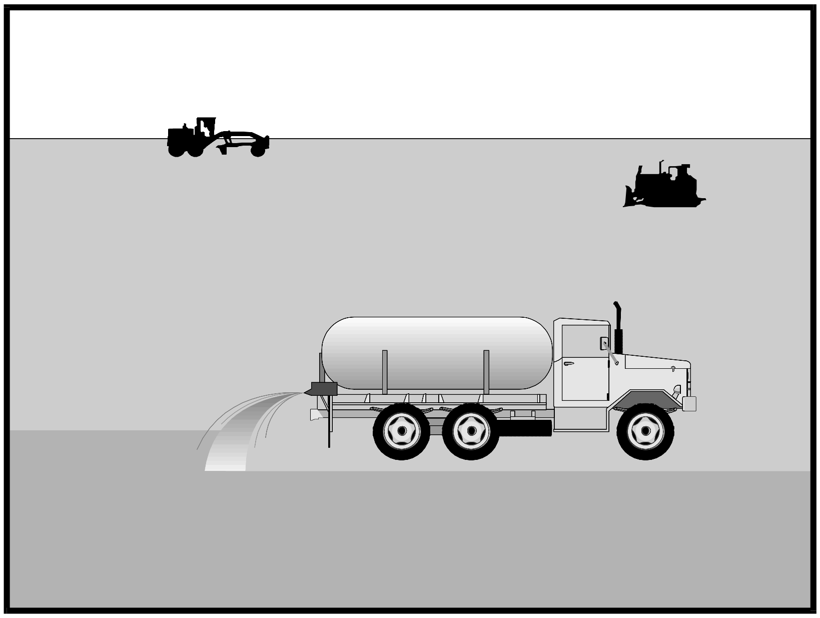
NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.
6. Protection can be effective even if it is not immediately adjacent to the inlet provided that the inlet is protected from potential sources of pollution.



DI PROTECTION – TYPE 4

NOT TO SCALE



Categories

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-5 Soil Binders

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Description and Purpose

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

California's Mediterranean climate, with a short "wet" season and a typically long, hot "dry" season, allows the soils to thoroughly dry out. During the dry season, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment. Site conditions and climate can make dust control more of an erosion problem than water based erosion. Additionally, many local agencies, including Air Quality Management Districts, require dust control and/or dust control permits in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. Wind erosion control is required to be implemented at all construction sites greater than 1 acre by the General Permit.

Suitable Applications

Most BMPs that provide protection against water-based erosion will also protect against wind-based erosion and dust control requirements required by other agencies will generally meet wind erosion control requirements for water quality protection. Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period (generally less than a few hours) and should be applied daily (or more often) to be effective.
- Over watering may cause erosion and track-out.
- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Chemical dust suppression agents may have potential environmental impacts. Selected chemical dust control agents should be environmentally benign.
- Effectiveness of controls depends on soil, temperature, humidity, wind velocity and traffic.
- Chemical dust suppression agents should not be used within 100 feet of wetlands or water bodies.
- Chemically treated subgrades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.
- If the soil surface has minimal natural moisture, the affected area may need to be pre-wetted so that chemical dust control agents can uniformly penetrate the soil surface.

Implementation

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table presents dust control practices that can be applied to varying site conditions that could potentially cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph or less, and controlling the number and activity of vehicles on a site at any given time.

Chemical dust suppressants include: mulch and fiber based dust palliatives (e.g. paper mulch with gypsum binder), salts and brines (e.g. calcium chloride, magnesium chloride), non-petroleum based organics (e.g. vegetable oil, lignosulfonate), petroleum based organics (e.g. asphalt emulsion, dust oils, petroleum resins), synthetic polymers (e.g. polyvinyl acetate, vinyls, acrylic), clay additives (e.g. bentonite, montimorillonite) and electrochemical products (e.g. enzymes, ionic products).

Site Condition	Dust Control Practices							
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Temporary Gravel Construction Entrances/Equipment Wash Down	Synthetic Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X			X
Disturbed Areas Subject to Traffic			X	X	X	X		X
Material Stockpiles		X	X	X			X	X
Demolition			X			X	X	
Clearing/ Excavation			X	X				X
Truck Traffic on Unpaved Roads			X	X	X	X	X	
Tracking					X	X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (see EC-1, Scheduling).
- Quickly treat exposed soils using water, mulching, chemical dust suppressants, or stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Restrict construction traffic to stabilized roadways within the project site, as practicable.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.
- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality

Control Board (RWQCB) requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."

- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and wheel wash areas.
- Stabilize inactive areas of construction sites using temporary vegetation or chemical stabilization methods.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater and should meet all applicable regulatory requirements.

Costs

Installation costs for water and chemical dust suppression vary based on the method used and the length of effectiveness. Annual costs may be high since some of these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check areas protected to ensure coverage.
- Most water-based dust control measures require frequent application, often daily or even multiple times per day. Obtain vendor or independent information on longevity of chemical dust suppressants.

References

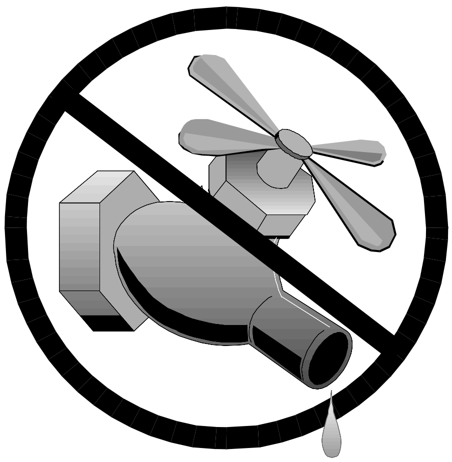
Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

California Air Pollution Control Laws, California Air Resources Board, updated annually.

Construction Manual, Chapter 4, Section 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative", California Department of Transportation (Caltrans), July 2001.

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.



Categories

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

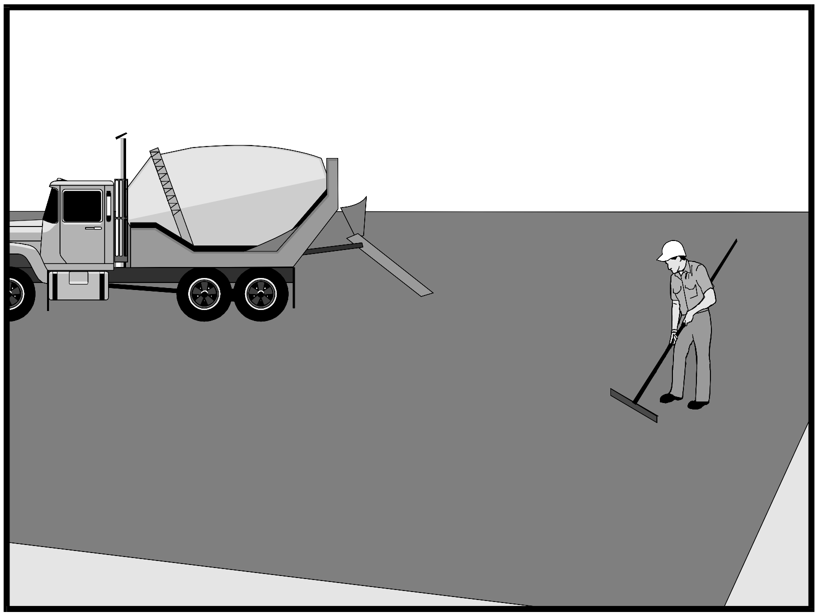
The cost is small to none compared to the benefits of conserving water.

Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Categories

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Legend:

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☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the discharge of pollutants from paving operations, using measures to prevent runon and runoff pollution, properly disposing of wastes, and training employees and subcontractors.

The General Permit incorporates Numeric Action Levels (NAL) for pH and turbidity (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials associated with paving and grinding operations, including mortar, concrete, and cement and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures are implemented where paving, surfacing, resurfacing, or sawcutting, may pollute stormwater runoff or discharge to the storm drain system or watercourses.

Limitations

- Paving opportunities may be limited during wet weather.

  Discharges of freshly paved surfaces may raise pH to environmentally harmful levels and trigger permit violations.

Implementation

General

- Avoid paving during the wet season when feasible.
- Reschedule paving and grinding activities if rain is forecasted.
- Train employees and sub-contractors in pollution prevention and reduction.
- Store materials away from drainage courses to prevent stormwater runon (see WM-1, Material Delivery and Storage).
- Protect drainage courses, particularly in areas with a grade, by employing BMPs to divert runoff or to trap and filter sediment.
- Stockpile material removed from roadways away from drain inlets, drainage ditches, and watercourses. These materials should be stored consistent with WM-3, Stockpile Management.
- Disposal of PCC (Portland cement concrete) and AC (asphalt concrete) waste should be in conformance with WM-8, Concrete Waste Management.

Saw Cutting, Grinding, and Pavement Removal

- Shovel or vacuum saw-cut slurry and remove from site. Cover or barricade storm drains during saw cutting to contain slurry.
- When paving involves AC, the following steps should be implemented to prevent the discharge of grinding residue, uncompacted or loose AC, tack coats, equipment cleaners, or unrelated paving materials:
  - AC grindings, pieces, or chunks used in embankments or shoulder backing should not be allowed to enter any storm drains or watercourses. Install inlet protection and perimeter controls until area is stabilized (i.e. cutting, grinding or other removal activities are complete and loose material has been properly removed and disposed of)or permanent controls are in place. Examples of temporary perimeter controls can be found in EC-9, Earth Dikes and Drainage Swales; SE-1, Silt Fence; SE-5, Fiber Rolls, or SE-13 Compost Socks and Berms
  - Collect and remove all broken asphalt and recycle when practical. Old or spilled asphalt should be recycled or disposed of properly.
- Do not allow saw-cut slurry to enter storm drains or watercourses. Residue from grinding operations should be picked up by a vacuum attachment to the grinding machine, or by sweeping, should not be allowed to flow across the pavement, and should not be left on the surface of the pavement. See also WM-8, Concrete Waste Management, and WM-10, Liquid Waste Management.
- Pavement removal activities should not be conducted in the rain.
- Collect removed pavement material by mechanical or manual methods. This material may be recycled for use as shoulder backing or base material.

- If removed pavement material cannot be recycled, transport the material back to an approved storage site.

Asphaltic Concrete Paving

- If paving involves asphaltic cement concrete, follow these steps:

  - Do not allow sand or gravel placed over new asphalt to wash into storm drains, streets, or creeks. Vacuum or sweep loose sand and gravel and properly dispose of this waste by referring to WM-5, Solid Waste Management.

  - Old asphalt should be disposed of properly. Collect and remove all broken asphalt from the site and recycle whenever possible.

Portland Cement Concrete Paving

- Do not wash sweepings from exposed aggregate concrete into a storm drain system. Collect waste materials by dry methods, such as sweeping or shoveling, and return to aggregate base stockpile or dispose of properly. Allow aggregate rinse to settle. Then, either allow rinse water to dry in a temporary pit as described in WM-8, Concrete Waste Management, or pump the water to the sanitary sewer if authorized by the local wastewater authority.

Sealing Operations

- During chip seal application and sweeping operations, petroleum or petroleum covered aggregate should not be allowed to enter any storm drain or water courses. Apply temporary perimeter controls until structure is stabilized (i.e. all sealing operations are complete and cured and loose materials have been properly removed and disposed).

- Inlet protection (SE-10, Storm Drain Inlet Protection) should be used during application of seal coat, tack coat, slurry seal, and fog seal.

- Seal coat, tack coat, slurry seal, or fog seal should not be applied if rainfall is predicted to occur during the application or curing period.

Paving Equipment

- Leaks and spills from paving equipment can contain toxic levels of heavy metals and oil and grease. Place drip pans or absorbent materials under paving equipment when not in use. Clean up spills with absorbent materials and dispose of in accordance with the applicable regulations. See NS-10, Vehicle and Equipment Maintenance, WM-4, Spill Prevention and Control, and WM-10, Liquid Waste Management.

- Substances used to coat asphalt transport trucks and asphalt spreading equipment should not contain soap and should be non-foaming and non-toxic.

- Paving equipment parked onsite should be parked over plastic to prevent soil contamination.

- Clean asphalt coated equipment offsite whenever possible. When cleaning dry, hardened asphalt from equipment, manage hardened asphalt debris as described in WM-5, Solid Waste Management. Any cleaning onsite should follow NS-8, Vehicle and Equipment Cleaning.

Thermoplastic Striping

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.

- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.

- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.

- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

Raised/Recessed Pavement Marker Application and Removal

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.

- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.

- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.

- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

Costs

- All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Sample stormwater runoff required by the General Permit.

- Keep ample supplies of drip pans or absorbent materials onsite.

- Inspect and maintain machinery regularly to minimize leaks and drips.

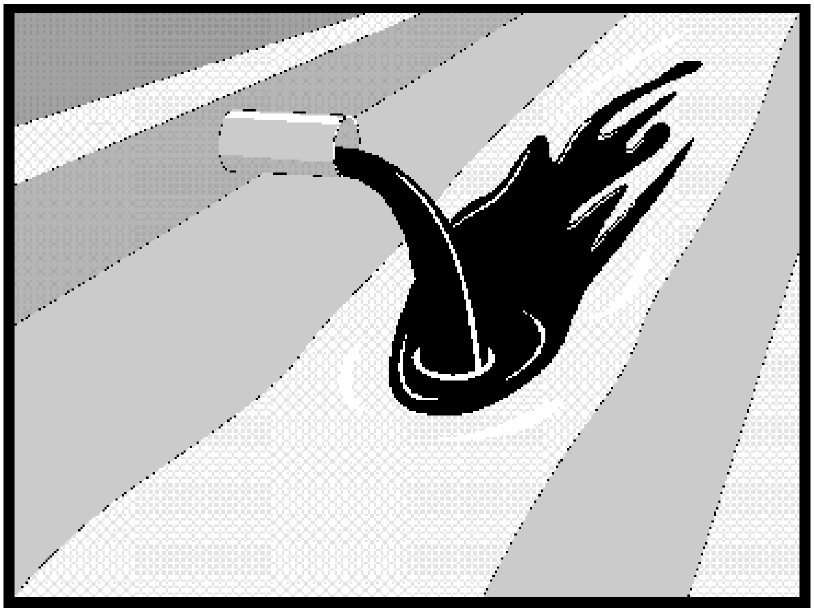
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Hot Mix Asphalt-Paving Handbook AC 150/5370-14, Appendix I, U.S. Army Corps of Engineers, July 1991.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.

- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General –** unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season
  - Unusual flows in sub drain systems used for dewatering
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the non-irrigation season
  - Non-standard junction structures
  - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect the site regularly to check for any illegal dumping or discharge.

- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.

- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

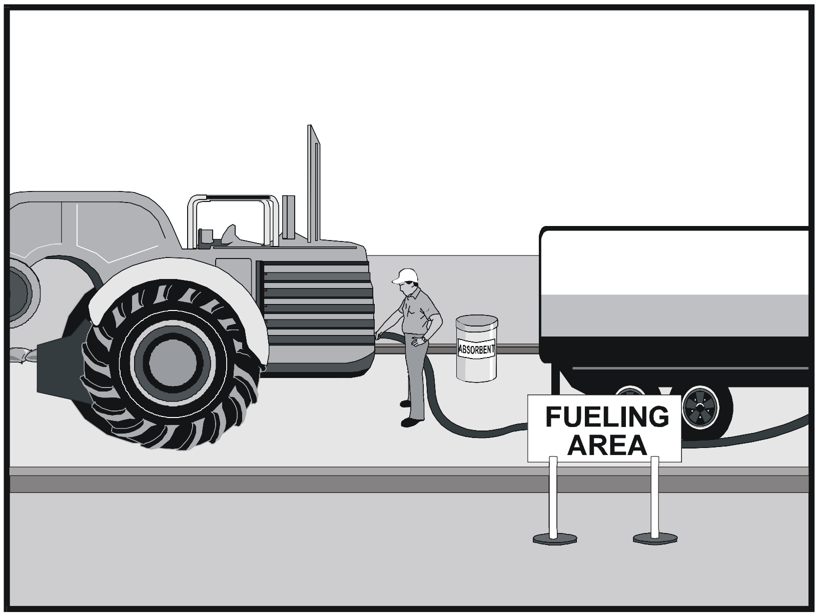
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Fueling NS-9



Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.

- Discourage “topping-off” of fuel tanks.

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.

- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.

- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.

- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.

- Train employees and subcontractors in proper fueling and cleanup procedures.

- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.

- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.

- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.

- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.

- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).

- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.

- Keep ample supplies of spill cleanup materials onsite.

- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

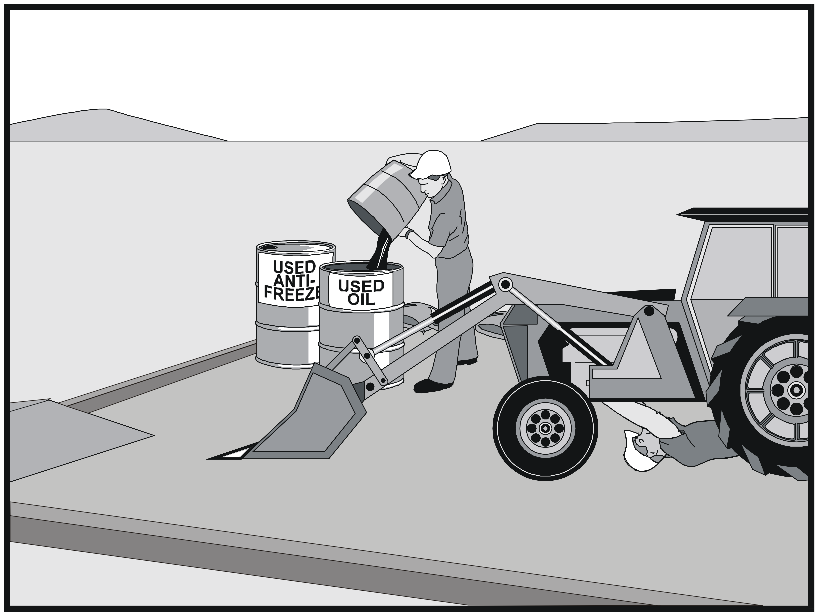
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



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☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a “dry and clean site”. The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8,

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Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.

- Repair leaks of fluids and oil immediately.

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products
- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

Inspection and Maintenance

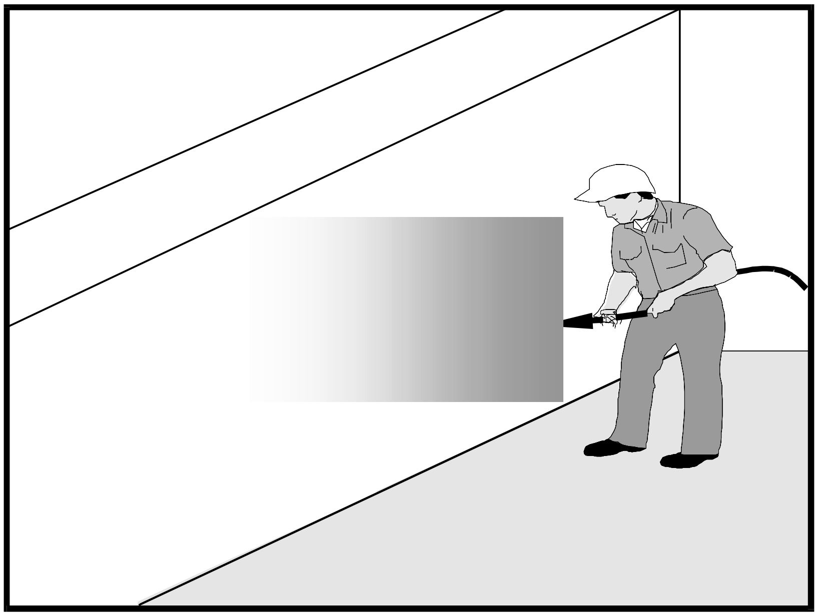
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Concrete and its associated curing materials have basic chemical properties that can raise the pH of water to levels outside of the permitted range. Discharges of stormwater and non-stormwater exposed to concrete during curing may have a high pH and may contain chemicals, metals, and fines. The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Proper procedures and care should be taken when managing concrete curing materials to prevent them from coming into contact with stormwater flows, which could result in a high pH discharge.

Suitable Applications

Suitable applications include all projects where Portland Cement Concrete (PCC) and concrete curing chemicals are placed where they can be exposed to rainfall, runoff from other areas, or where runoff from the PCC will leave the site.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

Chemical Curing

- Avoid over spray of curing compounds.

- Minimize the drift by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface, but does not allow any runoff of the compound.

- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.

- Protect drain inlets prior to the application of curing compounds.

- Refer to WM-4, Spill Prevention and Control.

Water Curing for Bridge Decks, Retaining Walls, and other Structures

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.

- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.

- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

Education

- Educate employees, subcontractors, and suppliers on proper concrete curing techniques to prevent contact with discharge as described herein.

- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete curing procedures.

Costs

All of the above measures are generally low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.

- Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.
- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

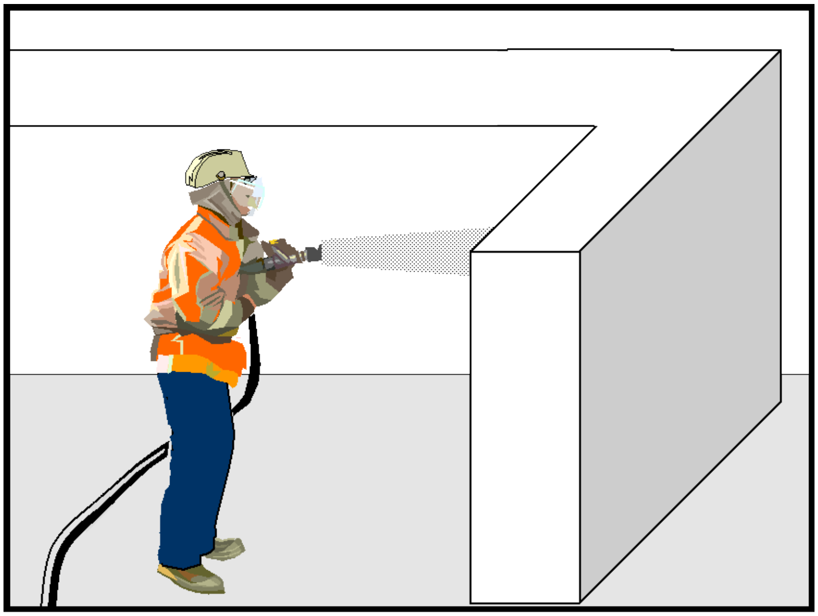
References

Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non Point Source Pollution Control Program, 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



Categories		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	☑

Potential Alternatives

None

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Description and Purpose

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high pressure water blasting. Stormwater and non-stormwater exposed to concrete finishing by-products may have a high pH and may contain chemicals, metals, and fines. Proper procedures and implementation of appropriate BMPs can minimize the impact that concrete-finishing methods may have on stormwater and non-stormwater discharges.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Concrete and its associated curing materials have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows, which could lead to exceedances of the General Permit requirements.

Suitable Applications

These procedures apply to all construction locations where concrete finishing operations are performed.

Limitations

- Runoff contact with concrete waste can raise pH levels in the water to environmentally harmful levels and trigger permit violations.

Implementation

- Collect and properly dispose of water from high-pressure water blasting operations.
- Collect contaminated water from blasting operations at the top of slopes. Transport or dispose of contaminated water while using BMPs such as those for erosion control. Refer to EC-9, Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Direct water from blasting operations away from inlets and watercourses to collection areas for infiltration or other means of removal (dewatering). Refer to NS-2 Dewatering Operations.
- Protect inlets during sandblasting operations. Refer to SE-10, Storm Drain Inlet Protection.
- Refer to WM-8, Concrete Waste Management for disposal of concrete debris.
- Minimize the drift of dust and blast material as much as possible by keeping the blasting nozzle close to the surface.
- When blast residue contains a potentially hazardous waste, refer to WM-6, Hazardous Waste Management.

Education

- Educate employees, subcontractors, and suppliers on proper concrete finishing techniques to prevent contact with discharge as described herein.
- Arrange for the QSP or the appropriately trained contractor's superintendent or representative to oversee and enforce concrete finishing procedures.

Costs

These measures are generally of low cost.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Sample non-stormwater discharges and stormwater runoff that contacts concrete dust and debris as required by the General Permit.

- Sweep or vacuum up debris from sandblasting at the end of each shift.
- At the end of each work shift, remove and contain liquid and solid waste from containment structures, if any, and from the general work area.
- Inspect containment structures for damage prior to use and prior to onset of forecasted rain.

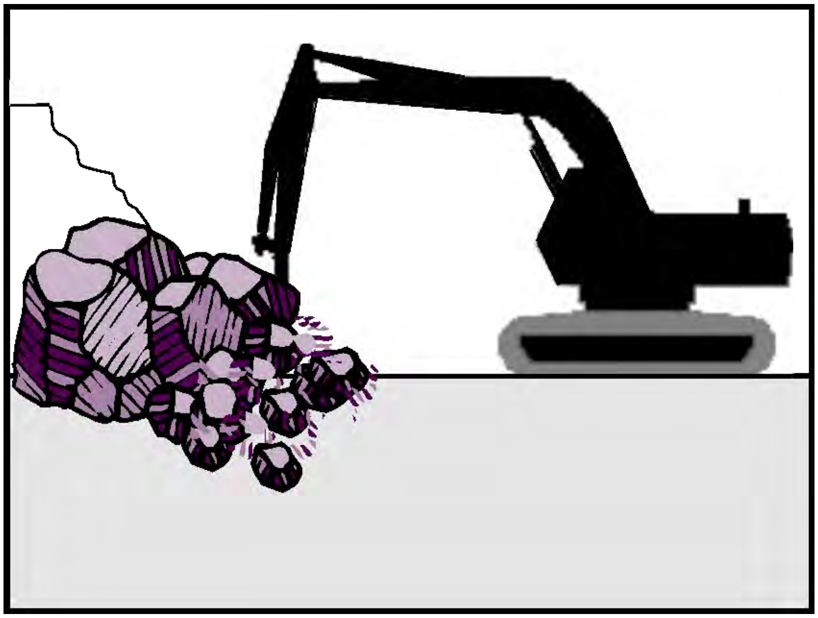
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Demolition Adjacent to Water NS-15



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Suitable Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

Limitations

None identified.

Implementation

- Refer to NS-5, Clear Water Diversion, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the owner.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with WM-3, Stockpile Management.
- Ensure safe passage of wildlife, as necessary.

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- Discharges to waterways shall be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.

- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to BMP WM-6, Hazardous Waste Management. For demolition work involving soil excavation around lead-painted structures, refer to WM-7, Contaminated Soil Management.

Costs
Cost may vary according to the combination of practices implemented.

Inspection and Maintenance
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

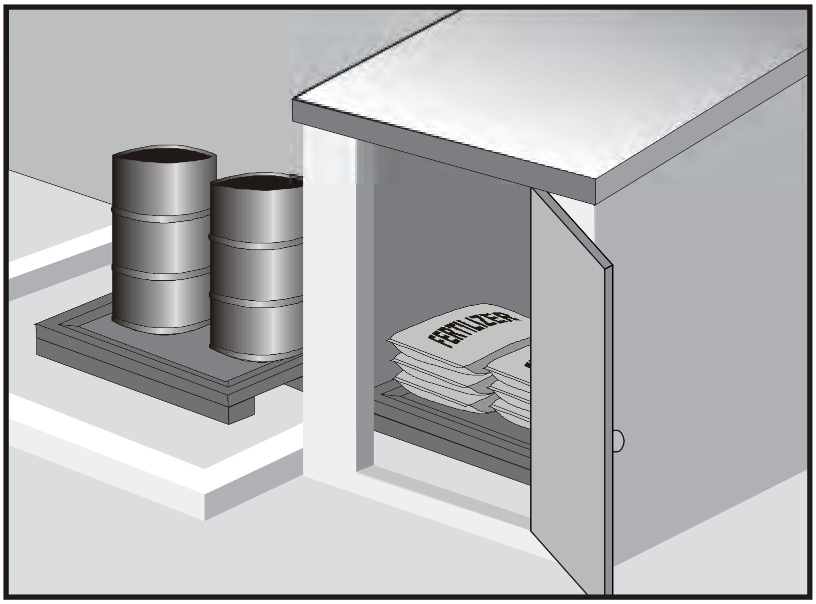
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runon and runoff.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.



Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in watertight containers and/or a completely enclosed designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Chemicals must be stored in water tight containers with appropriate secondary containment or in a storage shed.
- When a material storage area is located on bare soil, the area should be lined and bermed.
- Use containment pallets or other practical and available solutions, such as storing materials within newly constructed buildings or garages, to meet material storage requirements.
- Stack erodible landscape material on pallets and cover when not in use.
- Contain all fertilizers and other landscape materials when not in use.
- Temporary storage areas should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be available on-site for all materials stored that have the potential to effect water quality.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms or other appropriate containment BMP. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area that will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.

- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- Keep ample spill cleanup supplies appropriate for the materials being stored. Ensure that cleanup supplies are in a conspicuous, labeled area.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove and dispose of materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Materials should be covered prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or completely enclosed storage sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous wastes.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.
- If spills or leaks of materials occur that are not contained and could discharge to surface waters, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Keep storage areas clean and well organized, including a current list of all materials onsite.
- Inspect labels on containers for legibility and accuracy.

- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

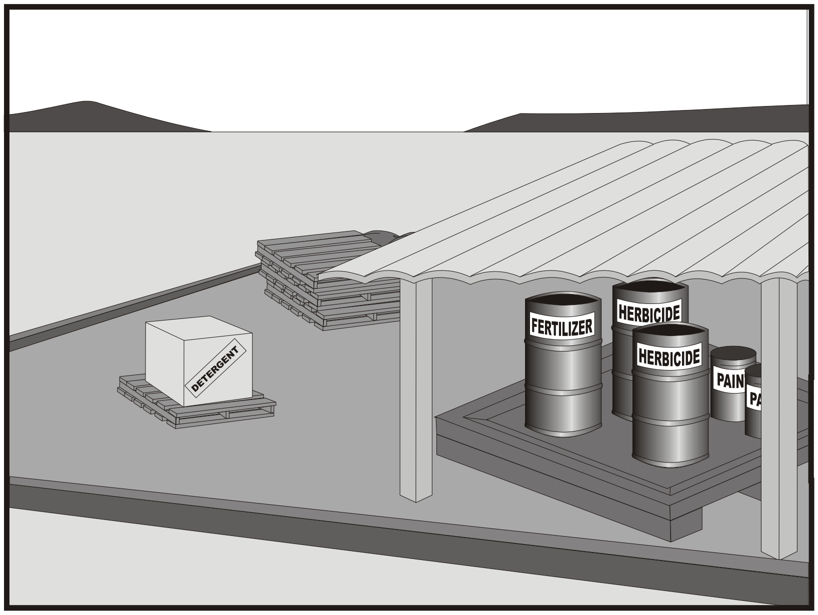
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use WM-2



Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Other materials that may be detrimental if released to the environment

Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.

- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.

- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.

- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):

  - Do not treat soil that is water-saturated or frozen.

  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.

  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.

  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).

  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).

  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.

  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.

  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

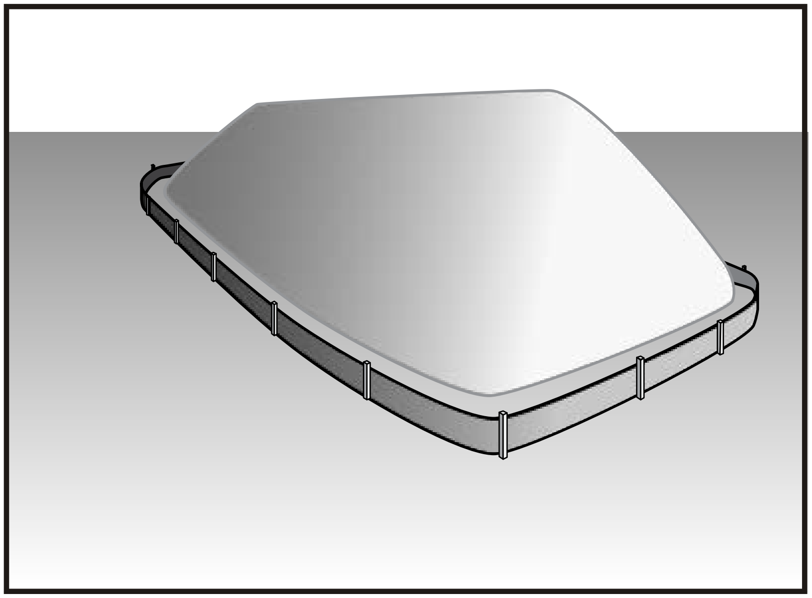
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Stockpile Management WM-3



Categories		
EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called “cold mix” asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.

- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.

- Protect all stockpiles from stormwater runon using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.

- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.

- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.

- Place bagged materials on pallets and under cover.

- Ensure that stockpile coverings are installed securely to protect from wind and rain.

- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

Protection of Non-Active Stockpiles

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

Soil stockpiles

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.

- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

Stockpiles of "cold mix"

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Stockpiles of fly ash, stucco, hydrated lime

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

Stockpiles/Storage of wood (Pressure treated with chromated copper arsenate or ammoniacal copper zinc arsenate

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

Protection of Active Stockpiles

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.

- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.

- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).

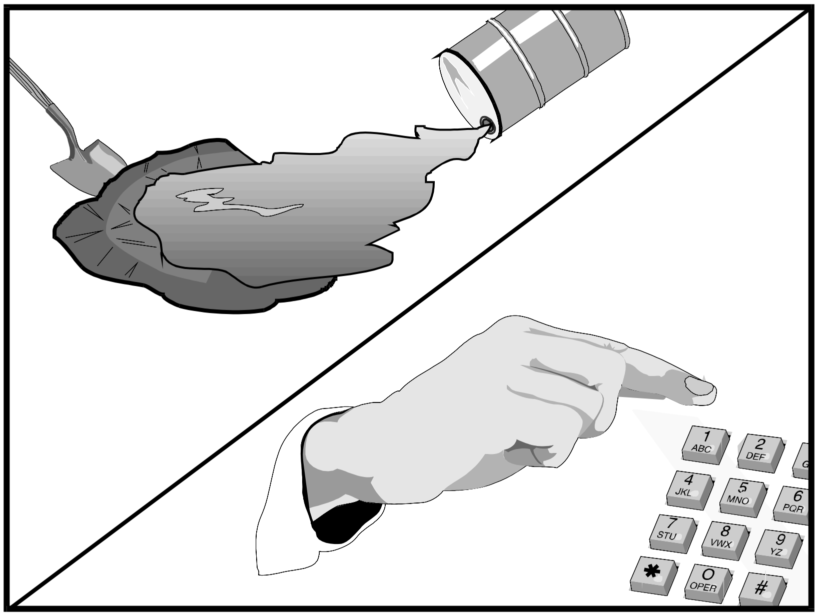
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

- Sediment shall be removed when it reaches one-third of the barrier height.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Spill Prevention and Control WM-4



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a “significant spill” is for each material they use, and what is the appropriate response for “significant” and “insignificant” spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor’s superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn’t compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
    - Contain the spread of the spill.
    - Recover spilled materials.
    - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:

  - Contain spread of the spill.

  - Notify the project foreman immediately.

  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.

  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.

  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:

  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.

  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.

  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.

  - Notification should first be made by telephone and followed up with a written report.

  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.

  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.

- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

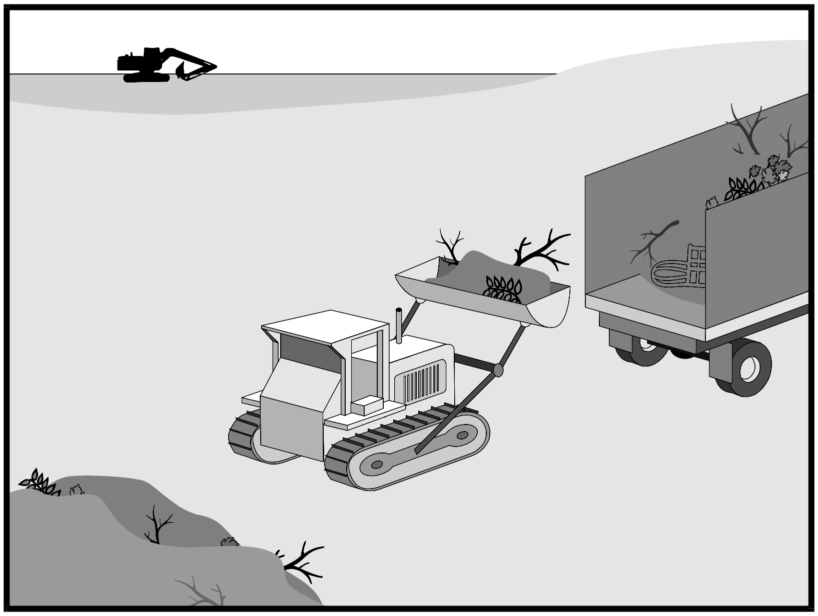
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor’s superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.

- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur

- Inspect construction waste area regularly.

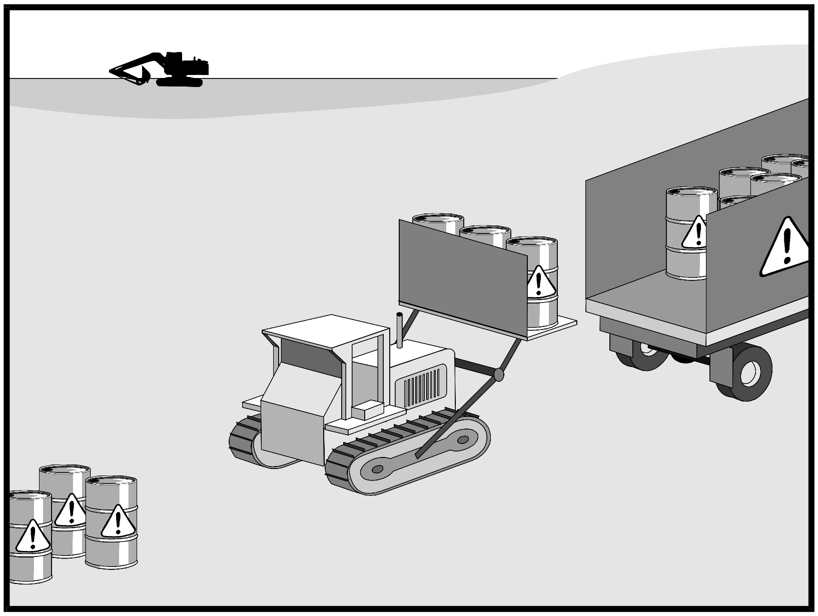
- Arrange for regular waste collection.

References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
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WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acids
- Septic Wastes
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

Material Use

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
  - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

■ Drums should not be overfilled and wastes should not be mixed.

■ Unless watertight, containers of dry waste should be stored on pallets.

■ Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

■ Paint brushes and equipment for water and oil based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.

■ Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. “Paint out” brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

■ The following actions should be taken with respect to temporary contaminant:

- Ensure that adequate hazardous waste storage volume is available.

- Ensure that hazardous waste collection containers are conveniently located.

- Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

- Minimize production or generation of hazardous materials and hazardous waste on the job site.

- Use containment berms in fueling and maintenance areas and where the potential for spills is high.

- Segregate potentially hazardous waste from non-hazardous construction site debris.

- Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.

- Place hazardous waste containers in secondary containment.

- Do not allow potentially hazardous waste materials to accumulate on the ground.

- Do not mix wastes.

- Use all of the product before disposing of the container.

- Do not remove the original product label; it contains important safety and disposal information.

Waste Recycling Disposal

- Select designated hazardous waste collection areas onsite.

- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.

- Place hazardous waste containers in secondary containment.

- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.

- Recycle any useful materials such as used oil or water-based paint.

- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- Arrange for regular waste collection before containers overflow.

- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.

- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.

- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.

- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events..
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.

- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.

- A copy of the hazardous waste manifests should be provided.

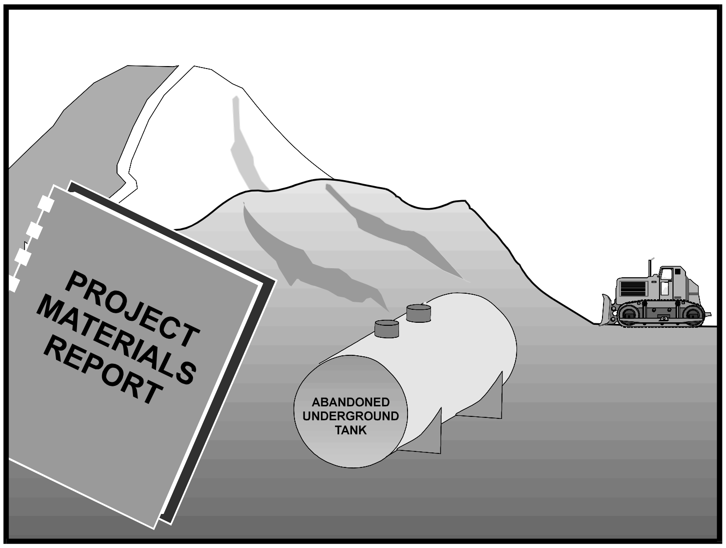
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the plans, specifications, and SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities
  - Detected or undetected spills and leaks
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
  - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.
  - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT)
  - United States Environmental Protection Agency (USEPA)
  - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

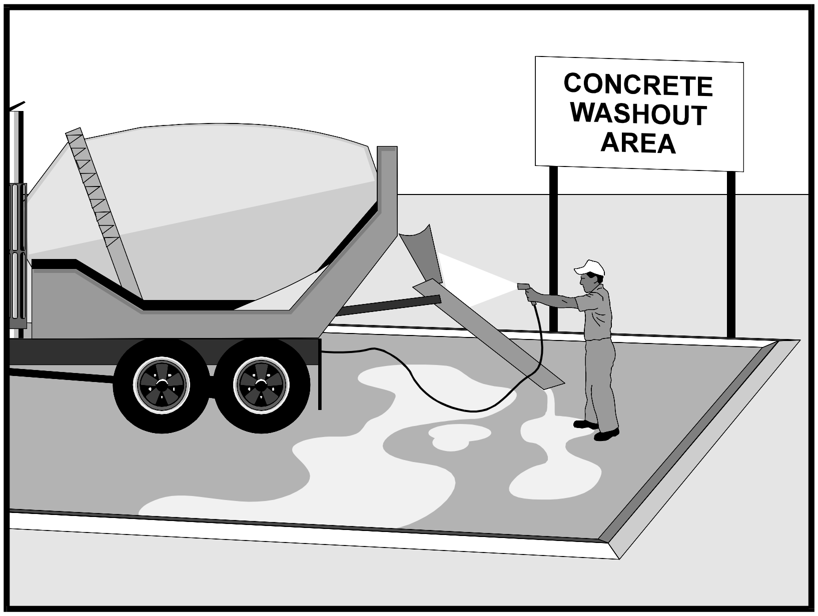
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☒
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	☑
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

If User/Subscriber modifies this fact sheet in any way, the CASQA name/logo and footer below must be removed from each page and not appear on the modified version.

Description and Purpose

Prevent the discharge of pollutants to stormwater from concrete waste by conducting washout onsite or offsite in a designated area, and by employee and subcontractor training.

The General Permit incorporates Numeric Action Levels (NAL) for pH (see Section 2 of this handbook to determine your project's risk level and if you are subject to these requirements).

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
  - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

Education

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

Concrete Demolition Wastes

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

Concrete Slurry Wastes

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
  - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
  - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
  - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
  - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a "roll-off"; this concrete washout facility should be properly sealed to prevent leakage, and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
  - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
  - Lath and flagging should be commercial type.
  - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

Removal of Temporary Concrete Washout Facilities

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations..

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.

- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

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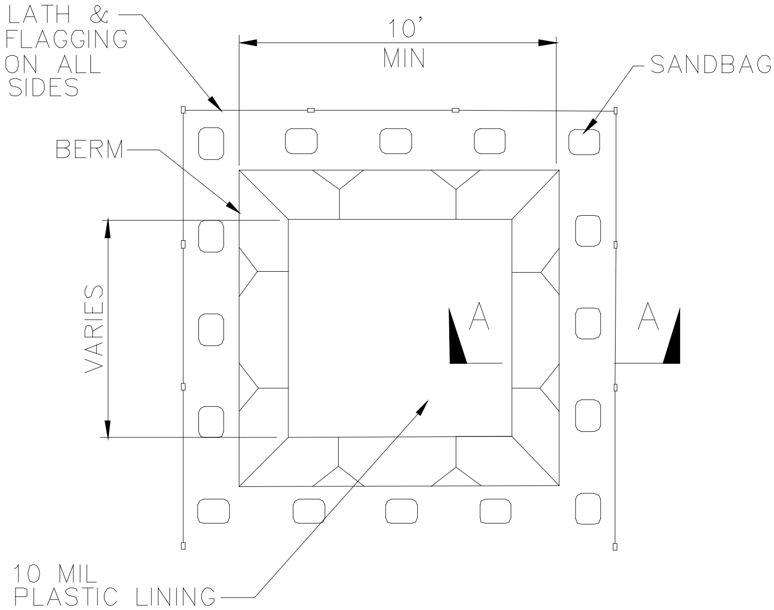
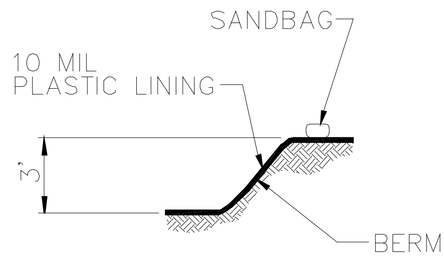
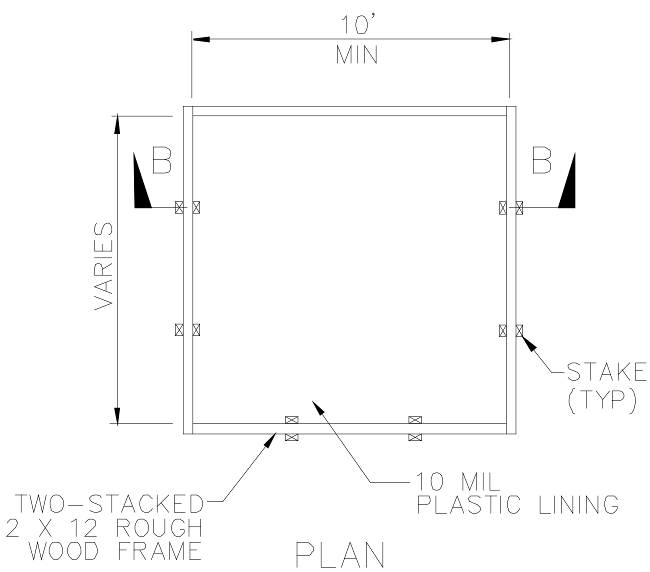


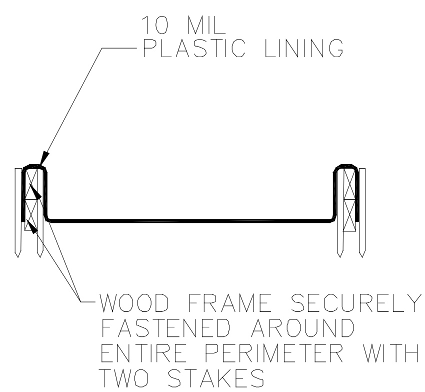
PLAN
NOT TO SCALE
TYPE "BELOW GRADE"



SECTION A–A
NOT TO SCALE



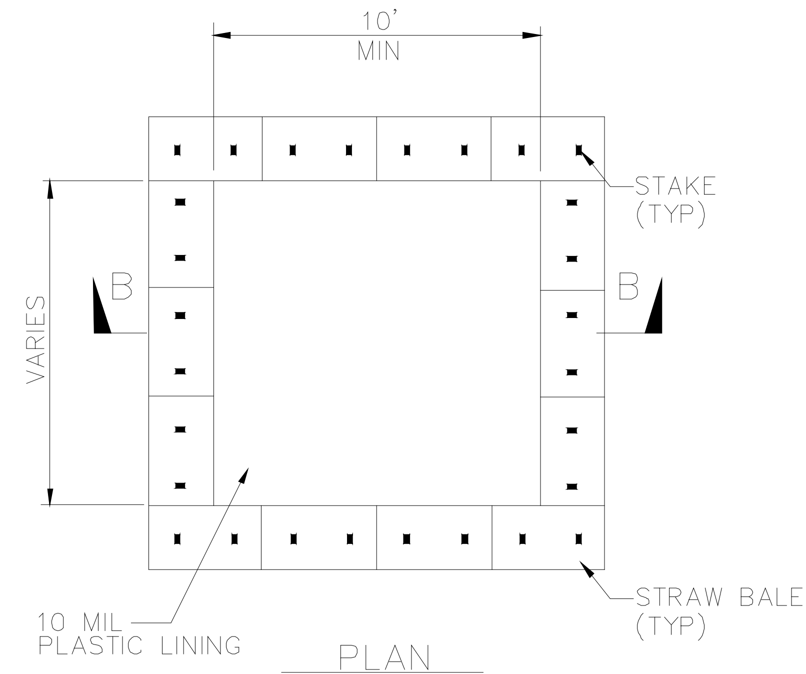
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"



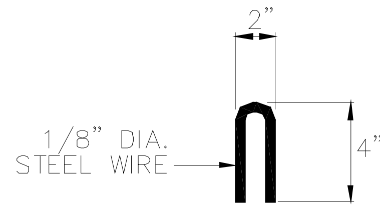
SECTION B–B
NOT TO SCALE

NOTES

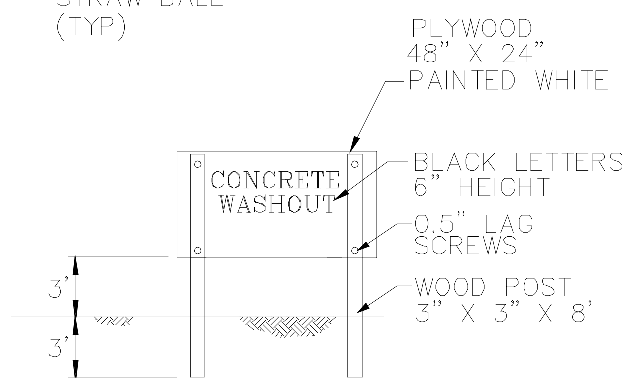
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



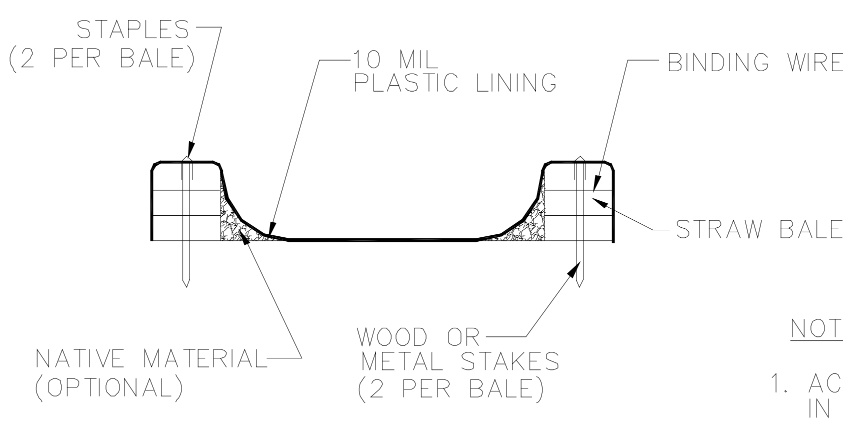
PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES



STAPLE DETAIL



CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

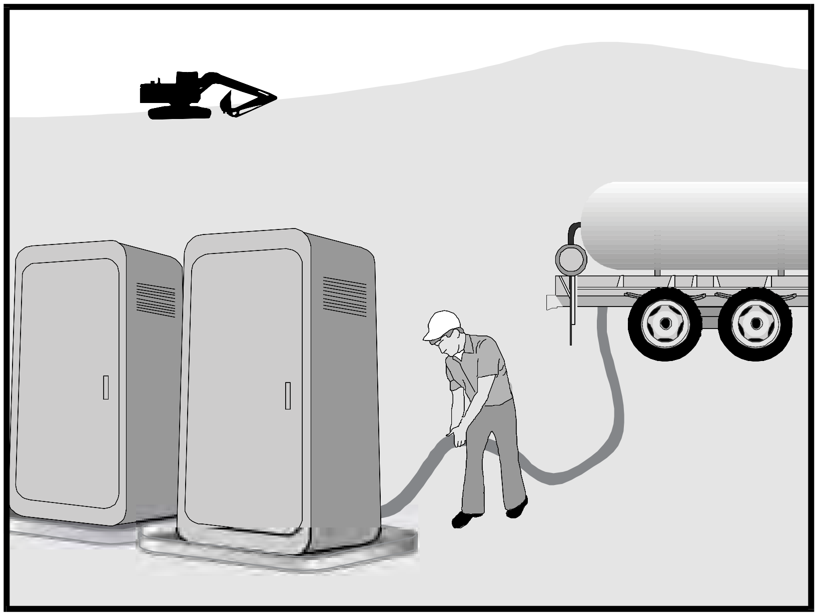


SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

Sanitary/Septic Waste Management WM-9



Categories		
EC	Erosion Control	
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WE	Wind Erosion Control	
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WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents	
Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.

- Consider safety as well as environmental implications before placing temporary sanitary facilities.

- Wastewater should not be discharged or buried within the project site.

- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.

- Only reputable, licensed sanitary and septic waste haulers should be used.

- Sanitary facilities should be located in a convenient location.

- Temporary septic systems should treat wastes to appropriate levels before discharging.

- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.

- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.

- Sanitary and septic facilities should be maintained in good working order by a licensed service.

- Regular waste collection by a licensed hauler should be arranged before facilities overflow.

- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.

- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.

- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.

- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).

- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Arrange for regular waste collection.

- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

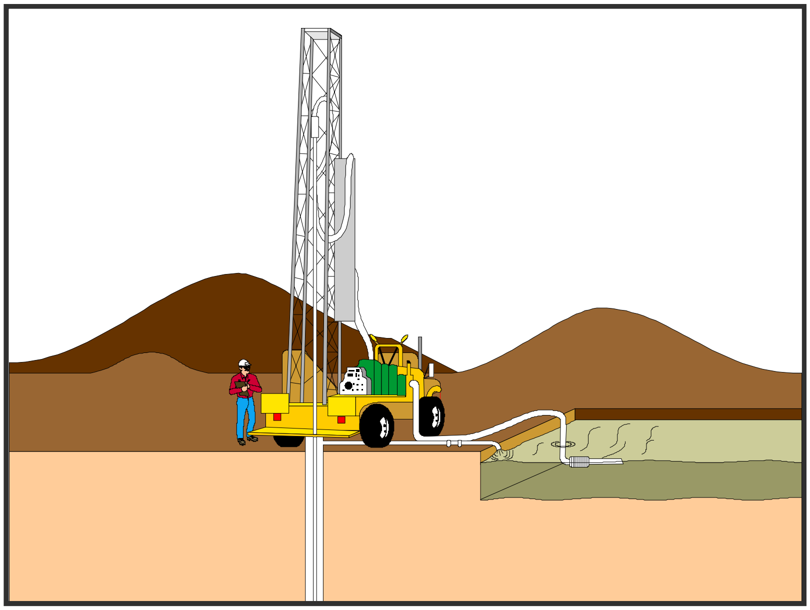
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Liquid Waste Management WM-10



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

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Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.

- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.

- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.

- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.

- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.

- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

BMP INSPECTION REPORT

<table>
<tr><td colspan="2">Date and Time of Inspection:</td><td colspan="3">Date Report Written:</td></tr>
<tr><td>Inspection Type:
(Circle one)</td><td>Weekly
Complete Parts I,II,III and VII</td><td>Pre-Storm
Complete Parts I,II,III,IV and VII</td><td>During Rain Event
Complete Parts I, II, III, V, and VII</td><td>Post-Storm
Complete Parts I,II,III,VI and VII</td></tr>
<tr><td colspan="5">Part I. General Information</td></tr>
<tr><td colspan="5">Site Information</td></tr>
<tr><td colspan="5">Construction Site Name:</td></tr>
<tr><td colspan="3">Construction stage and
completed activities:</td><td colspan="2">Approximate area
of site that is exposed:</td></tr>
<tr><td>Photos Taken:
(Circle one)</td><td>Yes</td><td>No</td><td colspan="2">Photo Reference IDs:</td></tr>
<tr><td colspan="5">Weather</td></tr>
<tr><td colspan="2">Estimate storm beginning:
(date and time)</td><td colspan="3">Estimate storm duration:
(hours)</td></tr>
<tr><td colspan="2">Estimate time since last storm:
(days or hours)</td><td colspan="3">Rain gauge reading and location:
(inches)</td></tr>
<tr><td colspan="5">Is a “Qualifying Event” predicted or did one occur (i.e., 0.5” rain with 48-hrs or greater between events)? (Y/N)
If yes, summarize forecast:</td></tr>
<tr><td colspan="5">Exemption Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.</td></tr>
<tr><td colspan="5"></td></tr>
<tr><td colspan="5">Inspector Information</td></tr>
<tr><td colspan="3">Inspector Name:</td><td colspan="2">Inspector Title:</td></tr>
</table>

Signature:	Date:

Part II. BMP Observations. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			

Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			
Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill,			

and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Linear sediment control along toe of slope, face of slope an at grade breaks (Risk Level 2 & 3 Only)			
Limit construction activity to and from site to entrances and exits that employ effective controls to prevent offsite tracking (Risk Level 2 & 3 Only)			
Ensure all storm, drain inlets and perimeter controls, runoff control BMPs and pollutants controls at entrances and exits are maintained and protected from activities the reduce their effectiveness (Risk Level 2 & 3 Only)			
Inspect all immediate access roads daily (Risk Level 2 & 3 Only)			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project CPPP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies		
Deficiency	**Repairs Implemented:** **Note -** Repairs must begin within 72 hours of identification and complete repairs as soon as possible.	
	Start Date	**Action**
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. **Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source of pollutants.**	
	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	
Notes:	

Part V. Additional During Storm Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. **Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Complete Part VII (Corrective Actions) as needed.**	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if CPPP change is required.	
Required Actions	**Implementation Date**

Rain Event Action Plan (REAP)			
Date of REAP		Permit Number:	
Date Rain Predicted to Occur:		Predicted % chance of rain:	

Predicted Rain Event Triggered Actions

Below is a list of suggested actions and items to review for this project. Each active Trade should check all material storage areas, stockpiles, waste management areas, vehicle and equipment storage and maintenance, areas of active soil disturbance, and areas of active work to ensure the proper implementation of BMPs. Project-wide BMPs should be checked and cross-referenced to the BMP progress map.

Trade or Activity	Suggested action to perform / item to review prior to rain event
❑ Information & Scheduling	❑ Inform trade supervisors of predicted rain ❑ Check scheduled activities and reschedule as needed ❑ Alert erosion/sediment control provider ❑ Alert sample collection contractor (if applicable) ❑ Schedule staff for extended rain inspections ❑ Check Erosion and Sediment Control (ESC) material stock ❑ Review BMP progress map ❑ Other:___________________________________ ❑ ____ ❑ ____
❑ Material storage areas	❑ Material under cover or in sheds (ex: treated woods and metals) ❑ Perimeter control around stockpiles ❑ Other:___________________________________ ❑ ____ ❑ __________________________________
❑ Waste management areas	❑ Dumpsters closed ❑ Drain holes plugged ❑ Recycling bins covered ❑ Sanitary stations bermed and protected from tipping ❑ Other:___________________________________ ❑ ____ ❑ ____
❑ Trade operations	❑ Exterior operations shut down for event (e.g., no concrete pours or paving) ❑ Soil treatments (e.g., fertilizer) ceased within 24 hours of event ❑ Materials and equipment (e.g., tools) properly stored and covered ❑ Waste and debris disposed in covered dumpsters or removed from site ❑ Trenches and excavations protected ❑ Perimeter controls around disturbed areas ❑ Fueling and repair areas covered and bermed ❑ Other:___________________________________

❑ Site ESC BMPs	❑ Adequate capacity in sediment basins and traps ❑ Site perimeter controls in place ❑ Catch basin and drop inlet protection in place and cleaned ❑ Temporary erosion controls deployed ❑ Temporary perimeter controls deployed around disturbed areas and stockpiles ❑ Roads swept; site ingress and egress points stabilized ❑ Other:________________________________ ❑ ____________________________________ ❑ _______________________________
❑ Concrete rinse out area	❑ Adequate capacity for rain ❑ Wash-out bins covered ❑ Other:________________________________ ❑ ____________________________________ ❑ _______________________________
❑ Spill and drips	❑ All incident spills and drips, including paint, stucco, fuel, and oil cleaned ❑ Drip pans emptied ❑ Other:________________________________ ❑ ____________________________________ ❑ _______________________________

❑ Other / Discussion / Diagrams	❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________ ❑ ____________________________________

Attach a printout of the weather forecast from the NOAA website to the REAP.

I certify under penalty of law that this Rain Event Action Plan (REAP) will be performed in accordance with the CPPP by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

____Date: _________________________
Inspector (Use ink please) Name/Signature

ATTACHMENT 9B

Santa Ana Regional Water Quality Control Board Consult

Wanda Cross, Chief, Regional Planning Programs Section

February 2017

Lynette Leighton

From: Cross, Wanda@Waterboards <Wanda.Cross@waterboards.ca.gov>
Sent: Tuesday, February 07, 2017 9:46 AM
To: Lynette Leighton
Cc: Cross, Wanda@Waterboards; Reeder, Terri@Waterboards
Subject: RE: Newport Beach Balboa Island Seawall - Project Questions

Good Morning Ms. Leighton,

I am responding to your question whether your proposed project, the Newport Beach Balboa Island Seawall Coping Repair Project, will require a Clean Water Act Section 401 Water Quality Certification (401 Certification) or State Waste Discharge Requirements (WDRs). A 401 Certification or State WDRs is required when a project will discharge dredged or fill material into waters of California including headwaters, riparian areas and/or wetlands.

The proposed project involves the repair and maintenance of the existing seawall located along the perimeter of North/South Bay Front boardwalk and a segment of the seawall located parallel to Edgewater Avenue in conformance with the City of Newport Beach Seawall Rehabilitation Project and the City of Newport Beach (City) certified Coastal Land Use Plan. The purpose of the repair is to preserve the structural integrity and increase the height of 36 segments of seawall on Balboa Island and a 150 foot long segment of seawall located approximately 35 feet north of Edgewater Avenue. These improvements would reduce the potential for water overtopping the walls during high tides, local wind waves, storm surges, and periods of larger ocean swells by increasing the height of the seawalls by 9 inches. The project would also be one of the City's first steps toward implementing plans to reduce the impact of sea level rise. All construction-related activities would be limited to the existing seawall, with no work done on the mudflats or waters of Newport Bay on the seaward side of the seawalls.

Based upon the information we received, the project will not require water quality certification under Clean Water Act Section 401. I received and reviewed the proposed project's CA Coastal Commission coastal development permit (CDP) application, and emails from you that indicate there are no waters of the U.S. or waters of the State located at the proposed project site. Consequently, no waters will be adversely impacted as a result of the proposed project. If you have any other questions, please contact me.

Sincerely,
Wanda Cross

Wanda M. Cross
Chief, Regional Planning Programs Section
Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501
(951) 782-4468
Email: wanda.cross@waterboards.ca.gov
www.waterboards.ca.gov/santaana/

From: Lynette Leighton [mailto:lleighton@rinconconsultants.com]
Sent: Wednesday, January 25, 2017 10:55 AM
To: Cross, Wanda@Waterboards; Reeder, Terri@Waterboards
Subject: Newport Beach Balboa Island Seawall - Project Questions

Hello Ms. Cross and Ms. Reeder,

I am working with the City of Newport Beach on a project to repair and maintain the seawalls on the perimeter of Balboa Island, and a seawall segment located parallel to Edgewater Avenue (northeastern waterfront on Balboa Peninsula).

I have questions pertaining to the project and whether or not any additional permits from the Santa Ana RWQCB would be required beyond a General Construction Permit. We submitted a Coastal Development Permit application package to the CA Coastal Commission, and were advised to contact the RWQCB for guidance on whether or not a permit from RWQCB is necessary.

A little more info about the project:
All construction-related activities would be limited to the existing seawall, with no work done on the mudflats or waters of Newport Bay on the seaward side of the seawalls. The end goal for the project is to install a 9" cap on the existing seawall to reduce the potential for water overtopping the walls during high tides, storm surges, and other ocean swell events. As such, this project would be one of the City's first steps toward implementing plans to reduce sea level rise impacts.

Please let me know if you would like to review the CDP application. I can place the document on our file transfer site (may be too big for an attachment).

I would appreciate any guidance you can provide, or for this email to get forwarded to the right person who can provide assistance.

Thank you,

Lynette Leighton, MEM
Associate Environmental Planner

Rincon Consultants, Inc.
Office: 760 918 9444 (ext. 236)
Direct: 760 932 0649
Mobile: 510 926 1728

www.rinconconsultants.com
Environmental Scientists Planners Engineers

ATTACHMENT 9C

California Department of Fish and Wildlife Consult

Loni Adams, Environmental Scientist

January 2017

Lynette Leighton

From: Adams, Loni@Wildlife <Loni.Adams@wildlife.ca.gov>
Sent: Tuesday, January 24, 2017 3:07 PM
To: Lynette Leighton
Subject: Balboa SeaWall Project

Linette,

I would be the correct person to review and provide comments and approvals. No permits would be issued for this type of project.

Loni

Lynette Leighton

From: Lynette Leighton
Sent: Monday, January 23, 2017 4:44 PM
To: 'AskR5@wildlife.ca.gov'
Subject: Newport Beach Balboa Island Seawall - Project Questions

Hello!

I am working with the City of Newport Beach on a project to repair and maintain the seawalls on the perimeter of Balboa Island.

I have questions pertaining to the project and whether or not a permit from CDFW would be required for the project, or if provision of specific project information may exclude the project from permitting requirements, based on CDFW's guidance. We submitted a Coastal Development Permit application package to the CA Coastal Commission, and were advised to contact CDFW for guidance on whether or not a permit from CDFW is necessary.

I would appreciate if this email got forwarded to the right person who can provide assistance.

Thank you,

Lynette Leighton, MEM
Associate Environmental Planner

rincon
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Mobile: 510 926 1728

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Environmental Scientists Planners Engineers

ATTACHMENT 9D

California State Lands Commission Consult

Reid Boggiano, Public Land Management Specialist

December 2016

Lynette Leighton

From: Boggiano, Reid@SLC <Reid.Boggiano@slc.ca.gov>
Sent: Monday, December 12, 2016 4:48 PM
To: Lynette Leighton
Subject: RE: Thank You - Newport Beach, Balboa Island Clarification

Hi Lynette,

That is correct. From our phone conversation, it appears the project will be located within lands granted to the City. Except for certain statutory authorizations, the Commission is not typically involved in day-to-day management operations for legislatively granted public trust lands. The grantee has the primary responsibility of administering the trust within the parameters of its granting statutes. Chapter 74, Statutes of 1978, required the City to notify the Commission for any expenditure of revenues for any single capital improvement on the granted lands involving an amount over $250,000 not less than 90 days prior to disbursement of funds. Within 90 days after the time of such filing, the State Lands Commission may determine and notify the city that such capital improvement is not in the statewide interest or is not authorized.

Please let me know if I can help answer any further questions.

Reid Boggiano
Public Land Management Specialist
External Affairs Division
California State Lands Commission
(916) 574-0450

From: Lynette Leighton [mailto:lleighton@rinconconsultants.com]
Sent: Monday, December 12, 2016 3:34 PM
To: Boggiano, Reid@SLC
Subject: Thank You - Newport Beach, Balboa Island Clarification

Hi Reid,

Thank you for taking my call this morning re: seawall repair around Balboa Island for the City of Newport Beach.

I just wanted to confirm my understanding with you:

- City of Newport Beach does not have to obtain review and approval of the project since they are the lease grantees of the tidelands (around Balboa Island)
- City will have to file a project notification with the CSLC 120 days prior to the project commencing, since the project is $250,000+ in annual expenditures from the Tidelands Fund
- Therefore, the City does not have to submit a project notification to the CSLC at this time since the project is still undergoing CCC approval(?)

Please let me know if there is anything else that I missed. I would also appreciate your direction to the notification form/application that you will have to receive; I am aware of the actual Lease Application guidelines, but not the project notification you mentioned.

Thank you,

Lynette Leighton, MEM
Associate Environmental Planner

Rincon Consultants, Inc.
Office: 760 918 9444 (ext. 236)
Direct: 760 932 0649
Mobile: 510 926 1728

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Inc. Magazine - 5000 Fastest Growing Companies

ATTACHMENT 10

Public Notice Materials

ATTACHMENT 10A

Example of Public Outreach Materials

BALBOA ISLANDS SEAWALL REPAIR - Frequently Asked Questions

The City of Newport Beach is considering the need to rebuild the deteriorating seawalls around Balboa Island and Little Balboa Island (Islands) possibly increasing the height of the wall by an incremental amount. This project is deemed necessary to provide structural integrity to the seawalls protecting the Island, as well as addressing projected sea level rise to protect the islands from future flooding. This brochure provides some answers to Frequently Asked Questions about the need for new seawalls and some possible approaches that could be taken to provide safety from flooding. Outreach to the Islands' community will continue throughout the life of the project.

Seawall Condition, Seawall Height and Flood Risk

1. How old are the seawalls around Balboa Island and Little Balboa Island (Islands)? What is their projected useful life?

The seawalls were built in the 1920's and 1930's so the seawalls are between 75 and 85 years old. More recently, a cap has been added to the bulkhead beam on some portions of the seawall. These seawalls have performed well but are beginning to show their age. Some tie-rods have corroded and no longer acting to restrain the seawall. The City has been spending an increasing amount of funding in the recent years to repair and seal cracks. The walls are estimated to have between 10-25 years of remaining useful life. More information can be found regarding the condition of the in the seawalls in a recent assessment report prepared by City entitled "Balboa Island Seawall Final Report", April 1, 2011 which is posted on the City's website:
http://newportbeachca.gov/index.aspx?page=1822 (Scroll down to the bottom of the page.)

2. Are the seawalls around the Islands high enough to provide adequate flood protection?

Some segments of the seawall around Balboa Island are not currently high enough to accommodate extreme high tides and waves and are periodically overtopped. If we witness additional sea level rise, longer segments of the existing seawall around Balboa Island will be subjected to future overtopping resulting in more frequent flooding over larger areas on Balboa Island. The Little Balboa Island seawall is somewhat higher than the Big Island due to a project built in the late 1980s that raised the cap. South facing sides of both islands are more susceptible to periodic overtopping from wave run-up through the harbor jetty due to storm surge.

3. What are the existing top-of-seawall elevations?

The attached figure shows existing top-of-wall elevations around the Islands. The table below summarizes the existing top-of-wall elevations.

Balboa Island		Little Balboa Island	
North Side	7.7-8.3'	**North Side (same as East side)**	8.6-9.1'
East Side (Grand Canal)	8.5-8.7'	**West Side (Grand Canal)**	8.5-8.6'
South Side	7.8-8.3'	**South Side**	8.6-9.3'
West Side	7.8-8.2'	**East Side**	8.6-9.1'

Elevations are based on NAVD88 datum. To convert to the MLLW datum, add 0.18 feet.

4. How high are sea levels forecast to rise?

Sea levels are predicted to rise relative to levels in 2010 as shown in the following table.

YEAR	Forecast Sea Level Rise (and Range)
2030	8" (6" to 10")
2050	18" (13" to 22")
2100	59" (39" to 76")

Data from “Sea-Level Rise for the Coasts of California, Oregon, and Washington, June 2012, National Research Council”.

5. **Would raising the seawalls reduce or eliminate flood insurance requirements?**

Future discussions with FEMA are necessary to answer this question. FEMA’s insurance rates are primarily based on the elevation of the building’s ground floor as related to the expected flood plain. Raising the seawalls could reduce or eliminate the flood plain and provide a rational for reducing or eliminating flood insurance requirements. However, there is no question that higher seawalls would provide substantial protection to existing houses.

6. **Where would the new seawall be built relative to the existing seawall and what material would be used?**

Although a design has not yet been developed, the best place to construct the new seawall, from the point of view of constructability and cost, would be just outside the existing seawall. Seawalls are typically constructed out of either concrete, steel or a combination of both.

7. **What would the top of wall elevation be for the new seawall?**

Although this has not been determined for Newport Beach, most other southern California Harbors require new seawalls to be built to 10.0’ NAVD88 datum (10.2’ MLLW). Community opinion will be solicited regarding this important issue.

8. **Why can’t we simply build an extension on top of the existing seawalls?**

While it may be possible to extend the top of the existing seawalls (preliminary engineering indicates up to one foot in most cases), the existing seawalls are deteriorating and nearing the end of their useful life. Regardless what the new cap elevation is, new walls are needed for long-term structural integrity.

9. **How will private dock access be addressed? How will the beach be accessed?**

Please see the city website for design concepts (address below).

Costs and Schedule

10. **What do you expect will be the cost of the new seawalls?**

Our consultants estimate the cost for new seawalls around the entire perimeters of Balboa Island and Little Balboa Island, including modifications to the Collins Bridge, Little Balboa Island Bridge, and the Ferry landing, would cost about $70 million. However, the project is likely to be constructed in phases with the most critical areas, the Grand Canal and the west end of Balboa Island, addressed first.

11. **Who owns the seawall around both islands and who will pay for the project?**

The City of Newport Beach. Besides the seawalls, the City is responsible for the streets and sidewalks; streetlights; and sewer, water and stormdrain facilities. The City does not have reserves in its General Fund or Tidelands Fund to construct this project. Funding opportunities from grants or other sources will be sought. The City will be exploring all options for such funding due to the size and impact of this large project.

12. **When would the wall be constructed and how long would the construction take?**

Before construction can commence, the City will need to design the seawalls and other related improvements and obtain a Coastal Development Permit from the California Coastal Commission along with several other permits from State and Federal agencies. That process could take 3 or more years. The seawall construction would likely be performed in phases over 5 to 10 years.

13. **Where can I get additional background information on this project?**

Please check out the City’s website. Here’s the link: www.newportbeachca.gov/seawalls The City will provide numerous opportunities for the Islands’ community to give input and to influence the decision making process of this important project as the design progresses.

DRAFT
Assessment of Seawall Structural Integrity and Potential for Seawall Over-Topping For Balboa Island and Little Balboa Island

Tidelands Management Committee

May 18, 2011

Balboa Island and Little Balboa Island Seawall Replacement

Tidelands Management Committee

July 17, 2012

Balboa Island and Little Balboa Island Seawall Replacement Project

Tidelands Management Committee

September 16, 2013

Balboa Islands Seawall Replacement Project

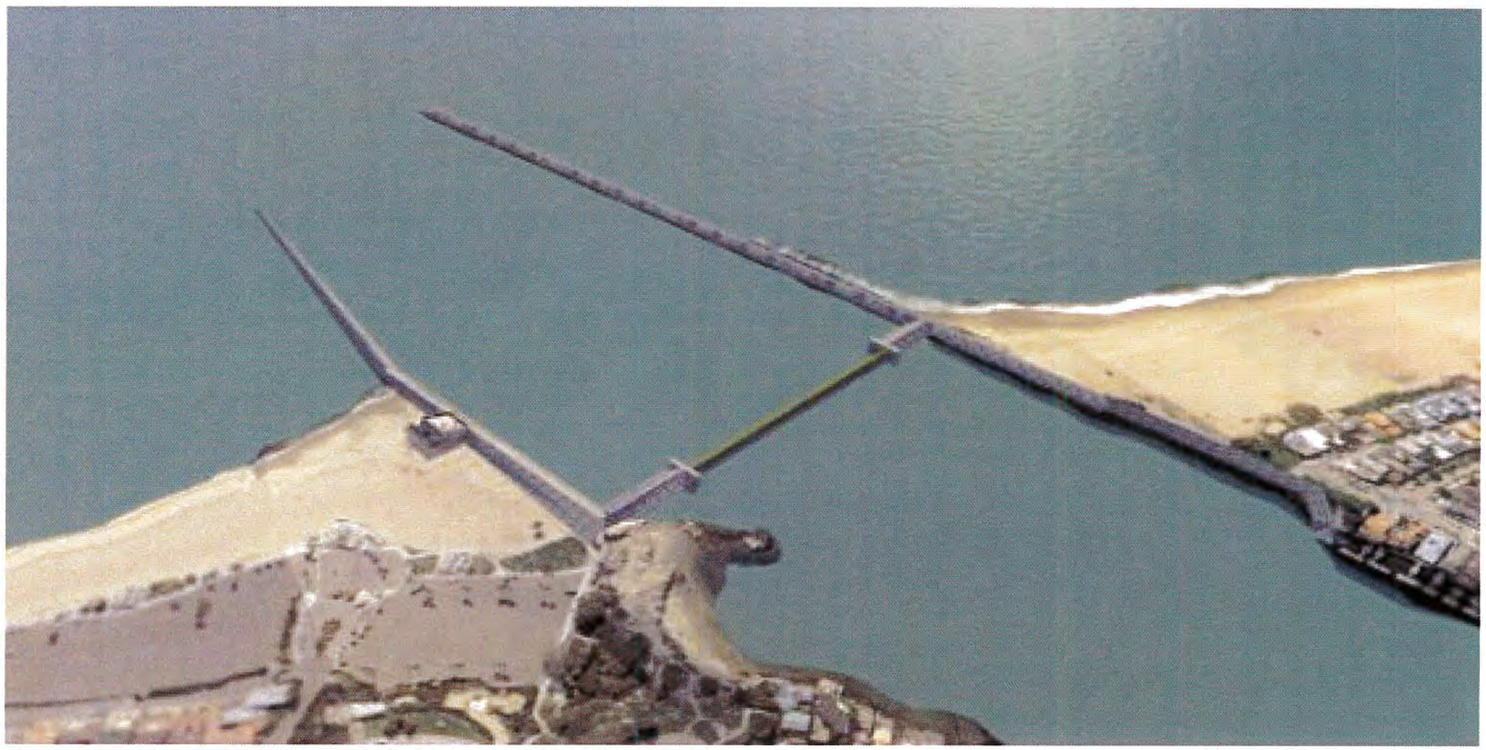
Balboa Islands - 1925

Tidelands Management Committee
March 19, 2014

BALBOA ISLANDS
SEAWALL REPLACEMENT PROJECT

Tidelands Management Committee
April 23, 2014

Protecting Newport Harbor from Sea Level Rise: Cost Considerations and Option



Tidelands Management Committee
May 29, 2014

BALBOA ISLANDS
SEAWALL REPLACEMENT PROJECT

Tidelands Management Committee

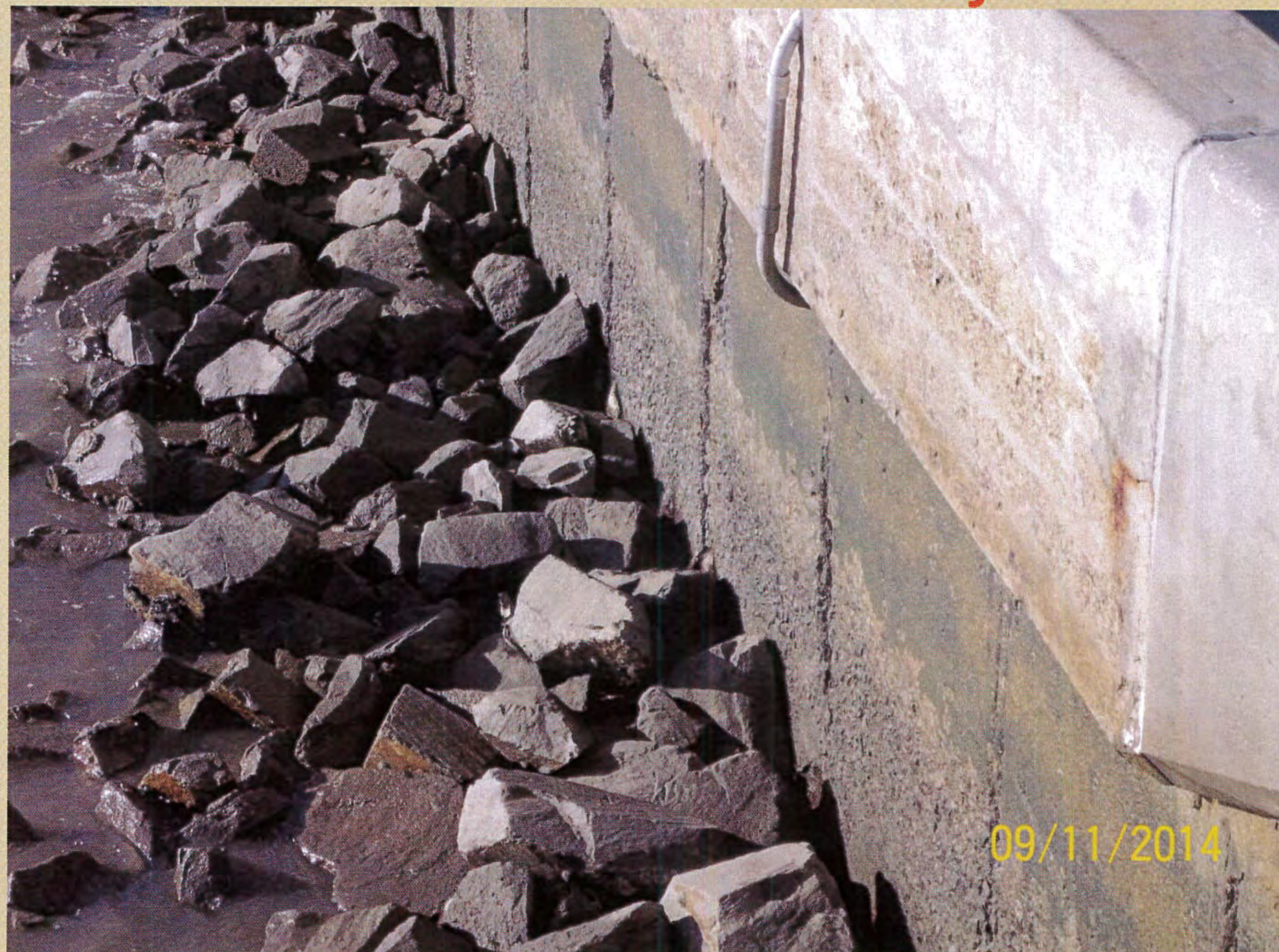
May 29, 2014

BALBOA ISLANDS SEAWALL REHABILITATION PROJECT

Tidelands Management Committee

September 17, 2014

Balboa Islands Seawall Rehabilitation Project



Tidelands Management Committee
October 29, 2014

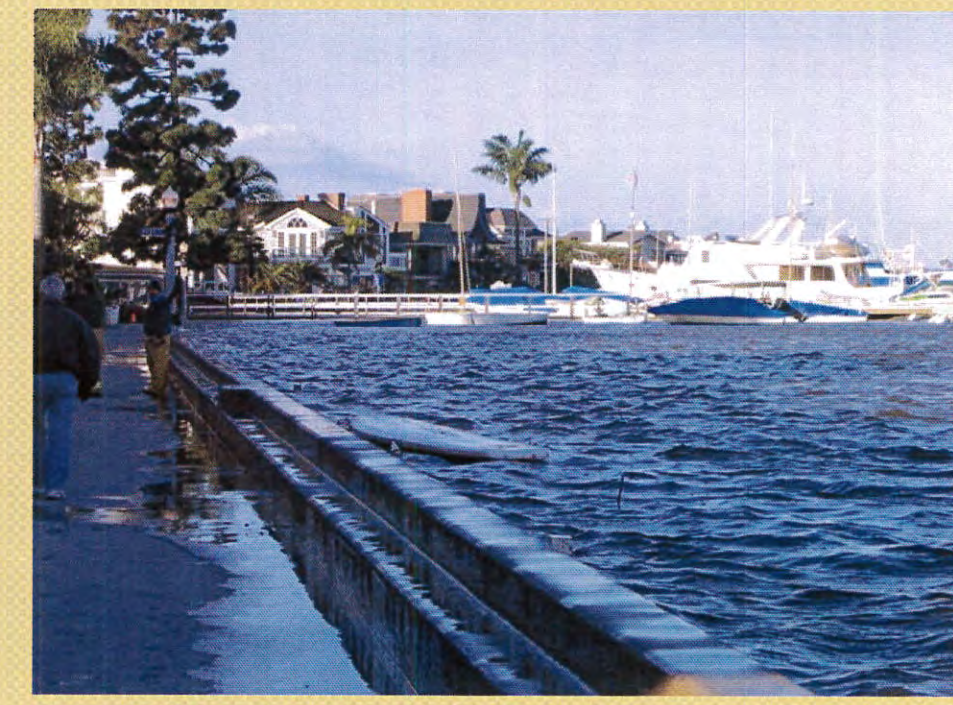
Balboa Islands Seawall Rehabilitation Project

Harbor Commission

January 14, 2015

Balboa Islands Seawall Rehabilitation Project

Challenges & Planning Direction

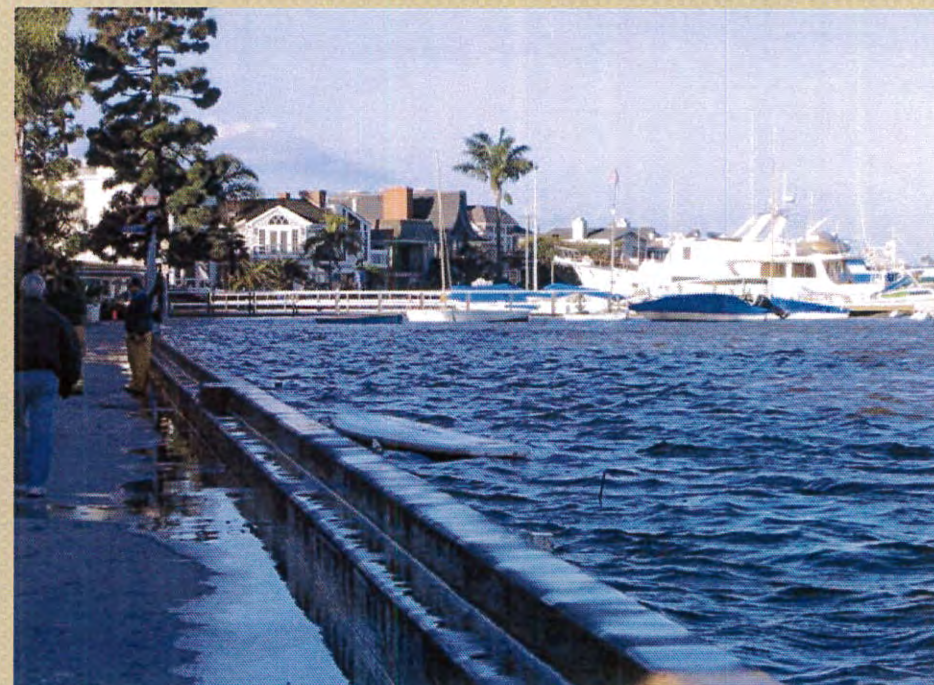


Tidelands Management Committee

February 18, 2015

Balboa Islands Seawall Rehabilitation Project

Rehabilitation Options



City Council Study Session

April 14, 2015

Draft 04/01/15

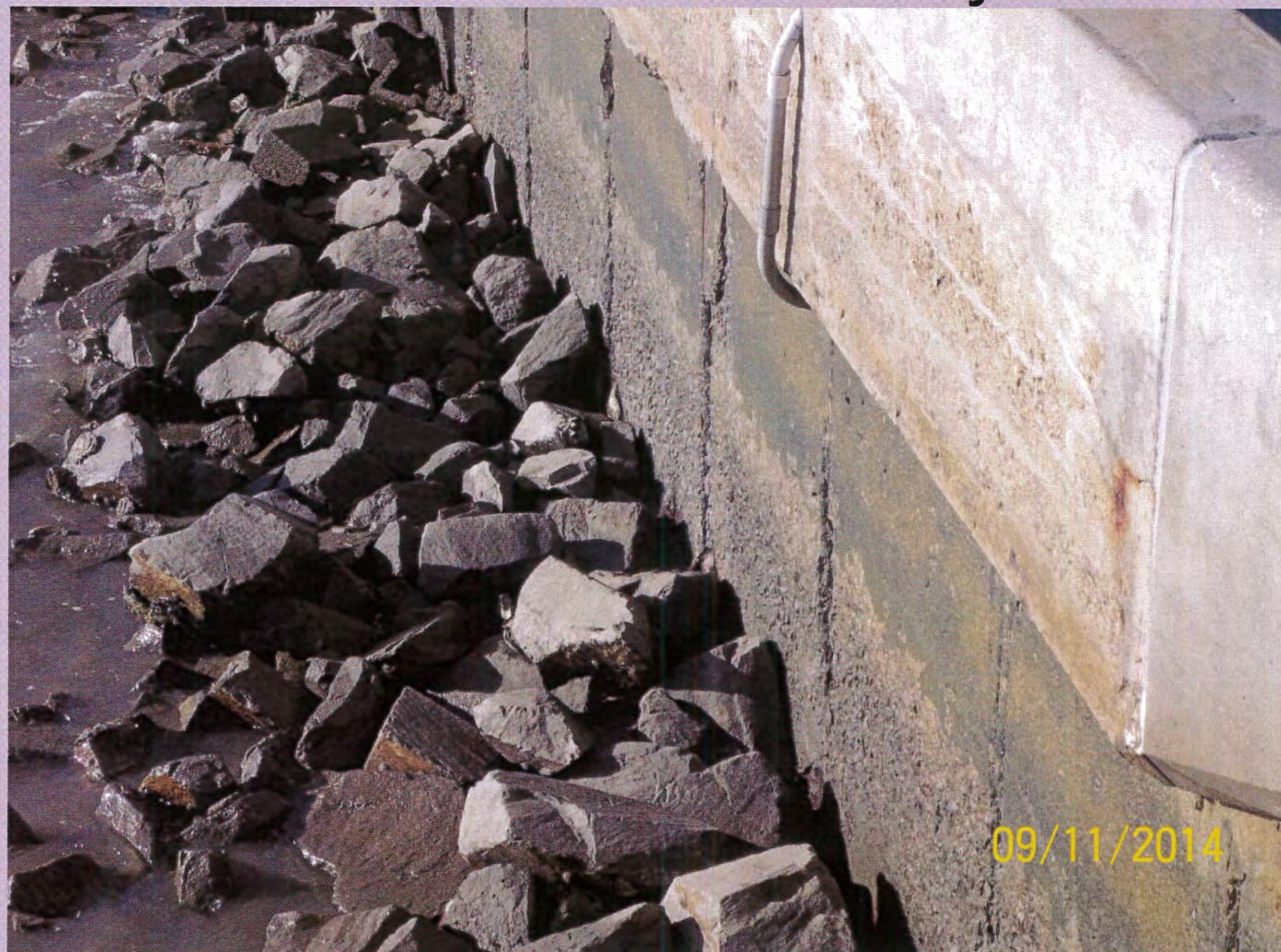
BALBOA ISLANDS SEAWALL REPLACEMENT PROJECT

Balboa Island Improvement Association
Beek Center
May 22, 2014

BALBOA ISLANDS SEAWALL REHABILITATION PROJECT

STUDY SESSION
JULY 14, 2015

UPDATE: Balboa Islands Seawall Rehabilitation Project



Study Session
November 12, 2014

Balboa Island Seawalls Rehabilitation Project

The Tidelands Management Committee pro-actively began discussions for protecting Balboa Island in 2011. Discussions have become more detailed as options are considered for protecting public safety and property in a cost effective manner.

The committee is discussing uncertainties associated with future sea level rise, accessibility to docks and the beach, and the need to preserve the wonderful experience of walking the Islands' boardwalks. At the next meeting in early 2015, City staff will make a presentation to the Tidelands Management Committee that will focus on seawall rehabilitation options and costs.

For a complete schedule of Tidelands Management Committee Meetings, please click here.

July 14, 2015 Study Session Seawall Presentation

October 29, 2014 Seawall Presentation

September 17, 2014 Seawall Presentation

More information on the following is coming soon:

- Measured sea level rise along the West Coast
- Existing elevations around the harbor
- FEMA flood insurance requirements

The City of Newport Beach is planning for the rehabilitation of the aging seawalls around Balboa Island and Little Balboa Island (Islands) to maintain the structural integrity of the seawall system and protect the Islands from flooding due to storm surges and high tide conditions.

1. How old are the seawalls around Balboa Island and Little Balboa Island (Islands)? What is their projected useful life?

The seawalls were first built in the 1920's and 30's and are between 75 - 85 years old. In recent years, a cap extension (Figure 1) was added to the bulkhead beam on some portions of the seawall to provide added flood protection.

Figure 1: Seawall Cap Extension

These seawalls have performed well in protecting the islands from flooding, but are now showing their age. The (exposed) walls are estimated to have between 10-25 years of remaining useful life. The walls along the north side of Balboa Island are largely covered in sand and the condition of these walls has not been examined. It is possible this reach of the seawall and other similar protected reaches around the islands may, with routine maintenance, have a longer remaining service life.

More information on the condition of the seawalls is available in the City's assessment report from April 2011:
2011 Assessment Report

2. Are the seawalls around the Islands high enough to provide adequate flood protection?

Presently yes, however, there are a few segments around Balboa Island that are not quite high enough should we experience extremely high tides and waves. The photo in Figure 2 shows the water overtopping the existing seawall in December 2010 when the Islands were hit with a moderate storm surge at high tide. Figure 3 shows the sea level near the top of the Balboa Island seawall on December 12, 2013 during a king tide with no wind or waves.

Should there be further rise in sea level; longer segments of the existing seawall around Balboa Island could be subjected to this overtopping. The Little Balboa Island seawall is somewhat higher than the Big Island due to a project in the 1980s that raised the cap. South facing sides of both islands can be more susceptible to periodic overtopping from wave run-up through the harbor jetty with large storm surges or wind driven waves.

Figure 2: Moderate storm surge during a high tide in December 2010

Figure 3: King tide on a calm day at the West Side of Balboa Island – December 12, 2013

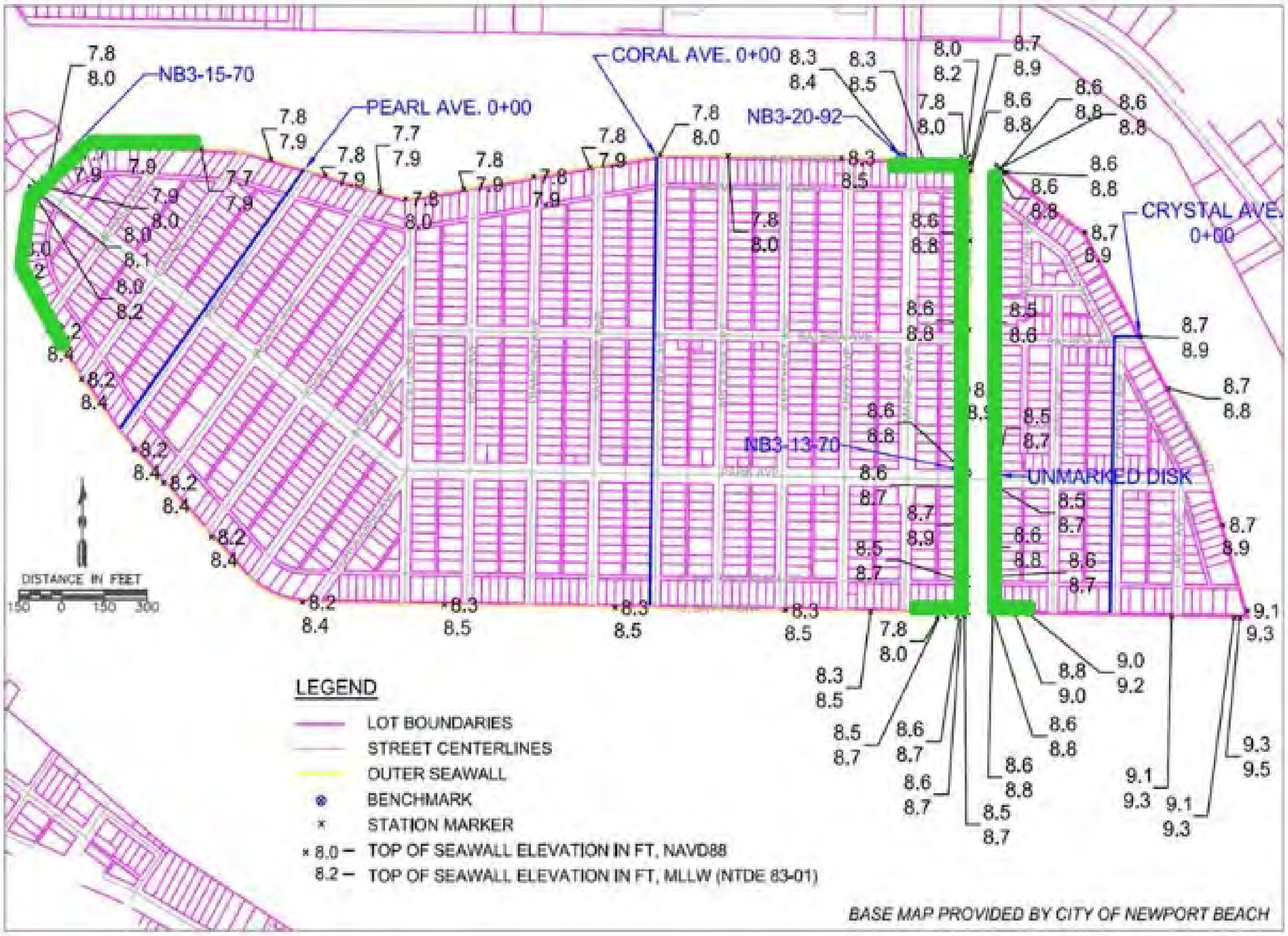
3. What are the existing top-of-seawall elevations?

Table 1 summarizes the range of existing top-of-wall elevations for each side of the Islands. Figure 4 shows more detailed information of the existing top of seawall elevation around the Balboa Islands. Note that two elevations are given at each measure point. The top elevation is based on the NAVD88 datum (a fixed vertical datum) and the bottom elevation is based on the Mean Lower Low Water datum (a variable, ocean-based, vertical datum). The NAVD88 datum is preferred as it is a fixed datum not subject to changes in sea level.

Table 1: Existing Top of Wall Elevations (NAVD88)

Balboa Island		Li le Balboa Island	
North Side	7.7-8.3’	North Side (same as East side)	8.6-9.1’
East Side (Grand Canal)	8.5-8.7’	West Side (Grand Canal)	8.5-8.6’
South Side	7.8-8.3’	South Side	8.6-9.3’
West Side	7.8-8.2’	East Side	8.6-9.1’

Figure 4: Existing Top of Wall Elevations on the Balboa Islands.



4. How high are sea levels expected to rise?

There is a lot of work being done to predict future sea level rise over the next few hundred years. Table 2 lists recent studies. All these studies predict a significant rise in sea level over the next 85 years.

In 2009, the California State Coastal Conservancy adopted a Climate Change Policy that agencies should plan for a 55-inch sea level rise by 2100. This projected 55-inch sea level rise by Year 2100 was used as the basis for the analysis in the City's 2011 study entitled Assessment of Seawall Structural Integrity and Potential for Seawall Over-Topping.

Table 2: Recent sea level rise reports with predictions for sea level elevations in Year 2100. Note that the "95%" column on the right hand side of the table level indicates there is a 5% chance the predicted increase in sea level will be exceeded.

Agency	Year	95%	50%	5%
IPCC 4th Assessment	2007	9"	15"	20"
Vermeer and Rahmstorf	2009	39"	49"	61"
US Corps of Engineers	2011	17"	39"	59"
Na onal Academy of Sciences	2012	17"	37"	66"
IPCC 5th Assessment	2013	17"	24"	31"
Quaternary Science Reviews	2014	28"	37"	47"

5. Why are there such large differences in the predictions?

There are two dynamical methods presently used to project sea-level changes during the next century: 1) physical, process-based models and 2) semi-empirical models. Semi-empirical model projections significantly exceed process-based projections.

Physical process-based models aim to describe quantitatively the different physical processes that contribute to sea level rise. The process-based method relies on coupled atmosphere-ocean models to estimate the effects of thermal expansion and on sea-level models combined with certain empirical relationships to determine the influence of land-ice mass changes. The most conservative sea level rise is predicted by Intergovernmental Panel on Climate Change (IPCC). The IPCC uses the process-based methodology. Between 2007 and 2013, the IPCC has increased its sea level rise prediction (95% confidence) from 20 inches to 31 inches.

Semi-empirical models try to exploit the link between observed sea level rise and observed global temperature changes in the past in order to predict the future. The semi-empirical method uses various physically motivated relationships between temperature and sea level, with parameters determined from the data, to project total sea level. National Academy of Sciences and Vermeer and Rahmstorf use semi-empirical models.

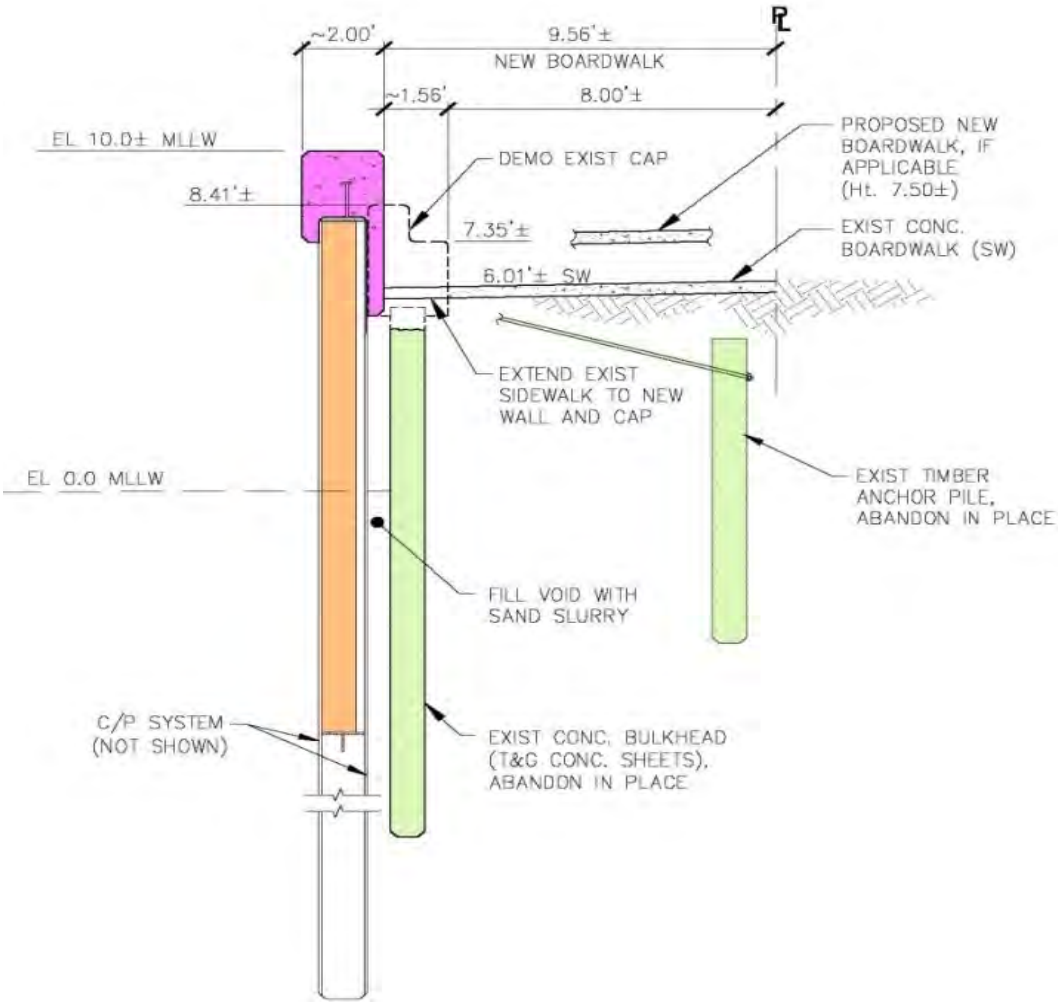
6. Would raising the seawalls reduce or eliminate flood insurance requirements?

Perhaps, but more study and FEMA review is needed. Please visit their website at www.fema.gov/national-flood-insurance-program.

7. Where would the new seawall be built relative to the existing seawall and what material would the seawall be?

The new seawall is recommended to be built on the waterside of the existing seawall (Figure 5). The new seawall will be made up of steel H-piles with concrete planks. Cathodic protection will be required for the steel H-piles to keep them from corroding. The existing pile cap will be removed and the boardwalk will be widened approximately 1.5 feet. The boardwalk may remain at the existing elevation. The design will explore opportunities to raise the boardwalk in conjunction with raising the seawall along certain reaches of the seawall. These opportunities would be discussed with the adjacent property owners.

Figure 5: Proposed new seawall built on the waterside of the existing seawall.



8. What would the top of wall elevation be for the new seawall?

The City is considering three basic options for constructing new seawalls and/or raising the existing seawall cap:

Option 1 - New seawalls at Elevation 10.0 feet (Figure 6)

a. Construct new seawalls to Elevation 10 feet (NAVD88) around most of the Islands (Figure 6 pink and blue sections) and raise the cap on the north side of Balboa Island (yellow section) to Elevation 10 feet.
b. If sea levels continue to rise, in about 50 years, replace capped seawall on the north side of Balboa Islands (yellow section) with a new seawall constructed to minimum Elevation 10 feet.

Option 2 - New walls at Elevation 9.5 feet (Figure 6)

a. Construct new seawalls to Elevation 9.5 feet (NAVD88) around most of the Islands (Figure 6 pink and blue sections) and raise the cap on the north side of Balboa Island (yellow section) to Elevation 9.5 feet.
b. If sea levels continue to rise, in about 40 years, add a minimum of 6-inches to the new seawalls (pink and blue sections) and replace the capped seawall on the north side of Balboa Islands (yellow section) with a new seawall constructed to minimum Elevation 10 feet.

Option 3 – Cap extensions with limited new wall construction (Figure 7)

a. Construct new seawalls on the west of Balboa Island (black section) to Elevation 9.5 feet.
b. Construct new seawalls on the Grand Canal to Elevation 9.5 feet south of the Park Avenue Bridge and Elevation 9.0 feet north of the bridge.
c. Raise the pile cap to 9.5 feet on the south side of the Islands.
d. Raise the pile cap to 9.0 feet on the north side of the Islands.
e. Raise the pile cap on the east side on Little Balboa Island (9.0-9.5 feet as shown in Figure 7).

f. If sea levels continue to rise, in about 30 years, raise new seawalls to minimum Elevation 10 feet and replace all capped seawalls with new seawalls to minimum Elevation 10 feet.

Figure 6: New seawall and cap extensions for Options 1 or 2. (Please click on the photo to enlarge)

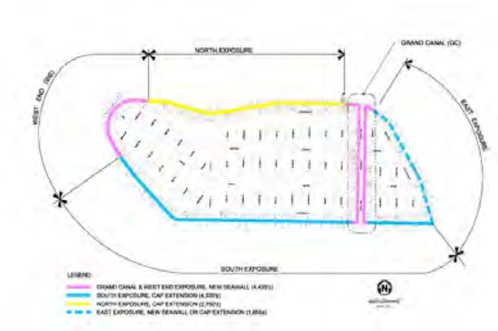
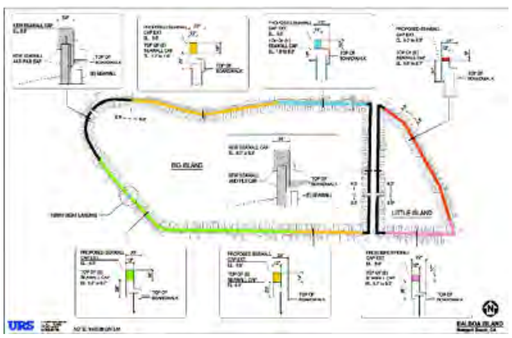


Figure 7: New seawall and cap extensions for Option 3. (Please click on the photo to enlarge)



9. What are typical top of seawall elevation at other harbors?

The top elevation of seawalls at other southern California harbors is 9.5 feet (NAVD88) or higher. (See Table 3.)

Table 3: Harbor Top Elevation (NAVD88)

Agency (Harbor)	Top of Wall Eleva on (NAVD88)
County of Orange (Dana Point)	9.62’
County of LA (Marina del Rey)	9.62’ - 11.62’
City of Hun ngton Beach (General)	9.62’
City of Long Beach (Alamitos Bay)	9.62’
City of Long Beach (Naples Island)	9.50’ (planned)

10. Which option is best?

Table 4 compares the estimated schedule and costs for constructing new seawalls and/or raising seawall caps for the three options described above. The cost estimate include costs for providing access for private and public piers, providing beach access over the higher seawalls, providing flood protection at the ferry landing and at the Collins Island Bridge, and providing ADA access of the boardwalk adjacent to the Mariner’s Bridge. All costs are in today’s dollars and include a 25% contingency. Option 1 provides the best flood protection and the lowest overall, long-term cost. Option 3 has the lowest initial cost and would have the least impact on view planes.

Table 4: Projected duration of flood protection and estimated cost for seawalls and associated improvements for the three options.

	Op on 1	Op on 2	Op on3
Year ~2020: Ini al construc on cost (w/ 25% con ngency)	$69 million	$69 million	$34 million

Projected flood protec on un l:	2063	2056	2047

If sea levels will rise above Elevation 9.0 feet, under Option 3, before 2047 the new seawalls would need to be raised and capped seawall sections would need to be replaced by new seawalls at an approximate cost of $57 million.

If sea levels will rise above Elevation 9.5 feet, under Option 2, before 2056, the new seawalls would need to be raised and aging capped seawall sections would need to be replaced by new seawalls at an approximate cost of $19 million.

Under Option 1, before 2063, aging capped seawall sections would need to be replaced by new seawalls at an approximate cost of $16 million.

11. When would the seawalls be constructed? How long would the construction take?

Before construction can begin, the City will need to design the seawalls and other related improvements and obtain a Coastal Development Permit from the California Coastal Commission along with several other permits from State and Federal agencies. That process could take 3 or more years. The seawall construction would likely be performed in two phases over a 5-year period with the seawalls of most concern, the Grand Canal and West End of Balboa Island, being in the first phase. The second phase would likely be the south sides of the Islands as they are more susceptible to waves from storms. The third phase may be the east side of Little Balboa Island with the final phase the north side of Balboa Island. The north side of Balboa Island is the most protected side from storm surges; however, these walls will also need to be reconstructed and raised in the event of sea level rise. Other items that would be constructed include access ramps for the public and private piers, beach access ramps, flood protection measures at the Ferry Landing, access modifications to Collins Island and boardwalk access modifications near Mariner's Bridge.

12. Will we be raising the adjacent Boardwalk?

The City plans to maintain the existing boardwalk elevation for now unless there is an opportunity to raise along certain reaches. Staff would discuss options with the property owners adjacent to the reach of interest.

13. How will private dock access be addressed?

The various interface between private docks and the seawall; i.e. steps, platforms, etc., have been addressed as part of the seawall project in order to provide safe access. Proposed design options and style concepts are under development and will be posted in March 2016.

14. How will the beach be accessed?

The proposed design is under development.

15. If the boardwalk is raised, what about drainage from my property?

The project design will include proper drainage for both public and private property.

16. Who owns the seawalls around both islands?

The City of Newport Beach. In addition to the seawalls, the City is responsible for the streets and sidewalks; streetlights; and sewer, water and storm drain facilities.

17. Who will pay for the seawall project?

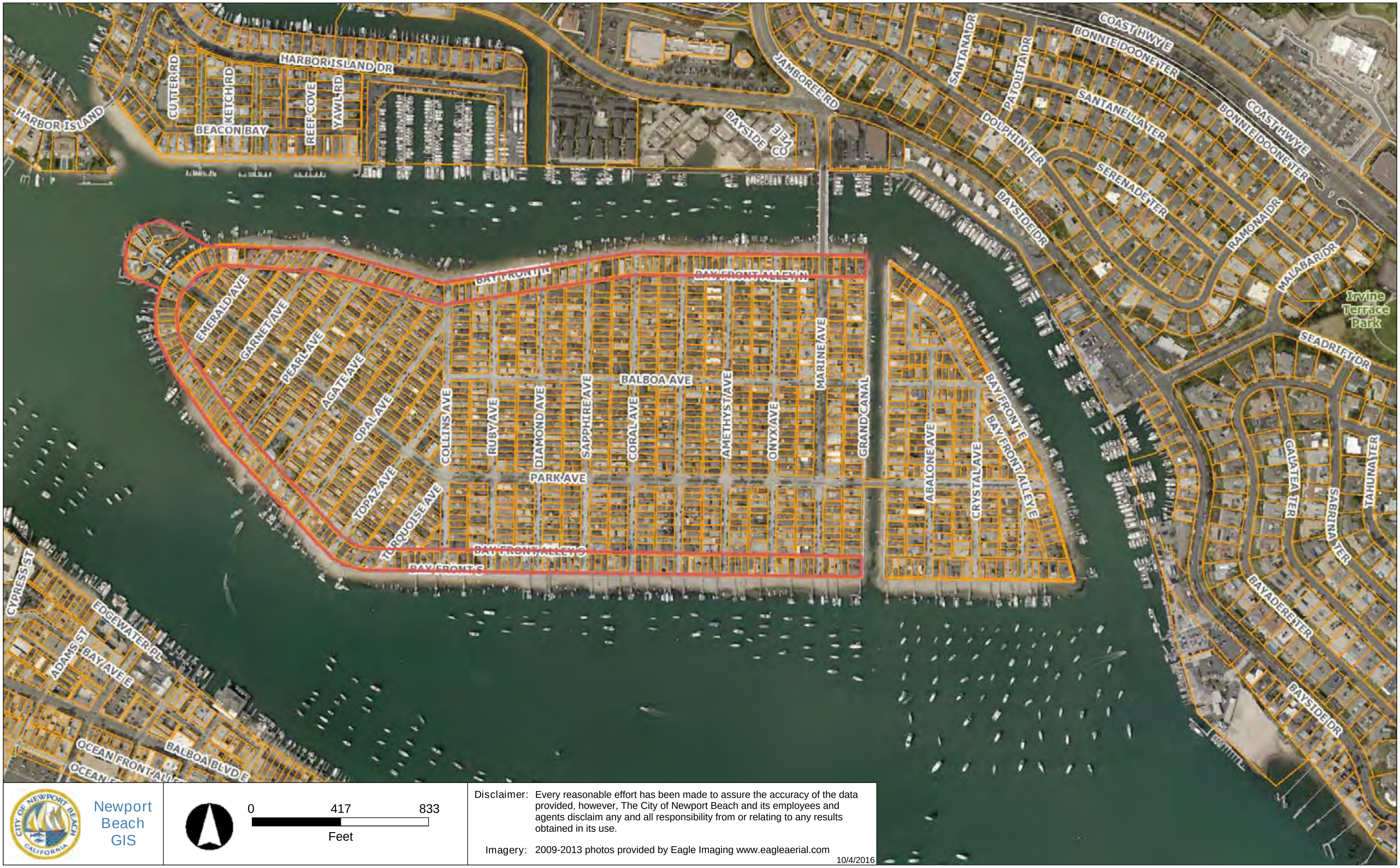
The exact method of payment is still under review as the concept and details are being developed.

18. Who can I contact if I have additional questions?

Please send your comments and questions to seawalls@newportbeachca.gov. Assistant City Engineer Bob Stein will be reviewing and responding to your emails.

ATTACHMENT 10B

Public Notification (within 100 ft)



Newport Beach GIS

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Feet

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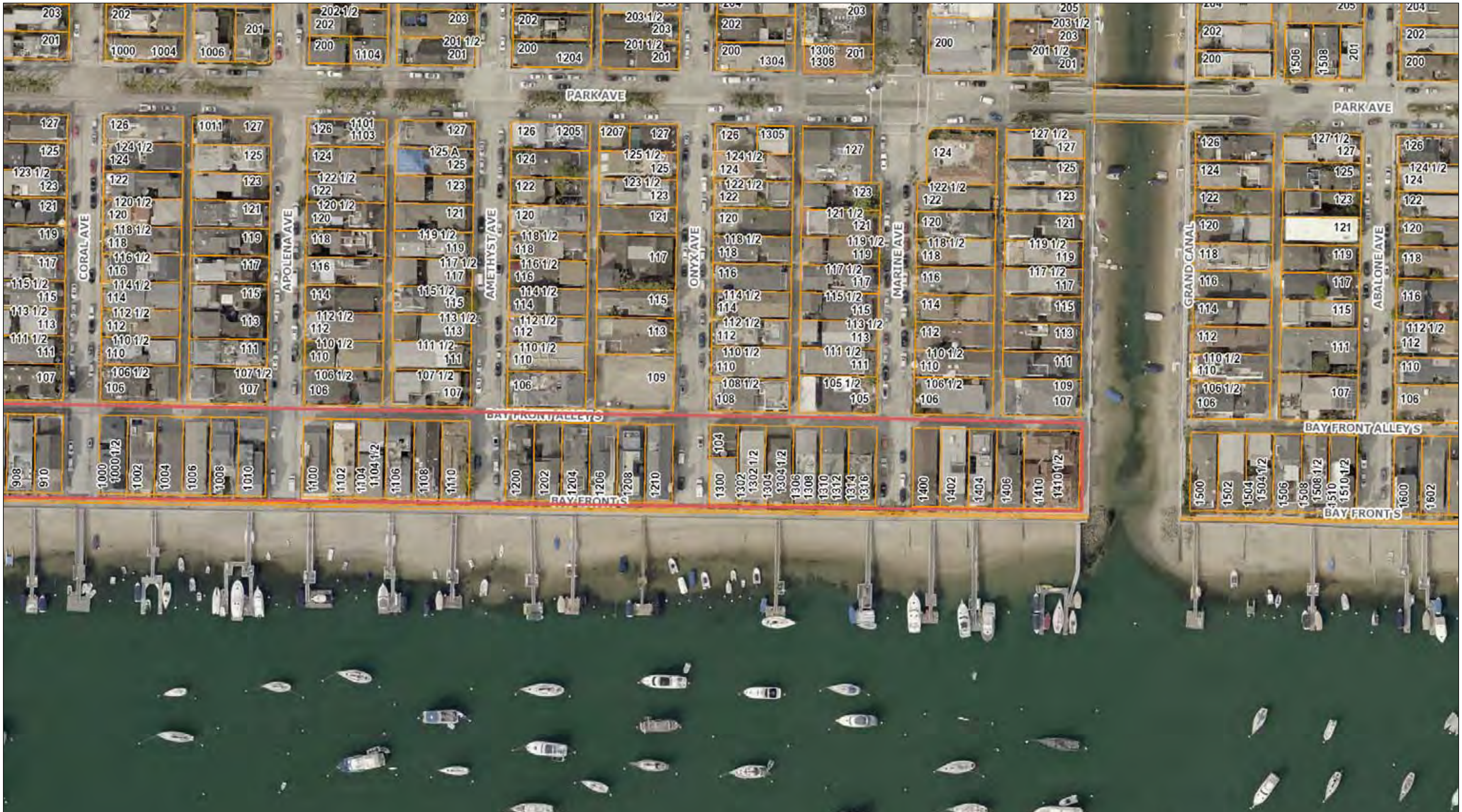

Newport Beach GIS

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Feet

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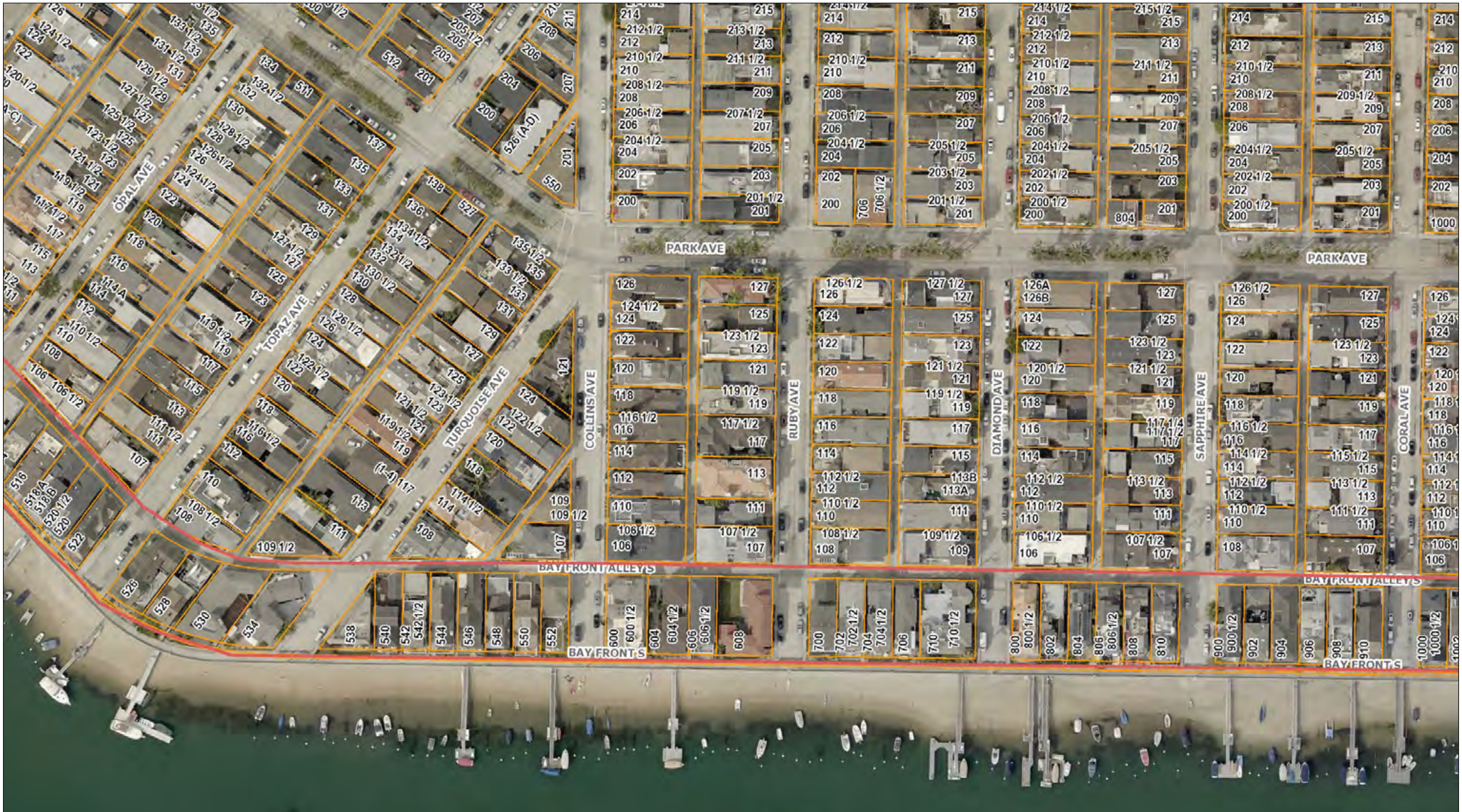

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EMERALD AVE
GARNET AVE
PEARL AVE
PARK AVE
AGATE AVE
OPAL AVE
BAYFRONT S
BAYFRONT ALLEY S
Balboa Island Park
Newport Beach GIS
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Feet
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10/4/2016


BAY FRONT N
BAY FRONT ALLEY N
EMERALD AVE
PARK AVE
GARNET AVE
PEARL AVE
AGATE AVE
OPAL AVE
COLLINS AVE
RUBY AVE
Newport Beach GIS
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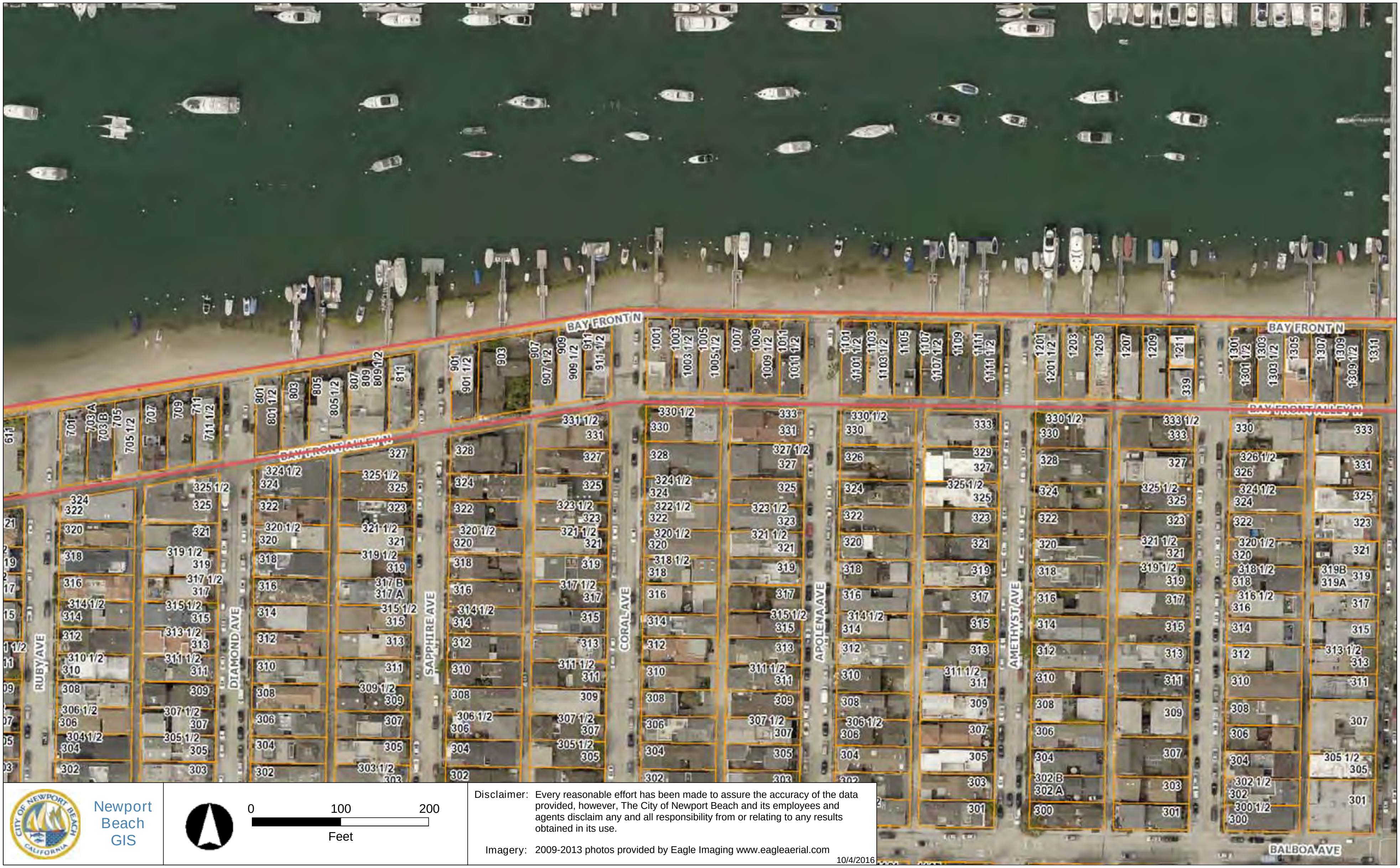

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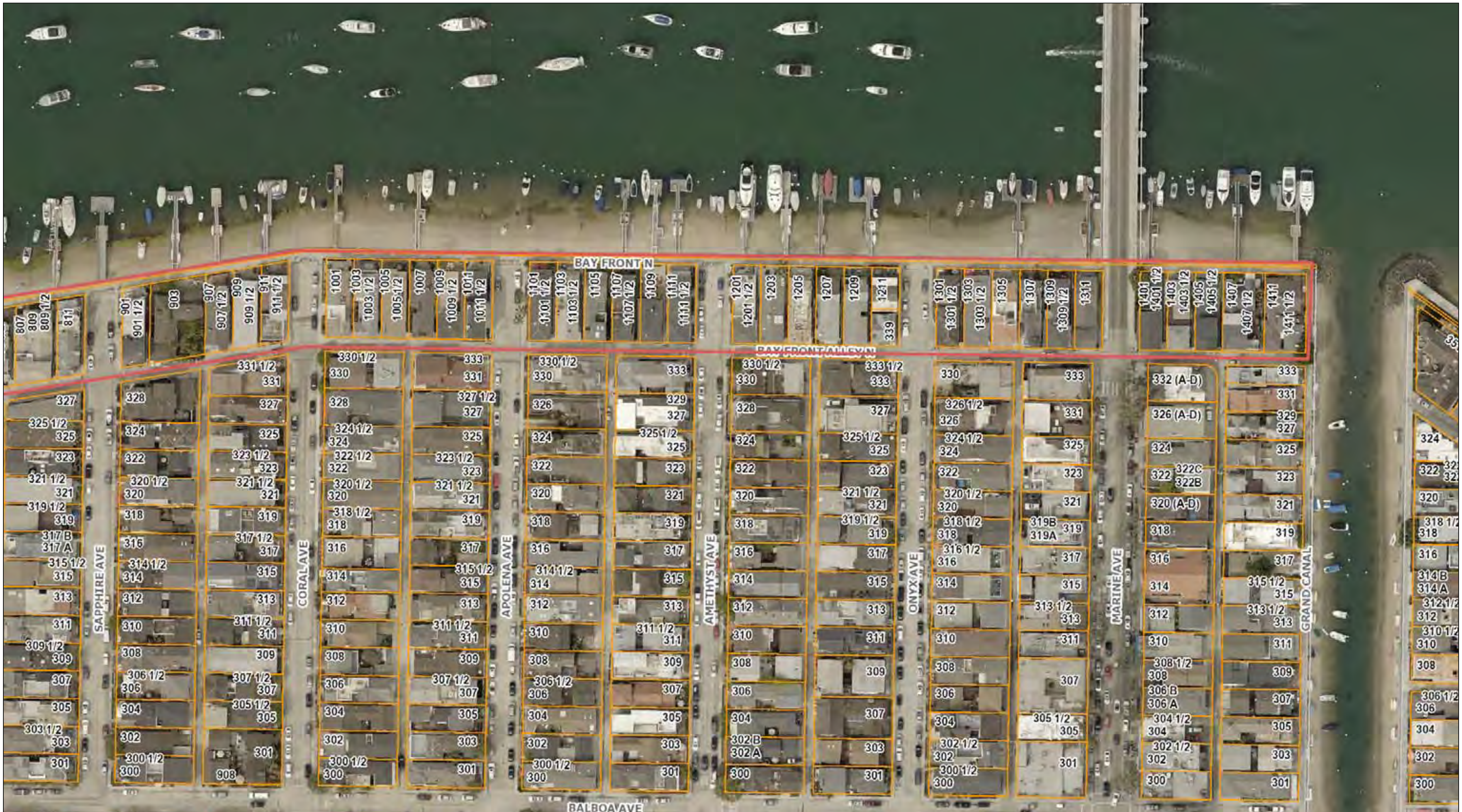

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10/4/2016

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Richard Crum
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Sally Peterson
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609 Balboa Ptnshp
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Beverly Childs
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Dale Jones
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Anne McNeill
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Noel Watson
302 S Bay Front
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Newport Beach, CA 92662

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Newport Beach, CA 92662

J Scudder
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Newport Beach, CA 92662

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Robert Teller
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Newport Beach, CA 92662

Leonard Bidart
510 S Bay Front
Newport Beach, CA 92662

Witt
1403 N Bay Front
Newport Beach, CA 92662

Lynn Newton
1407 N Bay Front
Balboa Island, CA 92662

Noel Watson
1411 N Bay Front
Newport Beach, CA 92662

Chrstine Johnson
104 Onyx Ave
Newport Beach, CA 92662

Bayfront 2
1300 S Bay Front
Newport Beach, CA 92662

Pickett Properties
1302 S Bay Front
Newport Beach, CA 92662

Pickett Properties
1302 S Bay Front
Newport Beach, CA 92662

Lynn Vale Penoyar
1304 S Bay Front
Newport Beach, CA 92662

Jacobson
1306 S Bay Front
Newport Beach, CA 92662

Fini Van Natta
1310 S Bay Front
Newport Beach, CA 92662

Frye Partnership
1404 S Bay Front
Newport Beach, CA 92662

Richard Salmonson
1406 S Bay Front
Newport Beach, CA 92662

G Longo Properties
1303 N Bay Front
Newport Beach, CA 92662

Shirley Pepsy Pepys
526 S Bay Front
Newport Beach, CA 92662

Bakman Ranch
1301 N Bay Front
Newport Beach, CA 92662

Deborah Dunwell Day
1309 N Bay Front
Newport Beach, CA 92662

Randy & Bonnie Bohart
1311 N Bay Front
Newport Beach, CA 92662

Catharine Allan
1211 N Bay Front
Newport Beach, CA 92662

Kate Jeremias
339 Onyx Ave
Newport Beach, CA 92662

Eric P A Of Williams
505 N Bay Front
Newport Beach, CA 92662

Linda Beek
406 S Bay Front
Newport Beach, CA 92662

Linda Beek
408 S Bay Front
Newport Beach, CA 92662

Larry Golnick
106 Pearl Ave
Newport Beach, CA 92662

Worr LLC
304 S Bay Front
Newport Beach, CA 92662

John Conners
308 S Bay Front
Balboa Island, CA 92662

Marilyn Stromquist
310 S Bay Front
Newport Beach, CA 92662

Susan & Mark Jennings
305 N Bay Front
Newport Beach, CA 92662

Theodore Mark Leventhan
207 N Bay Front
Newport Beach, CA 92662

Robert Nicholson Jr.
206 S Bay Front
Newport Beach, CA 92662

Non-Principal Propertye
120 S Bay Front
Newport Beach, CA 92662

Barbara Abshier
112 S Bay Front
Newport Beach, CA 92662

Bart Hackley Jr.
106 S Bay Front
Newport Beach, CA 92662

Janet Curci
105 N Bay Front
Newport Beach, CA 92662

Richard Rawlins
121 N Bay Front
Newport Beach, CA 92662

Paul Meyer
135 N Bay Front
Newport Beach, CA 92662

Debora Ann Best
136 S Bay Front
Newport Beach, CA 92662

Weinreb Holdings LP
1201 N Bay Front
Newport Beach, CA 92662

Simon Nord
1009 N Bay Front
Newport Beach, CA 92662

John Howard Cummings III
1101 N Bay Front
Newport Beach, CA 92662

Jay Murray Greer
1207 N Bay Front
Newport Beach, CA 92662

Watson
1305 N Bay Front
Newport Beach, CA 92662

Diane Christie
404 S Bay Front
Newport Beach, CA 92662

Donald Koll
1006 S Bay Front
Newport Beach, CA 92662

Sally Peterson
1104 S Bay Front
Newport Beach, CA 92662

David Farrell
1402 S Bay Front
Newport Beach, CA 92662

John Mullin
810 S Bay Front
Newport Beach, CA 92662

Larry DiSano
704 S Bay Front
Newport Beach, CA 92662

Steven Andrew Glyer
702 S Bay Front
Newport Beach, CA 92662

805 N Bay Front LLC
805 N Bay Front
Newport Beach, CA 92662

805 N Bay Front LLC
805 N Bay Front
Newport Beach, CA 92662

Sherman & Andrea Zieve
809 N Bay Front
Newport Beach, CA 92662

James Taylor
811 N Bay Front #UNIT
Newport Beach, CA 92662

705 N Bay Front LLC
705 N Bay Front
Newport Beach, CA 92662

Marilyn Alexander
711 N Bay Front
Newport Beach, CA 92662

Marilyn Alexander
711 N Bay Front
Newport Beach, CA 92662

Douglas & Carol Hanes
107 Pearl Ave
Newport Beach, CA 92662

L & Sutherland
1401 N Bay Front
Balboa Island, CA 92662

Joan Gregorius
1405 N Bay Front
Newport Beach, CA 92662

Noel Watson
1411 N Bay Front
Newport Beach, CA 92662

Bayfront 2
1300 S Bay Front
Newport Beach, CA 92662

Katherine Brittingham
1400 S Bay Front
Newport Beach, CA 92662

Robert McCaffrey
1410 S Bay Front
Newport Beach, CA 92662

James Paul Borke
600 S Bay Front
Newport Beach, CA 92662

Borke Retreat LLC
602 S Bay Front
Newport Beach, CA 92662

J Scudder
139 N Bay Front
Newport Beach, CA 92662

140 South Bayfront LLC
140 S Bay Front
Balboa Island, CA 92662

Robert Kupper
204 S Bay Front
Newport Beach, CA 92662

Matthew Clabaugh
208 S Bay Front
Newport Beach, CA 92662

Matthew Clabaugh
210 S Bay Front
Newport Beach, CA 92662

Noel Watson
302 S Bay Front
Newport Beach, CA 92662

Michael James Vail
306 S Bay Front
Newport Beach, CA 92662

Wanda Mary Shelton
301 N Bay Front
Newport Beach, CA 92662

Kenneth Lewis
309 N Bay Front
Newport Beach, CA 92662

Brett & Scott Williamson
311 N Bay Front
Newport Beach, CA 92662

Elaine Riley Martin
405 N Bay Front
Newport Beach, CA 92662

Susan & Mark Jennings
503 N Bay Front
Newport Beach, CA 92662

Kenneth & Catherine Shaw
542 S Bay Front
Newport Beach, CA 92662

Rbhi LLC
603 N Bay Front
Newport Beach, CA 92662

Borke Retreat LLC
602 S Bay Front
Newport Beach, CA 92662

Spencer Stanley Hurtt
605 N Bay Front
Newport Beach, CA 92662

Steven Andrew Glyer
702 S Bay Front
Newport Beach, CA 92662

609 Balboa Ptnshp
609 N Bay Front
Newport Beach, CA 92662

Sally Peterson
607 N Bay Front
Newport Beach, CA 92662

Larry DiSano
704 S Bay Front
Newport Beach, CA 92662

David & Sharman Demler
800 S Bay Front
Newport Beach, CA 92662

Sherman & Andrea Zieve
809 N Bay Front
Newport Beach, CA 92662

Jill Wondries
806 S Bay Front
Newport Beach, CA 92662

George Harwood Jr.
907 N Bay Front
Newport Beach, CA 92662

Gregory Johnson
909 N Bay Front
Newport Beach, CA 92662

Sally Peterson
1104 S Bay Front
Newport Beach, CA 92662

Donna Marie DiBari
710 S Bay Front
Newport Beach, CA 92662

Mary Sue Watson
1000 S Bay Front
Newport Beach, CA 92662

Denise Kading
1005 N Bay Front
Newport Beach, CA 92662

John Howard Cummings III
1101 N Bay Front
Newport Beach, CA 92662

Dale Jones
1107 N Bay Front
Newport Beach, CA 92662

L&M Franklin Investment
1103 N Bay Front
Newport Beach, CA 92662

Susan S S Schneider
1314 S Bay Front
Newport Beach, CA 92662

Bakman Ranch
1301 N Bay Front
Newport Beach, CA 92662

Kenneth Herold
1200 S Bay Front
Newport Beach, CA 92662

Linda Beek
410 S Bay Front
Newport Beach, CA 92662

Bart Hackley Jr.
106 S Bay Front
Newport Beach, CA 92662

Spencer Stanley Hurtt
605 N Bay Front
Newport Beach, CA 92662

Rbhi LLC
603 N Bay Front
Newport Beach, CA 92662

Timothy Psomas
601 N Bay Front
Newport Beach, CA 92662

Ronald Corradini
1210 S Bay Front
Newport Beach, CA 92662

Joseph Carey
1206 S Bay Front
Newport Beach, CA 92662

Christopher Vossman
1204 S Bay Front
Newport Beach, CA 92662

Dominic & Ng
1100 S Bay Front
Newport Beach, CA 92662

Curtis Talley
1002 S Bay Front
Newport Beach, CA 92662

Mary Sue Watson
1000 S Bay Front
Newport Beach, CA 92662

Barbara Lynn Ford
900 S Bay Front
Newport Beach, CA 92662

Fini Van Natta
902 S Bay Front
Newport Beach, CA 92662

Charles Lehman
910 S Bay Front
Newport Beach, CA 92662

Site LP
1111 N Bay Front
Balboa Island, CA 92662

Northern Bank
1003 N Bay Front
Newport Beach, CA 92662

Northern Bank
1003 N Bay Front
Newport Beach, CA 92662

Patricia Borland
901 N Bay Front
Newport Beach, CA 92662

Nancy Foster Bear
903 N Bay Front
Newport Beach, CA 92662

George Harwood Jr.
907 N Bay Front
Newport Beach, CA 92662

Gregory Johnson
909 N Bay Front
Newport Beach, CA 92662

Barbara Smith
911 N Bay Front
Newport Beach, CA 92662

Barbara Smith
911 N Bay Front
Newport Beach, CA 92662

Roland Brusco Jr.
109 N Bay Front
Newport Beach, CA 92662

Yeslek Bayfront LLC
117 N Bay Front
Newport Beach, CA 92662

Susan & Mark Jennings
503 N Bay Front
Newport Beach, CA 92662

Denise Kading
1005 N Bay Front
Newport Beach, CA 92662

Site LP
1111 N Bay Front
Balboa Island, CA 92662

Weinreb Holdings LP
1201 N Bay Front
Newport Beach, CA 92662

G Longo Properties
1303 N Bay Front
Newport Beach, CA 92662

Lynn Vale Penoyar
1304 S Bay Front
Newport Beach, CA 92662

L & Sutherland
1401 N Bay Front
Balboa Island, CA 92662

Witt
1403 N Bay Front
Newport Beach, CA 92662

Lynn Newton
1407 N Bay Front
Balboa Island, CA 92662

Joan Gregorius
1405 N Bay Front
Newport Beach, CA 92662

Robert McCaffrey
1410 S Bay Front
Newport Beach, CA 92662

James Paul Borke
600 S Bay Front
Newport Beach, CA 92662

Richard Crum
703 N Bay Front
Newport Beach, CA 92662

Victor & Beatrice Sherreitt
400 S Bay Front #5
Newport Beach, CA 92662

Victor & Beatrice Sherreitt
400 S Bay Front #5
Newport Beach, CA 92662

Victor & Beatrice Sherreitt
400 S Bay Front #5
Newport Beach, CA 92662

Victor & Beatrice Sherreitt
400 S Bay Front #5
Newport Beach, CA 92662

Victor & Beatrice Sherreitt
400 S Bay Front #5
Newport Beach, CA 92662

Anthony & Valorie Forbes
403 N Bay Front
Newport Beach, CA 92662

Boylan
606 S Bay Front
Newport Beach, CA 92662

Barbara Lynn Ford
900 S Bay Front
Newport Beach, CA 92662

Larry Golnick
106 Pearl Ave
Newport Beach, CA 92662

O'Brien L L Balboa
520 S Bay Front
Newport Beach, CA 92662

Robert Bendetti
325 Collins Ave
Newport Beach, CA 92662

Robert & Ladorna Eichenberg
1 Collins Is
Newport Beach, CA 92662

Lawrence Canarelli
2 Collins Is
Newport Beach, CA 92662

Thabit
5 Collins Is
Newport Beach, CA 92662

M Horning Jr.
6 Collins Is
Newport Beach, CA 92662

John Nisser
8 Collins Is
Newport Beach, CA 92662

Brian Barker
3 Collins Is
Newport Beach, CA 92662

Julie Pernworth
4 Collins Is
Newport Beach, CA 92662

Harry Thomasen
7 Collins Is
Newport Beach, CA 92662

Carolyn Stockton
350 Buena Vista
Newport Beach, CA 92661

Patricia M Adler
3 Point Catalina
Laguna Niguel, CA 92677

Veeh
339.5 Arden Ave #5
Glendale, CA 91203

Leonard W Miller
501 W Edgewater Ave
Newport Beach, CA 92661

Eugene C Scorziell
507 W Edgewater Ave
Newport Beach, CA 92661

342 Buena Vista LLC
5445 Dtc Pkwy #800
Greenwood Village, CO 80111

Jerry B Silver
103 E Edgewater Ave
Newport Beach, CA 92661

Anne M Burton
503 W Edgewater Ave
Newport Beach, CA 92661

Patricia M Adler
505 W Edgewater Aveta
Newport Beach, CA 92661

Veeh
101 E Edgewater Ave
Newport Beach, CA 92661

Leonard W Miller
501 W Edgewater Ave
Newport Beach, CA 92661

Eugene C Scorziell
507 W Edgewater Ave
Newport Beach, CA 92661

342 Buena Vista LLC
342 Buena Vis
Newport Beach, CA 92661

Jerry B Silver
103 E Edgewater Ave
Newport Beach, CA 92661

Anne M Burton
503 W Edgewater Ave
Newport Beach, CA 92661