Approved
Mark Pestrella

October 8, 2009

TO: Mark Pestrella

FROM: Rudy Lee
Flood Maintenance Division

LEVEE CERTIFICATION PROGRAM
APPROVAL OF OPERATION AND MAINTENANCE MANUAL

Recommendation

Approve the Levee and Flood Mitigation Systems Operation and Maintenance Manual for submittal to the Federal Emergency Management Agency.

Discussion

On October 16, 2007, the Federal Emergency Management Agency accepted Provisionally Accredited Levee Agreements for levees throughout the County of Los Angeles. The Agreements provide levee owners with two years to submit levee certification documentation, including an operation and maintenance manual, pursuant to the requirements of 44 CFR §65.10 for recognition of the levees on updated National Flood Insurance Program maps.

The attached Levee and Flood Mitigation Systems Operation and Maintenance Manual (Manual) describes our procedures for maintenance of levees, flood preparedness, and response to storms and other natural disasters, such as earthquakes. The Manual was prepared with input from Design, Geotechnical and Materials Engineering, Water Resources, and Watershed Management Divisions.

With your approval, we will provide the Manual to Watershed Management Division for submittal to the Federal Emergency Management Agency with our levee certification documentation package.

DWP:jd
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Attach.

cc: Watershed Management (Hildebrand w/o attach.)
Flood Maintenance (East, South, West w/o attach.)

Los Angeles County Flood Control District

LEVEE AND FLOOD MITIGATION SYSTEMS OPERATION AND MAINTENANCE MANUAL

October 2009

Los Angeles County
Department of Public Works

900 South Fremont Avenue
Alhambra, CA 91803

LEVEE AND FLOOD MITIGATION SYSTEMS
OPERATION AND MAINTENANCE MANUAL

Los Angeles County Flood Control District
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TABLE OF CONTENTS

1. INTRODUCTION

Levees are defined as “a manmade structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water as to provide protection from temporary flooding” per **44 CFR 59.1** (**see Appendix A**). Subsequently, a levee system refers to a flood protection system that consists of a levee, or levees (including flood walls), and associated structures such as closures and drainage devices, all of which are constructed and operated in accordance with sound engineering practices. Recent FEMA Memorandums (**PM 34, 43, and 45**) require that certifiable levees meet the criteria of **44 CFR 65.10**; and also satisfy the FEMA one-percent-annual-chance flood protection.

Throughout the expansion and development of Los Angeles County (County), river channeling, often with use of levees, was widely used as a technique for flood control and migrating natural waterways. Today, levees are a prominent flood control feature in the County, but they still provide a source of vulnerability within the drainage system. Therefore, the operation and maintenance of levee systems is critical. This Operation and Maintenance (O&M) Manual identifies the activities necessary to ensure adequate flood protection and is consistent with both Los Angeles County Department of Public Works standard practices and US Army Corps of Engineers operation and maintenance manual guidelines.

This manual was prepared by the Los Angeles County Flood Control District (LACFCD) according to standard practices followed by the LACFCD; therefore it primarily applies to levee systems under the jurisdiction of the LACFCD. At the date of its adoption by the County Official, this manual directly referenced 3.4 miles of Compton Creek, 11.25 miles of Coyote Creek, 7.23 miles of Dominguez Channel, 41.89 miles of San Gabriel River North and South Forks, and 1.03 miles of Santa Clara River. See **Appendix B** for the detailed maps showing the limits for each reach subject to these levee certification standards.

2. MAINTENANCE OF FACILITIES

2.1 Introduction

Flood Control Facilities (FCFs) refer to any structure used for the control of flood waters. Numerous FCFs located within the County fall under the jurisdiction of the LACFCD, which encompasses the Flood Maintenance (FMD), Water Resources (WRD), and Watershed Management (WMD) Divisions of the County of Los Angeles Department of Public Works (Department). Operation and maintenance of the LACFCD's FCFs is a role primarily undertaken by the Department's FMD. FMD is comprised of three independent maintenance areas; the East Area, the West Area, and the South Area; the borders of which are depicted on the map included as **Appendix C**. Each FMD area employs office and field staff (see **Appendix D**) who are responsible for repairs, upgrades, inspection (see Inspection Standards included as **Appendix E**), and monitoring of all LACFCD FCFs within their respective area. These FCFs must be properly maintained to provide adequate protection for life and property. Routine inspections of all LACFCD levees are performed on a yearly basis, as well as before, during, and after storm events. When deficiencies are encountered during inspections, they are repaired immediately under the direction of the area engineer. A database of O&M tasks and procedures is stored in Maximo (MMS), the Department-wide facility management program. The following sections provide maintenance recommendations and requirements for levee systems (see **Appendix F** for applicable Standard Procedures).

2.2 Encroachments

Routine maintenance and as-needed repair performed by FMD or a Department hired contractor are allowed within the LACFCD right-of-way. Other agencies may request right-of-way access too, in which case a permit can be obtained from our Construction Division's (CON) Permit Section. All unpermitted activity along the levee is prohibited.

Immediate action is taken by FMD staff to correct unpermitted work within a LACFCD right-of-way. In the case that an unpermitted encroachment is encountered during an inspection, the site is documented and reported to the appropriate FMD field yard. The appropriate FMD staff, upon determining that the encroachment is not permitted, issue a letter of encroachment to the violator. The violator has 30 days to respond to the letter or face legal action by the Department.


Picture 1: Permitted encroachment along Dominguez Channel access road

2.3 Access Roads

Access roads or patrol roads are typically located on top of the levee channel. They are vital to storm patrols and flood control activity and are maintained routinely. When repair work is needed, a work order is created in MMS and the appropriate field crew performs the work according to FMD Standard Procedures included in **Appendix F-3**. Repairs may include using native soil to fill in deficiencies, grading, and paving. Right-of-way fencing is located along the levee system access roads. Access gates located at necessary locations within right-of-way fencing allow the FMD crews access along the levee for routine maintenance and inspection activities.

Picture 2: San Gabriel River Bike Path & Access Road

2.4 Ruts and Depressions

FMD patrols the levee access roads routinely throughout the year. When ruts are discovered, a work order is issued and crews are dispatched to repair the deficiency under the supervision of an engineer. Repairs may consist of excavation, grading, compaction, and paving, and, in severe cases, may require input from Design (DES) and/or Geotechnical and Materials Engineering (GMED) Divisions.

Picture 3: Depression discovered along Coyote Creek

2.5 Concrete Surfaces

FMD routinely inspects the levee system, including concrete surfaces (see references to concrete levee and channel inspections in **Appendix E**). Over time, concrete surfaces weather, leaving the concrete rough to the touch and/or able to hold moisture on the surface. When trained staff observes this, field crews apply a protective coating to the concrete. This coating seals cracks, prevents moisture from entering the structure, and reduces the chances of freeze and thaw damage. This increases the life expectancy of the structure and ensures minimal seepage into the levee during periods of high water. Prior to the application of a concrete sealer the structure is cleaned, existing cracks are sealed with a flexible sealant, and any minor spalling is repaired.

When cracking or minor cracking/spalling is visible, it is brought to the attention of appropriate FMD staff for evaluation and repaired as described in Section 2.6 Cracking. More serious damage such as major spalling is repaired per DES and GMED specifications.

Picture 4: Coyote Creek's concrete trapezoidal channel

2.6 Cracking (Levee Specific)

FMD inspection staff routinely inspects the levees for cracking (see concrete: cracking references in Inspection Chart, **Appendix E**). Cracking within a concrete lined levee allows water to infiltrate the levee structure and provides a media for vegetation growth. Cracking discovered within a concrete levee, if it is an isolated occurrence, is often filled with Overflex, an asphalt-like material contained in a tarpot, to strengthen and prevent further crack propagation. When trained staff observes cracking that is more than six inches in length, it is evaluated for severity and repaired per DES specifications.

Picture 5: Vertical cracking along Coyote Creek repaired by FMD routine maintenance

2.7 Erosion

a. Types of Erosion

There are several types of erosion that affect FCFs including rain runoff, embankment overtopping, and flow within the FCFs themselves. Depending on the extent of erosion, the level of flood protection can be significantly reduced. Total failure of a FCF structure may occur if overtopping of the embankment is permitted.

The type of erosion that typically affects LACFCD facilities are a result of long-term flow redirection and scour due to high velocity flow. Long term flows can erode a FCF (e.g. levee embankment) at the water surface level, due to wave action, etc., or cause submerged damage to other FCFs along its path. High velocity flows typically cause damage to a levee embankment by removing fine material (i.e. sand and silt) and transporting it downstream. These flows can also facilitate the transport of the levee's larger components. When erosion is observed, immediate action is taken to repair it.

b. Erosion Repair

Erosion is repaired on an as needed basis. The repair is based on the extent, severity, and importance of the distressed area. Minor repairs are conducted by FMD staff per FMD Standard Procedures in **Appendix F-4**. Major repairs are conducted per GMED and DES specifications. Current GMED erosion repair guidelines and testing methods are provided in **Appendix G.**

Picture 6: Erosion repair of Project 1202 outlet along Dominguez Channel

2.8 Slope Stability

Levees are routinely inspected for any deficiency to the slope stability (see structural deficiencies in earthen channels and levees described in **Appendix E**). Slope stability is generally not a problem within the County's levee system as the slopes primarily have a shallow grade, approximately 3:1 to 2:1 (Horizontal:Vertical) for channelward slopes and 2:1 to 1.5:1 (Horizontal:Vertical) for landward slopes, and were constructed with a high factor of safety, typically a value greater than 1.25 as determined by the infinite slope method. However, if a levee is determined to be unstable, an engineer evaluates the slope instability and determines the solution. FMD crews will perform repairs to the slope per Standard Procedures in **Appendix F-4**. In large areas affected by slope stability (vertical or horizontal extent greater than 50 feet), GMED shall be contacted for slope evaluation and/or remediation recommendations.

2.9 Riprap Protection

Riprap is a commonly used defense against surficial deficiencies caused by flowing water. These deficiencies include erosion, scouring, undercutting, etc., which can be detrimental to the levee structure. The riprap armoring the County's earthen levees is routinely inspected (see rock levee and channel inspection sections of **Appendix E**). Deficiencies within riprap include, but are not limited to, settlement and movement. Most commonly, riprap is physically removed or relocated by the public. When deficiencies are noticed, a work order is issued and the deficiency is corrected by hand and mechanical means under the supervision of an engineer.

Picture 7: Moderately sized rip-rap lining Dominguez Channel

2.10 Debris Removal

The LACFCD utilizes a trash-free maintenance contract in addition to the FMD routine cleaning (according to Standard Procedures contained in **Appendix F-1)** to remove accumulated debris along County levees. The contractor communicates with an inspector from FMD regarding scheduling to ensure timely and efficient debris removal. If the FMD inspector discovers significant debris accumulation, the contractor is immediately notified, and the debris is to be removed within 24 hours of notification. Following the completion of debris removal by the contractor, the FMD inspector reviews the area to ensure that the contractor was thorough in the debris removal.

2.11 Vegetation Removal- Tree, Unwanted Vegetation, and Weed Control

Trees and brush can affect the stability of a levee structure. Root systems growing in a levee can decay and result in voids. This can accelerate seepage rates during high water conditions and increase the chance of sand boils, potentially leading to failure of the structure. Unwanted vegetation also provides a food source for burrowing rodents, resulting in voids that can cause levee failure.

FMD routine maintenance includes pre-/post- emergent weed control (applicable Standard Procedures are included in **Appendix F-6**), landscape maintenance, and invert clearing. When small vegetation is encountered, the area is to be sprayed with an approved pesticide under the supervision of a Qualified Applicator. Unwanted large vegetation, such as bushes and shrubberies, is removed from the levee.

Additionally, LACFCD utilizes an annual right-of-way clearing contract, in which the contractor is responsible for all unwanted vegetation removal. Furthermore, an as-needed tree contractor is utilized for immediate tree and large shrub removal. All contract work is overseen by an FMD inspector who ensures that the job is completed correctly.

All trees and brush that are cleared are disposed of at an appropriate disposal facility.

Picture 8: Dominguez Channel, free of slope vegetation

2.12 Rodent Control

The levees are inspected routinely for burrowing animals (following inspection guidelines listed in **Appendix E**). As mentioned above, rodents burrow into earthen levees for shelter and food, leaving voids along the way. These voids allow water infiltration that diminishes the integrity of the levee.

Rodent control procedures have been established and include fumigation, bait stations, bait broadcasting, and trapping. First, the Agricultural Commissioner of the Los Angeles County Department of Agriculture is contacted to spray the area. Once an approved pesticide has been applied, the area is inspected and rodent holes are filled. In the case of rodent holes within an earthen levee or the backside of a concrete levee, the holes are filled with native soil and compacted. If the rodent holes are discovered within an armored levee, the holes are filled with concrete or cement slurry.

2.13 Seepage/Sand Boils (Levees and Floodwalls)

Seepage and sand boils are the result of water migrating through a levee embankment and emerging on the opposite side. When seepage or sand boils are discovered, field staff assesses the situation (see also Section 5: Earthquake Guidelines). Minor instances of seepage, likely the product of rodents, unwanted vegetation, etc., most often occur immediately after rains, but subside quickly and naturally. In situations where the seepage is extensive, such as following a substantial earthquake, an MMS work order is issued and a work crew is dispatched to correct the problem under the direction of an engineer. There are numerous remedies for seepage through a levee, including cutoffs, riverside blankets, landside seepage berms, toe trenches, and pressure relief wells. DES and GMED may be contacted for their assistance in designing a seepage solution.

2.14 Excavations

Excavation proposed by FMD staff is reviewed by an FMD engineer. Excavation proposed by an outside agency goes through the permit process. The agency applies for a permit through CON, who forwards their application with applicable plans to the appropriate divisions. A permit to construct is only granted to the agency if the construction will not impair the structural integrity of the levee or impede the current and future levee functionality. Furthermore, the outside agency must adhere to the permit or it will be revoked. A Department inspector monitors the work to ensure safety and compliance.

Picture 9: Anaheim Street Bridge piers installed within the Dominguez channel levee slope

2.15 Utilities

As with excavations, utility installation and maintenance work proposed by an outside agency goes through the permit process as described in Section 2.14.

Picture 10: Utility bridge installed at the top of the Dominguez Channel levee slope

2.16 Subdrains - Toe Drainage and Weepholes

Many channels within the County include subdrain systems of various types. Subdrains are an effective method of relieving uplift pressures due to hydrostatic pressure. The Department's FMD maintains the levee subdrains throughout the year on a routine basis. Field crews follow a scheduled cleaning/inspection routine for all subdrains. Depending on the type of subdrain, various techniques are employed in the cleanout procedure. In general, the crews, following confined spaces safety procedures, break up debris within the subdrain vault (accessed through a manhole) using a high pressure water hose. Then, they use a vacuum truck (or trash pump) to remove all sand and debris from the vault. All debris is disposed of at a proper dumping facility. Procedures are outlined in the book of Standard Procedures included in **Appendix F-2**.

Picture 11: Submerged subdrain along Dominguez Channel

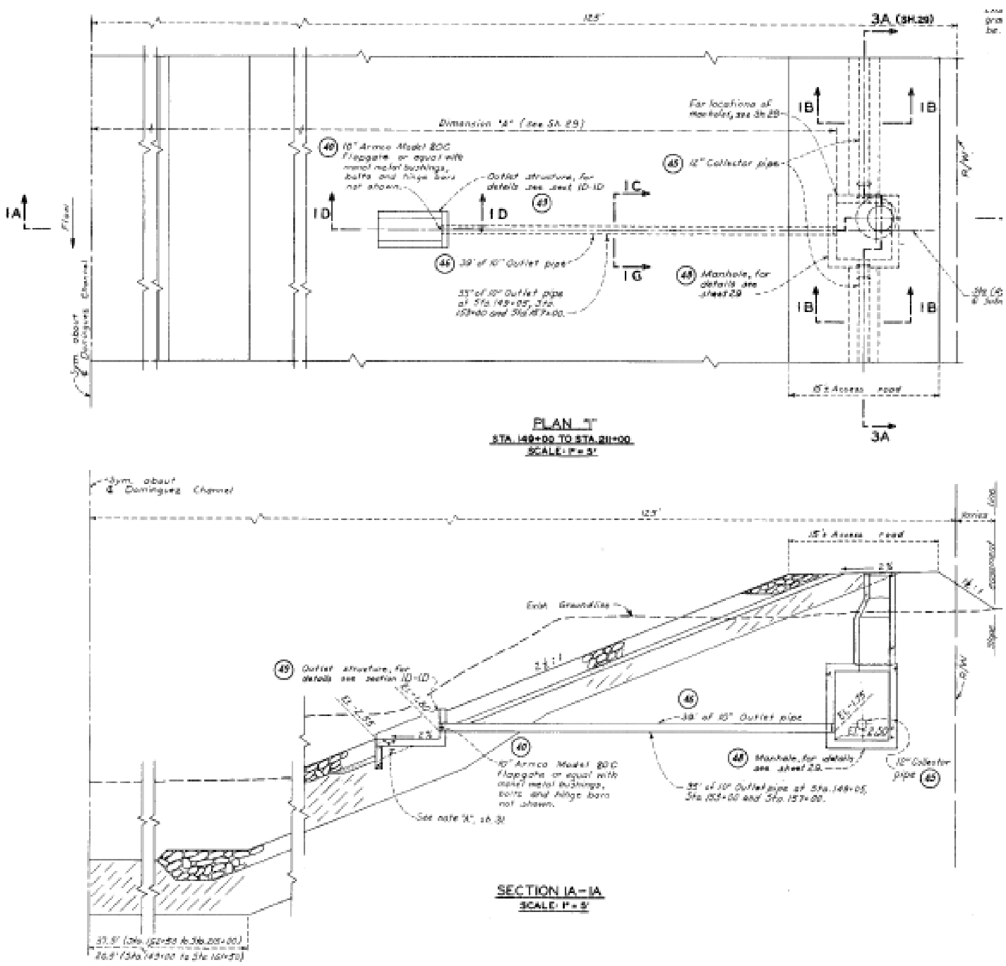


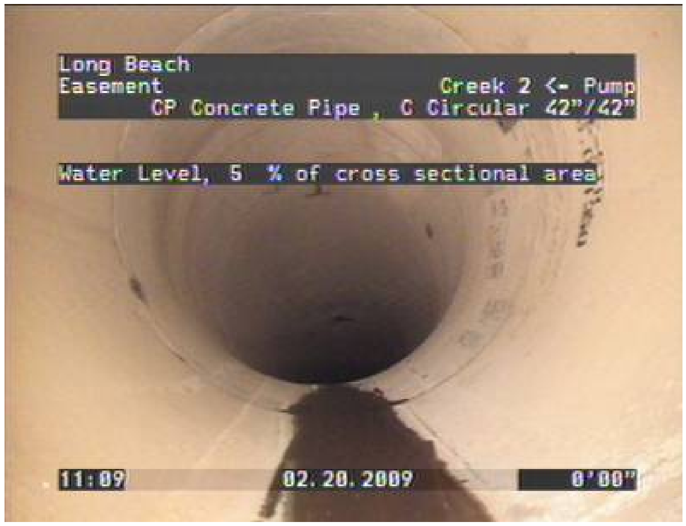
Figure 1: Subdrain detail drawings shown on Dominguez Channel as-builts

2.17 Interior Drainage Systems

During storm events, rainwater runoff is allowed to flow through storm drains into the levee channel. During high water conditions within the channel, submerged one-way flap gates (a complete list is included as **Appendix H**) on the storm drain outlets are closed and restrict flow from draining into the channel. When this occurs, the interior drainage system features, including detention basins along the levee, fill up with water to minimize flow in the channel. As the water level in the channel subsides below the flap gates, a pump station will discharge the basin's water to the channel. A complete list of LACFCD detention basins is included as **Appendix I.**

a. Concrete Culverts/Pipes

The storm drain system is inspected on a routine basis. If any part of the system is discovered to have debris, it is scheduled to be removed per Standard Procedures in **Appendix F-2**. When a storm drain is found to have failures, the system is evaluated. When minor deficiencies exist, the area is repaired. The extent of the repair depends on the nature of the deficiency. If the storm drain is found to be structurally inadequate, as in the case of excessive cracking or total collapse, the pipe is completely replaced. The area is backfilled and compacted with native soil as specified by GMED. When inspecting the drainage system, compliance with confined space entry regulations is followed to ensure crew safety. When excavation exceeds the capabilities of FMD, a contractor is employed to do the repair work.



Picture 12: Reinforced concrete pipe storm drain in Long Beach

b. Corrugated Metal Pipes

Inspection of corrugated metal pipes (CMPs) occurs on a routine basis. If the drain is functional, but is in need of structural reinforcement, a contractor is employed to line the length using cast-in-place pipe (CIP). When a pipe has collapsed or failed, it is immediately replaced per DES specifications.

c. Gated Structures

Flap gates and slide gates along the levee and within the interior drainage structure are inspected for maintenance on a routine basis. Flap gate maintenance includes: repairing pivot points, removing debris, and painting. Slide gate maintenance includes: greasing the stems, operating the hinges to prevent the gate from freezing, removing dirt and debris from in front, behind, and inside the gate's track to ensure the gate can seal properly, and painting. If the gate cannot seal properly, it is adjusted appropriately. Gates that are damaged or missing are reported and scheduled for replacement.

Metal grates, hand wheels, and other metalwork are secured in place, freed of rust, and regularly maintained by cleaning and painting. If any pipe or culvert has separated from the inlet/outlet structure headwall, it is repaired. Any concrete that is cracked and is integral to a gate's integrity is repaired.

Picture 13: Flap Gates associated with the Claretta Pump Plant along Coyote Creek

2.18 Pump Stations

LACFCD maintains pumping facilities throughout the County (see **Appendix J**). Pump Stations provide a means for transporting storm water from natural and artificial sumps to the flood control network. Generally, once a sump has reached capacity, the station's pumps activate and discharge the water into a channel, storm drain, or large body of water. Pump Stations are inspected bi-annually on a routine basis according to Standard Procedures listed in **Appendix F-7**. O&M manuals and emergency shut off procedures are located at each pump station as well as at FMD's Imperial Yard. A logbook is also located at each pump station which documents the date and type of maintenance performed.

Picture 14: Los Altos Pumping Plant along Cerritos Channel in Long Beach

2.19 Debris Basins

The LACFCD owns and maintains debris basins throughout the County. Debris basins are flood control facilities designed to catch debris in rural runoff to protect storm drains, waterways, and property, as well as prevent flooding. FMD maintains approximately 160 debris basins within the County. Most of these are located at the base of the Santa Monica and San Gabriel Mountains (see list in **Appendix K**). Debris basins are inspected routinely according to Standard Procedures in **Appendix F-8**. Any debris basins containing significant amounts of sediment require cleaning. This may include sediment removal (and disposal at a sediment placement site), and vegetation removal. Cleanout criteria is defined as 25% of maximum capacity in an unburned watershed and 5% of maximum capacity in a burned watershed (defined as a watershed more than 80% burned within the last 5 years).

Picture 15: Sullivan Debris Basin in Rustic Canyon

2.20 Dams/Rubber Dams

Dams are used throughout the County for flood control, water conservation, and recreation benefits. The LACFCD owns and operates 14 large dams (see list included in **Appendix L**); the Army Corps of Engineers owns and operates 4 additional dams. Each LACFCD dam has a specific operations plan under the direction of the WRD Operations Section. Releases during storm events from these dams are based on the operation plan, the forecast, and any emergency conditions and are at the discretion of the Duty Engineer from the WRD Dams Section. Army Corps dams, such as Whittier Narrows Dam, are operated during storm events in conjunction with WRD as they directly affect downstream LACFCD FCFs. However, they may request WRD to take over storm operations, at which point WRD releases water based on Army Corps restrictions (for instance, water releases from Whittier Narrows Dam are initiated at a Water Surface Elevation of 201’ Above Mean Sea Level).

Routine maintenance of the 14 LACFCD-owned dam facilities is carried out by FMD staff. FMD staff is responsible for preventative maintenance, “housekeeping”, landscape maintenance, and storm operation assistance and patrols. Maintenance task lists for each dam are included in **Appendix L**.

Picture 16: Santa Anita Dam upstream of the Los Angeles River network

In addition to large dams, LACFCD utilizes smaller rubber dams. The rubber dams direct flow into spreading grounds for water conservation purposes. In total, LACFCD owns 16 rubber dams located throughout the County (location maps are included as **Appendix M**) and are operated by WRD’s Operations Section. During large storm events, the rubber dams are not in operation. Generally, the maximum flow rate permitted over an inflated rubber dam is 1000 cfs; beyond that, the dam is deflated either remotely or locally by a safety valve.

3. FLOOD PREPAREDNESS

3.1 Equipment and Supplies

a. Sandbags

Administrative Services Division (ASD) acts as the Sandbag Coordinator while WRD provides funding for sandbags for the Department and the LA County Fire Department. An adequate supply of sandbags is kept in stock to respond to flood events: approximately 750,000 sandbags are stored at ASD's Central Warehouse, while LA County Fire Stations are stocked with sand bags at the beginning of storm season. Burlap sandbags have a limited shelf life, about 8 years, and are inspected annually and replaced when necessary. Sandbags are stored in a dry, secure location to prevent sun and weather exposure when not in use. The Department sandbag policy is included as **Appendix N**.

b. Plastic Sheeting

A small amount of 8 mil thick polyethylene sheeting is stored at flood yards for emergency applications. Larger amounts can be purchased as needed.

c. Hand Tools

Adequate hand tools are stored at each yard to ensure each crew can perform repairs during emergencies. These include square and round long handled shovels, short handled shovels, and an assortment of many other tools.

d. Emergency Lighting

FMD field yards utilize a light plant with two spotlights and a generator installed on a trailer. This trailer can be towed to any location along a levee that requires lighting for overnight emergency flood control work. In addition to large spotlights, FMD utilizes smaller halogen lights.

e. Communications System

All superintendents and foremen are issued a blackberry for instant communication. Additionally, field vehicles are equipped with two-way radios.

f. Riprap for Erosion

A small amount of riprap is stockpiled at field yards and various other locations for emergency use. Most riprap related materials are purchased on an as-needed basis.

g. Floatation Devices

Flotation devices are stored in the yard tool room or with a boat. Additional floatation devices, such as life rings, are stored in the tool room as well. Floatation devices are kept as a precaution only as FMD field crews are discouraged from entering flowing water. When an emergency situation within a channel exists, the crew member, fitted in a floatation device, is tethered to prevent being swept downstream. Additionally, a crew member is stationed 100-feet downstream equipped with a life ring secured to a safety line. **Appendix O** includes a typical FMD site plan showing equipment storage areas.

h. Pumps

Pumps are stored at field yards for emergency use during flood events. These pumps include various sized submersible pumps, which are small enough to be operated by electric generators, and larger trailer mounted trash pumps, which must be powered using diesel or gasoline motors. The submersible pumps have a capacity of 150-300 GPM, while the trash pumps have a capacity of 1500-3000 GPM.

i. Sources of Borrow Material

FMD may have emergency repairs that require additional earth/soil for backfill. In such cases, soil may be borrowed from one of many sediment placement sites in the County. Currently, there are 22 active sediment placement sites, most of which are located at the base of the San Gabriel Mountains (see **Appendix P**).

3.2 Reference Materials

a. Organizational Chart □Roster

An updated list of pertinent personnel within the Department, including their contact information, is kept up to date by FMD office staff and distributed to all field staff. Additionally, a Disaster Services Group (see Section 3.3) created directory including telephone numbers for other agencies such as the Army Corps of Engineers, local contractors, vendors, the Red Cross, Salvation Army, hospitals, railroad/ highway departments, the police and fire departments, local and state Emergency Operations Centers, and other critical groups is kept up to date by FMD office staff and stored on site.

b. Storm Routines

Prior, during, and after a storm event, field crews from each yard follow storm routines. These are guidelines that are used while inspecting the various FCFs. They are updated annually by each yard's Engineering Support Unit. The number and extent of inspections are determined by the storm intensity, the area engineer, and upon activation of the Department Operations Center (DOC) (see below). More information regarding specifics of storm routines is located in Section 4: Actions During Storm Events. Storm routines are detailed in **Appendix Q**; additionally, **Appendix F** contains storm routine standard procedures.

c. General Storm Response Plan

During a storm event,

- FMD field crews are dispatched to patrol the FCFs.
- Field supervisors are placed on 24 hour standby notice.
- Pump stations are manned throughout large storms.
- Dams are manned and under the direction of WRD.

- WRD uses automated gauges located throughout the County to monitor rainfall, runoff, and reservoir levels.
- The DOC at Headquarters is activated during large storm events.

More detail is included in Section 4: Actions During Storm Events.

d. Evacuation Plans

Staff is ready to assist in evacuating flooded areas by following the steps below:

a. Coordinate evacuation with police, fire department, and responders.
b. Contact DOC for sign-in roster and contact information.
c. Meet in predetermined locations & immediately verify the safety of all personnel.
d. Communicate the planned evacuation of an area with DOC and/or FMD supervisorial personnel.
e. Follow any additional DOC issued evacuation procedures.

3.3 Operations Center

a. Introduction

In the case of a large storm, the DOC is activated to oversee storm or emergency operations and to coordinate interagency activities. The center is located on the second flood of the Headquarters building (located at 900 S. Fremont Ave., Alhambra, CA). The primary purpose of the DOC is to support field activities and provide centralized information on the Department's response to Administration and the County Emergency Operations Center (CEOC). The activation is per a recommendation to the Deputy Director by the DOC Storm Director of WRD based on the expected storm intensity and DOC Activation/Deactivation Chart (see **Appendix R**). The Operations Center, once activated, is headed by assistant deputy directors and manned by representatives from many Department Divisions (depending on storm intensity and activation level) 24 hours daily until the emergency is over. See organizational chart located in **Appendix R** for additional information. Representatives working within the DOC are responsible for collecting data relevant to their division.

b. Supplies

The DOC is also equipped with emergency supplies, including:

- Radios and telephones for communication
- Television and/or radio to monitor weather and river forecasts
- Emergency generator in case of power outages
- Administrative supplies
- Levee operations and maintenance manuals (as needed by each division)
- All emergency action plans
- Past flood reports/ after action reports
- State, county, and local maps; utility, flood plain, and levee maps
- Telephone books, phone rosters, and a directory listing numbers for the Army Corps of Engineers' Emergency Operation Center, railroad/ highway departments (needed when closing access), local contractors, the Red Cross, Salvation Army,

hospitals, the police and fire departments, local and state Emergency Operations Centers, and other critical numbers.

c. Activation Levels

When the storm arrives, the Department Storm Director determines the appropriate activation level based on storm intensity and water levels. These activation levels include “Monitoring” (Level M), “Minimum Activation” (Level ONE), “Mid-Level Activation” (Level TWO), and “Full Activation” (Level THREE), and may be upgraded and downgraded as necessary. At this point, respective personnel are activated. This section details the features of each activation level.

i. Monitoring Level

The monitoring level is characterized by less than an inch of rainfall in a 24 hour period. The DOC is not activated, but WRD is monitoring rainfall levels and updating the DOC director in case the activation level must be increased.

ii. Minimum Activation (Level ONE)

A National Weather Service (NWS) issued Flood Watch usually signals an upgrade to Level ONE activation. Other characteristics of level ONE include: expected rainfall of up to 2” in a 24 hour period and anticipation of only minor localized disruptions and damage. At this point, the DOC is activated and headed by the DOC Director (from WRD). The DOC is manned by representatives from first-tier flood related divisions, which include CON, Information Technology Division (ITD), Road Maintenance Division (RMD), FMD, WRD, Situation Status (SITSTAT) personnel, and Dispatch. Additional divisions are notified of activation but are not required to report to the DOC. WRD reports any pertinent information to the DOC Director. In addition to the DOC, the CEOC may also be activated.

iii. Mid-Level Activation (Level TWO)

When the NWS issues a Flood Warning, the Storm Director will typically upgrade to Level TWO activation. This is characterized by continuous heavy rain (2” to 6” in a 24 hour period) and the anticipation of many localized disruptions and heavy damage. In addition to the divisions already manning the DOC, ASD, Building and Safety (B&S), GMED, Operational Services Division (OSD), Programs Development Division (PDD), Survey/Mapping & Property Management Division (SUR/MPM), Sewer Maintenance Division (SMD), WMD, Water Works Division (WWD), Traffic and Lighting Division (T&L), as well as the Disaster Services Group, Fleet Management Group, Public Information Officer, and Branch Coordinators (see **Appendix R**) are activated. SITSTAT reports are prepared every four hours, and an 8 a.m. report is directed to either the Board of Supervisors or the CEOC (which will be partially activated).

iv. Full Activation (Level THREE)

Any major storm with greater than 6” of rain in a 24 hour period will require Level THREE activation, the highest level of activation. This will indicate serious disruption and problems throughout the county. The cities are contacted for their assistance and any additional resources. The DOC is manned with all storm response divisions. SITSTAT reports are prepared every four hours, and an 8 a.m. report is directed to either the Board of Supervisors or the CEOC (which will be fully activated).

3.4 Training

a. Equipment

All crew members are trained by experienced personnel. Crew members are trained on all large and small equipment. An annual course for small equipment is provided for all crew members (see **Appendix D** for field staff positions); attendance sheets and the list of equipment discussed (included as **Appendix S)** are documented. The equipment covered includes: concrete saws (walk behind and hand held), air compressor, buster, chipping gun, soil compacting equipment, cement mixer, asphalt roller, lawn mower, weed whip, chain saw, pole saw, rotor hammer, generator, cutoff saw, grinder, and 6”/ 4”/ 2” portable pumps. In the case of heavy equipment, an experienced operator initially provides on-the-job training on an as needed basis depending on the employee’s work responsibilities.

b. Procedures

Training for repair procedures and techniques is performed on an as-needed basis. These include, but are not limited to, physical operation of slide gates, pumping stations, and flap gates; clean out procedures for catch basins, Debris Retaining Inlets (DRIs), and other drains; general repair work on levees; testing of communication/backup communication systems; notification of emergency personnel; etc. Repair procedures and additional background information are contained in the book of standard procedures (see **Appendix F**).

3.5 Relations with Local and State Partners

In the case of an emergency flood situation, FMD may require additional equipment. Equipment may either be borrowed from other FMD yards/Department divisions or rented by Fleet Management Group. In rare instances, FMD may contact other county departments or local agencies.

FMD may also require additional personnel during a flood situation. Local police departments, sheriffs departments, and fire departments may assist the Flood Control District during such an emergency for traffic control, patrolling, communication with the public, and flood containment. In the event of large scale flooding, the fire department may take the lead in directing the flood response.

4. ACTIONS DURING STORM EVENTS-FMD

This chapter outlines the steps performed during storm or high water events. Not all procedures apply to all situations and additional actions may be required on a case-by-case basis.

The following activities are separated into phases. The "Beginning of Storm" phase includes the steps performed prior to rain events. The "Activation" phase begins when the storm system arrives and water begins to accumulate. The "Activation" phase is divided into different levels based on storm intensity. The criteria for activation are described in Section 3.3. The "End of Storm" phase is activated once rain has ceased and water levels have started to recede. Each phase has specific duties assigned to FMD field crews. All duties are detailed in the storm routine handbook.

4.1 Introduction to Storm Response

a. Inspection Basics

When high water is expected, the FMD foremen and crews, under the direction of their FMD superintendent, take immediate action through inspection of FCFs. Initially, a single crew is put on standby at each field yard, while an office staff is stationed to receive Requests for Service (RFS) from constituents. The office staff reports urgent RFS to the supervising foreman who directs the standby crew to address the issue. An additional crew follows a storm routine (see **Appendix Q**) and Storm Routine Standard Procedures (see **Appendix F-5**), which lists locations and activities that must be addressed per the storm phase. This list is updated annually by each field yard. Special attention is given to the following items during initial inspection. (Note that several of these items can and should be accomplished annually and not wait for a storm event.)

i. Condition of recent repairs to the levee.
ii. Water conditions and accumulation of trash and debris along the levee.
iii. Transportation Facilities: roads, rail, and water access.
iv. Material Supply: Identify location, quantity, and conditions of all necessary tools and materials (sacks, sandbags, lumber, lights, etc.) and distribute and store them at points where maintenance is anticipated.
v. Communications: Locate and check all two-way radios and telephones.
vi. Drainage Structures: Most drainage structures are situated to convey interior drainage from low points of the protected area through the levee by gravity flow. Because of the location, drainage structures are generally subject to inundation at lower stages than most other project features, and special attention needs to be given to flap gates and other drainage structures that might not be accessible later. (See section d, below, for maintenance during high water.)

b. Patrols

To minimize damage and to prevent the levees from failing, problems must be detected early. The entire levee must be patrolled routinely and increased as necessary throughout the storm. Any significant conditions identified must be reported to FMD field yards. The following lists typical responsibilities of patrols. Initially, 1 crew will inspect the FCFs, but, when approximately ¼" of rain has fallen, the superintendents must call in additional crews to patrol because storm activation level will be upgraded, resulting in more extensive patrols and inspections. Patrols continue throughout the storm event, and responsibilities specific to each storm phase (and DOC activation level) are indicated in the corresponding sections.

i. Patrol Responsibilities:

General Inspection

- Record gage readings. (hourly)
- Inspect the riverside right-of way fencing from levee access roads frequently to make sure they are free from debris. Immediately remove any debris that has collected along the fence to ensure that it does not damage the fence.
- Verify that all necessary access roads and ramps along the levee are usable and accessible by foot and by vehicle.
- Photograph all significant issues. (Use date/time stamp on your camera when possible)
- Close recreation gates; ensure they are working properly.
- Secure right of way gates.
- Escort public encountered on the levees or floodwalls to the exit gates. Report anyone that will not cooperate to the supervisor, who will contact the appropriate law enforcement agency.
- Closely monitor high priority areas within the county to ensure proper drainage.

Levee Inspection (see Appendix E)

- Inspect for sand boils or unusual wet areas landward of the landside toe.
- Inspect for invert cracking or movement.
- Inspect for slides or sloughs in levee side slopes.
- Inspect for wave wash or scouring of the riverside levee slope.
- Inspect for low areas in levee crown.
- Monitor relief wells (flowing/non-flowing).
- Check flap/sluice gates for proper closure. If necessary, use a pike pole to close open flap gates.
- Check gap closures (stoplog/ sandbag, etc.).

Channel Wall Inspection

- Inspect for saturated areas or sand boils landward of the floodwall.
- Inspect for settlement (movement) of the floodwall.
- Inspect for bank caving which may affect the structural stability of the floodwall.
- Inspect toe drain risers (discharging/non-discharging).
- Inspect the landside of floodwall for any seepage, especially around joints.
- Inspect for wet areas, soft areas, seeps, and sink holes landward of the toe of the floodwall.
- Check gap closures (stoplog/ sandbag, etc.).

Pump Station Inspection

- Check Operations Log for recent pump malfunctions.
- Check sumps for water elevation. Ensure removal of trash in the sump as it could be detrimental to the pumps.
- Check fore bay trash rack for trash. Clean if necessary.
- Check ground fault indicator. If light is on, contact OSD for repairs.
- Check hour meter and water level recorder to ensure pumps have been running. If yes, record data on Pump Log Sheet. If not, start engines.
- Turn the submersible pump time-clock controls to Winter mode.
- Check rain gage; record information on Rainfall Intensities Form (see **Appendix T**).
- Verify proper ventilation (fans on, vents open, etc.) of the pumping plant, to prevent overheating of pump motors.
- Fill in Operation Report for DOC.
- Verify that assigned operators are on duty 24 hours daily; communicate with them.
- Turn off lights; leave panel lights on.
- Look for sink holes or wet areas around the perimeter of the pumping plant, and/or settlement of the pump house, all of which could potentially be the result of separation in the conduits. If conduit separation is suspected, the pumps and motors should be shut down until an engineering review can be conducted to analyze the condition.

Underground Drain Inspection

- Check outlet of drain.
- Visually inspect ground above drain for any surface land movement, sinkholes, or erosion.

ii. Equipment for Patrols

- Portable radio or cell phone
- Watch
- Log book with writing utensil
- Patrolling instructions
- Plan of action for patrolling
- Plans of flood control system
- Operation and Maintenance Manual for the project
- Weather gear (rain jacket, boots, hard hat)
- Flashlights or Floodlights (check batteries)
- Record Log
- Flotation Device/Rings
- Probing rod (pike pole)
- Potato Hooks
- Long handle fork
- Axe
- Pliers

− Bolt Cutters
− Short wooden stakes with hammer
− 40 feet of ½ inch nylon safety line to connect team members
− Traffic Cones
− Rags
− Utility gloves
− Camera

iii. **Safety/Security Precautions**

Crew members are always discouraged from entering the channels or any flowing water during a storm event. If it is completely necessary to enter the water, crew members are fitted in a flotation device and are tethered. An additional crew member shall be stationed 100-feet downstream with a life ring secured with a safety line when crew members are working in or near rushing waters.

If overtopping occurs during darkness, it’s recommended that the patrols not be resumed until daylight, though there may be cases where this recommendation can not be followed. Emergency lighting is available for emergency situations that occur after dark.

In addition, there is a possibility for persons to try to take advantage of the already dangerous situation of high flood waters for their own purposes. Patrols are to take note of people who are out of place or causing trouble. Any suspicious activities observed by the patrol are immediately reported to the local law enforcement agency.

iv. **Interaction with the public**

If the patrol team encounters numerous observers on the levees or at the floodwalls, as is plausible, an additional patrol may be assigned to the team as needed. This supplementary patrol would act as a safety officer and explain dangers that are present at the levee. The crews are to escort anyone they encounter from the levee/flood control area prior to locking the access and bike trail gates.

4.2 Beginning of Storm Phase

When a storm event is forecasted, the Department first notifies all necessary flood personnel. Additionally during this phase, FMD:

i. Reviews emergency plans; identifies problem areas or “hotspots” (see **Appendix Q** for lists of hot spots).
ii. Verifies that personnel have access to the gate keys, current rosters, storm routines, plans, and other critical equipment.
iii. Coordinates efforts with potentially affected communities.

iv. Alerts the community to the potential of flooding. This gives them advance warning to take action to minimize potential damage to their business or home.
v. Keeps local/state Emergency Operations Center informed of the situation in addition to the Department DOC.
vi. Prepares for storm routine inspections; distributes inspection instructions; reviews assignments for patrols, closings, etc
vii. Obtains lists of all pertinent equipment and vehicles.
viii. Assesses needed support (vehicles, radios, etc).
ix. Verifies serviceability of equipment.
x. Records gage readings and monitor river stages.
xi. Closes the levee recreation gates to the public.
xii. Installs levee or floodwall closures as necessary. (And, when necessary, coordinates road closings with the Department of Transportation or railroad authorities if limiting road or rail access through the levee)
xiii. Dispatches crews to inspect sensitive FCFs.

4.3 Activation Phase: Levels M, 1, 2 and 3

As the storm is upgraded, additional crews are activated and patrols are continued with additional duties described below.

a. General Continuing Activities

i. Patrol continuously, 24/7 (as the situation requires).
ii. Ensure all closures and gates are in place, and all maintenance is complete as described in Section 4.2: Beginning of Storm Phase.
iii. Remove padlocks from non-public access gates to facilitate patrols.
iv. Monitor inventory of equipment, materials, and supplies as they are used.
v. Keep the public informed of the current situation through the media, if warranted.
vi. Repair erosion and seepage problems identified by patrols as quickly as possible with procedures described in either **Appendix F** or **G** of this manual, depending on severity.
vii. During flood periods, competent operators should be on duty whenever it appears that station operation is imminent, even when station operation has been automated. Operators should thoroughly understand the manner in which the pumping station was designed to operate and be capable of manual operation should automated equipment or sensors fail.
viii. Portable pumps may be used to pump water from detention areas into the channel, if water is ponding in undesirable areas or is rising too quickly in ponding areas. Ponding areas should be continually patrolled during high water.
ix. Monitor debris basins and trashracks for sediment and accumulated debris. As debris and sediment continue to be deposited in the basin, debris loads will substantially block racks, and sediment deposits will block the entrance to the basin, forcing the flow against the sides. Any large accumulation of debris on racks or flow directed on the sides of basins will cause local erosion and scour. Levees and concrete structures that are part of the debris basin facility will need

to be closely monitored to ensure performance. Debris should be removed from trashracks at pumping stations periodically when the station is in operation.

x. Communicate with the operations section every 2 hours to update them on the facilities (i.e. debris basin, pump station, etc.) progress and status.

xi. It may be necessary at some inlets to use a power hose to keep debris flowing through the inlet. If, an inlet is found to be continuously plugging, a crew will be stationed to maintain a clear inlet and communicate with the field yard every 2 hours. If no hose is available to clean the inlet, crews should manually remove any debris and use sandbags to divert flows.

b. Additional Storm Activities-Level ONE

i. Pump Plant Patrols

Pump plants are patrolled as described above. In the MAG I phase, additional patrols are required (see lists in **Appendix Q**).

ii. Inlet Patrols

In addition to patrolling pump plants, crews inspect the inlets prone to sediment build-up or flooding to ensure that they are not plugged (see **Appendix P**).

iii. Stream Patrols

All streams and open channel projects are patrolled throughout the storm. Each yard has a separate RFS crew and supervision crew who are dispatched to inspect areas that are of public concern or is experiencing drainage problems (see lists in **Appendix Q**).

c. Additional Storm Activities- Level TWO

i. Pump Plant Patrols

In the MAG II phase, patrols of the pump plants listed in MAG I Pump Plant Patrols are continued.

ii. Inlet Patrols

In the MAG II phase, additional patrols are required.

iii. Stream Patrols

Stream patrols are continued as described in MAG I Stream Patrols.

d. Additional Storm Activities- Level THREE

i. Pump Plant Patrols

In the MAG III phase, patrols of the pump plants listed in MAG II Pump Plant Patrols are continued.

ii. Inlet Patrols

In the MAG III phase, additional patrols are required.

iii. Stream Patrols

Stream patrols are continued as described in MAG II Stream Patrols.

4.4 End of Storm Phase

Once flows have retreated to the low-flow level, which is considered the end of storm phase, the area is returned to pre-flood conditions. Field crews complete post-storm patrols/inspections of all FCFs which include:

a. General Patrol/Inspection Responsibilities

i. Open all closure structures and properly store associated components.
ii. Remove and dispose of all temporary protection measures (e.g. sandbags and material placed during temporary levee raises).
iii. Open all recreation gates.
iv. Inspect any facilities that were not looked at during the storm due to inaccessibility or safety issues.
v. Provide a report to the Geotechnical and Materials Engineering Division, Soils Investigations Unit, with a list of facilities and locations where geotechnical issues were encountered. Issues to be included are:
   - slope instability
   - slope sloughing
   - sand boils
   - seepage
   - lateral displacement of embankment (cracks wider than 1/2 –inch and parallel to slope face)
   - settlement of levee crown/roadway (greater than 1-inch vertical displacement over 30 feet or more than 2-inches regardless of distance)
   - circular cracking in levee embankment (any size)
   - all collapsed concrete panels
   - any voids behind concrete panels
   - scour exposing footings of structures such as bridges, etc.
   - damage to the subdrainage system
   - damage to permitted utilities within right-of-way
   - flood control measures used to temporarily secure levee protection (i.e. removal and recompaction, seepage berms, sand bagging, etc.)

b. Channels and Storm Drain Patrols

i. Inspect each location for existing and potential problems, such as plugging and erosion.
ii. See addendum for any specific problems at a given location.

c. Unimproved Channel Patrols

i. Check dip crossings for accessibility.
ii. Check pipe and wire revetments for damage/failure.
iii. Check stabilizers for damage/failure.
iv. Check outlets for debris obstruction.
v. Check berms and slopes for erosion or sloughing.
vi. Check bridges for debris deposits and obstruction.
vii. Check channel invert for major soil deposits.

d. Crib Structure Patrols

i. Visually inspect crib structures for deficiencies.
ii. Inspect bench drains for blockage.
iii. Check for erosion, especially at the dam, along access roads, and near bench drain inlets.
iv. Check area for signs of saturated fill.

e. Pump Plant Patrols

i. Visually inspect sump, trash rack, forebay for debris accumulation. Take note of how much debris needs to be removed.
ii. Visually inspect area for flooding or sinkholes.
iii. Open any closed slide gates once water has subsided to 3 inches below pond level.

f. Debris Basin Patrols

In addition to pump plant and levee patrols, debris basin/debris retaining inlet patrols are required following the storm. Responsibilities include:

i. Visually inspect dam, outlet tower, basin, spillway, trash bars, and inlet for deficiencies.
ii. Inspect bench drains for blockage.
iii. Check for erosion, especially at the dam, along access roads, and near bench drain inlets.
iv. Check area for signs of saturated fill.
v. Clear any debris plugging the inlet.
vi. Note debris depth and report them to the appropriate FMD staff (see **Appendix C** & **D**).

g. Final Duties

i. Inventory all storm duty equipment, sandbags, plastic, and miscellaneous supplies. Repair or replace damaged equipment, and restock supplies in preparation for the next storm event.
ii. Salvage any materials and supplies (e.g. wood from flashboards).
iii. Return any borrowed equipment.
iv. Identify whether remaining materials can be reused within the community.
v. Meet with key personnel, volunteer representatives, and community partners to debrief, share remaining concerns, and discuss lessons learned during the event.
vi. Revise local emergency plans to account for lessons learned and changes to procedures.
vii. Document the event: keep a map record of the FCFs that indicates storm event problem areas. This is useful for making repairs or improvements and provides a guide of focus areas for the next storm event.
viii. For future planning, keep records of the flood's high water marks, rainfall depths, and river data.

ix. Make repairs to the FCFs as soon as possible in preparation for the next storm event.
x. Initiate actions to provide a permanent means of flood protection if the existing system relies heavily on temporary solutions during emergencies.

5. EARTHQUAKE GUIDELINES

5.1 Dry Condition Earthquake

The dry condition earthquake procedure detailed below refers to an earthquake affecting a levee containing no flows, or that is ultimately dry.

Immediately (within 72 hours) after a seismic event of magnitude 4.0 or greater that occurs within the Los Angeles Basin, levees and FCFs shall be evaluated for potential seismically induced effects. Some seismically induced effects include lateral movement of slopes, sloughing or sliding of levee slopes, settlement, and irregular surfaces on the levee crown. A more detailed explanation of what to look for is outlined below:

a. Lateral spreading is typically a horizontal displacement and/or movement toward the channel slope. Usually it appears as a large crack traveling parallel with the face of the slope. This type of seismic deformation looks similar to slope instability (see wet condition earthquake below for example). See Section 5.2.b. for visual representation.

b. Slope instability is usually observed as a loss of soils near the top of a slope or a bulge near the bottom of a slope. Additional visual indicators include fencing leaning towards the bottom of the slope, semi-circular crack patterns near the top of the slope, and seepage into the slope. Slope instability or sloughing is generally not a problem within a dry levee system as the slopes primarily have a shallow channelward grade and a low water table. However, this type of seismic displacement can occur and should be noted when observed (see wet condition earthquake below for example). See Section 5.2.c. for visual representation.

c. Seismically induced settlement or liquefaction may appear as an irregular levee crown surface or low points. This may be difficult to observe since the liquefaction may occur over a large area. Typically areas observed to have a vertical difference of 1-inch or greater over a span of less than 30-feet should be noted for further evaluation (see wet condition earthquake below for example). See Section 5.2.d. for visual representation.

If a levee is determined to be unstable or there is any observation of the above conditions, an engineer from the Geotechnical and Materials Engineering Division should be contacted to conduct an immediate site visit to evaluate the observed levee distress. Methods to remediate the distressed include, but are not limited to, removal and replacement, stage construction, and densification of soils. Remediation of slopes should be conducted prior to the next anticipated flood event.

5.2 Wet Condition Earthquake

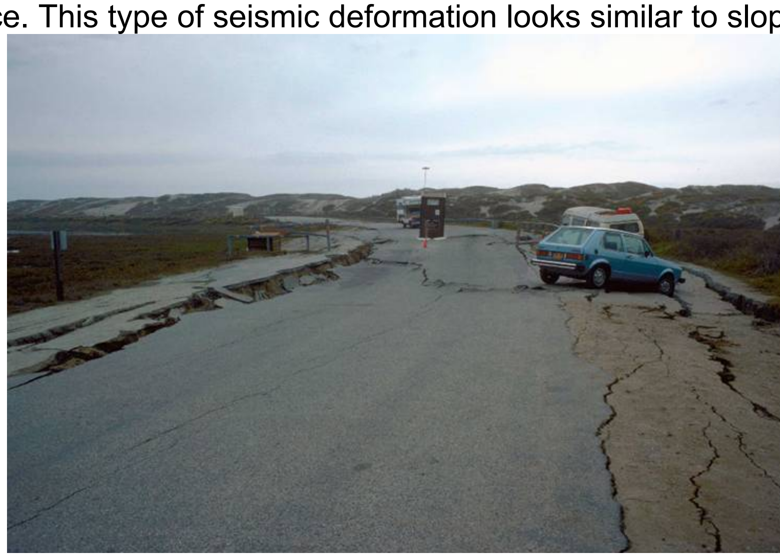
The wet condition earthquake procedure detailed below refers to an earthquake affecting a levee containing flows. Levee portions that have a channel invert below mean sea level always contain flow and are therefore always considered a wet condition.

Immediately (within 72 hours) after a seismic event of magnitude 4.0 or greater occurs within the Los Angeles Basin, the region shall be evaluated for potential seismically induced effects. Look for sand boils, lateral movement of slopes, sloughing or sliding of levee slopes, settlement, or irregular surfaces on the crown of the levee. A more detailed explanation of what to look for is listed below:

a. Sand boils appear as mounds of sand that look similar to ant hills. However, sand boils, no matter how small, should not be taken lightly as they may indicate a condition of underseepage which can be a much more dangerous soil instability condition.

Picture 17: Sand boil downstream of river dyke in Mai-Dong Vietnam, 1997

b. Lateral spreading is typically a horizontal displacement and/or crack movement toward the channel slopes. Usually it appears as a large crack travelling parallel with the slope face. This type of seismic deformation looks similar to slope instability.



Picture 18: Lateral spreading at Moss Landing (Monterey Bay) due to the 1989 Loma Prieta Earthquake

c. Slope instability is usually observed as a loss of soils near the top of a slope or a bulge near the bottom of a slope. Additional visual indicators include fencing leaning down the slope, semicircular crack patterns near the top of the slope, and seepage into the slope. Slope instability or sloughing is generally not a problem within a partially filled levee system as the slopes primarily have a shallow channelward grade and a low water table. However, this type of seismic displacement may occur and should be noted for further evaluation.

Picture 19: Typical landslide, Washington State

d. Seismically induced settlement or liquefaction may appear as an irregular levee crown of low points. This may be difficult to observe since the liquefaction may occur over a large area. Typically areas observed to have a vertical difference of 1-inch or greater over a span of less than 30-ft should be noted for further evaluation.

Picture 20: Lateral spreading in Las Lagunas, Peru following the August 2007 8.0 Magnitude earthquake in Pisco, Peru

If a levee is determined to be unstable or there is any observation of the above conditions, an engineer from the Geotechnical and Materials Engineering Division should be contacted to conduct an immediate site visit to evaluate the observed levee distress. Methods to remediate the distressed area include, but are not limited to, removal and replacement, stage construction, and densification of soils. Remediation of slopes should be conducted prior to the next anticipated flood event.

6. ADDITIONAL AGENCY RESPONSIBILITIES

6.1 Annual Pre-Flood-Season Inspections

Individual maintenance deficiencies and appropriate corrective actions are discussed in detail in chapter 2 of this manual. When conducting pre-storm-season inspections, document the condition of the facility and any additional pertinent information. Noted items include:

- Name and/or location of the FCF
- Date of the inspection
- Name of the inspector
- Project features that were inspected
- Overall condition of the project features
- Maintenance that has been completed
- Maintenance that is being preformed currently
- Maintenance items to be accomplished in the future
- Photographs showing flood damages, noted deficiencies, and overall project condition.
- Maintenance costs incurred for the flood control project that year, etc.

6.2 Records

As a public agency, the LACFCD records all repairs done to any FCF with photographs, plans and specifications, as-built drawings, and surveys. Modifications due to work by outside agencies are recorded as well.

In addition to FCF repair work records, the LACFCD keeps organized records of equipment, maintenance, and inspections. A database is in place that indexes equipment by name and title and contains pertinent information that includes instruction books, operating pressure limits, part catalogues, manufacturer’s drawings, reference field tests, special reports on major requirements, and, most importantly, changes in operating procedures. An additional data base holds maintenance information for pump stations including equipment inspections, hours of operation, number of operations, and other significant operating data.

7. APPENDICES

Appendix A-CFR Excerpts

Appendix B-Maps of Levee Certification Project Limits

Appendix C-Map of FMD Jurisdictional Area & Field Offices

Appendix D-FMD Organization Charts & Position Descriptions

Appendix E-Inspection Guidelines

Appendix F-Standard Procedures

Appendix G-Erosion Repair Guidelines & ASTM Test Methods

Appendix H-List of Closure Devices

Appendix I-Detention Basin List

Appendix J-Pump Plant List

Appendix K-Debris Basin List

Appendix L-Dam Information

Appendix M-Rubber Dam Location Maps

Appendix N-Sand Bag Policy

Appendix O-Typical Storage Site Map

Appendix P-Sediment Placement Sites Location Map

Appendix Q-Storm Routines & Hot Spots

Appendix R-DOC Activation & Organization Charts

Appendix S-Equipment Training Chart

Appendix T-Rainfall Intensities Form

APPENDICES

Appendix	**Page**

Appendix A – Code of Federal Regulations:

Title 44, Sections 59.1 – 65.10

SUBCHAPTER B—INSURANCE AND HAZARD MITIGATION

PARTS 50–54 [RESERVED]

NATIONAL INSURANCE DEVELOPMENT PROGRAM

PARTS 55–58 [RESERVED]

NATIONAL FLOOD INSURANCE PROGRAM

PART 59—GENERAL PROVISIONS

Subpart A—General

Subpart B—Eligibility Requirements

Subpart C—Pilot Inspection Program

AUTHORITY: 42 U.S.C. 4001 *et seq.;* Reorganization Plan No. 3 of 1978, 43 FR 41943, 3 CFR, 1978 Comp., p. 329; E.O. 12127 of Mar. 31, 1979, 44 FR 19367, 3 CFR, 1979 Comp., p. 376.

Subpart A—General

§ 59.1 Definitions.

As used in this subchapter—

Act means the statutes authorizing the National Flood Insurance Program that are incorporated in 42 U.S.C. 4001–4128.

Actuarial rates—see *risk premium rates.*

Administrator means the Federal Insurance Administrator.

Agency means the Federal Emergency Management Agency, Washington DC.

Alluvial fan flooding means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows; active processes of erosion, sediment transport, and deposition; and, unpredictable flow paths.

Apex means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.

Applicant means a community which indicates a desire to participate in the Program.

Appurtenant structure means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure.

Area of future-conditions flood hazard means the land area that would be inundated by the 1-percent-annual-chance (100-year) flood based on future-conditions hydrology.

Area of shallow flooding means a designated AO, AH, AR/AO, AR/AH, or VO zone on a community's Flood Insurance Rate Map (FIRM) with a 1 percent or greater annual chance of flooding to an average depth of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of special flood-related erosion hazard is the land within a community which is most likely to be subject to severe flood-related erosion losses. The area may be designated as Zone E on the Flood Hazard Boundary Map (FHBM). After the detailed evaluation of the special flood-related erosion hazard area in preparation for publication of the FIRM, Zone E may be further refined.

Area of special flood hazard is the land in the flood plain within a community subject to a 1 percent or greater chance of flooding in any given year. The area may be designated as Zone A on the FHBM. After detailed ratemaking has been completed in preparation for publication of the flood insurance rate map, Zone A usually is refined into Zones A, AO, AH, A1–30, AE, A99, AR, AR/A1–30, AR/AE, AR/AO, AR/AH, AR/A, VO, or V1–30, VE, or V. For purposes of these regulations, the term ''special flood hazard area'' is synonymous in meaning with the phrase ''area of special flood hazard''.

Area of special mudslide (*i.e., mudflow*) *hazard* is the land within a community most likely to be subject to severe mudslides (i.e., mudflows). The area may be designated as Zone M on the FHBM. After the detailed evaluation of the special mudslide (i.e., mudflow) hazard area in preparation for publication of the FIRM, Zone M may be further refined.

Base flood means the flood having a one percent chance of being equalled or exceeded in any given year.

Basement'' means any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway wall means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

Building—see *structure*.

Chargeable rates mean the rates established by the Administrator pursuant to section 1308 of the Act for first layer limits of flood insurance on existing structures.

Chief Executive Officer of the community (*CEO*) means the official of the community who is charged with the authority to implement and administer laws, ordinances and regulations for that community.

Coastal high hazard area means an area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

Community means any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village or authorized native organization, which has authority to adopt and enforce flood plain management regulations for the areas within its jurisdiction.

Contents coverage is the insurance on personal property within an enclosed structure, including the cost of debris removal, and the reasonable cost of removal of contents to minimize damage. Personal property may be household goods usual or incidental to residential occupancy, or merchandise, furniture, fixtures, machinery, equipment and supplies usual to other than residential occupancies.

Criteria means the comprehensive criteria for land management and use for flood-prone areas developed under 42 U.S.C. 4102 for the purposes set forth in part 60 of this subchapter.

Critical feature means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

Curvilinear Line means the border on either a FHBM or FIRM that delineates the special flood, mudslide (i.e., mudflow) and/or flood-related erosion hazard areas and consists of a curved or contour line that follows the topography.

Deductible means the fixed amount or percentage of any loss covered by insurance which is borne by the insured prior to the insurer's liability.

Developed area means an area of a community that is:

(a) A primarily urbanized, built-up area that is a minimum of 20 contiguous acres, has basic urban infrastructure, including roads, utilities, communications, and public facilities, to sustain industrial, residential, and commercial activities, and

(1) Within which 75 percent or more of the parcels, tracts, or lots contain commercial, industrial, or residential structures or uses; or

(2) Is a single parcel, tract, or lot in which 75 percent of the area contains existing commercial or industrial structures or uses; or

(3) Is a subdivision developed at a density of at least two residential structures per acre within which 75 percent or more of the lots contain existing residential structures at the time the designation is adopted.

(b) Undeveloped parcels, tracts, or lots, the combination of which is less than 20 acres and contiguous on at least 3 sides to areas meeting the criteria of paragraph (a) at the time the designation is adopted.

(c) A subdivision that is a minimum of 20 contiguous acres that has obtained all necessary government approvals, provided that the actual "start of construction" of structures has occurred on at least 10 percent of the lots or remaining lots of a subdivision or 10 percent of the maximum building coverage or remaining building coverage allowed for a single lot subdivision at the time the designation is adopted and construction of structures is underway. Residential subdivisions must meet the density criteria in paragraph (a)(3).

Development means any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials..

Director means the Director of the Federal Emergency Management Agency.

Eligible community or *participating community* means a community for which the Administrator has authorized the sale of flood insurance under the National Flood Insurance Program.

Elevated building means, for insurance purposes, a nonbasement building which has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

Emergency Flood Insurance Program or *emergency program* means the Program as implemented on an emergency basis in accordance with section 1336 of the Act. It is intended as a program to provide a first layer amount of insurance on all insurable structures before the effective date of the initial FIRM.

Erosion means the process of the gradual wearing away of land masses. This peril is not per se covered under the Program.

Exception means a waiver from the provisions of part 60 of this subchapter directed to a community which relieves it from the requirements of a rule, regulation, order or other determination made or issued pursuant to the Act.

Existing construction, means for the purposes of determining rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

Existing manufactured home park or subdivision means a manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Existing structures see *existing construction.*

Expansion to an existing manfactured home park or subdivision means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufacturing homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

Federal agency means any department, agency, corporation, or other entity or instrumentality of the executive branch of the Federal Government, and includes the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation.

Federal instrumentality responsible for the supervision, approval, regulation, or insuring of banks, savings and loan associations, or similar institutions means the Board of Governors of the Federal Reserve System, the Federal Deposit Insurance Corporation, the Comptroller of the Currency, the Federal Home Loan Bank Board, the Federal Savings and Loan Insurance Corporation, and the National Credit Union Administration.

Financial assistance means any form of loan, grant, guaranty, insurance, payment, rebate, subsidy, disaster assistance loan or grant, or any other form of direct or indirect Federal assistance, other than general or special revenue sharing or formula grants made to States.

Financial assistance for acquisition or construction purposes means any form of financial assistance which is intended in whole or in part for the acquisition, construction, reconstruction, repair, or improvement of any publicly or privately owned building or mobile home, and for any machinery, equipment, fixtures, and furnishings contained or to be contained therein, and shall include the purchase or subsidization of mortgages or mortgage loans but shall exclude assistance pursuant to the Disaster Relief Act of 1974 other than assistance under such Act in connection with a flood. It includes only financial assistance insurable under the Standard Flood Insurance Policy.

First-layer coverage is the maximum amount of structural and contents insurance coverage available under the Emergency Program.

Flood or *Flooding* means:

(a) A general and temporary condition of partial or complete inundation of normally dry land areas from:

(1) The overflow of inland or tidal waters.

(2) The unusual and rapid accumulation or runoff of surface waters from any source.

(3) Mudslides (i.e., mudflows) which are proximately caused by flooding as defined in paragraph (a)(2) of this definition and are akin to a river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water and deposited along the path of the current.

(b) The collapse or subsidence of land along the shore of a lake or other body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding as defined in paragraph (a)(1) of this definition.

Flood elevation determination means a determination by the Administrator of the water surface elevations of the base flood, that is, the flood level that has a one percent or greater chance of occurrence in any given year.

Flood elevation study means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

Flood Hazard Boundary Map (FHBM) means an official map of a community, issued by the Administrator, where the boundaries of the flood, mudslide (i.e., mudflow) related erosion areas having special hazards have been designated as Zones A, M, and/or E.

Flood insurance means the insurance coverage provided under the Program.

Flood Insurance Rate Map (FIRM) means an official map of a community, on which the Administrator has delineated both the special hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study see *flood elevation study*.

Flood plain or *flood-prone area* means any land area susceptible to being inundated by water from any source (see definition of ''flooding'').

Flood plain management means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and flood plain management regulations.

Flood plain management regulations means zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a flood plain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood protection system means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a ''special flood hazard'' and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Flood proofing means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Flood-related erosion means the collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.

Flood-related erosion area or *flood-related erosion prone area* means a land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer flood-related erosion damage.

Flood-related erosion area management means the operation of an overall program of corrective and preventive measures for reducing flood-related erosion damage, including but not limited to emergency preparedness plans, flood-related erosion control works, and flood plain management regulations.

Floodway— see *regulatory floodway*.

Floodway encroachment lines mean the lines marking the limits of floodways on Federal, State and local flood plain maps.

Freeboard means a factor of safety usually expressed in feet above a flood level for purposes of flood plain management. ''Freeboard'' tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Functionally dependent use means a use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

Future-conditions flood hazard area, or *future-conditions floodplain*—see *Area of future-conditions flood hazard*.

Future-conditions hydrology means the flood discharges associated with projected land-use conditions based on a community's zoning maps and/or comprehensive land-use plans and without consideration of projected future construction of flood detention structures or projected future hydraulic modifications within a stream or other waterway, such as bridge and culvert construction, fill, and excavation.

General Counsel means the General Counsel of the Federal Emergency Management Agency.

Highest adjacent grade means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

Historic Structure means any structure that is:

(a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;

(b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

(c) Individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of the Interior; or

(d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:

(1) By an approved state program as determined by the Secretary of the Interior or

(2) Directly by the Secretary of the Interior in states without approved programs.

Independent scientific body means a non-Federal technical or scientific organization involved in the study of land use planning, flood plain management, hydrology, geology, geography, or any other related field of study concerned with flooding.

Insurance adjustment organization means any organization or person engaged in the business of adjusting loss claims arising under the Standard Flood Insurance Policy.

Insurance company or *insurer* means any person or organization authorized to engage in the insurance business under the laws of any State.

Levee means a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee System means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest Floor means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; *Provided*, that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirements of § 60.3.

Mangrove stand means an assemblage of mangrove trees which are mostly low trees noted for a copious development of interlacing adventitious roots above the ground and which contain one or more of the following species: Black mangrove (Avicennia Nitida); red mangrove (Rhizophora Mangle); white mangrove (Languncularia Racemosa); and buttonwood (Conocarpus Erecta).

Manufactured home means a structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term ''manufactured home'' does not include a ''recreational vehicle''.

Manufactured home park or subdivision'' means a parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Map means the Flood Hazard Boundary Map (FHBM) or the Flood Insurance Rate Map (FIRM) for a community issued by the Agency.

Mean sea level means, for purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

Mudslide(i.e., mudflow) describes a condition where there is a river, flow or inundation of liquid mud down a hillside usually as a result of a dual condition of loss of brush cover, and the subsequent accumulation of water on the ground preceded by a period of unusually heavy or sustained rain. A mudslide (i.e., mudflow) may occur as a distinct phenomenon while a landslide is in progress, and will be recognized as such by the Administrator only if the mudflow, and not the landslide, is the proximate cause of damage that occurs.

Mudslide (*i.e., mudflow*) *area management* means the operation of an overall program of corrective and preventive measures for reducing mudslide (i.e., mudflow) damage, including but not limited to emergency preparedness plans, mudslide control works, and flood plain management regulations.

Mudslide (*i.e., mudflow*) *prone area* means an area with land surfaces and slopes of unconsolidated material where the history, geology and climate indicate a potential for mudflow.

New construction means, for the purposes of determining insurance rates, structures for which the ''start of construction'' commenced on or after the effective date of an initial FIRM or after December 31, 1974, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, *new construction* means structures for which the *start of construction* commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures.

New manufactured home park or subdivision means a manufactured home park or subdivision for which the construciton of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community.

100-year flood see *base flood*.

Participating community, also known as an *eligible community*, means a community in which the Administrator has authorized the sale of flood insurance.

Person includes any individual or group of individuals, corporation, partnership, association, or any other entity, including State and local governments and agencies.

Policy means the Standard Flood Insurance Policy.

Premium means the total premium payable by the insured for the coverage or coverages provided under the policy. The calculation of the premium may be based upon either chargeable rates or risk premium rates, or a combination of both.

Primary frontal dune means a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

Principally above ground means that at least 51 percent of the actual cash value of the structure, less land value, is above ground.

Program means the National Flood Insurance Program authorized by 42 U.S.C. 4001 through 4128.

Program deficiency means a defect in a community's flood plain management regulations or administrative procedures that impairs effective implementation of those flood plain management regulations or of the standards in §§ 60.3, 60.4, 60.5, or 60.6.

Project cost means the total financial cost of a flood protection system (including design, land acquisition, construction, fees, overhead, and profits), unless the Federal Insurance Administrator determines a given "cost" not to be a part of such project cost.

Recreational vehicle means a vehicle which is:

(a) Built on a single chassis;

(b) 400 square feet or less when measured at the largest horizontal projection;

(c) Designed to be self-propelled or permanently towable by a light duty truck; and

(d) Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Reference feature is the receding edge of a bluff or eroding frontal dune, or if such a feature is not present, the normal high-water line or the seaward line of permanent vegetation if a high-water line cannot be identified.

Regular Program means the Program authorized by the Act under which risk premium rates are required for the first half of available coverage (also known as "first layer" coverage) for all new construction and substantial improvements started on or after the effective date of the FIRM, or after December 31, 1974, for FIRM's effective on or before that date. All buildings, the construction of which started before the effective date of the FIRM, or before January 1, 1975, for FIRMs effective before that date, are eligible for first layer coverage at either subsidized rates or risk premium rates, whichever are lower. Regardless of date of construction, risk premium rates are always required for the second layer coverage and such coverage is offered only after the Administrator has completed a risk study for the community.

Regulatory floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

Remedy a violation means to bring the structure or other development into compliance with State or local flood plain management regulations, or, if this is not possible, to reduce the impacts of its noncompliance. Ways that impacts may be reduced include protecting the structure or other affected development from flood damages, implementing the enforcement provisions of the ordinance or otherwise deterring future similar violations, or reducing Federal financial exposure with regard to the structure or other development.

Risk premium rates mean those rates established by the Administrator pursuant to individual community studies and investigations which are undertaken to provide flood insurance in accordance with section 1307 of the Act and the accepted actuarial principles. ''Risk premium rates'' include provisions for operating costs and allowances.

Riverine means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Sand dunes mean naturally occurring accumulations of sand in ridges or mounds landward of the beach.

Scientifically incorrect. The methodology(ies) and/or assumptions which have been utilized are inappropriate for the physical processes being evaluated or are otherwise erroneous.

Second layer coverage means an additional limit of coverage equal to the amounts made available under the Emergency Program, and made available under the Regular Program.

Servicing company means a corporation, partnership, association, or any other organized entity which contracts with the Federal Insurance Administration to service insurance policies under the National Flood Insurance Program for a particular area.

Sheet flow area— see *area of shallow flooding.*

60-year setback means a distance equal to 60 times the average annual long term recession rate at a site, measured from the reference feature.

Special flood hazard area— see ''area of special flood hazard''.

Special hazard area means an area having special flood, mudslide (i.e., mudflow), or flood-related erosion hazards, and shown on an FHBM or FIRM as Zone A, AO, A1–30, AE, AR, AR/A1–30, AR/AE, AR/AO, AR/AH, AR/A, A99, AH, VO, V1–30, VE, V, M, or E.

Standard Flood Insurance Policy means the flood insurance policy issued by the Federal Insurance Administrator, or an insurer pursuant to an arrangement with the Administrator pursuant to Federal statutes and regulations.

Start of Construction (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97–348)), includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

State means any State, the District of Columbia, the territories and possessions of the United States, the Commonwealth of Puerto Rico, and the Trust Territory of the Pacific Islands.

State coordinating agency means the agency of the state government, or other office designated by the Governor of the state or by state statute at the request of the Administrator to assist in the implementation of the National Flood Insurance Program in that state.

Storm cellar means a space below grade used to accommodate occupants of the structure and emergency supplies as a means of temporary shelter against severe tornado or similar wind storm activity.

Structure means, for floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. *Structure*, for insurance purposes, means:

(1) A building with two or more outside rigid walls and a fully secured roof, that is affixed to a permanent site;

(2) A manufactured home (''a manufactured home,'' also known as a mobile home, is a structure: built on a permanent chassis, transported to its site in one or more sections, and affixed to a permanent foundation); or

(3) A travel trailer without wheels, built on a chassis and affixed to a permanent foundation, that is regulated under the community's floodplain management and building ordinances or laws.

For the latter purpose, ''structure'' does not mean a recreational vehicle or a park trailer or other similar vehicle, except as described in paragraph (3) of this definition, or a gas or liquid storage tank.

Subsidized rates mean the rates established by the Administrator involving in the aggregate a subsidization by the Federal Government.

Substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Substantial improvement means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the ''start of construction'' of the improvement. This term includes structures which have incurred ''substantial damage'', regardless of the actual repair work performed. The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or

(2) Any alteration of a ''historic structure'', provided that the alteration will not preclude the structure's continued designation as a ''historic structure''.

30-year setback means a distance equal to 30 times the average annual long term recession rate at a site, measured from the reference feature.

Technically incorrect. The methodology(ies) utilized has been erroneously applied due to mathematical or measurement error, changed physical conditions, or insufficient quantity or quality of input data.

V Zone—see ''coastal high hazard area.''

Variance means a grant of relief by a community from the terms of a flood plain management regulation.

Violation means the failure of a structure or other development to be fully compliant with the community's flood plain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in §60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

Water surface elevation means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, (or other datum, where specified) of floods of various magnitudes and frequencies in the flood plains of coastal or riverine areas.

Zone of imminent collapse means an area subject to erosion adjacent to the shoreline of an ocean, bay, or lake and within a distance equal to 10 feet plus 5 times the average annual long-term erosion rate for the site, measured from the reference feature.

[41 FR 46968, Oct. 26, 1976]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §59.1, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and on GPO access.

flood plain management criteria established by § 60.3 of this subchapter. Accordingly, this section describes the types of information FEMA needs to recognize, on NFIP maps, that a levee system provides protection from the base flood. This information must be supplied to FEMA by the community or other party seeking recognition of such a levee system at the time a flood risk study or restudy is conducted, when a map revision under the provisions of part 65 of this subchapter is sought based on a levee system, and upon request by the Administrator during the review of previously recognized structures. The FEMA review will be for the sole purpose of establishing appropriate risk zone determinations for NFIP maps and shall not constitute a determination by FEMA as to how a structure or system will perform in a flood event.

(b) *Design criteria.* For levees to be recognized by FEMA, evidence that adequate design and operation and maintenance systems are in place to provide reasonable assurance that protection from the base flood exists must be provided. The following requirements must be met:

(1) *Freeboard.* (i) Riverine levees must provide a minimum freeboard of three feet above the water-surface level of the base flood. An additional one foot above the minimum is required within 100 feet in either side of structures (such as bridges) riverward of the levee or wherever the flow is constricted. An additional one-half foot above the minimum at the upstream end of the levee, tapering to not less than the minimum at the downstream end of the levee, is also required.

(ii) Occasionally, exceptions to the minimum riverine freeboard requirement described in paragraph (b)(1)(i) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood elevation profile and include, but not necessarily be limited to an assessment of statistical confidence limits of the 100-year discharge; changes in stage-discharge relationships; and the sources, potential, and magnitude of debris, sediment, and ice accumulation. It must be also shown that the levee will remain structurally stable during the base flood when such additional loading considerations are imposed. Under no circumstances will freeboard of less than two feet be accepted.

(iii) For coastal levees, the freeboard must be established at one foot above the height of the one percent wave or the maximum wave runup (whichever is greater) associated with the 100-year stillwater surge elevation at the site.

(iv) Occasionally, exceptions to the minimum coastal levee freeboard requirement described in paragraph (b)(1)(iii) of this section, may be approved. Appropriate engineering analyses demonstrating adequate protection with a lesser freeboard must be submitted to support a request for such an exception. The material presented must evaluate the uncertainty in the estimated base flood loading conditions. Particular emphasis must be placed on the effects of wave attack and overtopping on the stability of the levee. Under no circumstances, however, will a freeboard of less than two feet above the 100-year stillwater surge elevation be accepted.

(2) *Closures.* All openings must be provided with closure devices that are structural parts of the system during operation and design according to sound engineering practice.

(3) *Embankment protection.* Engineering analyses must be submitted that demonstrate that no appreciable erosion of the levee embankment can be expected during the base flood, as a result of either currents or waves, and that anticipated erosion will not result in failure of the levee embankment or foundation directly or indirectly through reduction of the seepage path and subsequent instability. The factors to be addressed in such analyses include, but are not limited to: Expected flow velocities (especially in constricted areas); expected wind and wave action; ice loading; impact of debris; slope protection techniques; duration of flooding at various stages and velocities; embankment and foundation materials; levee alignment, bends, and transitions; and levee side slopes.

(4) *Embankment and foundation stability.* Engineering analyses that evaluate levee embankment stability must be submitted. The analyses provided shall evaluate expected seepage during loading conditions associated with the base flood and shall demonstrate that seepage into or through the levee foundation and embankment will not jeopardize embankment or foundation stability. An alternative analysis demonstrating that the levee is designed and constructed for stability against loading conditions for Case IV as defined in the U.S. Army Corps of Engineers (COE) manual, ''Design and Construction of Levees'' (EM 1110–2–1913, Chapter 6, Section II), may be used. The factors that shall be addressed in the analyses include: Depth of flooding, duration of flooding, embankment geometry and length of seepage path at critical locations, embankment and foundation materials, embankment compaction, penetrations, other design factors affecting seepage (such as drainage layers), and other design factors affecting embankment and foundation stability (such as berms).

(5) *Settlement.* Engineering analyses must be submitted that assess the potential and magnitude of future losses of freeboard as a result of levee settlement and demonstrate that freeboard will be maintained within the minimum standards set forth in paragraph (b)(1) of this section. This analysis must address embankment loads, compressibility of embankment soils, compressibility of foundation soils, age of the levee system, and construction compaction methods. In addition, detailed settlement analysis using procedures such as those described in the COE manual, ''Soil Mechanics Design—Settlement Analysis'' (EM 1100–2–1904) must be submitted.

(6) *Interior drainage.* An analysis must be submitted that identifies the source(s) of such flooding, the extent of the flooded area, and, if the average depth is greater than one foot, the water-surface elevation(s) of the base flood. This analysis must be based on the joint probability of interior and exterior flooding and the capacity of facilities (such as drainage lines and pumps) for evacuating interior floodwaters.

(7) *Other design criteria.* In unique situations, such as those where the levee system has relatively high vulnerability, FEMA may require that other design criteria and analyses be submitted to show that the levees provide adequate protection. In such situations, sound engineering practice will be the standard on which FEMA will base its determinations. FEMA will also provide the rationale for requiring this additional information.

(c) *Operation plans and criteria.* For a levee system to be recognized, the operational criteria must be as described below. All closure devices or mechanical systems for internal drainage, whether manual or automatic, must be operated in accordance with an officially adopted operation manual, a copy of which must be provided to FEMA by the operator when levee or drainage system recognition is being sought or when the manual for a previously recognized system is revised in any manner. All operations must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP.

(1) *Closures.* Operation plans for closures must include the following:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists for the completed operation of all closure structures, including necessary sealing, before floodwaters reach the base of the closure.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provisions for periodic operation, at not less than one-year intervals, of the closure structure for testing and training purposes.

(2) *Interior drainage systems.* Interior drainage systems associated with levee systems usually include storage areas, gravity outlets, pumping stations, or a combination thereof. These drainage systems will be recognized by FEMA on NFIP maps for flood protection purposes only if the following minimum

criteria are included in the operation plan:

(i) Documentation of the flood warning system, under the jurisdiction of Federal, State, or community officials, that will be used to trigger emergency operation activities and demonstration that sufficient flood warning time exists to permit activation of mechanized portions of the drainage system.

(ii) A formal plan of operation including specific actions and assignments of responsibility by individual name or title.

(iii) Provision for manual backup for the activation of automatic systems.

(iv) Provisions for periodic inspection of interior drainage systems and periodic operation of any mechanized portions for testing and training purposes. No more than one year shall elapse between either the inspections or the operations.

(3) *Other operation plans and criteria.* Other operating plans and criteria may be required by FEMA to ensure that adequate protection is provided in specific situations. In such cases, sound emergency management practice will be the standard upon which FEMA determinations will be based.

(d) *Maintenance plans and criteria.* For levee systems to be recognized as providing protection from the base flood, the maintenance criteria must be as described herein. Levee systems must be maintained in accordance with an officially adopted maintenance plan, and a copy of this plan must be provided to FEMA by the owner of the levee system when recognition is being sought or when the plan for a previously recognized system is revised in any manner. All maintenance activities must be under the jurisdiction of a Federal or State agency, an agency created by Federal or State law, or an agency of a community participating in the NFIP that must assume ultimate responsibility for maintenance. This plan must document the formal procedure that ensures that the stability, height, and overall integrity of the levee and its associated structures and systems are maintained. At a minimum, maintenance plans shall specify the maintenance activities to be performed, the frequency of their performance, and the person by name or title responsible for their performance.

(e) *Certification requirements.* Data submitted to support that a given levee system complies with the structural requirements set forth in paragraphs (b)(1) through (7) of this section must be certified by a registered professional engineer. Also, certified as-built plans of the levee must be submitted. Certifications are subject to the definition given at § 65.2 of this subchapter. In lieu of these structural requirements, a Federal agency with responsibility for levee design may certify that the levee has been adequately designed and constructed to provide protection against the base flood.

[51 FR 30316, Aug. 25, 1986]

§ 65.11 Evaluation of sand dunes in mapping coastal flood hazard areas.

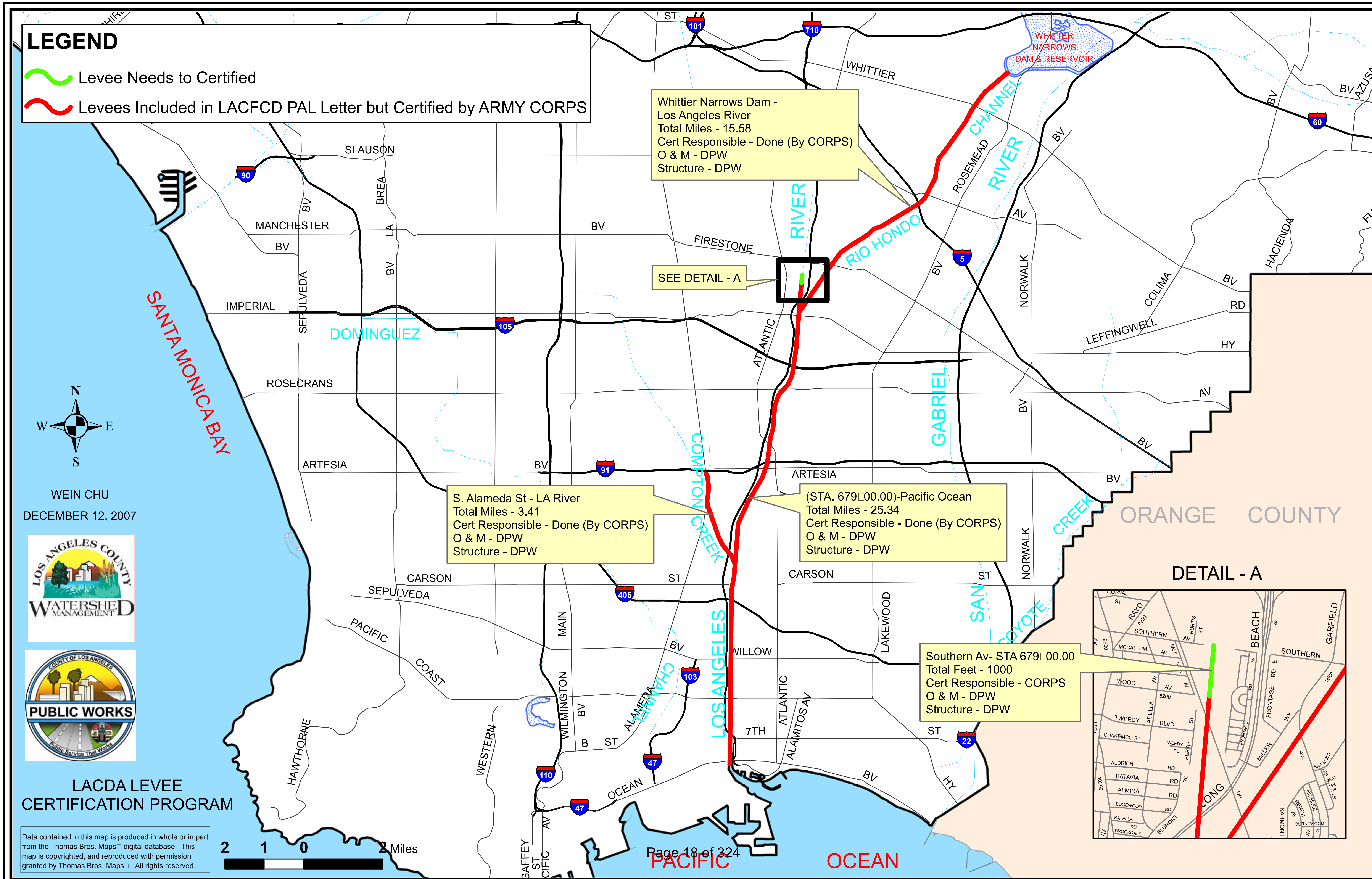
(a) *General conditions.* For purposes of the NFIP, FEMA will consider storm-induced dune erosion potential in its determination of coastal flood hazards and risk mapping efforts. The criterion to be used in the evaluation of dune erosion will apply to primary frontal dunes as defined in § 59.1, but does not apply to artificially designed and constructed dunes that are not well-established with long-standing vegetative cover, such as the placement of sand materials in a dune-like formation.

(b) *Evaluation criterion.* Primary frontal dunes will not be considered as effective barriers to base flood storm surges and associated wave action where the cross-sectional area of the primary frontal dune, as measured perpendicular to the shoreline and above the 100-year stillwater flood elevation and seaward of the dune crest, is equal to, or less than, 540 square feet.

(c) *Exceptions.* Exceptions to the evaluation criterion may be granted where it can be demonstrated through authoritative historical documentation that the primary frontal dunes at a specific site withstood previous base flood storm surges and associated wave action.

[53 FR 16279, May 6, 1988]

<u>Appendix B – Maps of Levee Certification Project Limits</u>



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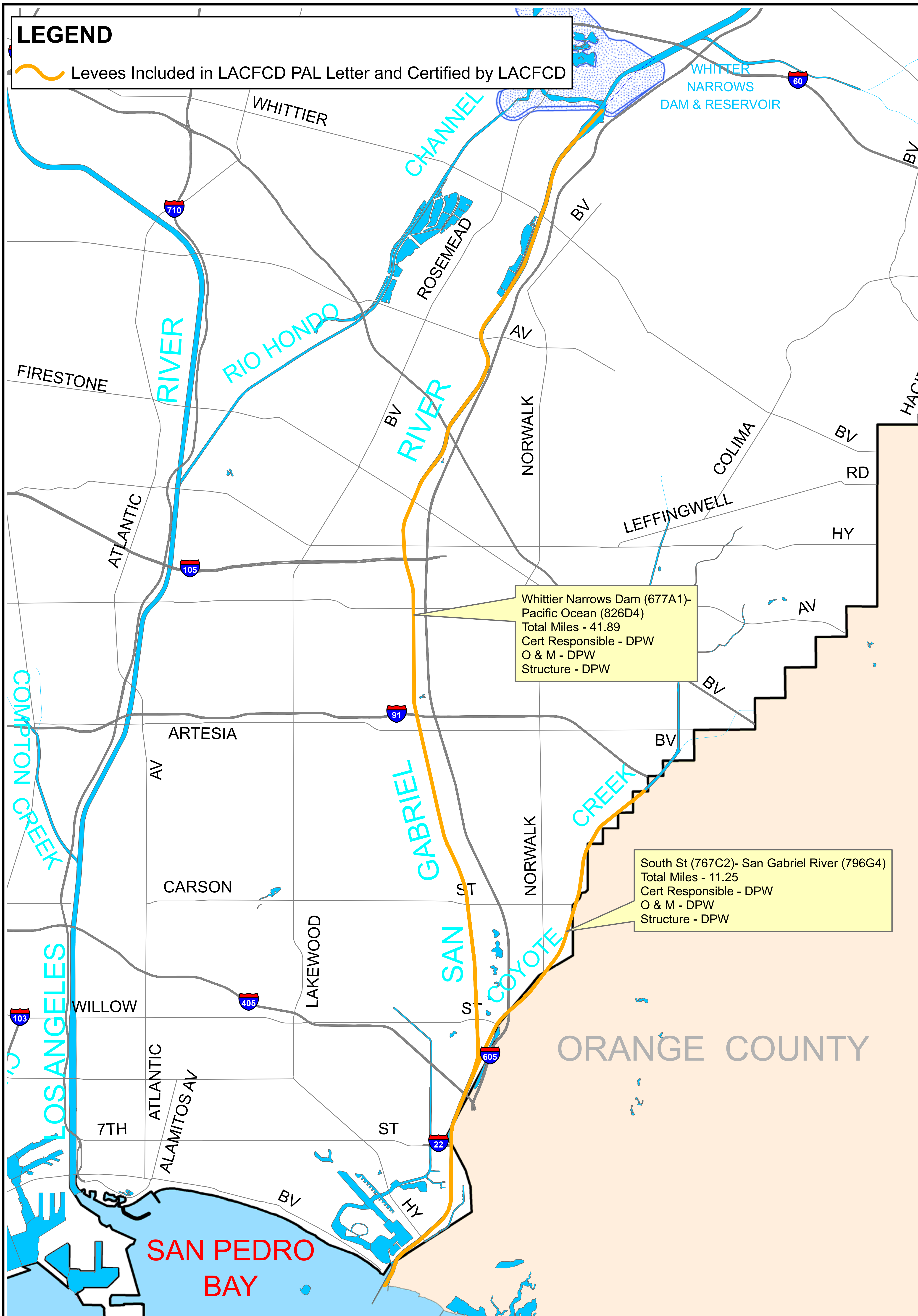

SAN GABRIEL RIVER & COYOTE CREEK
LEVEE CERTIFICATION PROGRAM

PUBLIC WORKS

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WEIN CHU
DECEMBER 12, 2007

N W E S

1 0.5 0 1 Miles

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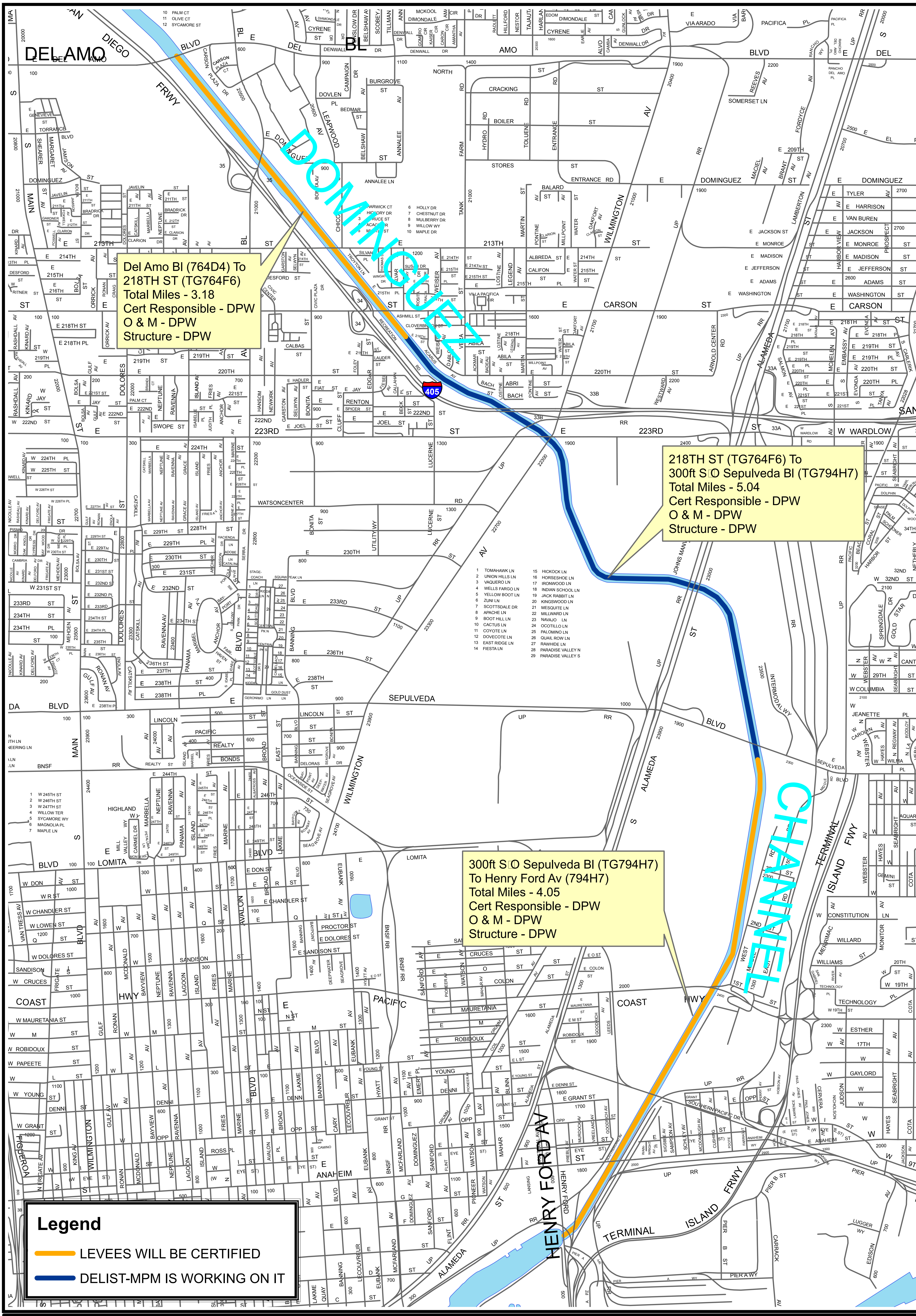


DOMINGUEZ CHANNEL
LEVEE CERTIFICATION PROGRAM

PUBLIC WORKS

0.3 0.15 0 0.3 Miles

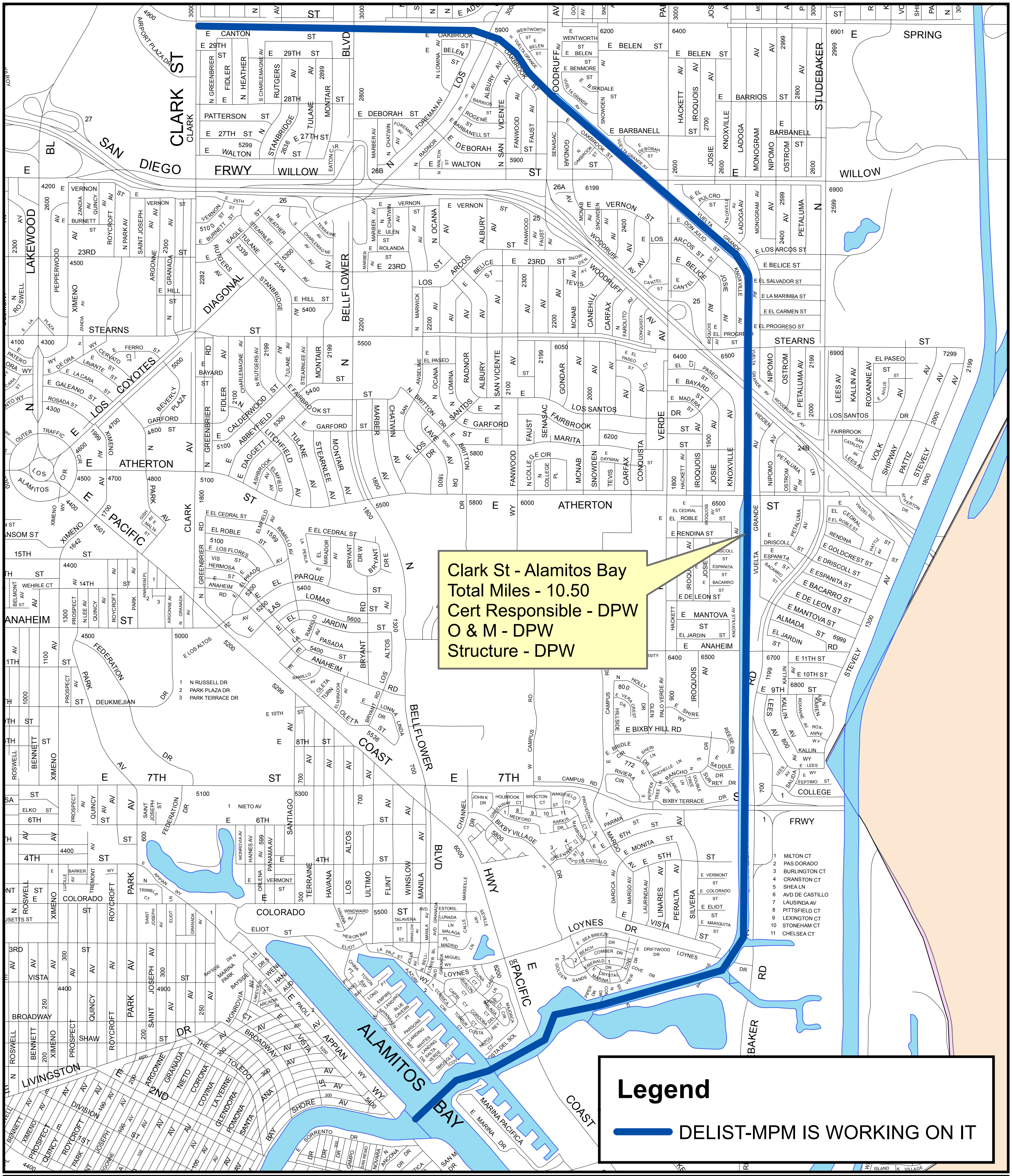
N W E S

LOS ANGELES COUNTY WATERSHED MANAGEMENT

DECEMBER 11, 2007

P: wmpub DATAMANAGEMENT wchu PDF gis Misc Maps Dominguez Channel 12 11 07

WEIN CHU



LOS CERRITOS CHANNEL LEVEE CERTIFICATION PROGRAM

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WEIN CHU
DECEMBER 12, 2007

0.3 0.15 0 0.3 Miles

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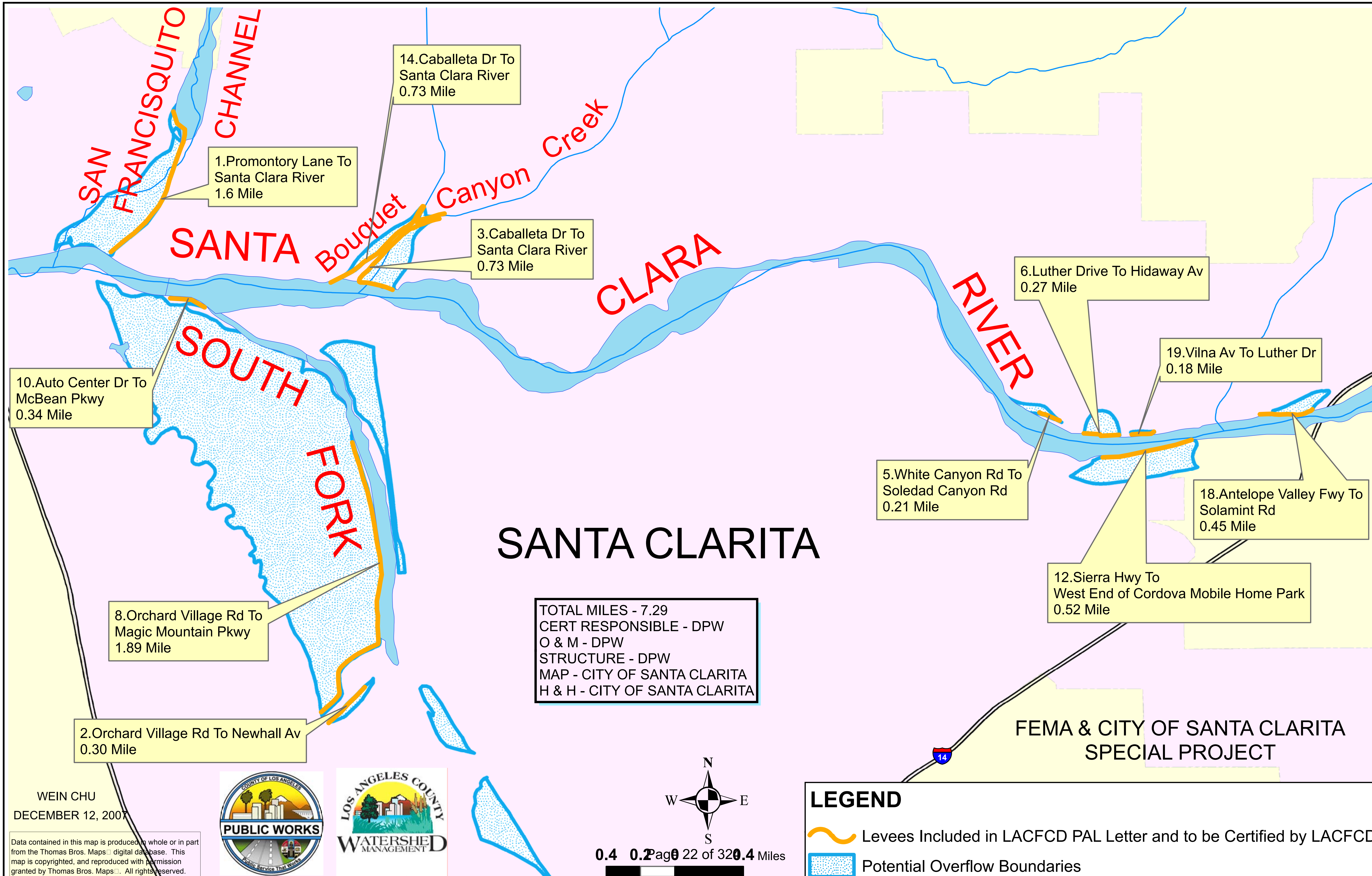
SAN FRANCISQUITO CHANNEL
SANTA CLARA RIVER
Bouquet Canyon Creek
SOUTH FORK
SANTA CLARITA
1.Promontory Lane To Santa Clara River 1.6 Mile
14.Caballeta Dr To Santa Clara River 0.73 Mile
3.Caballeta Dr To Santa Clara River 0.73 Mile
6.Luther Drive To Hidaway Av 0.27 Mile
19.Vilna Av To Luther Dr 0.18 Mile
10.Auto Center Dr To McBean Pkwy 0.34 Mile
5.White Canyon Rd To Soledad Canyon Rd 0.21 Mile
18.Antelope Valley Fwy To Solamint Rd 0.45 Mile
12.Sierra Hwy To West End of Cordova Mobile Home Park 0.52 Mile
8.Orchard Village Rd To Magic Mountain Pkwy 1.89 Mile
2.Orchard Village Rd To Newhall Av 0.30 Mile
TOTAL MILES - 7.29
CERT RESPONSIBLE - DPW
O & M - DPW
STRUCTURE - DPW
MAP - CITY OF SANTA CLARITA
H & H - CITY OF SANTA CLARITA
14
FEMA & CITY OF SANTA CLARITA SPECIAL PROJECT
WEIN CHU
DECEMBER 12, 2007
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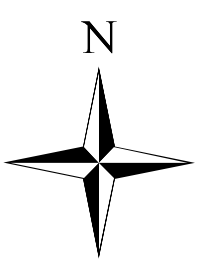
COUNTY OF LOS ANGELES PUBLIC WORKS
LOS ANGELES COUNTY WATERSHED MANAGEMENT
N W E S
0.4 0.2 0 0.4 Miles
Page 22 of 32
LEGEND
Levees Included in LACFCD PAL Letter and to be Certified by LACFCD
Potential Overflow Boundaries

Appendix C Map of FMD Jurisdictional Areas

Field Office Locations

FLOOD MAINTENANCE DIVISION
Field Yards



Legend
- East Area
- South Area
- West Area

Appendix D – FMD Organization Charts

– Staff Position Descriptions

FLOOD MAINTENANCE DIVISION - MAIN OFFICE

June 22, 2009

RUDY LEE	Extension
Asst. Deputy Director	4145

AREA ENGINEER		Phone Number	Extension
Tang, Keith	East Area	(626) 445-7630	6981 or 6982
Pedersen, David	South Area	(562) 861-0316	#6259
Vander Vis, Art	West Area	(818) 896-0594	4381

SECRETARIAL UNIT		Extension
Lozana, Gabriela	Sr. Sec IV	4146
Yueng, Wicky	Sec II	4147
Meyers, Monique	SW	4148

SENIOR CIVIL ENGINEER	Extension
Lacayo, Ron	4114

ENGINEERING UNIT		
Cruz, Jemellee	CE	4147
Rodriguez, Max	Supvg. Cadastral Engineer I	4173
Pelayo, Victor	Sr. CEA	4160
Attia, Fady	Sr. CET	4159

Pham, Scott	SA II	4152
Zifko, Joshua	CESW	4195
Lopez, Dianne	SW	4153

ACCOUNTANT III	
Yan, Bonnie	4162

SAFETY COORDINATOR	Extension
Driggs, Ron	4154

RESOURCE COORDINATOR	Extension
Blanco, Martin	4151

FLOOD MAINTENANCE DIVISION - WEST AREA

September 2, 2009

ART VANDER VIS
AREA ENGINEER

SECRETARIAL UNIT

Lee, Angela	**SEC IV**
Ovasapyan, Silvana	SEC III
Vardanyan, Anita	IC

SUPPORT SERVICES UNIT

CUNG NGUYEN AAE **Sr. Civil Eng.**

ENGINEERING SUPPORT UNIT

RICKARD, KENNETH	**CE**
CHEN, CHIEN-HAO	**ACE**
Alexanderson, Lee	CEA
Khachatrian, Karen	EAIII
Reiter, Eric	CE Tech
Vacant	CE Student

SCHEDULER P□E UNIT

Flores, Jairo	**Sup. CET**
Ahmed, Amr	SR. CE. Tech
Zindroski, Dana	AA II
Spicer, Laban	PWMW
Patpatian Annie	S.W.

ROW INVESTIGATION

BIRO, DOUG	SCEI

Vacant CS — HANSEN

VALDEZ, DAVE	**FCCS**
Eliason, James	***PWCL***
Rodarte, Juan	***PWCL***
Banks, William	UTO
Swan, Fredrick	HTD
Alvarez, Eliseo	PWMW
Nieves-Ordonez, Emilio	PWMW
Gutierrez, Roy	PWL
Avila, Anthony	PWL-Temp
Vacant	HTD

ROSE, PHIL	**FCCS**
Thomas, Marlin	***PWCL***
Mendibles, Jess	PWCL
Hiller, Stephen	PEO
Gaffney, Robert	HTD
Castro, Richard	PWMW
Razo, Arturo	PWMW
Perez, Andres	PWMW
Ochoa, Tony	PWL
Butler, William	PWL
Caldwell, William	PWL-Temp

Martinez, Robert (CS)	PWMW
Mariani, Ed (overhired)	PWMW
Raul Nungaray (Tool Room)	PWMW

Hansen Spreading Grounds

VANDERWIELEN, VICTOI CS — HANSEN

SNIDER, STEVE	**FCCS**
Torres, Maurilio	***PWCL***
D'Ambrosia, Vince	HTD
Martinez, James	PWMW
Miranda, Pete	PWMW
Hauffen, Paul	PWMW
Anastasi, Shannan	PWL-Temp
Vacant	PWMW

Spray Program

Valenzuela, Ed	***PWCL***
Pasco, Dominador	PWMW

Tujunga Spreading Grounds

MIRANDA, BENNY	**FCCS**
Lemos, Ray	***PWCL***
Moncada, Manuel	***PWCL***
Ministeri, James	PEO
Thompson, Joe	HO
Amparan, Rick	HTD
Valdez, Julian	HTD
Villegas, Armando	PWMW
Martinez, Ernie	PWMW
Cabrera, Juan	PWL
Vacant	PWL
Vacant	PWL

PACOIMA DAM

Torres, Joe	DO
Barba, Jose	ADO

Pacoima Spreading Grounds

Lopez Spreading Grounds

MELILLO, PAUL CS — SANTA CLARITA

Verdi, Lindsey	SC
RICE, JOHN	**FCCS**
Yescas, Rigoberto	***PWCL***
Habig, Douglas	PWMW
Vacant	PWMW

Pugh, John	***PWCL***
Williams, Marcel	PWL
Robinson, Mark	PWL

Downing, Daniel	HTD
Mendibles, Eric	HTD
Delgado, Anthony	PEO

LEMUS, MARTY	**FCCS**
O'callaghan, Andy	***PWCL***
Montes DeOca, Luis	PWMW
Duran, Anthony	PWMW

Culver, Lanell	***PWCL***
Nwachuku, Hope	PWMW
Miller, Thomas	PWL

Agriculture Deparment

LAMB, STAN CS — PICKENS

OLIMPIO, MIKE	**FCCS**
Lopez, Paul	***PWCL***
Jacobs, Paul	PWMW
Valencia, Salvador	HTD
May, Stephen	PWMW
Bennett, Blake	PWMW
Young, James	PWMW

BIG TUJUNGA DAM

Gilbert, Bill	DO
Orcutt, Ross	ADO

JOHNSON, RANDY	**FCCS**
Romain, Al	***PWCL***
Phil Horst	***PWCL***
Candelaria, Iggy	PWMW
Murillo,Jose	HTD
Williams, Earl	GGO
Armendariz, Mike	PEO
Jaramillo, Jorge	PWMW
Tejeda, Steve	PWL-Temp

FLOOD MAINTENANCE DIVISION - SOUTH AREA
September 4, 2009

DAVID W. PEDERSEN
AREA ENGINEER

SUPPORT SERVICES UNIT

TER□N, ED	**SCE**

SECRETARIAL UNIT

DIAZ, JULIA	**Sec. IV**
Polk, Lyla	Sec. I
Ibarra, Diana	ITC
Jessica Flores	SW

ENGINEERING SUPPORT UNIT

ORTEGA, DEL	**PCET**
Jason, Kitto	CET
Ibasan, Eduardo	CET

ZARGARYAN, ARAIK	**CE**

FACILITIES ENGINEERING UNIT

LIPKA, STEVE	**ACE**
Deck, Jared	SCEA
Mintier, Gillian	SCEA
Johnson, William	SCEA
Wada, Jenny	SCEA
Naing, Win	CET
Dickerson ***Anthony***	PWCL
Castaneda, Jacob (On Leave)	PWMW
Zifko, Josh (Temp □ HQ)	CESW

P □ E UNIT

GRESHAM, ROBERT	**AAIII**
Jaramillo-Ramirez, Orbel	PWCL
Martinez, Marty	PWMW
Corhiran, Dusadee	CESW

IMPERIAL YARD

SELF, BILLY	**CS**
MALDONADO, EDDIE	**FCCS**
DiMaggio, Vince	PWMW
Underground Crew	
Ayala, Manuel	***PWCL***
Banuelos, David	PWMW
Gudino, Jorge	PWMW
Ramos, Eduardo	PWMW
Delgadillo, Gonzalo	PWMW
Hidalgo, Chuck	PWL
Baker, Michael	***PWCL***
Almader, Orlando	PWMW
Lopez, Anthony	PWMW
Villalobos, Carlos	PWMW
Walton, Lonnie	PWMW

JOHANKNECHT, L	**CS**
ROSS, KENNY	**FCCS**
Spray Crew	
Delgadillo, Jacinto	***ACS***
Bejar, Alfred	PWMW
Cortez, Steve	PWMW
Madlock, Bobby	PWMW
Smith, David	PWMW
Weed Crew	
Ayala, Dagoberto	***PWCL***
Goner, Michael	HTD
Crader, George	PWMW
Manning, Sarah	PWMW
Mendoza, Ernie	PWMW
Pacheco, Ruben	PWMW
Aparicio, David	PWL

FEIKER, DERREL	**CS**
VALLES, JEFF	**FCCS**
Herron, Alex	PEO
Construction crew	
Bell, Wayne	**PWCL**
Vacant	HTD
Barajas, Ruben Jr.	PWMW
Brown, Darryl	PWMW
Garcia, Steve	PWMW
Alcala, Gerardo	PWL
Castaneda, Anthony	PWL
RABAGO, TOM	**FCCS**
Holton, Steve	**PWCL**
Consruction Crew	
Lozano, Edward	HTD
vacant	HTD
Aragon, Henry	PWMW
Elizarraraz, Ernesto	PWMW
Rubio, Oscar	PWMW
Varela, Carlos	PWMW

VELEZ, JASSON	**FCCS**
Garcia, Richard	HPEOP
Pacheco, Robert	HPEOIL
Betancourt, Ernie	PEO
Samano, Tony	**PWCL**
Garcia, Jesus (Jessie)	HTD
Nelson, Chris	HTD
Morales, Albert	PEO
Fence Crew	
Offord, Richard	**PWCL**
Mendoza, Miguel Jr.	PWMW
Sepulveda, Alfredo	PWL-Temp

ALAMITOS SUBYARD

LIMOSNERO, BEN	**FCCS**
Aldrete, Luis Jr.	HSEM
Clase, David	HSEM
Tejada, William	HSEM
Pump Plant Crew	
Valdez, Joaquin	**PWCL**
Clifton, Jeffrey	PWMW
Godinez, Marco	PWMW
Guzman, Richard	PWMW
Kendrick, Ryan	PWMW
West, Eugene	PWMW

RIO HONDO SG

HERRERA, ELIAS	**FCCS**
Orozco, Ignacio	PEO
Martinez, Daniel	HTD
Maint. Crew	
Carrillo, Alfred (Ben)	**PWCL**
Esqueda, Lorenzo	PWMW
Sanchez, Rafael	PWMW
Segovia, Jorge	PWMW
Smith, Antoine	PWL

83RD ST YARD

SARPY, GREG	**CS**
CARR, JEWEL	**FCCS**
McCowan, Karl	PEO
Blas, Ricardo	**PWCL**
Roby, Jerry	HTD
Winston, Jeremy	PWMW
Bowen, David	PWL
Hernandez, Vicente	PWL
Perry, Michael	**PWCL**
Chatman, Victor	HTD
Gibson, Egbert	PWMW
Muniz, Jim	PWL
vacant	PWL

STEPHENSON, MICHAEL	**FCCS**
Jerricks, Mark	PEO
Foster, Marvin	HTD
Pump Plant Crew	
Chavez, Manuel	**PWCL**
Duran, Robert	HTD
Vega, Guillermo	PWMW
Ortiz, Adrian	PWL
Fence Crew	
Staggers, Alfonza	**PWCL**
Hale, Gregory	PWMW
Dizon, Max	PWMW
Low-Flow Crew	
Yager, David	**PWCL**
Reynoso, David	PWMW
Gomez, John	EM
Battle, Robert	PWMW
Thedford, Henry	PWMW

REDONDO SUBYARD

CAUDILLO, STEVE	**FCCS**
Aldape, Paul (DGP)	**PWCL**
Sanchez, Rene	PWMW
McMihelk, Steve (ABP)	**PWCL**
Burciaga, Marco	PWL
Reyes, Ricardo (WCBBP)	**PWCL**
Duarte, Ricardo	PWMW
Merritt, David	PWMW
Batres, Cesar	PWL

FLOOD MAINTENANCE DIVISION - EAST AREA
August 2, 2009

TANG, KEITH
AREA ENGINEER

SUPPORT SERVICES UNIT
WHITE, MARK — SCE

SECRETARIAL UNIT

DIAZ-CASTILLO, MARIA	**SEC IV**
Torres, Sandra (Sec I	SEC III
Otanez, Liliana	ITC

P E UNIT

LONG, MIKE	**ACE**
Edwards, Rick	PCEA
Johnson, Leonard	PWCL
Chaney, David (PWCL	FCCS

FACILITIES ENGINEERING UNIT

ZARGARIAN, EDWARD	***PCEA***
Quach, Yen (PCEA)	ACE
Park, Brian	SCET
Win, Thu	SR CEA (rotation)

ENGINEERING SUPPORT UNIT

ROMO, RYAN	**ACE**
CAMACHO, REBECCA (SCET	PCET
Dao, Hien	SCET
Lomas, Erin (AA III)	SCET
	SW

DRIGGS, RON — CS

Kromka, Frank (PWMW)	PWCL
ANDERSON, RON	**FCCS**
Sanchez, Lloyd	***PWCL***
Escobar, Robert	PWMW
Frias, Raul	PWMW
Johnston, Roger	PEO
Rivera, David	PWL TEMP
Sanchez, Hector	HTD
Fernandez, Octaviano	**FCCS**
Rothwell, Anthony	***PWCL***
Raygoza, Art	***PWCL***
Cox, Ryan	PEO
Gutierrez, Anthony	PWL
McMillon, Howard	PWL
Nieto, Paul	HTD
Palomarez, Ricardo	PWL
Williams, Larry	PWMW

DRILLERS

(Tackett, Brent)	**DS**
Dotzer, Jeff	***DS***
Del Rio, Miguel	SD
Aldrete III, Luis (PWMW)	HTD
Bonam, Wade	D
Bullard, Charles	D
Garcia, Erik	D
Mahle, Gary	PWMW
Mendoza, Marcos	D
Puga, Juan (PWMW)	HTD
Ramirez, Fernando	D
Ramirez, Jose	D
Rodriguez, Louie	D
Torres, Richard	D

EATON DAM

Gonzalez, Richard	DO
Uebersetzig, Joshua	ADO

BRIONES, Robert — CS

MC CRAY, ALBERT	**FCCS**
Moreno, Baltazar	***PWCL***
Margett, Phil (HTD)	UTO
Monroy, Jose	PWL TEMP
Reyes, Armando	PWL
Rico, David	GNO
Tillet, Evan	PWMW
Ulloa, Gilbert	PWMW
MUNSON, LONNIE	***FCCS***
Gonzales, Adam	***PWCL***
Cabrera, Victor	PEO
Contreras, Adrian	PWMW
Gonzales, Vincent	HTD
Kenney, Erin	PWMW
Martinez, Francisco	PWMW
Perera, William	HTD

SPRAY CREW

VILLARRUEL, FERNIE	**ACS**
Baker, Jeremy	PWL
Nelson, Richard	PWMW
Ninke, Jeff	PWMW
Williams, LeErnest	PWMW

SANTA ANITA DAM

Forrester, Darryl	DO
Hightower, Robert	ADO

ROMAIN, ROLAND — CS

FRANCO, Leonel	**FCCS**
Landino, Victor	***PWCL***
Gabriel, Joseph (PWMW	HO
Jaime, Ruben	PWL
Lowther, Lyndon	PEO
Ruiz, Guillermo	PWMW
Snider, Paul	HTD
HOLDERNESS, Bob	**FCCS**
Lavin, Frank	***PWCL***
Chavez, Ray	PWMW
Leos, Bobby (PWMW)	GGO
Wolfe, John	PWMW

UNDERGROUND CREW

PATTEN, KENDALL	**FCCS**
Pardo, David	***PWCL***
Aguilar, Jose	PWMW
Alvarez, Alex	PWMW
Claro, Ignacio	PWMW
De La Rosa, Mike	PWMW
Garcia, Tony	PWMW
Seguin, Michael (PWMW	HTD
Torres, Alberto	PWMW

COGSWELL DAM

Morgan, Steve	DO
Luna, Jose	ADO

MORRIS DAM

Elrod, Gary	DO
McGowan, James	ADO

SAN GABRIEL DAM

Romero, Herbert	DO
Velasco, Benny	ADO
Villegas, Sammy	ADO

BROWN, Stan — CS

GONZALES, MIKE	**FCCS**
Mitchell, Mike	***PWCL***
Gomez, Carlos (PWMW	HTD
Gonzales, Anthony	PWMW
Gonzalez, Eduardo	PWMW
Huezo, Sergio	PWMW
Martinez, David	PEO
Sanchez, Ernie	HTD
KIRKLAND, JAMES	**FCCS**
Ambriz, Manuel	***PWCL***
Bodeman, Robert	PWMW
Higley, Davis (PEO)	HPEO
Navarette, Thomas	PWL
Porcho, Alfred	HTD
Rubio, Francisco	HTD
(Valenzuela, Carlos)	PWL

BIG DALTON DAM

Swenney, Kevin	DO

PUDDINGSTONE DAM

Kehler, Robert	DO

SAN DIMAS DAM

Diaz, Art	DO

Excell/staff chart

09:08:2009

Flood Maintenance Division
Staff Titles and Descriptions

Office Staff

SCE-Senior Civil Engineer or **PCE**-Principal Civil Engineer

Has immediate charge of a major section or several smaller sections of a division with responsibility for a highly complex or extensive engineering function, service, or project or providing engineering oversight and direction to major public works maintenance operation or acts as Flood Maintenance Area Engineer. Assists Assistant Deputy Director. BS in Civil Engineering required, PE required. Experience as a Civil Engineer with the County of Los Angeles or 5 years' experience as a professional civil engineer, including responsible charge of important and complex engineering works, 3 years of which must have been at the level of Los Angeles County's class of Associate Civil Engineer or higher required.

ACE-Associate Civil Engineer or **CE**-Civil Engineer

Performs highly complex and responsible civil engineering research and design or plans and directs major engineering assignments, programs, or projects, involving the large projects which typically cross departmental or divisional lines; may have immediate supervisorial charge of a section(s) with extensive or highly complex engineering responsibility. BS in Civil Engineering required, PE required. Professional engineering experience which includes having responsible charge of important engineering works including their direction, planning and design.

SCEI- Supervising Cadastral Engineer 1

Supervises an engineering unit or section engaged in precise map drafting, surveying analysis and related work. Varying degrees of professional civil engineering experience in the field of map drafting/checking or surveying.

CEA-Civil Engineering Assistant, **SCEA**-Senior Civil Engineering Assistant, or **PCEA**-Principal Civil Engineering Assistant

Under close supervision, assists in the performance of detailed civil engineering work related to the design, location, construction, and maintenance of public works structures, facilities, or projects. Entry Level Position, BS in Civil Engineering required, PE not required.

EA- Engineering Aid III, **CET**-Civil Engineering Technician, **SCET**-Senior Civil Engineering Technician, or **PCET**-Principal Civil Engineering Technician

Performs technical assignments within a specialized segment of a field of engineering or engineering support function. Either EAIII (entry level) experience and/or 2 years of Civil Engineering (or other engineering discipline) college coursework required.

ITC-Information Technology Consultant

Acts primarily as either Information Technology technical or business analyst consultant to the Chief Information Officer and Information Systems division managers in County Departments. BS in Computer Science, or Business Administration or Public Administration with 12 technology-related units and 2 years' experience in a technical, administrative, or advisory capacity dealing with the investigation and solution of complex systems or processing problems in areas such as personnel, budget, legislative, community, or government required.

Sec. 1-4-Secretary 1-4

Acts as secretary to a unit, section, division, or Department official within a County. Experience in computers and typing required.

AA-Administrative Assistant
Analyzes and makes recommendations for the solution of less complex problems of organization, program, procedures, systems, facilities planning, budget and personnel; or analyzes and makes recommendations for the solution of difficult problems in the same areas under supervision and guidance. Degree and/or varying levels of experience as an Administrative Aid, Administrative Trainee, or Personnel Trainee required. 6 months office clerical experience in the County service or 1 year's office clerical experience outside the County service -OR- A certificate or Associate in Arts degree in clerical procedures or office administration from accredited college required.

CESW-Civil Engineering Student Worker or **SW**-Student Worker
Performs sub-professional (civil engineering) duties in order to obtain practical work experience (in the field of civil engineering) while enrolled as a student in an engineering (CESW requirement only) program at an accredited college or university. Current enrollment in an accredited college required. Junior standing in an engineering program leading to an engineering degree required for CESW only.

SC-Supervising Clerk or **IC**-Intermediate Clerk
Performs specialized clerical duties requiring a working knowledge of specialized subject matter and the specialized clerical functions involved and the use of initiative and independent judgment within procedural and policy limits.

SA-Staff Assistant
Assists the manager of major division or bureau in a County department by analyzing and making recommendations for the solution of a variety of problems of organization, budget, procedures, systems, program, general management and personnel. Experience in a general administrative staff or specialized staff capacity analyzing and making recommendations for the solution of problems of organization, systems and procedure, program, facility planning, budget or personnel or experience as an Administrative Assistant I or Staff Assistant I.

Field Staff

CS-Construction Superintendent
Directs through subordinate Flood Control Construction Supervisors the activities of field crews engaged in performing operations maintenance repair and construction work on flood control and water conservation facilities within a designated area of the County. 2 years experience as FCCS required.

FCCS-Flood Control Construction Supervisor
Supervises one or more crews performing operations, inspection, construction, maintenance, or repair of flood control and water conservation structures, facilities or grounds. 2 years experience as PWCL required.

PWCL-Public Works Crew Leader
Oversee and participate in the work of a crew of workers engaged in the inspection, repair, construction, and maintenance of Flood Control and Water Conservation facilities. 2 years experience as PWMW required.

PWMW-Public Works Maintenance Worker
Performs a variety of semi-skilled tasks necessary to inspect, construct, maintain and repair flood control or water conservation facilities. 1 year construction experience required.

PWL-Public Works Laborer
Performs a variety of tasks characterized by heavy manual labor required to maintain, repair and construct flood control or water conservation facilities. Entry level.

HTD-Heavy Truck Driver
Drives single unit trucks with a Gross Vehicle Weight Rating of 26,001 pounds or more. 1 year experience driving trucks with a Gross Vehicle Weight Rating of at least 10,000 pounds required, including experience in operation of trucks with a Gross Vehicle Weight Rating of at least 26,001 pounds.

HSEM-Heavy Stationary Equipment Mechanic
Inspects, maintains and repairs various stationary and mobile emergency electricity generating, water pumping, and other equipment directly or indirectly related to storm water pump stations. Completion of an apprentice training program for automotive mechanics, or 5 of experience in automotive equipment repair, 1 year of which must have been at the journey level and 1 year of experience in the maintenance, diagnosing malfunctions, and repair of electric or electronic controlled engine driven equipment required. Experience must have included the repair of both engine and control systems and must have included repair of diesel engines.

HPEOP-Heavy Power Equipment Operator
Operates a truck crane with attachments such as a clam shell, drag-line bucket, drop hammer, load hook, or iron ball; or an excavator in construction for maintenance and demolition of roads, bridges, channels, basins and related structures. 1 year of experience in the operation of a truck crane of at least 10 - 25 ton capacity, including experience in crane, clam shell, and drag-line operation or 1 year of experience in the operation of gasoline or diesel powered track-laying shovel with shovel, clam shell, or drag-line attachments -OR- 1 year of experience in the operation of a 60,000 - 80,000 pound excavator required.

HPEOIL- Heavy Power Equipment Oiler
Responsible for performing minor adjustments and service on heavy power equipment such as truck cranes. Positions in this class also assist heavy equipment operators, as directed, in the operation of heavy power equipment by guiding the operator and attaching specialized equipment during demolition and maintenance work. A valid California Class B Driver License is required to perform job-related essential functions. Some positions may require a valid California Class A Driver License, and may require special endorsements to drive assigned vehicles.

PEO-Power Equipment Operator
Operates diesel or gasoline powered tracklaying tractors and loaders and non-tracklaying equipment used in the construction and maintenance of roads, trails, parks, channels, and related projects. Tracklaying: 1 year of experience operating tracklaying power equipment such as bulldozers and crawler loaders required. Non-Tracklaying: 1 year of experience operating non-tracklaying power equipment such as motor graders, rollers, and large wheeled loaders required.

UTO-Utility Tractor Operator
Operates a wheel-type tractor equipped with a variety of hydraulically actuated and tractor-powered attachments used in connection with construction and facilities maintenance activities. 1 year of experience in the operation and maintenance of wheel-type tractors and hydraulically actuated and tractor-powered attachments required.

HO-Hoist Operator
Operates hoists on construction, maintenance and repair jobs. 1 year of experience operating hoists in construction, maintenance and repair work including rigging and setting up construction material plants required.

EM-Electro Mechanic
Performs journey-level work in connection with the installation, modification, maintenance and repair of electrical and electro-mechanical equipment. Completion of a recognized electrical mechanic apprentice training program of at least 3 years or 4 years' electrical and mechanical experience in connection with

the installation and repair of heavy duty electrical equipment such as found in generating plants, pumping stations and similar establishments required.

DO-Dam Operator, **ADO**-Assistant Dam Operator

Oversees operation and assists in the maintenance of flood control dams, debris dams and basins, and basins and diversions. Experience in assisting in the operation and maintenance of flood control dams, debris dams and basins, and basins and diversions required.

D-Driller, **DS**-Driller Supervisor

Sets up and operates various drill rigs including auger, bucket, rotary, and diamond core drills and hydraulic boom trucks, grout plants, and related auxiliary equipment. California Class C Driver License is required. Valid certificate as a crane operator from a certifying entity that is accredited by the National Commission for Certifying Agencies (NCCA), for the specific type of crane to perform job-related duties, is required for promotion.

GNO-Gunite Nozzle Operator

Operates a cement gun nozzle and supervises a crew engaged in gunite work. 1 year's experience in gunite work, 6 months of which must have been in the operation of a gunite gun. required 40 hours of structured training in the operation of a gunite gun may be substituted for three months of the required experience operating a gunite gun.

GGO-Gunite Gun Operator

Operates a cement gun for the placing of gunite and assists a nozzle operator with gunite operations. 1 year's experience in work involving machine mixing of concrete or 6 months in gunite work required. 40 hours of structured training in the operation of a gunite gun may be substituted for 3 months of the required experience in gunite work.

Appendix E – Inspection Guidelines

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 18
Levees

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
General	Trash and Debris	1. Trash, litter, or debris totaling five cubic feet or more along 100 lineal feet of levee.	1. Levee free of trash, litter, or debris exceeding 1/2 cubic foot along 100 lineal feet of levee
	Vegetation	2. Unwanted vegetation taller than 18 inches and closer than six inches apart covering 400 square feet along 100 lineal feet of levee.	2. Levee free of nonplanned vegetation taller than 3 inches.
		3. Poison oak within the area of work or access where District personnel might normally be.	3. Access or work area within right of way safe for District personnel.
	Rodents	4. Burrowing rodents digging holes in or along the levee, or along and under the edges of the facing.	4. Levee able to hold basin storage or withstand run-off free of danger of erosion or undermining.
Concrete or Gunite	Structural Damage	5. Cracks 1/8-inch or wider totaling 50 feet in length in a 200-square-foot area or which expose the reinforcing.	5. Levee free of cracks wider than 1/32 inch or which expose the reinforcing.
		6. Erosion, spalling, or chipping which is more than 1-1/2 inches deep and is exposing the reinforcing.	6. Levee facing structurally sound with no exposure of the reinforcing.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 18 Levees

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
Concrete or Gunite	Structural Damage	7. Broken or missing protective facing of six square feet or more which could cause undermining and erosion of the fill.	7. Levee facing in place without danger of erosion or undermining.
	Graffiti	8. Graffiti in amounts exceeding those present within the surrounding community and that is visible to the public.	8. No graffiti present that is visible to the public.
Unlined Earth	Structural Damage	9. Erosion forming ruts or grooves in the levee which have a depth of 1-1/2 feet or 1/10 of the crest or base width, whichever is less.	9. Levee surface uniform and free of ruts or gloves.
Grouted Rock	Structural Damage	10. Eroded or missing grout extending around one or more rocks that exceeds 1/3 of the thickness of the grouted rock	10. Rock securely bedded and in place.
		11. Missing rock that exceeds 1/2 the thickness of the rock fencing.	11. Rock securely bedded and in place to prevent undermining or erosion.
Ungrouted Rock	Structural Damage	12. Any missing facing rock of one square foot or more exposing sub-base or bedding material.	12. Facing rock securely in place without danger of erosion or undermining.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 18
Levees

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
Rock Levees-High Public Use	Trash and Debris	13. Ten pieces of paper, Styrofoam cups, bottles, or containers, etc., that each exceeds six square inches in area within 100 linear feet of levee.	13. Area clear of paper Styrofoam cups, plastic, etc., that exceed three square inches in area.
		14. Ten pieces of any debris of color that contrasts with the background area that each exceeds three square inches in area within 100 linear feet of levee.	14. Area clear of debris of contrasting color that exceeds three square inches in area.
		15. Wood and other trash that exceed 1 cubic foot in 100 linear feet of levee.	15. Area clear of trash exceeding 1/8 cubic foot per 100 linear feet of levee.
	Glass	16. Broken glass that is a safety hazard to the public.	16. Area clear of broken glass.
	Dead Animals	17. Complaints of odors or health hazards caused by dead animals, etc., that exceed 1/2 cubic foot in area per 100 linear feet of levee.	17. Area clear of dead animals.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 33
Walls and Soffit-Channels and Storm Drains

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
General	Movement	1. Movement that has displaced the soffit or wall more than 3 inches from line or grade for a distance of 20 feet.	1. Soffit and wall in place and structurally sound.
	Graffiti	2. Graffiti, visible to the public, in amounts exceeding those present within the surrounding community.	2. No graffiti present that is visible to the public.
	Safety hazard	3. Dangerous gases exceeding safety standards in work areas.	3. No dangerous gases in work areas when personnel are present.
Concrete	Structural damage	4. Cracks wider than 1/4 inch that total more than 50 feet in length along 100 linear feet of drain.	4. Walls and soffit structurally sound.
		5. Chipping or spalling that is more than 2 inches deep or which exposes the reinforcing steel over an area of more than 8 square feet.	5. No exposure of reinforcing steel or damage larger than 1/4 inch deep and 4 inches in diameter.
		6. Chipping or spalling along an expansion joint or edge which is more than 1 inch deep and 8 square feet in area.	6. No chipping or spalling larger than 1/4 inch deep and 4 inches in diameter.
		7. Missing expansion joint material or separation at joint which permits passage of filter or backfill material.	7. Expansion joint permitting no passage of filter or backfill material.
		8. Void behind channel wall greater than 5 cubic feet.	8. No void behind channel wall.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 33
Walls and Soffit-Channels and Storm Drains

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
	Vegetation	9. Vegetation growing in expansion joints.	9. No vegetation in expansion joints.
Grouted Rock	Loose or Missing	10. See AMC MS No. 18 "Levees".	
Vegetation	General	11. Build-up of vines and brush on channel wall fencing or in channel that exceeds 24 inches in thickness on the channel side of the fence.	11. Vines and brush less than 4 inches thick on the channel side of the fence.
	Hazardous Conditions	12. Vines or growth growing down channel walls onto the invert for a total distance of 50 feet along 500 lineal feet of channel.	12. No vines or growth on channel walls as high above invert as is possible using work method specified.
		13. Brush or tree limbs 1 inch or less in diameter hanging into the channel below one-half the height of channel. Tree limbs greater than 1 inch in diameter hanging more than 2 feet below the top of the channel wall.	13. No brush or tree limbs hanging below top of channel wall fence, or channel wall if no fence.
	Rodents	14. Complaints of rodents living in overgrowth on District property and are a nuisance or health problem to adjacent property owners.	14. No rodents present in overgrowth.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 15
Inverts-Channels and Storm Drains

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
General	Trash, litter, and debris (not including silt, sand, gravel, etc.)	1. Any single item of trash or debris that exceeds 1/3 of the area of an opening into an underground system (open channels that drain into an underground system).	1. Invert basically free of large pieces of trash.
		2a. Complaints of trash, litter, or debris that is unsightly or causes unpleasant odors noticeable outside the Department right of way.	2a. Invert free of excessive unsightly material or unpleasant odors outside Department right of way.
		2b. Clean invert once yearly to meet maintenance standards as required under BMP (FM) No. 3.	2b. Invert free of trash, litter or debris.
	Debris consisting of silt, sand, gravel, etc.	3. Debris that blocks more than 10 percent of the channel capacity that normal storm season flows will not remove.	3. Invert capable of carrying maximum flow.
	Vegetation	4. Vegetation more than 6 inches high growing through cracks or expansion joints.	4. Cracks or joints essentially free of vegetation.
	Ponded Water	5. Complaints of ponded water that causes unpleasant odors noticeable outside the Department right of way.	5. Invert free of unpleasant odors that are noticeable outside Department right of way.
		6. Boat, raft, or inner tubes, etc., which would be a public nuisance and safety	6. No non-Department floating devices present.

ACCEPTABLE MAINTENANCE CONDITIONS
AND MAINTENANCE STANDARDS

No. 15
Inverts-Channels and Storm Drains

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
		hazard.	
	Insects	7. Insects which cause a nuisance outside Department right of way.	7. Presence of insects at an acceptable level outside Department right of way.
	Trapped or dead animals	8. Dead animals attracting insects or causing unpleasant odors which are detectable outside of the Department right of way in residential areas.	8. Invert free of trapped or dead animals.
	Pollution	9. Any noticeable oil, gas, or other pollution that exceeds 5 gallons or any amount that could be a hazard to plant, animals, or marine life, or constitute a fire hazard.	9. Invert free of oil, gas, or other pollution.
Concrete or Gunite channel	Erosion or Spalling	10. Erosion or spalling that exposes more than 3 or more reinforcing steel bars within a two square feet area.	10. No critical exposure or reinforcing steel.
	Cracks	11. Cracks more than 3/8 inch wide that go completely through the concrete more than 6 inches thick.	11. Invert free of cracks wider than 1/8 inch.
		12. Cracks more than 1/4 inch wide that go completely through the concrete less than 6 inches thick.	12. Invert free of cracks wider than 1/8 inch.

ACCEPTABLE MAINTENANCE CONDITIONS
AND MAINTENANCE STANDARDS

No. 15
Inverts-Channels and Storm Drains

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
	Settlement or Movement	13. Movement or settlement that has displaced the invert facing more than 1 inch from line and grade.	13. Invert securely bedded with facing flush to within 1/4 inch.
Grouted Rock	Erosion or Missing Rock	14. Eroded or missing grout extending around 1 or more rocks that exceeds 1/3 of the thickness of the grouted rock.	14. Rock securely bedded and in place.
		15. Missing rock that exceeds 1/2 the thickness of the rock facing.	15. Rock securely bedded and in place to prevent undermining or uplifting.
	Settlement or Movement	16. Abrupt movement or settlement that has displaced the invert facing more than 3 inches from line and grade.	16. Invert securely bedded with facing flush to within 1/2 inch.
Unlined or soft bottom	Obstruction[1]	17. Trees or shrubs with a main trunk diameter of more than 1-1/2 inches growing in the watercourse.	17. Invert free of obstructing trees and shrubs.
		18. Vegetation or debris that blocks 1/5 of the height of the channel measured from the design invert elevation to the top of the channel.	18. Invert capable of carrying maximum flow.
Asphalt	Erosion	19. Erosion more than 1 inch deep over an area of more than 6 square feet.	19. Invert facing flush to within 1/4 inch.

[1] Soft bottom channels covered by agreement with Fish and Game are to conform to the terms of the agreement.

ACCEPTABLE MAINTENANCE CONDITIONS
AND MAINTENANCE STANDARDS

No. 15
Inverts-Channels and Storm Drains

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
	Cracks	20. Cracks wider than 1/4 inch that total more than 20 feet in length within an area of 400 square feet or condition of similar magnitude.	20. Invert facing free of cracks wider than 1/8 inch.
	Settlement or Movement	21. Same as for concrete or gunite.	
Low-flow curb	Vegetation	22. Vegetation growing in joints between curbs and invert surface that is more than 6 inches tall and is continuous for a distance of more than 200 feet.	23. Joints basically clear of vegetation and root growth.
	Erosion	23. Missing curb which does not confine water within prescribed low-flow area.	24. Curb unbroken to confine water within low-flow area.
		24. Leaking curb that permits odor or insect problem.	25. Curb confining water to low-flow area.
Low-flow channel	Trash, debris, or silt	25. Trash, debris, or silt that causes water to go out of low-flow channel.	26. Water contained in low-flow channel.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 14
Inlet or Outlet Structures

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
General	Trash and Debris	1. Trash and debris that blocks the inlet or outlet more than 1/4 the height or diameter of the inlet or outlet.	1. Inlet or outlet clear of trash and debris.
	Rodents or Burrowing Animals	2. Holes, caused by burrowing animals.	2. Area adjacent to structure free of holes and burrowing animals.
	Erosion	3. Erosion around the wing walls or headwalls that could cause undermining or settlement.	3. Structure in place free of undermining.
	Settlement or Movement	4. Settlement or movement that has dropped or uplifted the structure facing or base more than 3 inches.	4. Structure firmly bedded in place.
	Vegetation	5. Vegetation 18 inches tall and closer than 2 feet apart located on the apron or within 15 feet of the structure.	5. Area within 15 feet of the structure free of vegetation taller than 2 inches.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 14
Inlet or Outlet Structures

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
Concrete	Structural Damage	6. Part of the structure that is cracked, chipped, broken off, or spalled more than 2 inches deep and 6 inches in diameter.	6. Structure free of damage more than 1/4 inch deep and 2 inches in diameter.
	Graffiti	7. Graffiti in amounts exceeding those present within the surrounding community and that is visible to the public.	7. No graffiti present that is visible to the public.
Rock or Masonry	Structural Damage	8. Any missing or loose rock or block section of the structure.	8. Inlet or outlet structurally sound with all rock or block sections in place.
Metal	Worn or Deteriorated	9. Eroded, rusted, or worn conditions that affect the structural adequacy of that inlet or outlet.	9. Structurally adequate inlet or outlet in place.

ACCEPTABLE MAINTENANCE CONDITIONS AND MAINTENANCE STANDARDS

No. 12

Flap Gates

Subcomponent or Type	Defect	Description of AMC Deficiency	Description of Maintenance Standard
General	Loose, Bent, Broken or Missing Parts	1. Loose anchor bolts.	1. Anchor bolts securely in place.
		2. Missing, broken, or bent frame or parts that prevent the gate from functioning properly.	2. Gate and frame structurally sound and functioning properly.
		3. Flap gate "frozen" and not able to open or close freely.	3. Flap gate able to open and close freely.
	Trash or Debris	4. Trash or debris that prevents the gate from opening or closing properly.	4. Flap gate able to open and close freely.
	Graffiti	5. Graffiti in amounts exceeding those present within the surrounding community and that is visible to the public.	5. No graffiti present that is visible to the public.

Appendix F Standard Procedures

Appendix F-1: Channel Invert Cleaning

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 002

CHANNEL INVERT CLEANOUT - MANUAL OPERATIONS

Introduction

This standard procedure is to be used to remove large pieces of debris such as tree stumps, bedsprings, shopping carts, trash cans, etc. from the channel invert. The work is to be done by hand with the crew moving down the channel invert or down access roads and loading the debris onto the truck.

Crew Members Needed

(1) HTD
(1) PWCL
(1) PWL

Equipment Needed

3 cubic yard dump truck or stake bed truck with Standard Tool and Material Issue

Materials Needed

Amount	Type
5 gallons	Gas (premixed with oil)
1 quart	Oil, Chain
50 feet	Rope, Manila Hemp, 1/2 -inch

Tools Needed

Amount	Type
1	Saw, Chain
1	Blade, Chain, Saw (extra)
2	Shovels, Square Nose
2	Pitch Forks
1	Broom, Outside Push, 18-inch Block

Procedure

1. Drive truck along access road or channel invert and load large items of trash or debris into truck.

1. Haul trash to authorized dump when truck is full. Check with supervisor for dump location for each channel.

2. Report any AMC deficiencies to supervisor by the end of the day.

NOTE:

Use this procedure along with Standard Procedure No. 38 if mechanical lift assistance is required.

BEST MANAGEMENT PRACTICES (BMPS)
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Conduct tailgate on applicable regulatory permits.
$ Check chain saw for leakage before use.
$ Place spill containment pans under trucks when not in operation.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 031

CHANNEL INVERT CLEANOUT - USING A BOBCAT TYPE LOADER AND TRUCK CRANE

Introduction

This procedure is to be used in shallow trapezoidal channels not exceeding six feet in depth. The bobcat loader pushes and carries debris to the truck crane which loads the material in dump trucks for disposal. Activities such as trash and debris removal will be conducted in compliance with the Department's Storm Water Pollution Prevention Plan and National Pollutant Discharge Elimination System (NPDES) permit requirements.

Crew Members Needed

(1) FCCS
(2) PEO
(3) HTD
(2) PWMW

Equipment Needed

Amount	Type
1	Bobcat Loader
1	Truck Crane
1	Tilt Bed Trailer
2	10-cubic-yard Dump Truck

Tools Needed

Amount	Type
1	Bar, digging
1	Pruning Shears
1	Docking Saw
2	Shovel, square point, long handle
2	Shovel, weep hole
2	Hoes, planter with handle

Tools Needed(Cont□d.)

Amount	Type
2	Slings, cable, 10 feet long
2	Signs, traffic, hand, stop/slow
6	Traffic Cones, 36-inch
2	Signs, AMen and Equipment Working@

Materials Needed

Amount	Type
1	Sanitary Fill Charge Plate
10 pounds	Rags, wiping

Note: Lubricants and fuels for equipment to be ordered by operators as needed.

Procedure

1. Bobcat loader is placed in channel with truck crane. See California Best Management Practice (BMP) Handbook category CA12 - Spill Prevention and Control for guidance on preventing storm water pollution from leaking vehicles or maintenance of vehicle near storm water source.
2. Clean weep holes with weep hole shovel ahead of loader.
3. Bobcat stockpiles debris from bridge to bridge. Consult California Storm Water Best Management Practice Handbook, BMP categories CA20, CA21 - Solid Waste Management and Hazardous Waste Management respectively, for guidance on preventing storm water pollution generated from debris and trash.
4. Truck crane removes stockpiled material from channel and loads into dump truck. Utilize traffic signs and cones when working in flow of traffic.
5. Haul debris to authorized landfill or approved disposal site. Consult supervisor for location of landfill or approved disposal site.
6. Bobcat is to be removed from channel at the end of each working day.
7. Supervisor is responsible for parking and security of all equipment at the end of each day.
8. Loader is transported to and from job site on equipment trailer towed by the 10 cubic yard dump truck assigned to the job.
9. Report AMC deficiencies to supervisor by the end of the day.

Special Instructions

Permits are to be obtained for hauling on streets posted for restricted weight and/or travel on hauling route. Remove excessive mud from exterior of trucks before entering public roads and highways.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos.: ESC1, ESC2, CA12, CA20, CA21, CA30

* Identify and record illicit connections to channels, storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of illicit connections and implement the Illicit Connection/Illicit Discharge procedures as applicable.
* Report dumping or illicit discharge to an immediate supervisor or call 1(888) CLEAN LA.
* Report Illegal dumping of non hazardous waste to Planning and Estimating Unit. Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in public book case at all FMD field yards.
* Place spill containment pans under trucks and loader when not in operation.
* Remove all tools, equipment and project generated garbage before leaving.
* Report the amount of debris and/or green waste removed on a MMS work order.
* Remove excessive mud from loader and trucks before entering public roads and highways.
* Conduct tailgate on applicable Best Management Practices and regulatory permit requirements.
* For improved channel invert cleanouts where the debris is too wet to haul to a landfill dumpsite, place debris in small piles inside channel ensuring low flow is diverted away from the pile. Remove debris within 24 hour.
* Debris that cannot be dried in small piles inside the channel should be placed in an impervious area with the appropriate BMP=s in-place to prevent sediment transfer by wind, rain or leaching. Remove debris within 24 hours.

$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Conduct tailgate on applicable regulatory permits.
$ Check chain saw for leakage before use.
$ Place spill containment pans under trucks when not in operation.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 032

CHANNEL INVERT CLEANOUT USING MOTOR GRADER

Introduction

This standard procedure is to be used on channels with wide inverts, high overcrossings, and invert access. The grader is to windrow the debris for removal by the skip loader and dump truck. The channel invert cleanout will be conducted in compliance with the Department's Storm Water Pollution Prevention Plan and the National Pollutant Discharge Elimination System (NPDES) permit requirements.

Crew Members Needed

(1) FCCS
(2) PEO
(2+) HTD

Equipment Needed

Motor Grader

Skip Loader, rubber tire

Tilt Bed Trailer

10-cubic-yard Dump Truck, minimum of 2 (number of trucks is determined by hauling time to dump site)

Tools Needed

Amount	Type
1	Pruning Shears
1	Docking Saw
2	Shovel, square point, long handle

Note: Lubricant for equipment is ordered by operator as needed.

Materials Needed

Amount	Type
50 gals./day	Diesel
20 gals./day	Gasoline
10 lbs.	Rags, wiping

Procedure

1. Windrow debris to the side walls with the motor grader. Ensure motor grader is not leaking engine oil or other fluids that may contaminate storm water. See California Best Management Practice (BMP) Handbook category CA12 - Spill Prevention and Control for guidance on preventing storm water pollution from leaking vehicles or maintenance of vehicles near storm water source.

2. Stockpile debris and load onto dump trucks with skip loader. Consult California Storm Water Best Management Practice Handbook, BMP categories CA20, CA21- Solid Waste Management and Hazardous Waste Management respectively, for guidance on preventing storm water pollution trash and debris.

3. Haul debris to authorized landfill or approved disposal site. Consult with supervisor for location of landfill or approved disposal site.

4. Report any AMC deficiencies or hazards, and potential sources of storm water pollution to supervisor by end of day.

Special Instruction

Obtain hauling permits for the use of streets with limited or restricted hauling weight on the hauling route to the dump site. Remove excessive mud from trucks, loader, and trailer before accessing public roads and highways.

<u>STORM WATER POLLUTION PREVENTION PLAN (SWPPP)</u>
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

* Identify and record illicit connections to channels, storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of illicit connections and implement the Illicit Discharge/Illicit Connection procedures as applicable.
* Report dumping or illicit discharge to an immediate supervisor or call 1 (888) CLEAN LA.
* Report illegal dumping of non hazardous waste to Planning and Estimating Unit. Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in the public book case at all FMD field yards.
* Check equipment and tools for leaks before use.
* Place spill containment pans under trucks when not in operation.
* Cover stockpile debris with tarp. Remove all stockpile debris within 24 hours.
* Report the amount of debris and/or green waste removed on a MMS work order.
* Remove excessive mud from loader, trucks, grader, and trailer before accessing public roads and highways.
* Schedule cleanouts and other maintenance activities during dry weather only.
* Do not wash trucks and other vehicles in the channel.
* Conduct Tailgate on applicable Best Management Practices and permit requirements.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 036

CHANNEL INVERT CLEANOUT USING A D-8 DOZER

Introduction

This procedure is to be used for the clearing of large unlined riverbeds (dirt inverts). The dozer is to scrape up weeds and debris and bury it while rough grading the channel invert.

Crew Members Needed

(1) PEO
(1) PWMW

Equipment Needed

Dozer, D-8 or similar, with fully equipped tool box trailer
Tilt Bed Trailer
Pickup Truck

Tools Needed

None

Materials Needed

Amount	Type
50 gals./day	Diesel

Procedure

1. The pickup truck is used to tow the tool box trailer for the heavy equipment and to haul the daily fuel for the dozer.

2. The dozer is used to tow the tool box trailer for the heavy equipment and to haul the daily fuel for the dozer.

3. Report any AMC deficiencies to supervisor by the end of the day.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 037

CHANNEL INVERT CLEANOUT USING THE EIMCO LOADER OR A SMALL DOZER AND A TRUCK CRANE

Introduction

This standard procedure is to be used for small channels with height and width restrictions where a standard skiploader cannot operate. The more compact EIMCO loader or small dozer will haul and stockpile the debris at locations convenient for the truck crane to load the trucks.

Crew Members Needed

(1) FCCS
(1) PWMW
(2) HTD
(3) PEO
(1) PWL

Equipment Needed

10-yard dump truck (2 minimum, number of trucks depends on the length of the haul)
EIMCO loader 911, skid steer loader, or a small dozer (D-3 or D-4 size).
Tilt Bed Trailer
Truck Crane with 3/4-Cubic Yard Bucket without Teeth

Tools Needed

Amount	Type
3	Shovels, Square Point, Long Handle
2	Signs, Traffic, Hand, Stop-Slow
2	Shovels, Weep Hole
2	Hoes, Planter with Handle
2 pairs	Slings, Cable, 10-Feet long
6	Traffic Cones, 36 Inch
1	Sign, AMen and Equipment Working@

Materials Needed

Amount	Type
1	Sanitary Fill Charge Plate
10 lbs.	Rags, Wiping
50 gals./day	Diesel Fuel, Automotive

Note: Lubricant for equipment is ordered by operator as needed.

Procedure

1. The EIMCO loader or small dozer is to be transported to and from the jobsite on the trailer towed by a dump truck assigned to the job.

3. Place the loader or dozer into the channel with the truck crane.

4. Clean weep holes with weep hole shovel ahead of the loader or dozer.

5. The loader or dozer is to stockpile debris at the bridge overcrossings or other locations convenient for the truck crane.

6. The truck crane is set up at each bridge or area where debris is stockpiled and load it onto the dump trucks. Place safety and/or traffic cones when working in or near the flow of traffic.

7. Haul the debris to an authorized dump. Check with Supervisor for dump site location for each channel.

8. The loader or dozer is to be removed from the channel at the end of each working day by the truck crane.

9. The Supervisor is responsible for the parking and security of all equipment at the end of each day.

10. Report any deficiencies to the Supervisor at the end of the day.

Special Instructions

Obtain a hauling permit for streets along the haul route to the dump site, which have a restricted hauling weight or travel time.

BEST MANAGEMENT PRACTICES (BMP□S)
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Place spill containment pans under trucks when not in operation.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
$ Conduct tailgate on applicable regulatory permits.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 038

CHANNEL INVERT CLEANOUT USING A SKIP LOADER

Introduction

This standard procedure is to be used for channels with invert access ramps, no overcrossings to restrict the operation of a skip loader and with an invert that is readily passable by a loaded dump truck. A 10-cubic yard dump truck is sufficient for hauling.

Crew Members Needed

(1) FCCS
(1) PWCL
(1) PEO
(1) PWL
(1) HTD

Equipment Needed

Skip Loader, Rubber Tire
10-yard dump truck (2 minimum, number of trucks depends on the length of the haul)
Pickup Truck
Tilt Bed Trailer

Tools Needed

Amount	Type
2	Shovels, Square Point, Long Handle

Materials Needed

Amount	Type
15 gals./day	Gasoline
2 lbs.	Rags, Wiping
1	Sanitary Fill Charge Plate

Note: Lubrication is ordered by operator as needed.

Procedure

1. The loader is to be transported to and from the jobsite on a tilt bed trailer towed by the dump truck assigned to the job.

11. The loader is to stockpile debris and load it onto the dump trucks.

12. Haul the debris to an authorized dump. Check with superintendent for dump location for each channel.

13. The Supervisor is responsible for the parking and security of all equipment at the end of the day.

14. Report any deficiencies to the Supervisor at the end of the day.

Special Instructions

Obtain a hauling permit for streets along the haul route to the dump site which have a restricted hauling weight or travel time.

BEST MANAGEMENT PRACTICES (BMPS)
California Storm Water Best Management Handbook
BMP Category Nos CA12, CA20, CA21, CA30

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Place spill containment pans under trucks when not in operation.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
$ Conduct tailgate on applicable regulatory permits.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 039

CHANNEL INVERT CLEANOUT USING EIMCO CLASS LOADER, SKIPLOADER, AND TRUCKS

Introduction

This procedure is used where there is an invert access ramp but travel in the invert is restricted by low overcrossings. This procedure should be used when the overcrossing clearances are between 5 feet and 8 feet, and the channel invert to be cleaned is less than 2000 feet long. The channel invert cleanout will be conducted in compliance with the Department's Storm Water Pollution Prevention Plan and the National Pollutant Discharge Elimination System (NPDES) permit requirements.

Crew Members Needed

(1) HTD
(1) PEO
(1) PWMW

Equipment Needed

EIMCO Loader or skid steer loader
Skiploader
5 cubic yards or 10 cubic-yards dump truck - One truck minimum. Number of trucks is determined by the haul time to dump site.
Tilt Bed - For transporting the loader

Tools Needed

Amount	Type
3	Shovels, Square Point with Long Handle
1	Signs, Traffic, Hand, Stop-Sign
1	Shovel, Weep Hole
1	Hoes, Planter with Handle

Materials Needed

Amount	Type
5 lbs.	Rags, Wiping
25 gals./day	Diesel Fuel
25 gals./day	Gasoline

Note: Lubricants, filters, etc., are to be ordered by operator of equipment as needed.

Procedure

1. Loaders are transported to and from jobsite on tilt bed trailer towed by dump truck assigned to job.

2. Position skip loader and dump truck for loading debris. Ensure skip loader and dump truck are not leaking oil and other fluids that may pollute storm water. See California Best Management Practice (BMP) Handbook category CA12 - Spill Prevention and Control for guidance on preventing storm water pollution from leaking vehicles or maintenance of vehicles near storm water source.

3. Eimco loader clears and stockpiles debris for skip loader to load the truck. Consult California Storm Water Best Management Practice Handbook's, BMP categories CA20, CA21 - Solid Waste Management and Hazardous Waste Management respectively, for guidance on preventing storm water pollution generated from debris and trash.

4. Equipment operator operates both the Eimco loader and skip loader.

5. Haul debris to authorized landfill or approved disposal site. Consult with supervisor for location of landfill or disposal site.

6. Supervisor is responsible for the parking and security of all equipment at the end of the work day.

7. Report any AMC deficiencies to supervisor by the end of the day.

Special Instructions

Permits are to be obtained for hauling on streets posted for restricted weight and/or truck travel on hauling route.

<u>STORM WATER POLLUTION PREVENTION PLAN (SWPPP)</u>
California Storm Water Best Management Handbook
BMP Category Nos.: ESC1, ESC2, CA12, CA20, CA21, CA30

* Identify and record illicit connections to channels, storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of illicit connections and implement the Illicit Connections/Illicit Discharge Procedures as applicable.
* Report dumping or illicit discharge to an immediate supervisor or call 1 (888) CLEAN LA.
* Report Illegal dumping of non hazardous waste to Planning and Estimating Unit. Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in the public book case at all FMD field yards.
* Place spill containment pans under trucks and loaders when not in operation.
* Remove all tools, equipment and project generated garbage before leaving.
* Removed excess mud from loaders, trucks and trailers before accessing public roads and highways.
* Conduct tailgate on applicable Best Management Practices and regulatory permit requirements.
* Schedule cleanouts (other than emergency cleanouts) for dry weather conditions only.
* Record debris and\or green waste removed on a MMS work order.

Appendix F-1: Channel Invert Cleaning

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 112
MAINTENANCE CLEANING - HAND REMOVE DEBRIS AND LITTER

Introduction

This procedure is used for general hand cleaning of surface drains, access roads, and accumulated debris around access gates of debris basins, dams, and sediment placement sites. It may also be used for general maintenance cleaning of other District facilities.

Crew Members Needed

(1) PWMW
(1) PWL
For debris basins and sediment placement sites
(1) HTD may be necessary for large slides or for other facilities.

The crew may vary according to job location and size.

Equipment Needed

Pickup Truck
Dump Truck (optional for large amounts of debris)

Tools Needed

Amount	Type
2	Shovels, Square Point, Long Handle
2	Shovels, Round Point, Long Handle
2	Brooms, Outside, Push, Bass and Palm, 18-inch Block
2	Forks, Manure, 5 each 13-inch Tines, Long Handle
1	Wheelbarrow
12	plastic trash bags

Procedure

1. Remove accumulated trash or debris near access gates.
2. Clean debris and rocks from access road.
3. Clean out debris from surface drains.
4. Put trash and garbage in trash bags and haul to nearest permanent pickup point.
5. Report any AMC deficiencies to supervisor by the end of the day.

Procedure for other District facilities

1. Clean areas as directed by the routine.
2. Report any AMC deficiencies to supervisor by the end of the day.

BEST MANAGEMENT PRACTICES (BMP□S)
California Storm Water Best Management Handbook
BMP Category Nos.: CA20, SC50, SC60, SC61 and ESC 54

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ All debris removed from District facilities is to be properly disposed of.
$ Every reasonable attempt to keep debris out of the inlets and/or drains should be taken during the cleaning process.

Appendix F-2: Drain Cleaning

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 010

UNDERGROUND DRAIN INSPECTION

Introduction

This procedure provides for the inspection of underground drains and the reporting of drainage connections. For unique conditions, consult with Supervisors.

Crew Members Needed: Without Underground Radio

(1) PWCL
(2) PWMW
(3) PWL

Crew Members Needed With Underground Radio

(1) PWCL
(1) PWMW
(2) PWL

Spot Inspection Only

(1) PWCL
(1) PWMW
(1) PWL

Equipment Needed

Amount	Type
2	Pickup truck with radio

Tools Needed

See Flood Maintenance Division's Confined Space Manual for Entry, Inspection, and Work in Confined Spaces.
Underground Truck Standard Tool Issue

Materials Needed

Amount	Type
1 each	See Confined Space Manual for Entry, Inspection, and Work in Confined Spaces.
1 each	Reduced location drawing for each facility.

Procedure

1. See Division's Safety Manual for Entry, Inspection, and Work in Confined Spaces for the procedures to follow inspection and safety.

2. All underground drains are to be inspected for any deviation from the acceptable maintenance conditions which apply to storm drains.

3. All inlets (a hole in the wall) which enter the underground system and are not identified on the location drawings are to be recorded and the following information indicated thereon:

   a. Type on inlet (C.M.P., V.C.P., A.C.P., R.C.P., etc.)

   b. Size (width) of inlet (in inches for pipe, in feet for box)

   c. Use of inlet - (catch basin, storm drain, unknown)

   d. Where the inlet enters the drain [left side, right side (both looking downstream), sophist, near sophist, etc.]

   e. Any signs of erosion, discoloration. or high water temperature at the end of the inlet or in the inlet system.

   f. The inlet location is to be designated by the approximate station number or by the distance from a known manhole. The accuracy of the location measurement needs only to be specified within five feet and no tape measurements should be made. The reduced-size location drawings are to be used to identify station numbers and manholes as well as present inlets.

Procedure (Contd.)

4. All unidentified inlets (including manholes) are to be marked on the location drawings and a copy forwarded to Construction Division - Permit Section.

5. For debris basins and debris disposal areas where the outlet pipe empties into an underground storm drain system, an annual inspection is to be completed only to the first downstream manhole. All others are to be inspected to the outlet.

6. All covered (buried) manholes should be located and a sketch made of their exact location and forwarded with any Acceptable Maintenance Condition (AMC) deficiencies.

7. Report any AMC deficiencies to your Supervisor by the end of the day.

Storm Water Pollution Prevention Plan (SWPPP)

BMP category No. 5 - Drain Inlet Inspection

* Identify and record any undocumented connections or illicit discharges to storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of undocumented connections or illicit discharges and forward the information by official memo to the Assistant Deputy Directors of Flood Maintenance Division, with copies to Construction Division and Watershed Management Division.
* Report dumping or discharge of hazardous substances to an immediate supervisor or call 1(888) CLEAN LA.

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 011

PRE-STORM AND POST-STORM INLET AND DRAIN INSPECTION

PRE-STORM INLET AND DRAIN INSPECTION

Introduction

This procedure provides for the inspection of inlet structures prior to the start of the storm season.

Crew Members Needed

(1) PWL
(1) PWMW, (optional for nighttime and remote areas).

Equipment Needed

Pick Up Truck

Tools Needed

Amount	Type
1	Cutter, Bolt, No. 0
1	Camera, Polaroid
2	Pitch Forks
2	Potato Forks

Materials Needed

Amount	Type
1	Job order pad
5	Gate locks
15 feet	Chain, galvanized, 1/4-inch
3 rolls	Polaroid film

Procedure

1. Each inlet is to be inspected for any AMC deficiency.

2. When an AMC deficiency is found, estimate the type and amount of work required and record this on a Job Order form. Take a picture of the deficiency.

3. Turn in the Job Order forms containing the AMC deficiencies to the Work Receptionist at the end of the day.

4. The most extensive repairs the inspector is to make on his patrol is the replacing of the gate locks or signs.

5. The inspection crews should perform any clean-up work that does not require more than four hours total time.

POST-STORM INLET AND DRAIN INSPECTION

Introduction

Standard Procedure No. 11 provides for the inspection and cleaning of inlets and drains upon notifications of impending storms to insure serviceability. The post storm inspection is to alleviate the need for remedial repairs to damaged or plugged inlets and drains.

Crew Members Needed for Inspection

(1) PWCL
(1) PWL

Crew Members Needed for Clean Up

(1) HTD
(2) PWL

Equipment Needed

Pickup Truck
Dump Truck

Tools Needed

Amount	Type
1	Shovels
2	Pike Poles
2	Potato Forks
1	Docking Saw
100 ft.	Rope

Materials Needed

Amount	Type
None	

Procedure

1. Cleanup crew consists of 2 PWL and 1 HTD. Cleanup crew will clean inlets and drains reported by the inspection crew. Debris from inlets will be hand loaded onto dump truck and hauled to disposal site if possible. If conditions warrant, debris may be stockpiled in vicinity of inlet or drain for later removal.

2. If inlet obstruction is too severe for the cleanup crew they are to request additional manpower and equipment as needed.

3. Inspection crew will assist the cleanup crew after they have inspected all of the facilities listed on routine.

4. Report all AMC deficiencies to their supervisor at the end of work shift.

BEST MANAGEMENT PRACTICES (BMPS)
California Storm Water Best Management Handbook
BMP Category No=s CA20, SC50. SC60, SC61 and ESC 54

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ All sediment removed from the inlets and/or drains is to be properly disposed of
Every reasonable attempt to keep sediment out of the inlets and/or drains should be taken during the clean-up process.

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 012

UNDERGROUND DRAIN INSPECTION - DRAINAGE CONNECTION INFORMATION SYSTEM - DATA COLLECTION

Introduction

This procedure provides for the inspection of underground drains and the reporting of drainage connections. For unique conditions, consult with supervisors.

Crew Members Needed Without Underground Radio

(1) PWCL
(2) PWMW
(3) PWL

Crew Members Needed With Underground Radio

(1) PWCL
(1) PWMW
(2) PWL

Equipment and Tools Needed

See Districts Safety Manual for Entry, Inspection, and Work in Confined Spaces.

Materials Needed

1. See Districts Safety Manual for Entry, Inspection, and Work in Confined Spaces.
2. System Location Maps.
3. Data sheets

Procedure

1. All underground drains are to be inspected for any deviation from the Acceptable Maintenance Conditions which apply to storm drains. See Districts Safety Manual for Entry, Inspection, and Work in Confined Spaces for the procedures to follow for inspection and safety.

Procedure (Cont'd.)

2. All inlets (a hole in the wall) which enter the system are to be recorded on the attached data sheet with the following information:

a. Type of inlet (C.M.P., R.C.P., V.C.P., A.C.P., R.C.B., etc.)
b. Size (width) of inlet (in inches for pipe, in feet for box)
c. Use of inlet (catch basin, storm drain, unknown)
d. Where the inlet enters the drain (left side, right side, (both looking downstream) soffit, near soffit, etc
e. Any signs of erosion, discoloration, or high water temperature at the end of the inlet or in the inlet system.
f. The location specified by the approximate station number or by the distance from a manhole. The accuracy of the location measurement needs only to be specified within five feet and no tape measurements should be made. Where inlets have nearly the same station number, it is important that one of them is determined to be the furthest downstream.

3. The area office will provide copies of location maps with manholes numbered and data sheets attached. The numbered manholes will be indicated on the data sheet to identify location; or station number may be used if available. The location map must be attached to the data sheets and forwarded upon completion to Construction Division, Permit Section.

4. Reaches of storm drain that cannot be inspected must be so documented on the data sheets.

5. Report any AMC deficiencies to the supervisor by the end of the day.

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 053

Subdrain Cleanout - Vault Type - Using Vacuum Truck - Hauling Debris and Water to Disposal Site

Introduction

This procedure is for the cleanout of subdrains using a vacuum truck. It provides for the inspection of the vaults and drain liens and for greasing of the flap gates. The vaults are located in either the channel invert, channel side slope, or along the right of way. Access may be from the invert or the right of way. This procedure is used where debris and water from the vault may not be deposited in the channel.

Crew Members Needed

(1) PWCL
(1) HTD
(3) PWL

Equipment Needed

Vacuum Truck
Pickup Truck
Safety Manual for Entry, Inspection and Work in confined spaces.

Tools Needed

Amount	Type
1	Valve, eddy, 2-1/2 inch
1	Meter, water, 2-1/2 inch
2	Socket set, 2 inch drive, with 3/8 inch, 7/16 inch and 2 inch deep sockets and 4 inch and 6 inch extension
50 feet	Hose, fire, 2-1/2 inch
6	Taps, 2 inch
1	Wrench, spanner
2	Hammer, 4 pound
2	Bar, digging, 6-inch
1	Tank, compressed air with regulator valve (8-hour tank)
1	Ladder, extension, 12 inch
2	Hoses, air 25-foot, with masks (half face)
1	Detector, Gas-Oxygen

Tools Needed (Cont□d.)

Amount	Type
1	Detector, Hydrogen Sulfide
1	Manifold with 50-foot length air hose
1	Safety harness
1	Life line
2	Screwdrivers - 8 inch
1	Cold Chisel
1	Bucket, rubber, 4 gallon
1	Brush, wire
1	Canyon lumber
2	Shovel, square point, long handle
1	Hammer, 8 pound
1	Broom, street
1	Brush, acid
1	Wrench, allen, catch basin (3-8 inch)
1	Wrench, allen, 5/8 inch

Materials Needed

Amount	Type
24	Bolts, machine, 2 inch by 1 2 inch with hex. head
24	Bolts, machine, 3/8 inch by 1-1/4 inch with hex. head
24	Washers, 2-inch
24	Washers, 3/8- inch
2 pounds	Grease with graphite
20	Sandbags (filled)
1 pound	Rags, wiping 22
1 quart	Hand cleaner
1 pint	Liquid wrench
2 pint	Never seize

Procedure

1. Access will be from the channel invert.

3. Divert water away from the vault cover if necessary by placing sandbags.

4. Check for combustible gases and oxygen deficiency prior to removing cover.
NOTE. If gas is detected, refer to Safety Manual for Entry, Inspection and Working Confined Spaces.

Procedure (Contd.)

5. Mark cover and frame so proper alignment will be easier when replacing cover. Remove cover.

6. Remove sand debris from vault using vacuum truck. Use high pressure water hose to loosen mud and debris if necessary.

7. Breathing equipment, safety harness, and life line must be worn by any personnel entering the vault. Entry must be in accordance with the Safety Manual for Entry, Inspection and Work in Confined Spaces.

8. One man only will enter the vault to visually inspect lateral for obstructions and to grease the flap gates.

9. Each flap gate is to be checked to insure it has free movement without binding. All foreign material is to be removed from the hinges and the hinge bolts lubricated with grease.

10. Replace cover. Place Never Seize on bolt threads and install bolts. Replace any bolts that are missing or damaged. If the cover is a door, grease hinges.

11. Empty debris and water at appropriate dumping sites designated by the Construction Superintendent.

12. Report any blocked laterals or conditions exceeding the AMC to the supervisor.

BEST MANAGEMENT PRACTICES (BMPS)
California Storm Water Best Management Handbook
BMP Category Nos CA12, CA20, CA30, CA32, CA40, ESC1, ESC52, AND ESC54

- Identify and record illicit connections to channel and report findings to supervisor by the end of the workday.
- Report dumping or illicit discharge of hazardous waste immediately to a supervisor or call (1-888) CLEANLA.
- All spills must be cleaned up immediately. All waste is to be disposed of properly.
- Ensure that all debris is properly disposed of at an appropriate facility.
- All soiled rags are to be properly disposed of and/or property stored.
- Ensure that adequate BMP's are in place to capture debris that may be washed downstream (i.e. sandbag berm).

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 054
SUBDRAIN CLEANOUT (VAULT TYPE) USING A VACUUM TRUCK DRYING DEBRIS IN A DRYING BIN AND THEN DISPOSING

Introduction

This procedure is for the cleanout of channel sub drains using a vacuum truck. It also provides for the inspection of the vault and drain lines and for greasing of the flap gates. The vaults are located in either the channel invert, the channel side slopes, or along the right of way. This procedure is used where debris and water from the vault is deposited into a drying bin prior to being disposed.

Crew Members Needed

(1) FCCS
(2) PWMW
(1) HTD
(1) PWL

Equipment Needed

Vacuum Truck
Pickup Truck
Safety Manual for Entry, Inspection, and Work in Confined Spaces

Tools Needed

Amount	Type
1	Valve, eddy, 2 2-inch
1	Meter, water, 2 2-inch
2	Socket set, 2-inch drive with 3/8", 7/16" and 2" deep sockets and 4" and 6" extensions
50 feet	Hose, fire, 2 2-inch
6	Taps, 2-inch
1	Wrench, spanner
2	Hammer, 4-pound
2	Bar, digging, 60-inch

Tools Needed (Cont.'d.)

Amount	Type
1	Tank, compressed air with regulator valve (8-hour tank)
2	Hoses, air, 25-foot with masks (half face)
1	Detector, Gas-Oxygen
1	Detector, hydrogen sulfide
1	Manifold with 50-foot-length air hose
1	Detector, hydrogen sulfide
1	Manifold with 50-foot-length air hose
1	Harness, safety
1	Life line
2	Screwdrivers - 8-inch
1	Cold Chisel
1	Bucket, rubber - 3-gallon
1	Brush, wire
1	Crayon, lumber
2	Shovels, square point, long handle
1	Hammer, 8-pound
1	Broom, street
1	Brush, acid
1	Wrench, Allen, catch basin (3/8-inch)
1	Wrench, Allen, 5/8-inch
1	Tripod
1	Self-retracting lifeline

Materials Needed

Amount	Type
24	Bolts, machine, 2-inch by 1 2-inch with hex. head
24	Washers, 2-inch
24	Bolts, machine, 3/8-inch by 1 1/4-inch with hex. head
24	Washers, 3/8-inch
20	Sandbags (filled)
2 lbs.	Grease with graphite
1 lb.	Rags, wiping
1 qt.	Cleaner, hand
1 pt.	Liquid wrench
2 pt.	Never Seize (or equivalent)

<u>Procedure</u>

1. Access will be from the channel invert.

13. Divert water away from the vault cover if necessary by placing sandbags.

14. Check for hazardous gases and oxygen deficiency prior to removing cover. Note: If gas is detected, refer to Safety Manual for Entry, Inspection, and Work in Confined Spaces.

15. Mark cover and frame so proper alignment will be easier when replacing cover. Remove cover.

16. Remove sand and debris from vault using vacuum truck. Use high pressure water hose to loosen mud and debris if necessary.

17. Breathing equipment, safety harness, and life line must be worn by any personnel entering the vault. Entry must be in accordance with the Safety Manual for Entry, Inspection, and Work in Confined Spaces.

18. One employee only will enter vault to visually inspect laterals for obstructions and to grease the flap gates.

19. Each flap gate is to be checked to insure it has free movement without binding. All foreign material is to be removed from the hinges and the hinge bolts lubricated with grease.

20. Replace vault cover. Place Never Seize (or equivalent) on bolt treads and install bolts. Replace any bolts that are missing. If the cover is a door, grease hinges.

21. Transport debris and water to drying bins until final disposal arrangements can be made.

22. Report any blocked laterals or conditions exceeding the AMC to the Supervisor.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category Nos. CA12, CA20, CA21, SC50, SC60, SC61, ESC40 and ESC54

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.

BEST MANAGEMENT PRACTICES (BMP'S) (Cont'd.)

$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections

$ Procedures as applicable.

$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.

$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.

$ All debris removed from District facilities is to be properly disposed of.

$ Every reasonable attempt to keep debris out of the inlets and/or drains should be taken during the cleaning process.

$ All spills must be cleaned up immediately. All waste is to be properly disposed of.

$ When using equipment in any facility special attention should be paid to identify any leaks. Place spill containment and drip pans under equipment when they are in facilities.

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 055

SUBDRAIN CLEANOUT-VAULT TYPE-USING TRASH PUMP

Introduction

This procedure is to be used for pumping out channel subdrain vaults using a trash pump. It also provides for the inspection of the vaults and drain lines and for the greasing of the flap gates. Vaults are located in either the channel invert, channel side slope, or along the right of way. Access may be from the invert or along the right of way. This procedure is used where debris and water from the vault may be deposited in the channel. Subdrain cleanout will be conducted in compliance with the Department's Storm Water Pollution Prevention Plan and the National Pollutant Discharge Elimination System (NPDES) permit requirements.

Crew: Members Needed

(1) SMW
(1) MW
(1) FCL

Equipment Needed

3/4-ton Pickup Truck
3-inch Trash Pump
1/2-inch Pump
Truck with Hydraulic Lift Bed

Tools Needed

Amount	Type
1	Wrench, spanner
20 ft.	Hose, suction, 3-inch
20 ft.	Hose, discharge, 3-inch
1	Socket set, **2**-inch drive with breaker bar, 3/8", 7/16", 2" deep sockets and 4" and 6" extensions

Tools Needed (Cont□d.)

1	Manhole lifter (standard)
2	Screwdrivers - 8-inch
1	Hammer, 4-pound
1	Bucket, rubber, 3-gallon
1	Brush, wire
1	Crayon, lumber
2	Shovels, square point, long handle
1	Hammer, 8-pound
1	Broom, street
1	Brush, acid
1	Bar, digging, 60-inch
1	Tank, compressed air, with regulator valve (8-hour tank)
2	Hoses, air, 25-foot with masks (half face)
1	Manifold with 50-foot air hose
1	Harness, safety
1	Life line
1	Detector, gas - oxygen
1	Detector, hydrogen sulfide
1	Wrench, pipe, 36-inch (stilson)
1	Ladder - 12-foot extension
1	Wrench, allen, catch basin (3/8-inch)
1	Wrench, allen, 5/8-inch

Materials Needed

Amount	Type
2 lbs.	Grease with graphite
20	Sandbags (filled)
24	Bolts, machine, 2-inch by1-2-inch with hex. head
24	Bolts, machine, 3/8-inch by 1-1/4-inch with hex. head
24	Washers, 2-inch
24	Washers, 3/8-inch

Materials Needed (Cont□d.)

1 lb.	Rags, wiping
1 pt.	Liquid wrench
1 qt.	Hand cleaner
5 gals.	Fuel for pump
2 pt.	Never seize

Procedure

1. Divert water away from the vault cover if necessary by placing sandbags.
2. Remove debris from cover and mark cover and frame so proper alignment will be easier when replacing cover.
3. Remove gas test allen screw in cover. If one is not available, remove the cover bolts.
4. Check for combustible gases and oxygen deficiency prior to removing cover completely.

   Note: If gas is detected, refer to Flood Maintenance Division=s Confined Space Manual for entry, inspection, and working in confined Spaces.

5. Break cover loose and pry off using pull rings. Remove cover completely by inserting manhole lifter in bolt hole.
6. Pump out water and debris. Consult California Storm Water Best Management Practice Handbook categories CA1 - Dewatering Operations, CA20, CA21 - Waste Management for procedures on preventing storm water pollution from solid waste and discharges from dewatering operations.
7. Breathing equipment, safety harness, and a life line must be worn by any personnel entering the vault. Entry must adhere to Flood Maintenance Division=s Confined Space Manual.
8. One man only will enter the vault to visually inspect the laterals for obstructions and to grease the flap gates.
9. Each flap gate is to be checked to insure it has free movement without binding. All foreign material is to be removed from the hinges and the hinge bolts lubricated with grease.
10. Replace the cover. Place never seize on bolt threads and install bolts. Replace any bolts that are missing. If the cover is a door, grease the hinges.
11. Report any blocked laterals or conditions exceeding the AMC to the supervisor.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos.: CA1, CA12, CA20, CA21, CA30

* Identify and record illicit connections to channels, storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of illicit connections and implement the Illicit Connections/Illicit Discharge (IC/ID) Procedures.
* Report dumping or discharge of hazardous waste to an immediate supervisor or call 1(888) CLEAN LA.
* Report Illegal dumping of non hazardous waste to Planning and Estimating Unit (P&E).Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in public book case at all FMD field yards.

* Check equipment and tools for leaks before use.
* Place spill containment pans under trucks when not in operation.
* Do not over grease hinges and flapgates. Removing excess grease.
* Remove excessive mud from trailer and trucks before entering public roads and highways.
* Minimize use of detergents and dispose of wash rags per Department's SWPPP.
* Conduct tailgate on applicable Best Management Practices and regulatory permit requirements.

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 057

SUBDRAIN CLEANOUT - VAULT TYPE - USING WATER PUMP AND VACUUM TRUCK.

Introduction

This procedure is to be used to cleanout channel subdrains where clean water may be deposited in the channel but debris, mud, or silt cannot. A water pump is to be used to pump the clear water only (not debris) from the subdrain into the channel. The vacuum truck follows and sucks out the remaining debris.

Crew Members Needed

(1) PWCL
(1) HTD
(1) PWL

Equipment Needed

Vacuum Truck
Pick-up Truck
3-inch trash/water pump
Truck with hydraulic lift bed

Tools Needed

Amount	Type
1	Wrench, spanner
20 feet	Hose, suction, 3-inch
20 feet	Hose, discharge, 3-inch
1	Socket set, 2-inch drive with breaker bar
1	Lifter, manhole (standard)
1	Hammer, 4-pound
1	Chisel, cold
1	Bucket, rubber, 3-gallon
1	Brush, wire
1	Crayon, lumber
2	Brush, wire
1	Crayon, lumber

Tools Needed (Cont d.)

2	Shovel, square point, long handle
1	Hammer, 8-pound
1	Broom, street
1	Brush, acid
1	Bar, digging, 6-inch
1	Tank, compressed air with regulator valve (8-hour tank)
2	Hoses, air, 25-foot with masks (half face)
1	Manifold with 50-foot air hose
1	Safety harness

Materials Needed

Amount	Type
1	Life line
1	Detector, gas, oxygen
1	Detector, hydrogen sulfide
1	Wrench, pipe, 36-inch (stilson)
1	Wrench, adjustable, 15-inch (crescent)
1	Ladder, extension, 12-foot
1	Wrench, allen, catch basin, 3/8-inch
1	Wrench, allen, 5/8-inch
2 pounds	Grease with graphite
20	Sandbags (filled)
24	Bolts, machine, 2-inch by 1 2-inch with
24	Washers, 2 inch
24	Washers, 3/8 inch
1 pound	Rags, wiping
1 pint	Liquid wrench
1 quart	Hand cleaner
5 gallons	Fuel for pump
2 pint	Never seize

Procedures

1. Divert water away from the vault cover if necessary by placing sandbags.

23. Remove debris from cover and mark frame so proper alignment will be easier when replacing cover.

24. Remove gas test allen screw in cover. If none is available, remove the cover bolts.

25. Check for combustible gases and oxygen deficiency prior to removing cover completely.

26. Break cover loose and pry off using pull rings. Remove cover completely by insertine manhole lifter in bolt hole.

27. Using trash/water pump, remove only the clear water. The debris, mud, and silt is to be left in the vault, and not to be deposited in low flows.

28. Use the vacuum truck to remove the remaining water, debris, mud, and silt.

29. Breathing equipment, safety harness, and a life line must be worn by any person entering the vault. Entry must be in accordance with the Safety Manual for Entry, Inspection, and Work in Confinded Spaces.

30. One man only will enter the vault to visually inspect the laterals for obstructions and to grease the flap gates.

31. Replace the cover.

32. Place never seize on all bolt threads and install the bolts. Replace any bolts that are missing. If the cover is a door, grease the hinges.

33. Report any blocked laterals or AMC deficiencies to the supervisor by the end of the work day.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos CA20, CA30, CA31, CA32, CA40, ESC1 and ESC40

- Identify and record illicit connections to channel and report findings to a supervisor by the end of the workday.

- Report dumping or illicit discharge of hazardous waste immediately to a supervisor or call 1 (888) CLEANLA.

- Special attention should be paid to identify equipment leaks. Place spill containment and drip pans under equipment when they are not in use.

- Ensure that all debris is properly disposed of at an appropriate facility.

- All soiled rags are to be properly disposed of and/or properly stored.

- Check Power Tools for leakage before use.

- Have spill kits handy and in reach at all times.

- Use dry clean up methods whenever possible for spills.

- Identify and report evidence of major repairs and vehicle maintenance.

- Remove all tools, equipment, and project generated debris before leaving.

- Use appropriate BMP=s to contain sawdust, leaves, and loose debris to prevent them from getting into channel low flow.

- Dispose of trash immediately per County requirement and standard operating procedures.

- Document all findings on the MMS work order, and return it to your supervisor.

Appendix F-2: Drain Cleaning

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 070

INSPECTION OF FLAP GATES

Introduction

This procedure will provide guidelines to be used for the inspection, cleaning, and lubrication of flap gates on all outlet pipes including those on ocean outlets.

Crew Members Needed

(1) PWCL
(1) PWL
(An additional PWMW is optional when several gates are to be inspected)

Equipment Needed

Pick-up truck

Tools Needed

Amount	Type
2	Shovel - round point
2	Shovel - square point
2	Hook - potato
2	Fork - manure, 5 tine
1	Hammer - 4 pounds
1	Hammer - 8 pounds
1	Bar - digging, 6 foot
1	Pike pole
2	Wrench, 18-inch adjustable
2	Brush - wire
1	Wrench, 2-inch socket set
1	Pick
1	Broom Street
1	Pliers - fence

Materials Needed

Amount	Type
10 feet	Wire - galv. 14 gallons
1 quart	Grease (kote) copper kote
2 pints	Liquid wrench
5 pounds	Rags
1 pint	Hand Cleaner

Procedure

1. Check flap gate for broken or missing hinges and bolts, grease hinges and bolts.

2. Check gates and frame for cracks and other damage.

3. Check gate and frames for proper alignment and tight seal, remove any obstructions from gates and structure that will obstruct proper alignment of gate to frame.

4. Remove any growth from flap gate and frame with wire brush.

5. Check upstream lateral for obstructions and debris build-up.

6. If breakaway ties are required, remove/replace as necessary.

7. Report AMC deficiencies to supervisor.

BEST MANAGEMENT PRACTICES (BMP□S)
California Storm Water Best Management Handbook
BMP Category Nos CA30, CA31, CA32, CA40 and ESC1

$ Ensure that all debris is properly disposed of at an appropriate facility.

<u>BEST MANAGEMENT PRACTICES (BMP’S)(Cont’d.)</u>

$ All soiled rags are to be properly disposed of and/or properly stored.

$ Have spill kits handy and in reach at all times.

$ Use dry clean up methods whenever possible for spills.

Appendix F-3 : Right-of-Way Access Road

Appendix F-3: ROW Access Road

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 001

HAND CLEAR TRASH AND DEBRIS FROM CHANNEL RIGHT OF WAY AND ACCESS ROAD

Introduction

This standard procedure is to be used to remove trash, litter, and dead weeds from the access road and adjacent right of way. The work is to be done by hand while moving down the access road with the truck and loading the debris into the truck. Debris clearing will be conducted in compliance with the Departments Storm Water Pollution Prevention Plan (SWPPP) and National Pollutant Discharge Elimination System (NPDES) permit requirements.

Crew Members Needed

(1) HTD
(1) PWCL
(2) PWL

Equipment Needed

3/4 Ton Pick Up (Transportation for Crew and Tools)
10-Cubic Yard Dump Truck

Tools Needed

Amount	Type
2	Fork 10-Tines
2	Forks, Manure, 5-Tines
3	Pruners, Tree, 30-inch Handle
2	Rakes, Garden
2	Shovels, Square Point, Long Handle
2	Brooms, Outside Push, 18-inch Block

Tools Needed (Cont’d.)

1	Saw, Bow
2	Small Chain Saws
2	Hoes, Planter
2	Files, Bastard, Mill, Flat, 12-inch (with handle)
2	Tarps 8 foot x 10 foot

Materials Needed

Amount	Type
2 gallon	Gas (with gas mix)
1 quart	Oil for Chain Saw
1 each	Chain for Chain Saw
1 each	Chaps
As needed	Safety Equipment: eye/ear Protraction, Dust Mask, Gloves
1 each	Spill Kit (drip pan, Absorbent Pads, and Boom Socks, Rags)

Procedure

1. Drive truck down access road or to area to be cleaned and load trash and debris into truck. Trim any growth that blocks access.

2. Haul trash to authorized dump when truck is full. Check with supervisor for dump location for each channel.

3. The crew will stockpile debris and cut vegetation while the truck is at the dump.
4. Report any AMC deficiencies to supervisor by the end of the day.

5. Replace County signs on access gates as needed.

6. Complete minor or temp fence repairs.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Check chain saw for leakage before use.
$ Place spill containment pans under trucks when not in operation.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
$ Conduct tailgate on applicable regulatory permits

Appendix F-3: ROW □ Access Road

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 007
CLEAN ACCESS ROAD, RIGHT OF WAY, AND CHANNEL IN ONE OPERATION
Kinneloa Channel, Rubio Wash, Mendocino d□s to Alta Dena Golf Course.

Introduction

This standard procedure is to be used on trapezoidal channels where the access road is not continuous and on short lengths of channel where it is not practical to have a channel clean-up crew remove debris in the channel inverts. When the District right of way is cleared, the debris is tossed into the channel where it is bundled and/or placed in wheelbarrow and hauled to debris buckets for removal on the same work day.

Crew Members Needed

(1) HTD
(4) PWL
(1) PWCL.

Equipment Needed

3/4 Ton Pick Up
3/4 Ton Pick Up Utility Truck
5-cubic yard or 10-cubic yard dump truck

Tools Needed

Amount	Type
2	Fork, Large, 10 Tines
4	Fork, Manure, 5 Tines
2	Pruners, tree, 30-inch Handle
2	Rakes, Garden
2	Small Chain Saw
3	Shovels, Square Point, Long Handle
2	Brooms, Outside Push, 18-inch Block
2	Wheelbarrow
2	Hoes, Planter
2	Tarps, Light Weight 8 foot X 10 foot
2	Power Trimmer

Materials Needed

Amount	Type
50 feet	Rope, 2-inch
1 gallon	Can, (Mixed fuel)
1 quart	Bar Oil
1 each	Spare chain
1 each	Chain Saw Repair Kit
1 each	Chaps
1 each	Spill Kit (drip pan, absorbent pads, boom socks, rags, plastic bags)
As needed	(Safety equipment) eye and ear protraction dust mask, gloves.

Procedure

8. Where an access road is available, the debris should be loaded directly into the dump truck.
9. Where there is no vehicular access the trash should be thrown into the channel.
10. Remove trash from channel invert (trash, debris must be removed from channel invert daily).
11. Load cut vegetation and debris by sue of pitch forks and tarp on the dump truck.
12. Haul trash to authorize dump when truck is full. Check with supervisor for dump location for each channel.
13. Crew stockpiles debris while truck goes to dump (when emergency transportation is available).
14. Report any AMC deficiencies to supervisor by the end of the day.

BEST MANAGEMENT PRACTICES (BMP=S)
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.

BMP'S (Cont'd.)

- $ Report illegal dumping of nonhazardous waste to the P&E Unit or Facility Engineering Unit.
- $ Check chain saw for leakage before use.
- $ Place spill containment pans under trucks when not in operation.
- $ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
- $ Conduct tailgate on applicable regulatory permits.

Appendix F-3: ROW Access Road

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 017

HAND CLEAR TRASH AND DEBRIS FROM ROCK LEVEES

Introduction

This standard procedure is to be used for the hand-clearing of trash and debris from rock levees.

Crew Members Needed

(1) PWCL
(2) PWL (Crew will vary depending on the area and size of the job)

Equipment Needed

3/4 ton pickup truck (additional vehicles will be needed on larger jobs)
stakebed truck

Tools Needed

Amount	Type
4	Pick-up sticks

Materials Needed

Amount	Type
30	Bags, plastic
4	Gloves

<u>Procedure</u>

1. Transport employees, tools, and materials to the job site.
2. Pick up trash and debris and place in plastic bags for later pickup.
3. Pick up and load bags into truck at end of day or end of job, whichever comes first.
4. Report any AMC deficiencies to Supervisors at end of day.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category No CA20

$ All debris removed from the rock levees must be properly disposed.

Appendix F-3: ROW Access Road

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 027

CLEAR TRASH AND DEBRIS FROM RIGHT OF WAYS WITH PEDESTRIAN ACCESS ONLY - REMOVE DEBRIS

Introduction

This procedure is to be used on short sections of channel right of way where there are no access roads and where it would be impractical to toss the trash into the channel for removal.

Crew Members Needed

(2) PWL
(1) HTD

Equipment Needed

Dump Truck

Tools Needed

Amount	Type
2	5 tine forks
2	Garden rakes
1	Wheelbarrow
1	Square-point shovel with a long-handle

Materials Needed

Amount	Type
25 ea.	Burlap Bags
50 ft.	Rope, Manila, 2-inch

Procedure

1. Drop off the crew, tools, and materials at the upstream end of the portion of the channel to be cleaned.

2. The truck driver is to park the dump truck at the first intersection downstream of the work crew and then walk up the right of way to meet and work with the crew.

3. The crew is to work their way down the right of way placing debris into burlap bags, the wheelbarrow, or tying it into bundles for transportation to the dump truck.

4. When the crew has cleaned all of the right of way upstream of the intersection where the truck is parked, the truck driver repeats Procedure No. 2 and the crew continues working downstream.

5. Haul debris to the authorized dump when truck is full. Check with the supervisor for dump location for each channel.

6. The crew will travel with the truck to the dump site unless a large crew is used and a supervisor remains at the work site.

7. While the truck is away, the crew will continue collecting and stockpiling the trash only if a supervisor remains at the work site. Otherwise, debris should be stockpiled by the crew prior to going to the dump if they will be returning to the job site.

8. Report any AMC deficiencies to the supervisor by the end of the day.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA12, CA20, CA21, ESC 54 and SC76

$ All debris removed must be properly disposed of
$ Every reasonable attempt to keep sediment out of the inlets and/or drains should be taken during the clean-up process.
$ Any containers along the right of way containing substances that could be spilled into the channel must be carefully handled to avoid spills. If the substance is unknown it should be reported to your Supervisor immediately.
$ Any hazardous material(s) found on the right of way must be handled and disposed of properly.

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 119

INSPECTION OF RIGHT-OF-WAY FENCING.

Introduction

This standard procedure is to be used for inspection and minor repair of Right-Of-Way and/or channel wall fencing in those areas where tight security is required. Activities such as trimming overgrowth and the removal of trees will be conducted in compliance with regulatory permit requirements from the Army Corps of Engineers (COE), California Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG)

Crew Members Needed

(1) FCCS
(1) MW
(1) FCL

Equipment Needed

3/4 Ton Pick Up

Tools Needed

Standard Tool Issue

Materials Needed

Amount	Type
20 Ft.	Chain Link Fabric (60-inch)
1 Roll	Wire #9

Procedure

1. Inspect R/W fence and gates for any means to gain entry onto R/W in accordance with the following criteria:

   A. Opening in fence fabric large enough to permit a child or adult to enter R/W.

   B. Fence fabric that has been crushed down from the top for easy entrance.

   C. Holes in the earth under the fence to permit entry.

   D. Mound of earth, debris or other materials that may be used as a ladder to enter.

   E. Trees that have limbs overhanging the fence that may be used to gain entrance.

2. Inspectors will secure any means of entry, if work can be accomplished within 2 Hr.

3. Temporarily secure area that will take longer than 2 Hr. and write down the location and flag area with Survey tape.

4. Inform your supervisor of all temporary repairs, so he may send a security fence repair crew to correct deficiencies.

5. Any other AMC deficiencies report to your supervisor at the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos. CA3, CA12, CA20, CA21

* Report dumping or illicit discharge to an immediate supervisor or call 1(888) CLEAN LA.
* Report Illegal dumping of non hazardous waste to Planning and Estimating Unit (P&E). Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in public book case at all FMD field yards.
* Place spill containment pans under pickup truck when not in operation.
* Remove all tools, equipment, chain link fabric and trash before leaving.

Appendix F-3: ROW Access Road

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 216

MINOR REPAIR AND CLEANING OF ACCESS ROADS.

Introduction

This standard procedure is to be used for the minor repair of pot holes in asphalt and dirt access roads, also, for the cleaning of debris off roads.

Crew Members Needed

(1) HTD
(1) PEO
(3) PWCL

Equipment Needed

Utility Loader

5 Yard Dump Truck

Tools Needed

Amount	Type
1	Standard Tool Issue

Materials Needed

Amount	Type
Varies depending on job	Base material
Varies depending on job	Cold patch

<u>Procedure:</u>

1. Fill pot holes with base material and cold patch on asphalt roads and compact.

2. Fill holes with base material on dirt roads.

3. Sweep glass off roads and pick up debris from roads.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category Nos. CA2, CA10, CA12, CA20, CA30, CA32, CA40, ESC1, ESC2, ESC21, and ESC23

$ Every reasonable attempt to keep debris out of the inlets and/or drains should be taken during the process.

$ In order to reduce debris on the roadways truck drivers shall clean their trucks of muddy debris, trash, etc. before leaving the Sediment Placement Site (SPS) or site where the debris was generated.

$ All debris brought to the Sediment Placement Site (SPS) for placement must be clean and free of contaminants, trash, etc.

$ Vehicles leaking fluids should be repaired prior to hauling material.

$ All debris removed from District facilities is to be properly disposed of.

$ It may be necessary to sweep the streets that trucks are using to haul debris. All trimmings are to be properly disposed of.

$ Record the amount of debris and/or green waste disposed of on a MMS work order.

$ Remove all tools, equipment, and project generated debris before leaving.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 456
FENCE REPAIR (CHAIN LINK)

Introduction

This procedure will be used to repair Department chain link fence. Applicable Best Management Practices will be implemented to comply with the Department's National Pollutant Discharge Elimination System permit requirements.

Crew Members Needed

(1) FCCS
(1) PWMW
(2) PWL

Equipment Needed

Pickup Truck

Materials Needed

Amount	Type
1 doz.	A 1 Locks
10 ft.	5/16" chain
2 ea.	Top rails
1 roll	5' chainlink
1 roll	4' chainlink
Supply	Misc. fence hardware
Supply	Misc. fence bolts & nuts
Supply	9 & 16 ga. tie wire
Supply	7 ga. tension wire
1 roll	Barb wire
1 doz.	Barb wire arms
1 lb.	Hog rings

Tools Needed

Amount	Type
3 ea.	Fence pliers
1 ea.	Bolt cutters
2 ea.	Channel lock pliers
2 ea.	Hog ring pliers
2 ea.	Crescent wrench 8"
1 ea.	½" open end wrench
1 ea.	9/16" open end wrench
1 ea.	Tension wire puller
2 ea.	Chainlink fence puller
1 ea.	Chain binder

Procedure

1. Reconstruct damaged chain link fence to conform to the specifications illustrated in the Flood Control District Design Manual Standard Drawings.

   A. Refer to the Standard Plans for Public Works Construction (SPPWC) 600-1, Chain Link Fence and Gates, for fence specifications on headwalls or on channel walls.
   B. Refer to the Standard Plans for Public Works Construction (SPPWC) 600-1, Chain Link Fence and Gates for fence specifications with barbed wire.
   C. Refer to the Standard Plans for Public Works Construction (SPPWC) 600-1, Chain Link Fence and Gates, for fence specifications for Right of Way Fences.

2. Report any gates requiring major repairs or replacing to your supervisor.

3. Report any AMC deficiencies to your supervisor at the end of the shift.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook - Municipal
BMP Category Nos.: SC-32, SC-60

- Temporarily store unserviceable gates, fence fabrics, posts, barbed wire, and other unserviceable parts in the bone yard for disposal, and away from possible contact with storm water and precipitation. Waste metals should be recycled or transported to a recognized metal salvage facility. Dispose of metal shavings properly
- Maintain a clean area by removing all tools, equipment and project generated garbage before leaving. Maintain good housekeeping.

Appendix F-3: ROW Access Road

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 633
HAND CLEARING TRASH, DEBRIS, WEEDS, AND TRIM OVERGROWTH FROM ACCESS ROADS AND ADJACENT RIGHT OF WAY

Introduction

This standard procedure is used to clean trash, debris, weeds, and trim overgrowth from access road and adjacent right of way. Debris and foliage is to be hauled to an authorized dump site. Trimming overgrowth and the removal of trees, shrubs, and debris will comply with regulatory permit requirements from the Army Corps of Engineers (COE), California Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG).

Crew Members Needed

(1) FCCS
(1) SMW
(2) FCL
(1) HTD (Crew size may vary)

Equipment Needed

(1) 5 to 10 Cubic Yard Dump Truck
Additional transportation for larger crew
(2) 3/4 Ton Pick-ups

Tools Needed

Amount	Type
3	Fork, manure, 5 tines
3	Pruners, tree, 30-inch handle
3	Rakes, garden
3	Shovels, square point, long handle
3	Brooms, outside push, 18-inch block
3	Saw docking and pruning; 14-inch
3	Hoe, planter

Tools Needed (Cont□d.)

Amount	Type
3	Files, bastard, mill flat, 12-inch
3	Ladder, 20-foot extension
As Needed	Goggles/eyeshields, all purpose
As Needed	Respirators, dust
1	Gas power hedge clipper
1	Gas power weed whip or weed eater
1	Gas power chain saw

Procedure

1. In accordance with maintenance standard, cut all standing weeds that are 2 inches or higher on District right of way and adjacent right of way. Avoid sensitive species, native vegetation and riparian trees 4-inch (dbh) diameter at breast height or greater.

2. In accordance with maintenance standard, cut ivy, grapevines, ice plants, and other light foliage with pruning shears, hedge cutter, or hoe.

3. Trim larger growth and branches with pruning shear, docking saw, or chain saw.

4. In accordance with maintenance standard, remove all trash, litter, and dead weeds from the access road and adjacent right of way.

5. Where an access road is available, all cutting and debris should be handed, loaded into dump truck and hauled to an authorized dump site. Check with supervisor for dump location for each channel.

6. Where there is no vehicular access, the trash and foliage should be stockpiled and covered in bundles in a contained area to prevent runoff from contaminating the storm water. Remove debris within 24 hours and before it rains.

7. Report any AMC deficiencies to supervisor by the end of the day

<u>STORM WATER POLLUTION PREVENTION PLAN (SWPPP)</u>
California Storm Water Best Management Handbook
BMP Category Nos.: SC-34, SC-41, SC-60, SC-73, SC-75

- Conduct tailgate on applicable Best Management Practices and regulatory permit requirements.
- Record the amount of debris and/or green waste disposed of on a MMS work order.
- Check equipment and tools for leaks before use.
- Place spill containment pans under trucks when not in operation.
- Cover stockpile debris with tarp. Remove all stockpile debris within 24 hours.
- Remove all tools, equipment and project generated garbage before leaving Remove mud and secure debris before allowing trucks to enter public roads.

Appendix F-4: Slope Repairs

Appendix F-4: Slope Repairs

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 020

MAINTENANCE OF UNIMPROVED CHANNELS- HAND CLEAR ENVIRONMENTALLY SENSITIVE CHANNELS

Introduction

This procedure indicates the method by which environmentally sensitive unimproved channels (this includes natural and/or pipe and wire improved watercourses) are to be maintained. Activities such as trimming overgrowth and the removal of trees, shrubs, and debris that obstruct water flow will be conducted in compliance with regulatory permit requirements from Army Corps of Engineers, California Regional Water Quality Control Board, and California Department of Fish and Game. This procedure is activated only under the specific direction of the Area Engineer with a job order.

Crew Members Needed

(1) FCCS
(1) HTD
(2) PWMW
(3) PWL

Equipment Required

5-cubic yard or 10-cubic yard dump truck

Tools Needed

Amount	Type
2	Axes, double bit
3	Forks, manure, 5-tine
4	Pruners, tree, 30-inch handle
2	Shovels, square point, long handle
2	Brooms, outside push, 18-inch block
2	Saws, docking
2	Saws, pruning, 14-inch
2	Wheelbarrows

Tools Needed (Cont'd.)

Amount	Type
3	Hooks, potato
6 pairs	Goggles, eye, all purpose
1	Ladder, 20-foot extension, light-weight
1	Hoist, E-Z
2	Machetes, 18-inch

Materials Needed

Amount	Type
100 feet	Rope, manila, 2-inch
5 lbs.	Twine

Procedure

1. Move the dump truck (with tools) to the jobsite and park as near as possible to the channel invert access. See California Best Management Practice (BMP) Handbook category CA12 - Spill Prevention and Control for guidance on preventing storm water pollution from leaking vehicles or maintenance of vehicles near storm water source.

2. Hand clear trash and/or debris which has a significant potential to obstruct the watercourse. Avoid native vegetation, sensitive species, and riparian trees with a 4inch dbh (Diameter-at-breast-height) or greater. Consult California Storm Water Best Management Practice (BMP) Handbooks, BMP category No. ESC2 - Preservation of Existing Vegetation for compliance guidelines.

3. Trim only overgrowth which will interfere with the proper function of the channel. Ask your supervisor for specific guidance.

4. Remove and clear all trees and shrubs on the channel bottom avoiding sensitive species, native vegetation, and riparian trees with a 4-inch dbh (diameter-at-breast-height) are greater. Consult supervisor or Army Corps of Engineers (COE), California Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG) for permit compliance requirements for channel clearing.

Procedure (Contd.)

5. Load debris in truck and haul to landfill or authorized disposal area. Consult California Storm Water Best Management Practice Handbook, BMP categories CA20, CA21 Solid Waste Management and Hazardous Waste Management respectively, for guidance on preventing storm water pollution generated from tree and shrub wastes by implementing appropriate BMP=s.

6. The crew stockpiles debris while truck goes to dump.

7. Report any AMC deficiencies to supervisor by the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos.: ESC1, ESC2, ESC21, CA12, CA20, CA21, CA30

* Identify and record illicit connections to channels, storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of illicit connections and implement the Illicit Discharge/Illicit Connections procedures as applicable.
* Report dumping or illicit discharge to an immediate supervisor or call 1(888) CLEAN LA.
* Report Illegal dumping of non-hazardous waste to the Planning and Estimating Unit. Consult SWPPP manuals and Material Safety Data Sheets (MSDS) for guidance on storing and responding to hazardous and nonhazardous materials. SWPPP manuals and MSDS are located in public book case at all FMD field yards.
* Place spill containment pans under trucks when not in operation.
* Record the amount of debris and/or green waste disposed of on a MMS work order.
* Conduct tailgate on applicable regulatory permits and Best Management Practices.

Appendix F-4: Slope Repairs

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 092

REPAIR OF EROSION ON UNLINED LEVEES

Introduction

This procedure provides for the repair of an unlined levee by use of equipment. Activities such as trimming overgrowth and the removal of trees, shrubs and debris will be conducted in compliance with regulatory permit requirements from the Army Corps of Engineers (COE), California Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG).

Crew Members Needed

(1) PEO
(1) FCL

Equipment Needed

Crawler Tractor
D-8 or D-7 (To be determined by size of levee)
Sheepsfoot Roller (If controlled compaction is required)
Low Bed Trailer

Tools Needed

Equipment tool trailer (if job lasts more than one day)

Material Needed

None

Procedure

1. Make pre-inspection of the basin or channel bottom by walking and looking for dangerous soft spots or any other hazards. Report evidence of contaminated soil to a supervisor immediately. Consult California Storm Water Best Management Practice Handbook category CA22 - Contaminated Soil for instructions on remediating or limiting storm water pollution from contaminated soil.

2. Proceed along the base of levee developing fill material that has eroded from the levee. Place and compact this material in eroded areas as required to restore the original slope and stability to the levee. Consult California Storm Water Best Management Practice Handbook category ESC21 - Dust Control for requirements for dust control.

3. If sufficient fill material cannot be developed to repair the erosion, the Supervisor should be contacted.

4. Report any AMC deficiencies to the Supervisor at the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category No s. ESC21, CA10, CA12, CA22

* Report dumping or discharge of hazardous waste to an immediate supervisor or call 1(888) CLEAN LA.
* Report Illegal dumping of non hazardous waste to Planning and Estimating Unit. Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in the public book case at all FMD field yards.
* Check equipment for leaks before use.
* Place spill containment pans under trucks and equipment when not in operation.
* Cover stockpile debris with tarp.
* Report the amount of debris and/or green waste removed on a MMS work order.
* Remove excessive mud from loader, trucks, grader, and trailer before accessing public roads and highways.
* Schedule levee repair activities during dry weather only.
* Do not wash trucks and other vehicles on site.
* Conduct Tailgate on applicable Best Management Practices and permit requirements.

Appendix F-4: Slope Repairs

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 109

MAINTENANCE CLEANING GAGE BOARDS

Introduction

This procedure is used for cleaning gage boards and gage markings on concrete structures, outlet towers, spillways, etc. This standard procedure does not include the cleaning of gage boards in stilling wells or other confined spaces.

Crew Members Needed

(1) ADO or (1) DO for dams
(1) PWCL and (1) PWL for spreading grounds, basins, or open channels

Equipment Needed

Pickup truck (required for District facilities with no resident operator)
boat (maybe required for dam facilities)

NOTE: All safety requirements for the operation of a boat must be followed.

Tools Needed

Amount	Type
1	Pail, 8 quart
1	Extension ladder, 12 ft.

Materials Needed

Amount	Type
1 lb.	Rags, wiping
8 oz.	Detergent, liquid
*5 gal.	Water can, filled

*May be required when water is not available.

<u>Procedure</u>

1. Refer to the Department’s Safety Manual for Entry, Inspection, and Work in Confined Spaces.

15. Mix detergent and water in pail as indicated on detergent label.

16. Using rags and detergent/water mixture, clean off all foreign matter on gage markings and elevation numbers.

17. Rinse off washed area with fresh water.

18. Report any AMC deficiencies to supervisor by the end of the day.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category Nos SC10, SC11 and SC20

$ All chemicals and byproducts (dirty wash water, etc.) is to be properly disposed of and/or properly stored.

$ If possible find alternative environmentally friendly chemicals to use as cleaning agents.

$ Containers that cleaning chemicals are stored in should be sealable and properly labeled to avoid spills and unintentional mixing. Never store chemicals near open flames.

$ Handle all cleaning chemicals with extreme caution. Workers should follow the instructions as provided by the manufacturer for every chemical.

$ Every employee handling chemicals should be familiar with the MSDS for each chemical. MSDS’s can be found at their respective Flood Maintenance Division yard.

Appendix F-4: Slope Repairs

County of Los Angeles Department of Public Works

Flood Maintenance Division

<u>STANDARD PROCEDURE NO. 110</u>

GAGE BOARD MAINTENANCE (Comment on lead and vinyl paint)

<u>Introduction</u>

This procedure is used to resurface gage boards, restencil gage board markings, and restencil gage markings on concrete structures, outlet towers, spillways, etc. All work will be conducted in compliance with the Department=s Storm Water Pollution Prevention Plan (SWPPP) and the National Pollutant Discharge Elimination System (NPDES) permit requirements

<u>Crew Members Needed</u>

(1) PW MW
(1) FCL

<u>Equipment Needed</u>

Pickup Truck
Scaffold
Flood Maintenance Division’s Confined Space Manual.

<u>Tools Needed</u>

Amount	Type
2	Paint brush, 3-inch
1	Brush, wire
2	Paint scrapers, 22-inch
2	Sanding blocks
2	Pails, paint, 2 gallons
1	Shovel, square point, long handle
1	Shovel, round point, long handle
1	Extension ladder, 12 feet
	Respirator (Lead chips)?

Materials Needed

Amount	Type
1 gal.	Enamel paint, exterior, white*
1	Stencil, standard gage board markings
5 gals.	Paint thinner
5 lbs.	Wiping rags
6 cans	Enamel paint, aerosol spray, and black
1 gal.	Remove lacquer thinner (Water base paint)
15 sheets	Sandpaper No. 100 garnet
10 sheets	Sandpaper No. 80 garnet
10 sheets	Sandpaper No. 50 garnet
5 gals.	Water can, filled

Procedure

1. Equipment, tools, and materials to be delivered to the job site at the beginning of work.
2. Consult Confined Space Manual before entering, or working in a confined space.
3. Remove any accumulated dirt or debris from gage board or gage markings on concrete structures. Dirt, debris, rash rags must be disposed of per SWPPP requirements. Consult California Storm Water Best Management Practice Handbook Categories CA20 - Solid Waste, CA21 - Hazardous Waste for information on disposing of waste properly.
4. Clean and remove all loose, peeled, or blistered paint. Dispose of paints chips and empty paint containers per Department′s SWPPP requirements for hazardous waste. Consult California Storm Water Best Management Practice Handbook Category CA3 - Structure Construction and Painting for measures to prevent or reduce storm water pollution.
5. Scribe a line on edge of board to retain as reference when restenciling gage board elevation markings and numbers. On concrete structures, make a mark adjacent to existing elevation markings and numbers to retain as reference when restenciling.
6. Apply uniform coat of white paint.
7. Allow paint to dry one full day before stenciling.
8. Position stencil to line up scribe mark on board with corresponding mark on stencil. On concrete structures, line up stencil with reference markings.

Procedure (Cont�d.)

9. Apply black aerosol spray paint for gage markings.
10. Position stencil and paint elevation numbers using black aerosol spray paint.
11. Clean up tools, equipment, and work area.
12. Report any AMC deficiencies to supervisor by the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos. CA3, CA11, CA12, CA20, CA21, CA30

* Report dumping or discharge of hazardous waste to an immediate supervisor or call 1(888) CLEAN LA.
* Report Illegal dumping of non hazardous waste to Planning and Estimating Unit. Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in public book case at all FMD field yards.
* Check equipment for leakage before use.
* Place spill containment pans under trucks when not in operation.
* Remove all tools, equipment and project generated garbage before leaving.
* Remove excessive mud from trucks before entering public roads and highways.
* Do not steam clean.
* Use phosphate-free or biodegradable soaps and **water based paints**.
* Use as little water as possible.
* Have spill kits handy and in reach at all times.
* Use dry clean up methods for spills. Do not hose down contaminated area.
* Report spills to Planning and Estimating Unit. Spills exceeding 42 gallons must be reported to the appropriate environmental and/or emergency authorities according to County policies and applicable regulations. Spills that may degrade storm water quality must be reported to Radio Dispatch at (626) 458-HELP.
* Dispose of used rage, wash water, used paint brushes per Department=s SWPPP requirements for Hazardous waste.
* Conduct tailgate on applicable Best Management Practices and regulatory permit requirements.

Appendix F-5: Storm Routines

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

Flood Maintenance Division

STANDARD PROCEDURE NO. 302

STORM ROUTINE - KEEP INLETS AND DRAINS CLEAR OF DEBRIS.

Introduction

This procedure is for the purpose of stationing men full time at inlets and drains in order to keep them clear of debris using fire hoses. (Crew: vary according to need.)

Equipment Needed

Vehicle with radio communication.

Tools Needed

Amount	Type
2	Potato hook
2	Pike pole, 8-foot
2	Fork, 5 tine, long handle
1	Axe, double blade
2	Flashlight, 5 cell
*	Shovel, long handle, round point
*	Eddy valve
*	Water meter
*	Spanner wrench
*	Fire hose, 2 2 inch

*Provide what each job requires.

Materials Needed

Amount	Type
24	Burlap bags
20	Batteries, D cell
100 feet	Rope, 2 inch, manila

Procedure

1. Do no perform any duties specified in the routine if conditions make them unsafe.

19. Obtain a permit to use the nearest fire hydrant at the beginning of the storm season.

20. If needed, obtain permission to use private property for access to drain or inlet.

21. Place eddy valve (and water meter, if required) on fire hydrant.

22. Attach fire hose to hydrant and roll out the length of hose required to reach the inlet or drain. Join sections of hose securely.

23. Insure the control of the nozzle end of the fire hose when water is being used either manually or by some other control method (such as using sandbags or rope).

24. Use enough water to keep debris flowing through drain.

25. Keep inlet structure clear of debris.

26. Use sandbags to stabilize fire hose, divert water or to catch large debris.

27. Routinely communicate with supervisor at least once every two house.

28. Turn over Storm Routine Reporting Form to the next patrol crew at the end of your work period. At the end of the storm, turn in the Storm Routine Reporting Form to the area headquarters yard, Planning and Estimate Unit.

29. After work has ceased, turn off water and determine how much was used. Report quantity used on Job Order. If another agency provided the water meter, they should be notified.

30. Disconnect the hose, water meter, and eddy valve from the fire hydrant.

31. Test Atmosphere for Gases before entering.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA30, CA31, CA32, CA40, ESC1 and ESC54

- Ensure that all debris is properly disposed of at an appropriate facility.
- Ensure that empty food containers, soda cans and bottles are recycled

Appendix F-5: Storm Routines

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

Flood Maintenance Division

STANDARD PROCEDURE NO. 310

STORM ROUTINE - AFTER STORM FIELD EVALUATION

Introduction

This procedure is for the evaluation of those facilities other than underground facilities not looked at during storms because of inaccessibility and/or safety problems, but where it is anticipated that AMC deficiencies will have occurred during the storm. Included in performance of minor work. It is intended that this routine be done the first normal working day after a storm.

Crew Members Needed

(1) PWCL
(1) PWMW
(1) PWMW

Equipment Needed

Pickup

Tools Needed

Amount	Type
2	Potato Hooks
2	Pike Poles, 8-Foot
2	Fork, 5 Tine, Long Handle
1	Axe, Double Blade
2	Flashlight, 5-Cell
1	Bolt Cutter, #0
2	Pliers, Button
1	Digging Bar, 6-inch
1	Shovel, Square, Long Handle
1	Shovel, Round, Long Handle

Materials Needed

Amount	Type
20	Batteries, D-Cell
50 feet	Rope, 2-inch, Manila
6	Standard Traffic Cones
1 pound	Rags
1	Clipboard
1	Storm Routine Book
10 pounds	Tie Wire, 12 Gage
5 pounds	Tie Wire, 14 Gage

General Procedure

1. Do not perform work when conditions are unsafe. Report condition immediately to supervisor.

2. Perform work that can be completed within 30 minutes such as removing small amounts of debris to unplug an inlet.

3. Do not perform work on private property unless approval is given by area Headquarters Yard.

4. Fill out Storm Routine Reporting Form and turn it in to the area Headquarters Yard, Planning and Estimating Unit. Report all AMC deficiencies to your supervisors at the end of the day.

Channels and Storm Drains

Inspect each location for existing and potential problems such as plugging and erosion. See addendum for any specific problems at a given location.

Debris Basins and Debris Disposal Areas

Visually inspect dam, outlet tower, basin, spillway, trash bars, and inlet for deficiencies.
Inspect bench drains for blockage.
Check for erosion, especially at the dam, along access roads, and near bench drain inlets.
Check area for signs of saturated fill.

General Procedure (cont�d)

Crib Structures

Visually inspect crib structure for deficiencies.
Inspect bench drains for blockage.
Check for erosion.
For crib structures used as debris basins, check for debris which could cause plugging of downstream inlets or channels.

Unimproved Channels

1. Check dip crossings for accessibility.
32. Check pipe and wire revetments for damage or failures.
33. Check stabilizers for damage or failures.
34. Check outlets for debris obstruction.
35. Check berms and slopes for erosion and sloughing.
36. Check bridges for debris deposits and obstruction.
37. Check channel invert for major soil deposits.

BEST MANAGEMENT PRACTICES (BMP�S)
California Storm Water Best Management Handbook
BMP Category Nos. CA40 And ESC1

X Every reasonable attempt to keep debris out of the inlets and/or drains should be taken during the process.

X Ensure that all debris is properly disposed of at an appropriate facility.

X Remove all tools, equipment, and project generated debris before leaving.

X Report spills to spill response team. Spills exceeding 42 gallons must be reported to the appropriate environmental and/or emergency authorities according to County policies and applicable regulations. Spills that may degrade storm water quality must be reported to Radio Dispatch at (626) 458-HELP .

X Document all findings on the MMS work order, and return it to your supervisor.

X Dispose of trash immediately per County requirement and standard operating procedures.

Appendix F-5: Storm Routines

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

Flood Maintenance Division

STANDARD PROCEDURE NO. 313
STORM ROUTINE - MAINTAIN CLEAN INLETS (REMOVE AREA).

Introduction

This procedure provides for the assignment of men to evaluate a given area for the purpose of determining deficiencies and keeping drains, inlets, or gutters clear of debris in remote areas.

Crew Members Needed

(1) PWCL
(1) PWMW
(1) PWL

Equipment Needed

Four wheel drive pick-up with radio communication.

Tools Needed

Amount	Type
2	Potato hooks
2	Pike poles, 8-foot
3	Fork, 5 tine, long handle
3	Shovel, round point, long handle
1	Axe, double blade
3	Flashlight, 5 cell
1	Chain 3/8 inches x 15 feet with hooks

Materials Needed

Amount	Type
100	Burlap bags
30	Batteries, D-cell
100 feet	Rope, 3/4-inch manila
1 pound	Rags
1	Clipboard
1	Storm Routine Book

General Storm Procedures

1. Do not perform work when conditions are unsafe. Report condition to supervisor immediately.

38. Visit all gutters and inlets at the specified frequency.

39. Clear gutters and inlets to provide adequate drainage.

40. Place sandbags at locations to check erosion of divert flows.

41. Communicate with Supervisor at least once every two hours.

42. Fill out Storm Routine Reporting Form. Turn over the Storm Routine Reporting Form to the next patrol crew at the end of the work period. At end of storm, turn in the Storm Routine Reporting Form to the Area Headquarters Yard Planning and Estimating Unit.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA40, ESC1 and ESC54

X All soiled rags are to be properly disposed of and/or properly stored.

X Ensure that all debris is properly disposed of at an appropriate facility.

X Remove all tools, equipment, and project generated debris before leaving.

X Ensure that empty food containers, soda cans and bottles are recycled.

X If the No Dumping logo is not present or has faded, request Flood Maintenance Yard paint a new logo.

X Identify and report evidence of major repairs and vehicle maintenance.

X Use dry clean up methods whenever possible for spills.

X Record the amount of debris and/or green waste disposed of on a MMS work order.

X Dispose of trash immediately per County requirement and standard operating procedure

Appendix F-5: Storm Routines

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

Flood Maintenance Division

STANDARD PROCEDURE NO. 314

STORM ROUTINE - CHECK OPERATION OF PUMPING PLANT DURING STORM

Introduction

This procedure is to make a first time and periodic check of pumping plants to insure their proper operation during a storm.

Crew Members Needed

(1) PWCL
(1) PWMW

Equipment Needed

None

Tools Needed

Amount	Type
1	12-inch Screwdriver
1	Flashlight, 5 cell
1	A1C2R1 Key
1	4-Inch Crescent Wrench
1	12-Inch Crescent Wrench
1	12-Inch Pipe Wrench
1	14-Inch Pipe Wrench

Materials Needed

Amount	Type
1 Roll	Electrical Tape
20 each	Batteries, D cell

Procedure

1. Unlock door and enter pump plant.

2. Push button marked ATTENDED and call BATS, Telephone (626) 458-HELP. Give the operator your name and the name of the plant you are calling from.

3. Check Operations Log for report of malfunctions of pumps.

4. Check sumps for elevation of water and possible pollution or trash that could damage pumps. If pollution is present, call Imperial Yard and notify Work Reception of the type of pollution present.

5. Check fore bay trash rack for trash. Clean if possible, if not notify Work Reception.

6. Check ground fault indicator. If light is on, call Communications and Electrical Division for repairs. Notify supervisor of action and continue with the routine.

7. Check hour meter and water level recorder to see if pumps have been running. If they have been running, record data on pump Pump Log Sheet and Process to step 8.

8. If pumps are not running and the routine calls for them to be prewar med, start engines. See starting procedures.

9. Check rain gage and record information on Rainfall Intensities Form.

10. Fill in Operation Report for DOC.

11. Shut off sump pump if it is not automatic.

When Leaving Plant

1. Check electric beam to be sure it is clear and operating.

2. Push UNATTENDED switch. Give the operator the name of the plant you are leaving and the name of the plant you will be at next.

3. Turn off interior and exterior lights. Leave panel light on.

4. Lock building. Wait outside door for five minutes to allow BATS operator to call back if the alarm system is not working.

<u>Start up Procedure for Natural Gas Engines</u>

1. Check battery terminals to be sure they are tight. Tighten if necessary. If they cannot be tightened or the terminal is burned, notify Work Reception at Imperial Yard.

2. Check wire leads to starter solenoid to be sure they are tight. Tighten if necessary.

3. Check engine oil level (dip stick). Add oil if necessary. Check for water in oil.

4. Check water level in radiator and add water if necessary.

5. Disengage pump clutch.

6. Start engine using automatic bypass system. Let engine warm up for about 15 minutes. Listen for unusual sounds such as loud knock or loud metal to metal sounds. If these sound are present, shut engine down and call Work Reception.

7. While engine is running, check the hour meter, RPM, oil temperature, oil pressure, fuel pressure, water temperature, amp meter gases, and record readings on Operating Record Check Sheet.

8. Check water and fuel hoses for leaks. Tighten if necessary.

9. Check fuel filter bowl for proper fuel flow.

10. Engage pump clutch (only if there is water in the sump).

11. Check pump oil reservoir and add oil if necessary.

12. Check oiler solenoid. Drip rate should be 3-5 drops per minute.

13. Visually check are of discharge pipe for obvious failure. Notify Work Reception if there is evidence of failure.

14. After engine has warmed up, shut engine down and set controls to automatic.

15. Check gas pressure, if no pressure, open gas valve manually and call Work Reception.

16. To shut engine off, manual, manual bypass gas valve must be turned off.

Starting Procedure of Diesel Engines

1. Check battery terminals to be sure they are tight. Tighten if necessary. If they cannot be tightened or the terminal is burned, notify Work Reception at Imperial Yard.
2. Check wire leads to starter solenoid to be sure they are tight. Tighten if necessary.
3. Check engine oil level (dip stick). Add oil if necessary. Check for water in oil.
4. Check water level in radiator and water if necessary.
5. Disengage pump clutch.
6. Start engine using automatic bypass system. Let engine warm up for about 15 minutes. Listen for unusual sound such as loud knock or loud metal to metal sounds. If these sounds are present, shut engine down and call Work Reception.
7. While engine is running, check the hour meter, RPM, oil temperature, oil pressure, fuel pressure, water temperature, amp meter gages, and record readings on Operating Record Check Sheet.
8. Check water and fuel hoses for leaks. Tighten if necessary.
9. Check fuel filter bowl proper fuel flow.
10. Engage pump clutch (only if there is water in the sump).
11. Check pump oil reservoir and add if necessary.
12. Check oil solenoid. Drip rate should be 3-5 drops per minute.
13. Visually check are of discharge pipe for obvious failure. Notify Work Reception if there is evidence of failure.
14. After engine has warmed up, shut engine down and set controls to automatic

Starting Procedure of Electric Motors

1. Check ground fault detector. If light is on, call Communications and Electrical Division for repairs. Notify supervisor of action and continue with operator of plant.

2. Check voltmeter for proper plant input voltage.

3. Check main breaker to be sure it is in closed position.

4. Check water level light. If water is high enough, switch to manual. If water is not high enough to pump, push test button. If test button does not go on, call Work Reception.

5. While pump is running, check amp meter for proper operation of motor.

6. Check pump oil level and drip rate. If oiler is not working, call Work Reception and note malfunction on log sheet and red tag pump.

7. Listen for unusual sounds. If present, shut motor down and call Work Reception.

8. Fill in Pump Operation Record and check Sheet.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA40 And ESC1

- X Every reasonable attempt to keep debris out of the inlets and/or drains should be taken during the process.
- X Ensure that all debris is properly disposed of at an appropriate facility.
- X Remove all tools, equipment, and project generated debris before leaving.
- X Report spills to spill response team. Spills exceeding 42 gallons must be reported to the appropriate environmental and/or emergency authorities according to County policies and applicable regulations. Spills that may degrade storm water quality must be reported to Radio Dispatch at (626) 458-HELP.
- X Dispose of trash immediately per County requirement and standard operating procedures.
- X Document all findings on the MMS work order, and return it to your supervisor.

Appendix F-5: Storm Routines

Los Angeles County Flood Control District

Operation and Maintenance Division

STANDARD PROCEDURE NO. 316

STORM ROUTINE - PATROL CORPS FACILITIES

Introduction

This procedure provides for patrol personnel to conduct Final Storm Flow Phase patrolling on Los Angeles County Drainage Area projects financed by the Federal Government through the Corps of Engineers.

Crew Members Needed

(2) PWMW

Equipment Needed

2 ton pick-up or similar

Tools Needed

Amount	Type
1	Potato Hook (Sectionalized Handle for Smaller Cars)
2	Flashlights, 5 Cell
1	Bolt Cutter, #0
1	Pliers, Button
1	Shovel, Round, Long Handle (Short Handle for Smaller Cars)
1	Camera, Self-Developing

Materials Needed

Amount	Type
12	Burlap Bags
20	Batteries, D-Cell

Materials Needed (Contd.)

Amount	Type
3	Locks, A-1
10 ft.	Chain, 1/4-Inch
1	Life Ring with 50 Feet 3/8-Inch Nylon Rope
3	Standard Traffic Cones
1 lb.	Rags
1	Clipboard
Supply	Storm Routine Reporting Forms
5 lbs.	Tie Wire, 14 Gage
5 rolls	Film for Camera

Procedure

1. The Final Storm Flow Phase occurs when the water surface elevation observed at any project unit equipped with streamflow gaging apparatus reaches the staff gage level at one-third capacity. Patrolling of the facilities indicated in the routine should be complete and comprehensive. Patrolling on channels requires that both banks be patrolled if at all accessible.

43. The Storm Routine Reporting Form must be filled out and turned in to your supervisor at the end of the shift.

44. Record the staff gage level and the time when observed.

45. Photographs should be taken at locations where storm flow damage is occurring or has occurred, where such damage has been repaired, where unusual conditions are noted, or where visual records may be useful in making maintenance determinations.

46. Side drain gates should be checked for proper operation. If a drain should backflow, the upstream end of the drain inlet should be sandbagged if it can be accomplished within 10 minutes, if not, report the situation to the Operation and Maintenance Division Area Headquarters yard as soon as possible. Perform minor work taking less than 10 minutes such as removing small amounts of debris to unplug an inlet or placing up to 6 sandbags to prevent further erosion.

<u>Procedure (Cont'd.)</u>

47. All debris accumulations that would reduce channel capacity should be reported to the Area Headquarters yard.

48. Any condition endangering any flood control structure must be reported.

49. A paramount consideration in patrolling is that patrols will be accomplished only if it is safe to do so.

50. All patrols will report as directed by the supervisor or on a frequency not to exceed 2 hours.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. SC50, SC60, SC61, CA20 and CA21

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.

Appendix F-6: Vegetation Abatement

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 004

TRIM IVY AND OTHER OVERHANGING FOLIAGE FROM CHANNEL WALL - NO VEHICULAR ACCESS TO THE INVERT - REMOVE FOLIAGE FROM CHANNEL

Introduction

This standard procedure is to be used when the crew can stand in the invert, and cut foliage with a hoe or trimmer. The foliage is to be removed from the channel.

Crew Members Needed

(1) HTD
(2) PWL

Equipment Needed

5-yard Dump Truck
A-Frame Easy Hoist with Two Trash Buckets

Tools Needed

Amount	Type
2	Pruners, Tree, 30-inch Handle
1	Saw, Pruner, 14-inch
1	Saw, Docking
2	Hoes, Planter
2	Forks, Manure, 5 Tines
2	Files, Bastard, Mill, 12-inch with Handles
1	Ladder, 20-foot Extension
1	Pruners, Tree, with 4-foot Pruner Pole
3	Goggles/Eyeshields, All Purpose
3	Respirators, Dust
2	Wheelbarrows

Materials Needed

Amount	Type
50 ft.	Rope, Manila, 2-inches
5 lbs.	Twine

Procedure

1. Enter channel by: (1) using walk gates or (2) place ladder into channel at street intersection or other convenient place of entry. Be sure that ladder is securely tied to fence or railing.

2. Cut ivy, grapevines, ice plant, and other light foliage with pruning shears or hoe.

3. Trim larger growth and branches with pruning shears or docking saw.

4. Tie cuttings into bundles and remove from channel and load into dump truck.

5. Haul trash to authorized dump when truck is full. The crew will travel with the truck to the dump site unless job site security is required or transportation is available for medical emergencies in which case the crew will stockpile debris. Check with supervisor for dump location for each channel.

6. Report any AMC deficiencies to supervisor by the end of the day.

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 008

TRIM IVY AND ANY OTHER OVERHANGING FOLIAGE FROM CHANNEL WALL - VEHICULAR ACCESS TO CHANNEL INVERT AVAILABLE

Introduction

This standard procedure is to be used in a rectangular channel when access is available to drive a truck down the invert. The foliage is to be pulled away from the channel wall and trimmed into the truck.

Crew Members needed

(1) HTD
(2) PWL

Equipment Needed

5-yard Dump Truck with a self-contained 110 volt A.C. Generator or a 2-Kilowatt 110-Volt A.C. Generator with two 25-foot Extension Cords

Tools Needed

Amount	Type
2	Pruners, Tree, 30-inch Handle
2	Saws, Pruning, 14-inch
2	Hoes, Planter with Handle
2	Clippers, Electric Hedge, Heavy Duty
2	Forks, Manure, 5 Tines
3	Goggles/Eye-shields, All Purpose
3	Respirators, Dust

Materials Needed

Amount	Type
5 gals.	Gasoline

Procedure

1. Drive truck down channel invert along side wall where overgrowth is to be trimmed.

2. Place portable generator in bed of truck or securely fasten to cab shield.

3. Pull growth away from wall, and with electric hedge trimmer cut foliage so that it will fall into truck.

4. If growth is too heavy for electric hedge trimmer, use pruners, pruning saw, or hoe to chop growth.

Trim growth above channel invert according to AMC/MS.

6. Haul trash to authorized dump when truck is full. PW to accompany truck to the dump. Check with supervisor from dump location for each channel.

7. Report any AMC deficiencies to supervisor by the end of the day.

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 009

TRIM IVY AND ANY OTHER OVERHANGING FOLIAGE FROM CHANNEL WALL - NO ADJACENT RIGHT OF WAY OR VEHICULAR ACCESS TO THE INVERT - LEAVE FOLIAGE IN THE CHANNEL.

Introduction

This standard procedure is to be used when the crew can stand in the invert and cut foliage with a hoe or trimmer. The foliage is to be left for later cleanup.

Crew Members Needed

(1) PWMW
(2) PWL (varies)

Equipment Needed

Pickup - Crew Cab

Tools Needed

Amount	Type
3	Pruners, tree, 30-inch handle
3	Saws, pruner, 14-inch
1	Saw, docking
4	Hoes, planter
3	Forks, manure, 5 tines
4	Files, bastard, mill, 12-inch
4	Handles, file, for 12-inch
1	Ladder, 20-foot extension
1	Pruner, tree, with 4Bfoot pruner pole
4	Goggles/eye shields, all purpose
4	Respirators, dust

Materials Needed

Amount	Type
50 feet	Rope, manila, 2-inch
5 pounds	Twine

Procedure

1. Enter channel by: (1) using walk gates, or (2) place ladder into channel at street intersection or other convenient place of entry. Be sure the ladder is securely tied to fence or railing.
2. Cut ivy, grapevines, ice plant, and other light foliage with pruning shears or hoe. Check maintenance standard for how much needs to be cut.
3. Trim larger growth and branches with pruning or docking saw.
4. Leave cuttings in channel for later removal by channel cleaning crew.
5. Remove tools from channel at end of day.
6. Report any AMC deficiencies to Supervisor by the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

BMP Category No. 11 - Good Housekeeping and Maintenance

* Identify and record illicit discharges to channels, storm drains or appurtenant structures, and report findings to a supervisor by the end of the work day.
* P&E will verify the accuracy of illicit discharges and forward the information by official memo to the Assistant Deputy Directors of Flood Maintenance Division, with copies to Construction Division and Watershed Management Division.
* Report dumping or discharge of hazardous waste to an immediate supervisor or call 1(888) CLEAN LA
* Report Illegal dumping of non hazardous waste to Hansen Yard=s Engineering Support Unit. Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in public book case at all FMD field yards.
* Check docking saw for leakage before use.
* Cuttings must be removed from channels within 24 hrs.

Appendix F-6: Vegetation Abatement
County of Los Angeles Department of Publics Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 013
MECHANICAL WEED ABATEMENT - LEAVE CUTTINGS

Introduction

This standard procedure will be used where chemical weed abatement cannot be applied to riverbed bottoms, side slopes, or levees. Examples are areas such as spreading ground basins and the Zone I Ditch, which is adjacent to a bird sanctuary.

Crew Members Needed

(1) UTO
(1) PWL

Equipment Needed

Utility tractor with rotary mower attachment or slope mower
Truck and tilt bed trailer if travel time exceeds one hour

Tools Needed

Amount	Type
2 each	Wrench, adjustable (crescent) 12-inch
1	Pliers, button
1	Grease gun, cartridge-type
1	Screwdriver, slotted, 8-inch
1	Hammer, 4-pound

Materials Needed

Amount	Type
6	Bolts, 5/8-x-5-inch
6	Lock washers, 5/8-inch
1	Lubricating grease, cartridge
1 pound	Rags
12 oz. can	Graphite, wet
1	Respirator, cartridge-type
1 bundle	Stakes, survey, 60-inch

Procedure

1. Clear area to be mowed of all debris that may damage mower.

2. Check soil to determine if it will support the equipment.

3. Inspect area for any holes or washouts that may pose a danger to the operator or equipment and fill in if possible.

4. If it is not practical to fill in the holes or washouts, then place stakes around the area so that the operator may avoid it.

5. Mow only the weeds covered in the routine.

6. Report deficiencies to the Supervisor at the end of the workshift.

Storm Water Pollution Prevention Plan (SWPPP)

BMP category No. 11 - Good Housekeeping and Maintenance

* Report illegal dumping immediately
* Place spill containment pans under trucks when not in operation.
* Check for illegal dumping of hazardous materials such as motor oil, transmission fluid, grease etc.

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 014

BLADE WEEDS IN BOTTOM OF RIVERBED USING A CRAWLER TRACTOR

Introduction

This standard procedure will be used for clearing weeds from large riverbed areas where chemical weed abatement is impractical. The weeds are to be windrowed in the riverbed.

Crew Members Needed

(1) PEO
(1) HTD
(1) FCCS
(1) PWL

Equipment Needed

Dozer, D-8 or equivalent
Truck and tilt-bed trailer

Tools Needed

Amount	Type
1	Pitchfork
1	Hoe, planter=s

Materials Needed

Amount	Type
2 pair	Gloves

Procedure

1. Clear weeds from areas of the riverbed where there is excessive growth exceeding the AMC.

2. Blade off the growth in the riverbed only. Do not work on the levees because growth on the levees aids in the prevention of erosion.

3. If there is any possibility of damage to any structure by direct contact of the equipment, then these areas should be hand-cleared to the extent that the structure would be visible to the operator.

4. Report AMC deficiencies to the Supervisor

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 016

MACHINE MOW WEEDS - REMOVE CUTTINGS

Introduction

This standard procedure will be used where chemical weed abatement cannot be applied to riverbed bottoms, side slopes, or levees. Examples are areas such as spreading ground basins and the Zone I Ditch, which is adjacent to a bird sanctuary.

Crew Members Needed

(1) PEO
(1) PWL
(1) HTD
(1) FCCS

Equipment Needed

Utility tractor with flail mower attachment or slope mower
Truck
Tilt bed trailer (if travel time exceeds one hour)
10-yard dump truck
Water truck (for fire suppression)

Tools Needed

Amount	Type
2	Wrench, adjustable (crescent) 12-inch
1	Pliers, button
1	Grease gun, cartridge-type
1	Screwdriver, slotted, 8-inch
1	Hammer, 4-pound

Materials Needed

Amount	Type
6	Bolts, 5/8-x-5-inch

Materials Needed (Cont'd)

6	Lock washers, 5/8-inch
1	Lubricating grease, cartridge
1 pound	Rags
12 oz. can	Graphite, wet
1	Respirator, cartridge-type
1 bundle	Stakes, survey, 60-inch

Procedure

1. Clear area to be mowed of all debris that may damage mower.
2. Check soil to determine if it will support the equipment.
3. Inspect area for any holes or washouts that may pose a danger to the operator or equipment and fill in if possible.
4. If it is not practical to fill in the holes or washouts, then place stakes around the area so that the operator may avoid it. Flags may also be used to mark holes or washouts where needed.
5. Mow only the weeds covered in the routine.
6. Remove the mowed cuttings to an authorized dump location. Check with the Supervisor for the weed dump site.
7. Report any deficiencies to the Supervisor by the end of the day.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos.; CA12, CA20, CA21, ESC40, ESC54 and SC40

$ All spills must be cleaned up immediately. All waste is to be properly disposed of.
$ When using equipment in any facility, special attention should be paid to identify any leaks. Place spill containment and drip pans under equipment when they are in facilities.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
$ Every reasonable attempt to keep debris out of the inlets and outlets should be taken.
$ Conduct tailgate on applicable regulatory permit.

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 028

TRIM IVY AND OTHER OVERHANGING FOLIAGE FROM RIGHT OF WAY FENCE AND ADJACENT RIGHT OF WAY ALONG ACCESS ROAD

Introduction

This standard procedure is to be used when overgrowth is to be trimmed from the right of way fence adjacent to the access road. The overgrowth trimmings are to be loaded into the dump truck and hauled away.

Crew Members Needed

(1) FCCS
(1) PWCL
(1) PWMW
(2) PWL
(1) HTD

Equipment Needed

10-Yard Dump Truck with (27 or 21 series)
2 ton pick-up (8 series)

Tools Needed

Amount	Type
2	Pruners, tree, 30-inch handle
2	Saws, trimmer, 14-inch
2	Hoes, planter
2	Gas hedge trimmers
2	Forks, manure, 5 tines
2	Goggles/eyeshield, all purpose
2	Respirators, dust
1	Chainsaw

Materials Needed

None

Procedure

1. Drive dump truck down access road to area to be trimmed.
2. In accordance with the Maintenance Standard, cut ivy, grapevines, and other light foliage with gas hedge trimmer.
3. In accordance with the Maintenance Standard, chop away foliage on ground with hoes.
4. Trim larger growth and branches with tree pruners or trimmer saw.
5. Load debris onto truck and haul to authorized dump when truck is full. Check with Supervisor for dump location for each facility.
6. When larger crews are used and transportation is available for medical emergencies, the crew will continue to cut and stockpile debris while the truck is at the dump site.
7. Report any AMC deficiencies to the Supervisor by the end of the day.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

- $ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
- $ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
- $ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
- $ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
- $ Check gas hedge trimmer and chainsaw for leakage before use.
- $ Place spill containment pans under trucks when not in operation.
- $ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
- $ Conduct tailgate on applicable regulatory permits

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works

Flood Maintenance Division

STANDARD PROCEDURE NO. 209

TRIM SHRUBBERY

Introduction

This procedure is for light to medium trimming of shrubs using hand tools. Shrubs vary in size and are trimmed to improve clearance and plant growth habits. Includes stacking, chipping, and clean-up. This procedure will comply with regulatory permit requirements from the Army Corps of Engineers (COE), California Regional Water Quality Control Board (RWQCB), and California Department of Fish and Game (CDFG)

Crew Members Needed

(1) HTD
(1) PWMW
(1 or 2) PWL depending on job site.

Equipment Needed

5-yd. Dump Truck
Brush Chipper

Tools Needed

Amount	Type
3	Hedge Shears
3	Lopping Shears
3	Pruning Shears (small)
3	Spring Rake
3	Pitch Fork, long handle
3	18-inch Street Broom

Materials Needed

Amount	Type
3	Safety Goggles
3	Ear Protectors
5 gals. per hr.*	Gasoline

* Approximate amount needed for Brush Chipper per running hour.

Procedure

1. Tools and materials to be delivered to the jobsite at the start of the job.
2. Trim excess shrubbery growth back in accordance with Maintenance Standards. Avoid sensitive species, native vegetation and riparian trees with a 4-inch dbh (diameter-at-breast-height) or greater. In levee system, remove unwanted roots 2-inch and greater. See California Storm Water Best Management Practice Handbook, ESC2 - Preservation of Existing Vegetation.
3. Allow the lower foliage to grow and provide cover around the base of the shrub, low to the ground, to help retain moisture in the soil.
4. As work progresses, using safety apparel, and being careful not to pick up rocks, hand pitch trimmings into brush chipper-discharging chips into truck.
5. When truck is full, driver will haul load to dump site prescribed by supervisor. Ensure truck bed is covered and trash is secured. Workers to trim and stack until truck returns.
7. Clean-up and proceed to next assignment.
8. Report AMC deficiencies to supervisor by the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos.: CA3, CA11, CA12, CA20, CA21, CA30

* Conduct tailgate on applicable Best Management Practices and regulatory permit requirements.
* Record the amount of debris and/or green waste disposed of on a MMS work order.
* Check Bush Chipper for leaks before use.
* Place spill containment pans under trucks when not in operation.
* Remove all tools, equipment and project generated garbage before leaving.

Appendix E-6: Vegetation Abatement

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 266
CONTROL OF PERENNIAL WEEDS - ROUNDUP

Introduction

Roundup is a foliage-applied herbicide used to control infestations of perennial weeds, such as bermudagrass, johnsongrass, Canada thistle, common mullein, field bindweed, Dallis grass, kikuyugrass, alkali clover, and many others. It will also control annual weeds. Retreatment may be necessary to control weeds regenerated from underground parts or seeds.

Crew Members Needed

(1)PWMW
(1) MTD

Equipment Needed

600-gallon spray rig

Tools Needed

Amount	Type
1	Spray Rig Standard Tool and Material Issue

Materials Needed

Amount	Type
1	Notebook of herbicide labels
*	Water
**	Roundup
2 gals./day	Anti-Foam Q

* The quantity of water to be used must be calculated in units of 100 gallons.
**Calculate the approximate quantity of Roundup needed for the acreage to be sprayed plus enough for one extra load.

Procedure

1. Comply with all laws, regulations, and safety procedures pertaining to the use of herbicides.
2. Place the appropriate amount of water in tank.
3. Load chemicals onto spray rig truck (do not place in tank). Transport Roundup in its original five-gallon container. Do not double handle.
4. Check spray rig for operational failures and make minor repairs if necessary.
5. At the jobsite, measure the exact quantity of Roundup needed, place in the tank, and begin mixing. If necessary, place herbicide warning signs (see No. 12 under Special Instructions). Commence spraying after the solution has mixed for 5 minutes.
6. Apply the herbicide at the rate indicated on the label. (Directions for use on the herbicide label must take priority over all other instructions.)
7. Before leaving the jobsite, secure all equipment and all empty containers to the truck.
8. Report any AMC deficiencies to the supervisor by the end of the day.
9. At the end of the day, dispose of all empty cans in the designated area for empty herbicide containers.

Special Instructions

1. Do not apply if wind causes the herbicide to drift off the target area (more than five miles per hour or gusty).
2. If spraying Bermuda grass, for best results, apply when actively growing and when seed heads first appear.
3. If spraying Johnson grass, apply Roundup when it has reached 12 inches or more in height. For best results, delay application until most Johnson grass approaches the early head stage of growth.
4. Delay ten days after spraying if the foliage is to be removed.
5. Do not use Roundup in landscaped areas except as a directed spray.
6. Spray coverage should be uniform and complete.
7. Do not add a surfactant to this product.
8. Do not apply Roundup within ten hours of anticipated rainfall.
9. Do not apply Roundup in hot weather (90 degrees or more).
10. Do not mix with any pesticides, herbicidal oils, or other material other than water.
11. Do not apply Roundup with galvanized spray equipment.
12. If a herbicide is being applied to district rights of way that are open for public use (equestrian and bicycle trails, etc,), warning signs may be placed at the usual point or points of entry.
13. The herbicides listed below may be substituted for Roundup if it is not available, or under some conditions, they may be more suitable to use.

<u>Downpon M</u> - Use as a post-emergence application on perennial grasses such as bermudagrass and johnsongrass. Downpon M is very effective in the control of cattail. It will not control broadleaf weeds. It can be used in combination with other herbicides such as Amizol, TCA, and 2, 4-D (see Standard Procedure No. 267).

Amizol 90W - (Standard Procedure No. 265) Can be used to control a broad spectrum of weeds - both annual and perennial. Applications must be made to the foliage. It translocates throughout the plant. It can be used in combination with more herbicides than any other product (see label) (see Standard Procedure No. 265).

Appendix F-6: Vegetation Abatement

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 425
HAND CLEAR DEBRIS AND WEEDS FROM BENCH DRAINS

Introduction

This standard procedure is to be used to remove weeds and other debris from bench drains that slope mower cannot safely remove. Hoe or rake weeds three feet from each side of drain. Rake or fork weeds down and load into truck. Shovel debris out or bench drain down to truck.

Crew Members Needed

(1) HTD
(1) PWL

Equipment Needed

10-yard Dump Truck

Tools Needed

Amount	Type
3	Forks (5) Tines
2	Rakes
1	Shovels, square points, long handle
3	Files, bastard, mill, flat 12-inch with handles
1 each	Gas-powered trimmer (weed eater)

Materials Needed

Amount	Type
2 gallons	Gas Mix

Procedure

1. Shovel or fork down weeds, load on dump truck and haul to dump or stockpile in area of SPS. When larger crews are used, transportation must be available for medical emergencies. The crew will stockpile debris while the truck is dumping trash.

51. Report any AMC deficiencies to supervisor by end of the shift.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. ESC1, ESC2, CA12, CA20, CA21, CA30

$ Identify and record illicit connections to channel and report findings to a supervisor by the end of the work day.
$ Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.
$ Report dumping or illicit discharge of hazardous waste to an immediate supervisor or call 1 (888) CLEANLA.
$ Report illegal dumping of non hazardous waste to the P&E Unit or Facility Engineering Unit.
$ Check chain saw for leakage before use.
$ Place spill containment pans under trucks when not in operation.
$ Record the amount of debris and/or green waste disposed of on a MMS Work Order.
$ Conduct tailgate on applicable regulatory permits.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 051
SUMP PUMP INSPECTION BY REMOVAL

Introduction

This standard procedure is to be used when it becomes necessary to remove, inspect, and reinstall low-flow sump pumps.

Crew Members Needed

(1) PWCL
(2) PWMW

Equipment Needed

Pick-up Truck with hoist
See District's Safety Manual for Entry, Inspection, and Work in Confined Spaces.

Tools Needed

Amount	Type
1	Socket set, 2-inch drive with breaker bar
1	Hammer, 4-pound
1	Rip bar
2	Screwdriver, blade type 12-inch
1	Gas Test equipment
1	Harness, safety

Materials Needed

Amount	Type
5 pounds	Rags
1 pint	Liquid wrench
1 pint	Hand cleaner

Procedure to Remove Pump

3. Notify the head of Design Division's Mechanical Section at least 48 hours in advance of the work performance so they can arrange for an inspection of the pump.

Procedure to Remove Pump (Cont□d.)

4. Notify Communication and Electrical Division (Eaton Yard) at least 48 hours in advance of the work performance and request an electrician to make the necessary electrical disconnections of the motor for the sump pump being removed.

3. If entry into the sump area is required to perform the work, comply with the District's standards for work in confined spaces.

52. At locations with inlet gate valves or slide gates, close all of the valves to eliminate the flow of water into the sump area.

53. Disconnect the sump pump from the discharge hose or column and remove any holding brackets.

54. Using either the bridge crane hoist or the truck mounted hoist along with the appropriate slings and rigging remove the pump, discharge columns and/or hoses from the sump area.

55. Clean the pump and wait for the inspection by the representative from the Mechanical Section of Design Division.

Procedure to Reinstall Pump

56. After a representative of Design Division's Mechanical Section has inspected the sump pump for mechanical deficiency, and excessive wear, and any necessary repairs have been completed, call Communication and Electrical Division (24 hours in advance of the proposed reinstallation of the sump pump) and request an electrician to make the electrical connections to the sump pump motor.

57. If entry into the sump area is required to perform the work, comply with the District's standards for entry and work in confined spaces.

58. Lower the pump, and discharge column or hoses into the sump and make the necessary connections while using the bridge crane hoist or truck mounted hoist or truck mounted hoist and rigging for support.

59. At locations with inlet gate valves or slide gates, close all valves to eliminate the flow of water into the sump.

60. Assist the electrician in test running the pump. (Submersible pumps should be completed submerged underwater before running, and Turbine type pumps bowls must be completely submerged before running.

61. Report any AMC deficiencies to the supervisor at the end of the work day.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category Nos: CA12, CA30, CA32, CA40 And ESC1

- All spills must be cleaned up immediately. All waste is to be disposed of properly.
- Refer to Confined Spaced Manual for guidance on testing for gas. Confine Space Manual is available at the public bookshelf at all Flood Maintenance Division’s field offices.
- Identify and report evidence of major repairs and vehicle maintenance.
- Use dry clean up methods whenever possible for spills.
- Remove all tools, equipment, and project generated debris before leaving.
- Document all findings on the MMS work order, and return it to your supervisor.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 052
PUMP PLANT BASIN CLEAN OUT USING A SKIP LOADER

Introduction

This standard procedure is to be used for cleaning pump plant basins with access ramps passable by a loaded dump truck.

Crew Members Needed

(1) PWCL
(1) PWL
(1) PEO
(1 or more)HTD.

Equipment Needed

Skip loader, Rubber Tire
10 Cubic Yard Dump Truck, (varies depending on haul distance)
Tilt Bed Trailer
Pickup Truck

Tools Needed

Amount	Type
2	Shovels (square point)

Materials Needed

None

Procedure

1. The loader is to be transported to and from the jobsite on a tilt bed trailer towed by a dump truck assigned to the job.

2. The loader is to stock pile debris and load it onto the dump trucks.

3. Haul debris to an authorized dump.

4. The supervisor is responsible for the parking and security of all equipment at the
end of the day.

5. Report any deficiencies for the Supervisor at the end of the day.

6. The supervisor is responsible for the parking and security of all equipment at the
end of the day.

7. Report any deficiencies for the Supervisor at the end of the day.

BEST MANAGEMENT PRACTICES (BMPS)
California Storm Water Best Management Handbook
BMP Category Nos. CA10, CA11, CA12, CA20, CA30, CA31, CA32, CA40, ESC1, ESC2, ESC21, ESC22 and ESC24

- Planning & Estimating (P&E) or Engineering Support Unit (ESU) will verify the accuracy of illicit connections and implement the illicit discharge/illicit connections procedures as applicable.

- Report illegal dumping of non-hazardous waste to the P&E Unit or Facility Engineering Unit.

- All soiled rags are to be properly disposed of and/or properly stored.

- In order to reduce debris on the roadways truck drivers shall clean their trucks of muddy debris, trash, etc. before leaving the SPS or site where the debris was generated.

- Ensure that all debris is properly disposed of at an appropriate facility.

- Remove all tools, equipment, and project generated debris before leaving.

- Record the amount of debris and/or green waste disposed of on a MMS work order.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 600
TEST RUNNING OF PUMP PLANT ENGINE LUBRICATING PUMPING SHAFTS.

Introduction

This procedure provides for the test running of the engines and pump lubrication at the District=s pump plants.

Crew Members Needed

(1) FCCS

Equipment

Pickup truck or passenger car

Tools Needed

Amount	Type
1 each	Wrench, crescent, 8-inch
1 each	Wrench, crescent, 12-inch
1 each	Service kit, batter

Materials Needed

Amount	Type
2 pounds	Rags, wiping
5 gallons	Water, battery
1 each	Pump Plant Operation Manual

Procedure

1. If a telephone is available, notify BATS at Alcazar that the security of the station is open.

2. Refer to and follow lobo procedures prior to starting work.

3. Open the pump oiler manual by-pass to all right angle gear drives and electric

motor pumps. Set the oil drop rate at 20 or more drops a minute (refer to Pump Plant Manual.

4. Check the water level in the radiator and inspect the entire system for leaks.

5. Check the engine oil level.

6. Check the battery water level.

7. Inspect fan belts and adjust tension, if necessary.

8. Visually inspect the engine, looking for loose fittings, brackets, and other loose or damage object on the engine.

9. Refer to the Pump Plant Manual in the center desk drawer of the office for instructions on starting the engine.

10. Start the engine and run for one-half hour or until engine reaches operating temperature, whichever is less, without the clutch engaged. Check the gauges and record readings in the engine log.

11. With the engine at idle speed and just before completion of this procedure, engage the clutch momentarily and observe the right angle gear drive oil pressure gauge. When the oil pressure reaches a constant level, release the clutch. Repeat process three or four times.*

12. While the clutch is engaged, check the automatic oiler drip rate and the cooling water exhaust drain.

13. Disengage the clutch and turn the engine control to off at the engine control panel.

14. Close all the manual by-pass valves for the oilers. Refill each oiler as needed.

15. Check to make sure that all engines and pump controls are in the appropriate settings as indicated by the station <u>Status Board</u>.

16. Report any AMC deficiencies to the Supervisor verbally and in writing at the end of the day.

*This depends on the water surface elevation in the sumps at the various Pump Plants. The engine pump units should be used during this procedure to reduce the water storage while pumping at the reduced RPM. To reduce hazards.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA32, CA40 and ESC1

- Refer to and follow lobo procedures prior to starting work.
- All chemicals and their byproducts are to be properly disposed of and/or properly stored.
- All soiled rags are to be properly disposed of and/or properly stored.
- Have spill kits handy and in each at all times.
- Use dry clean up methods for spills.
- Remove all tools, equipment, and project generated debris before leaving.
- All spills must be cleaned up immediately. All waste is to be disposed of properly.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 601
TEST ENGINE SAFETY CONTROLS

Introduction

This standard procedure provides for the testing of the over speed safety control, low oil pressure safety control, and the high engine temperature control switch.

Crew Members Needed

(1) PEM
(1) Electrician – Critical Resource

Equipment needed

Mechanics service truck

Tools needed

Amount	Type
1	Standard mechanics tool inventory
1	Thermometer (220 degree)
1	Bucket, water, 2-12-gallon
1	Burner, propane

Materials needed

None

Procedure

1. A test running of the engine using Standard Procedure No. 600 is required to perform this procedure.
2. Check engine over speed safety control.
   a. With engine running, increase engine governor control setting to allow engine RPM to exceed the over speed setting.

b. If working properly, the engine should automatically shut-off when RPM exceeds the over speed setting.

STANDARD PROCEDURE NO. 601

Page 2

<u>Procedure(cont d)</u>

3. Check the engine low oil pressure safety control.
   a. With engine running, short across the oil safety switch. Maintain the short until the engine completely stops and the oil pressure drops to zero. Remove the short, the oil failure light on the engine control panel should be <u>On</u> and stay <u>On</u> until the engine control switch is reset.
4. Check the high engine temperature safety control switch.
   a. Drain the radiator to a level such that the high water temperature safety switch can be removed.
   b. Disconnect the electrical wires and remove the high water temperature safety switch from the engine water manifold.
   c. Using extension wiring, reconnect the high water safety switch to the control panel.
   d. Place the high water temperature switch probe into a bucket of warm water.
   e. With the engine control switch in automatic, heat the water in the bucket. Use a thermometer to check the temperature of the water and record when the safety switch activates the hot water light on the engine control panel. It should activate around 200 degree Fahrenheit.
   f. Reinstall high water temperature safety switch on the engine if it works satisfactorily. Reconnect wiring and fill radiator to recommended level.
5. Secure engine to the status required by the station status board.
6. Report any deficiencies to the Superintendent verbally and in writing at the end of the day.

BEST MANAGEMENT PRACTICES (BMP S)
California Storm Water Best Management Handbook
BMP Category Nos. CA40 And ESC1

- All spills must be cleaned up immediately. All waste is to disposed of properly.
- All soiled rags are to be properly disposed of and/or properly stored.
- Have spill kits handy and in reach at all times.
- Use dry clean up methods for spills.
- Remove all tools, equipment, and project generated debris before leaving.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 602
SERVICING NATURAL GAS ENGINES AT THE PUMP PLANTS.

Introduction

This procedure provides for the annual servicing and maintenance of the natural gas engines at the District's pump plant.

Crew Members Needed

(1) HSEM
(2) PWMW

Equipment Needed

Amount	Type
1	Truck, mechanics service
1	Truck, pickup

Tools Needed

Amount	Type
1	Standard Mechanics Tool Inventory
1	Factory Service Manual
1	Pump, Suction Oil

Materials Needed

Amount	Type
See Factory Service Manual	Oil, Manufacturer SAE (Loc. 58.0)
See Factory Service Manual	Filters, oil
See Factory Service Manual	Filters, air
15 pounds	Rags, wiping
10 gallons	Solvent
1	Kit, Oil Sample Test

Procedure

1. If a telephone is available, call BATS at (626) 458-4357 to notify them that the security of the station is open.

2. Refer to the factory service manual and the mechanics engine service logbook.

3. Refer to and follow lobo procedures prior to starting work.

4. Test run engine and check the compression. If the compression reading for any of the cylinders varies by more than 25% from the average reading, of the average compression reading of all the cylinders is 25% below the original compression when the engine was new, repair the valves as required. This should be done by requesting a job order for the use of Standard Procedure No. 604 after completing Step No. 3 of this procedure.

5. Extract engine oil sample (refer to oil test kit instructions) and give oil sample to Supervisor.

6. Drain engine oil, remove the inspection port covers to the crankcase and remove all of the filters. Inspect the interior of the crankcase housing. If there is damage to the cylinder walls, rods, pistons, bearings, or if there are other indications of problems, report them to the Supervisor and request a job order for the use of Standard Procedure No. 603 to complete the repair work.

7. If any deficiencies are noted in Step No. 2 or 3 of this procedure, and Standard Procedure No. 603 has been requested, all further work using this procedure (602) should be terminated, otherwise, continue with the procedure.

8. Replace inspection port gaskets and covers, add oil and new oil filters.

9. Torque cylinder head bolts to manufacturers specifications.

10. Check and adjust the rocker arms.

11. Service and adjust the engine governor. (Refer to factory service manual)

12. Check coil, spark plugs, electrical wires, and magneto timing.

13. Adjust the carburetor, regulator, and check the gas line for leaks.

14. Check the LPG system. (Refer to Standard Procedure NO. 604)

15. Service the air and water filters.

Procedure (Cont'd.)

16. Service the water pump, inspect cooling system, hoses, fittings, thermostats, and radiator.

17. Service the cable and throttle control linkage.

18. Check the engine gauges.

19. Adjust the clutch and lubricate the drive shaft universal joints.

20. Service and test batteries (Refer to Standard Procedure No.628)

21. Whenever possible, check the engine operation while it is running under a load.

22. Make service record entries in the mechanics service log book.

23. Report any deficiencies to the Superintendent verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category No's CA12, CA30, CA31, CA32, CA40 And ESC1

- All spills must be cleaned up immediately. All waste is to disposed of properly.
- All soiled rags are to be properly disposed of and/or properly stored.
- Have spill kits handy and in reach at all times.
- Use dry clean up methods for spills.
- Remove all tools, equipment, and project generated debris before leaving.
- All chemicals and their byproducts are to be properly disposed of and/or properly stored.

Appendix F-7: Pump Stations

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
Flood Maintenance Division

STANDARD PROCEDURE NO. 603
MINOR/MAJOR OVERHAUL OF NATURAL GAS ENGINES AT THE PUMP PLANT.

Introduction

This procedure provides for the minor and/or major overhaul of natural gas engines , The procedure is used when problems are noted during the routine operation of the engines or when deficiencies are noted during the performance of Standard Procedure No. 602. It should include, but not necessarily be limited to, the following procedure.

Crew Members Needed

(2) HSEM
(1) PWMW

Equipment Needed

Amount	Type
1	Truck, mechanic=s service
1	Truck, pickup

Tools Needed

Amount	Type
1	Tool inventory, power equipment standard mechanic=s
1	Factory Service/Repair Manual

Materials Needed	Needed
See Factory Service Manual	Gasket set
See Factory Service Manual	Oil SAE #30 (Loc. 58)
See Factory Service Manual	Filters, Oil
See Factory Service Manual	Filters, Water
See Factory Service Manual	Filters, Air
50 pounds	Rags, wiping
10 gallons	Solvent
1 6-oz bottle	Gas leak detector (Snoop)

Procedure

5. If a telephone is available call BATS at (626) 458-4357 to notify them that the security of the station is open.

6. Refer to the Factory Service/Repair Manual and the Mechanic=s Engine Log Book before proceeding.

7. Refer to and follow lobo procedures prior to starting work.

8. If low compression was noted during an engine test or servicing, the cylinder h ead(s) must be removed and sent to an approved valve/head repair shop for service.

9. If defects were noted during a crankcase inspection, the necessary repairs must be made using the Factory Service/Repair Manual procedure. The Area Engineer must be aware of the extent of the possible repairs required.

10. Drain the crankcase if it has not already been done. Make a complete inspection of the interior of the crankcase. Check the bearings, cylinder walls, rods, pistons, and liners. If any additional defects are noted, compile a list of parts necessary to make the repairs and notify the Superintendent.

11. Follow the procedures in the Factory Service/Repair Manual to complete the repairs and servicing of the engine.

12. After the repairs are completed and the engine parts have been installed, fill the crankcase with oil and check all of the fluid levels prior to starting the engine.

13. Whenever possible, run the engine under a load as part of the breaking in period.

14. Record all the service and repair items in the Mechanic=s Engine Service Log Book.

15. Report progress and any deficiencies noted to the Supervisor verbally in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP�S)
California Storm Water Best Management Handbook
BMP Category Nos. CA12, CA21, CA30, CA31, CA32, CA40 And ESC1

X All spills must be cleaned up immediately. All waste is to disposed of properly.
X All soiled rags are to be properly disposed of and/or properly stored.

BEST MANAGEMENT PRACTICES (Cont�d.)

- Have spill kits handy and in reach at all times.

- Use dry clean up methods for spills.

- Remove all tools, equipment, and project generated debris before leaving.

- All chemicals and their byproducts are to be properly disposed of and/or properly stored.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 604
CHANGING FROM NATURAL GAS FUEL TO LIQUID PROPANE GAS FOR DUAL FUEL SYSTEM ENGINES AT PUMP PLANTS.

Introduction

This procedure describes how to change the fuel supply used by the engines at the pump plants, from Natural Gas to Liquid Propane (L.P.G). This procedure can be used either in testing the dual system or during a period of loss of Natural Gas Service.

Crew Members Needed

(2) HSEM

Equipment Needed

Amount	Type
1 each	Pick-up truck
1 each	Explosive meter

Tools Needed

Amount	Type
1 each	Wrench, crescent 6 inch
1 each	Wrench, crescent 8 inch

Materials Needed

Amount	Type
1 each	Gas leak detecting liquid (Snoop)
1 each	Pump Plant Operations Manual

Procedure

A. Activating the Fuel Tank to the Delivery System

2. If a telephone is available, call BATS (626) 458-4357 to notify them that the security of the pump plant is open.

3. Refer to the Pump Plant Operations Manual for the location of the L.P.G.

tank.

STANDARD PROCEDURE NO. 604
Page 2

Procedure (Cont□d.)

4. Refer to and follow lobo procedures prior to starting work.

5. Open the tank valve (1)* slowly. Check the delivery line, fittings, and valve at the tank for leaks. Open the delivery line valve (2)* slowly, (opening either of these valves too fast may result in a valve or line freeze). Check the delivery line, all fittings and the delivery valve for leaks.

6. Return to the building and check the entire L.P.G. delivery system up to the engine(s) L.P.G. converter for leaks.

Start, and Test Run the Engine(s) Using L.P.G.

Refer to Standard Procedure No. 600 for starting and testing running of the engine (s).

With the engine (s) running, flip the fuel transfer switch (8)* from Natural Gas to L.P. Gas (this transfer switch is located on the engine (s) instrument panel. There will be a slight hesitation as the engine (s) gas delivery system changes from Natural Gas to L.P.G.

After the engine (s) has run for 15 minutes using the L.P.G., close the L.P.G. tank valve to evacuate the liquid propane from the delivery system.

After the engine(s) has completely evacuated the liquid propane from the delivery system and has stopped running, return the fuel selector switch (8) from L.P. Gas to Natural Gas, restart the engine (s) and complete Standard Procedure No. 600.

Close the L.P.G. delivery line valve (s) and secure the L.P.G. Tank.

Upon completion of the testing of the L.P.G. system, and test running the engine, return all of the engine (s) controls to the appropriate setting as indicated by the station Status Board.

Report any AMC deficiencies to the Supervisor at the end of the day.

Activation of the L.P.G. System during Disrupted Natural Gas Service.

Complete steps, 1, 2, 3, and 4 of Section A of this procedure.

Procedure (Cont�d.)

Place the fuel transfer switch (8) from Natural Gas to the L.P. Gas position. This switch is located on the engines instrument panels.

Check that all engine controls are in the appropriate setting as indicated by the station Status Board.

To secure the L.P.G. System After the Natural Gas Service has been restored.

62. Refer to Standard Procedure No. 600 and start the engine.

63. Close the L.P.G. tank valve (1) while the engine is running to evacuate the liquid propane from the delivery system.

64. After the engine has completed evacuated the liquid propane from the delivery system and has stopped running, return all of the engine (s) controls to the appropriate setting as indicated by the station Board. Return the fuel transfer switch (8) from L.P. Gas to the Natural Gas Position.

65. Report any AMC deficiencies to the Supervisor.

BEST MANAGEMENT PRACTICES (BMP�S)
California Storm Water Best Management Handbook
BMP Category Nos. CA12, CA31, CA32, CA40 And ESC1

$ All spills must be cleaned up immediately. All waste is to disposed of properly.

$ All soiled rags are to be properly disposed of and/or properly stored.

$ Have spill kits handy and in reach at all times.

$ Use dry clean up methods for spills.

$ Remove all tools, equipment, and project generated debris before leaving.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 607
SERVICE SUMP PUMP AUTOMATIC FEED GREASE CUPS

Introduction

This procedure provides for the servicing of the force feed grease cups and lines leading to the sump pump drive bearings.

Crew Members Needed

(1) PWCL
(1) PWMW and PWL

Equipment Needed

Amount	Type
1	Pickup truck
1	District Safety Manual for Entry, Inspection, and Work in Confined Spaces

Tools Needed

Amount	Type
6	Fitting, grease, Zerk
1	Gun, grease
1	Ladder, extension, 32-foot
2	Wrench, pipe, 12-inch
2	Wrench, crescent, 12-inch

Materials Needed

Amount	Type
10 pounds	Rags, wiping
5 pounds	Grease, Mobilplex EP #2
5 gallons	Solvent

<u>*P*rocedure</u>

1. Refer to the District's Safety Manual for entry, inspection, and work in confined spaces.

2. Dewater the sump area.

3. Turn the sump pump to off and use manually when required during the performance of this procedure.

4. Remove the pressure grease cup, noted as Item 28 on the attached sketch, and install Zerk fittings.

5. Disassemble the pressure grease cups, remove old grease, and wash, using solvent.

6. Disconnect the grease lines (Items 22 and 23) at each bearing (Items 10 and 12), and purge the grease lines of old grease by using the Zerk fittings installed under Step 4.)

7. Reconnect the grease lines to the bearings, remove the bypass grease plug on the opposite side of each bearing and continue purging the grease line and bearing.

8. Remove the Zerk fittings and install the cleaned pressure grease cups.

9. Fill the pressure grease cups using the grease gun. Continue purging the grease lines while replacing the grease bypass plugs at each bearing. Fill the pressure

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA12, CA30, CA32, CA40 And ESC1

- All spills must be cleaned up immediately. All waste is to be disposed of properly.
- Identify and report evidence of major repairs and vehicle maintenance.
- Use dry clean up methods, whenever possible for spills.
- Remove all tools, equipment, and project generated debris before leaving.
- Do not over grease hinges. Wipe off excess grease.
- Document all findings on the MMS work order, and return it to your supervisor.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 608
SERVICING RIGHT ANGLE GEAR DRIVE UNIT

Introduction

This procedure provides for the servicing of the right angle gear drive units at the District's pump plants.

Crew Members Needed

(1) HSEM
(1) PWMW

Equipment Needed

Amount	Type
1	Truck, mechanic's services

Tools Needed

Amount	Type
1	Tool Inventory, Mechanic's Standard
1	Sprayer, Hudson, 3-gallon

Materials Needed

Amount	Type
See Factory Service Manual	Oil, gear-drive
5 gallons	Solvent
1 can	Cleaner, contact, aerosol (zip)
15 pounds	Rags, wiping
6 each	Cans, 5-gallon, empty (clean)

Procedures
1. If a telephone is available, call BATS at (626) 458-4357 to notify them that the security of the station is open.

2. Drain the oil and check for condensation, metal chips, etc, in the oil.

3. Refer to and follow lobo procedures prior to starting work.

4. Remove the inspection covers and inspect for rust, gear tooth wear, and failure (see addenda).

5. Inspect the interior of the lower gear drive housing for sludge. If any sludge is present, flush the gear drive unit using solvent and rags to remove the sludge.

6. Inspect the interior oil pressure and water coolant tubes for damage, loose fittings, or sediment build-up on the tubes. Tighten any fittings found to be loose and remove all sediment build-up from the tubes.

7. Remove the bottom plug to the external oil filter, drain the sediment, and replace the plug.

8. Replace the inspection covers and add oil according to the Factory Service Manual.

9. Visually inspect the anti-back spin ratchet mechanism for defects. Clean the metal chips and dust from the mechanism by using an aerosol contact cleaner that contains no oil.

10. Grease the pressure fitting with the grease recommended in the Factory Service Manual. Use the pressure fitting to fill the grease chamber until grease flows out of the relief plug.

11. Start engine, engage the clutch, and operate the right angle gear drive at low RPM. Check the oil pressure gage for proper pressure (refer to Factory Service Manual).

12. Check the entire right angle gear drive unit for oil leaks while it s operating.

13. Clean the work area of any oil spilled on the equipment or the floor.

14. Return the pump plant to the operating condition as described on the station status board.

15. Remove all deficiencies to the Supervisor verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA12, CA32, CA40 and ESC1

- All spills must be cleaned up immediately. All waste is to disposed of properly.
- All soiled rags are to be properly disposed of and/or properly stored.
- Use dry clean up methods, whenever possible for spills.
- Remove all tools, equipment, and project generated debris before leaving.
- Identify and report evidence of major repairs and vehicle maintenance.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 609
SERVICING OF PUMPS AT THE PUMP PLANTS.

Introduction

This procedure provides for the servicing and inspection of the pump units at the pump plants.

Crew Members Needed

(1) FCCS
(1) PWCL
(2) PWMW
(1) PEM

Equipment Needed

Truck, pickup
District Safety Manual for Entry, Inspection, and Work in Confined Spaces

Tools Needed

Amount	Type
1	Wrench set, ratchet, 3/4-drive
1	Wrench set, ratchet, 2-drive
2	Wrench, crescent, 12-inch
2	Wrench, crescent, 18-inch
2	Flashlight, 5-cell with batteries

Materials Needed

Amount	Type
10 pounds	Rags, wiping
1 each	Pump Plant Operations Manual

Procedure

16. If a telephone is available, call BATS at (626) 458-4357 to notify them that the security of the station is open.

17. Refer to the District's Safety Manual for Entry, Inspection, and Work in Confined Spaces.

18. Refer to and follow lobo procedures prior to starting work.

19. Before entering or working within any pump or discharge line, turn the power source (electric motor or engine) to the Aoff@ position and tag to prevent accidental running.

20. Inspect the pump oiler reservoir, clear and refill the reservoir if necessary.

21. Open the manual by-pass valve for the pump oiler and set the drip rate at 20 or more drops per minute (refer to the Pumps Plant Operation Manual).

22. Dewater the sump work area. If it is necessary to operate the submersible sump pump, white it is exposed to air, it must continually be kept hosed down. This method can only be used for short intervals.

23. Inspect the inside and outside of the pump columns for rust, corrosion, and wear.

24. Check the alignment of the pumps shaft (see Standard Procedure No. 624).

25. Inspect the inside and outside of the pump bowl for pitting, abrasion, wear, or any damage to the impeller, remove any debris found in the pump bowl.

26. Tighten all nuts and bolts and report to the Superintendent the size and total number of any missing bolts and nuts.

27. Check the suction bowl bearing for grease and add the grease as necessary.

28. Check the pumps bowl oil by-pass port for traces of fresh oil running out of and down the outside of the pump bowl.

29. Inspect the discharge line for corrosion, settlement, or joint separation.

<u>Procedure (Cont’d.)</u>

30. Return all pump controls to the appropriate setting as indicated by the station Status Board.

31. Report any deficiencies to the Superintendent verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category No’s CA30, CA31, CA32, CA40 And ESC1

- All soiled rags are to be properly disposed of and/or properly stored.

- All spills must be cleaned up immediately. All waste is to disposed of properly.

- Have spill kits handy and in reach at all times.

- Use dry clean up methods for spills.

- Remove all tools, equipment, and project generated debris before leaving.

- All chemicals and their byproducts are to be properly disposed of and/or properly stored.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 610
CHECKING OF THE DRIVE SHAFT ALIGNMENT BETWEEN THE ENGINE AND THE RIGHT ANGLE GEAR DRIVE UNIT AT THE PUMPING PLANTS.

Introduction

This procedure outlines the method used in checking and adjusting the alignment between the engine PTO unit and the right angle gear drive unit at the District's pumping plants.

Crew Members Needed

(2) HSEM
(1) PWMW

Equipment Needed:

Mechanics service truck

Tools Needed:

Amount	Type
1 set	Standard mechanics tool inventory
2 each	Straight edge, 36-inch x 1-inch square steel
1 each	Tape measure, 12-feet
4 each	C-Clamp, 6-inch
4 each	C-Clamp, 4-inch
1 each	Level, 24-inch

Materials Needed:

None

Procedure

1. Refer to and follow lobo procedures prior to starting work.

2. Secure the engine to prevent starting.

<u>Procedure (Cont’d.)</u>

3. Remove the drive line safety cage and any pipes, conduits, etc., that would interfere with the rotation of the steel straight edges.

4. Remove the drive line.

5. Refer to the accompanying drawing and bearing alignment instructions for the Twin Disc PTO and the right angle gear drive unit.

6. Replace drive shaft, safety cage, and any pipes or conduits removed for alignment procedure.

7. Restore engine to condition indicated on status board.

8. Report any deficiencies, including those in alignment, to the Superintendent at the end of the shift.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category Nos. CA30, CA31, CA32, CA40 And ESC1

X Identify and report evidence of major repairs and vehicle maintenance.

X All soiled rags are to be properly disposed of and/or properly stored.

X Remove all tools, equipment, and project generated debris before leaving.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 611
ACTIVATE DEACTIVATE THE ENGINE PRE-HEATERS AT THE PUMP PLANTS

Introduction

This procedure provides for the activation of the engine pre-heaters before the storm season, and the deactivation of the pre-heaters during the dry months.

Crew Members Needed

(2) HSEM

Equipment Needed:

Pickup truck or passenger car

Tools Needed

Amount	Type
1	Key to the pump station

Materials

None

Procedure

1. If a telephone is available, notify BATS at Alcazar that the security of the station is open.

2. Refer to and follow lobo procedures prior to starting work.

3. To activate the engine pre-heaters:
   a. Check the station status board for any reason that the pre-heaters should not be activated.
   b. Locate and turn on the engine pre-heater breaker switch on the main electric control panel.

4. To deactivate the engine pre-heater (engine heater).

Procedure (Cont'd.)

a. Refer to the station status board for the operation status of the equipment to be deactivated.
b. Turn off the engine pre-heater switch.

5. Secure the station when leaving.

6. Report any deficiencies to the Superintendent at the end of the work shift

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA30, CA31, CA32, CA40 And ESC1

- Identify and report evidence of major repairs and vehicle maintenance.
- Document all findings on the MMS work order, and return it to your supervisor.

Appendix F-7: Pump Stations

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 612
POST-STORM OPERATIONAL INSPECTION OF THE PUMP PLANTS.

Introduction

This procedure provides for the checking of the operational status of the pump plants after storms. It also provides for the dewatering of the sump and fore bay area. Visually inspect the sump, fore bay, and trash racks, and report on the amount of mud, debris, or other material that could become a problem to the operations of the pump plant in any subsequent storms.

Equipment Needed

Amount	Type
1	Truck, pickup

Tools Needed

Amount	Type
1	Flashlight, 5-cell
1	Funnel, 8-inch
1	Key for pump plant locks
1	Meter, combustible gas and oxygen deficiency
1	Pump Plant Operations Manual

Materials Needed

Amount	Type
10 gallons	Oil, R & 0 SAE #10
10 gallons	Oil, engine SAW #30
10 pounds	Rags, wiping

Procedure

1. Before entering the pump station, test for combustible gas and oxygen if the station has such a warning on the door.

2. If a telephone is available, notify BATS at Alcazar Headquarters that the security of the station is open.

Procedure (Cont�d.)

3. Refer to and follow lobo procedures prior to starting work.

4. Check the status board for the operating status of each pump.

5. From the top side, visually inspect the sump and fore bay for any pollution, high water, or other hazards. Do Not Enter The Sump Alone.

6. If any pollution is found, phone this information to the Water Quality Section of the Water Conservation Division. Make a record of the call and of the sump condition on the job order.

7. If there is no evidence of pollution in the sump and there are both electric and engine driven pumps available for use, it would be preferable to use the engine driven pump to dewater the sump.

8. Perform the pre-operational checks as described in the Pump Plant Operation Manual.

9. Disengage the clutch and start the engine by turning the engine control switch to Aby-pass. Idle the engine for three minutes, increase the engine RPM slightly, engage the clutch, and match the engine pump speed to the inflow of water into the sump area and proceed to dewater the sump. Just prior to the pump suction bowl being fully exposed, stop pumping by turning the engine control switch to the off position. Reset the engine controls to the appropriate setting as indicated by the status board.

10. To operate any electric motor pump, refer to the Pump Plant Operations Manual.

11. To operate an electric pump unit in the manual position, when the sump storage is below the automatic start-stop elevations, the pump unit should be completely submerged. Turn the control selector switch to the hand (manual) position and observe the sump water drawdown. When the pump unit suction bowl becomes exposed, turn the pump control selector switch to the off position.

12. When the water in the sump is above the automatic sump pump shut off elevation, and the sump pump will not operate in the automatic position, repeat Step 10 until the sump pump can be operated in automatic by pressing the test button.

13. When the sump pump can be operated in automatic, check the discharge outlet to verify that the pump is pumping normally. If there is not discharge, turn the sump pump selector switch to the off position and notify the Supervisor.

14. Completely dewater the sump so a visual inspection of the sump, trash racks, and fore bay can be made. At locations with submersible sump pumps, DO NOT run these pumps with the motor exposed to air.

15. Fill the pump oilers and the engine crack case to the full mark. Fill the give gallon cans of R & O oil and engine oil that are to be left in the station.

16. Return all pump controls to the appropriate setting as indicated by the status board.

17. Make al entries in the Pump Record Logs.

18. Secure the station when leaving.

19. Report any deficiencies to the Superintendent verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP S)
California Storm Water Best Management Handbook
BMP Category Nos. CA30, CA31, CA32, CA40 And ESC1

- Identify and report evidence of major repairs and vehicle maintenance.
- All soiled rags are to be properly disposed of and/or properly stored.
- Remove all tools, equipment, and project generated debris before leaving.
- Check for leakage before use.
- Use dry clean up methods, whenever possible for spills.
- All spills must be cleaned up immediately. All waste is to be disposed of properly.
- Use dry clean up methods, whenever possible for spills.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 613
SERVICE STATIONARY AIR COMPRESSOR (ELECTRIC)

Introduction

This procedure provides for the maintenance and servicing of stationary electric compressors.

Crew Members Needed

(2) HSEM
(1) Electrician.

Equipment Needed

Mechanic's Tool Truck

Tools Needed

Amount	Type
1	Tool Inventory, Standard Mechanic's Manual,
1	Factory Service

Material Needed	Type
Refer to Service Manual	Oil, compressor
5 gallons	Solvent
5 pounds	Rags, wiping

Procedure

1. If a telephone is available, notify BATS at Alcazar that the security of the station is open.

2. Refer to and follow lobo procedures prior to starting work.

Procedure (Cont’d.)

3. Turn off the electric motor unit at the power source to prevent accidental operation during servicing.

4. Drain the compressor’s oil reservoir and replace the drain plug.

5. Add oil as recommended in the Factory Service manual.

6. Remove the air breather vents and filters and clean or replace as required.

7. Inspect the flywheel and pulley to make sure the connections are tight and check the drive belts for damage and proper tension and replace as required.

8. Clean the cooling surfaces of the vanes around the tubes delivering air from the compressor the receiving tank.

9. Turn on the power to the compressor unit and check for proper operation.

10. Check the system for air leaks.

11. With the compressor running, check the high-pressure relief valve to insure that it is working properly. To do this, an electrician is required to short out the upper limit switch for the air pressure receiver tank until the high-pressure pop-off safety valve activates. (If the pop-off valve does not open within 10 psi above the upper limit switch setting, remove the short circuit and notify your Supervisor immediately.) When the pop-off valve activates properly, remove the short circuit and the compressor should stop running.

12. Slowly open the valve on the air receiver tank to release all of the air.

13. Clean the compressor and work area of all debris and oil spills

14. Report any deficiencies to the superintendent verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category No’s CA30, CA31, CA32, CA40 And ESC1

- Identify and report evidence of major repairs and vehicle maintenance.
- All soiled rags are to be properly disposed of and/or properly stored.
- Remove all tools, equipment, and project generated debris before leaving.
- Check for leakage before use.
- Document all findings on the MMS work order, and return it to your supervisor.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 614
SUMP AND FOREBAY CLEANOUT AT PUMP PLANTS

Introduction

This procedure provides for the removal of mud and debris accumulated in the sump and fore bay of the pump plants. This work must be done when the accumulated debris presents a hazard to the operation of the pumps. It also provides for the visual inspection of the pumping equipment.

Crew Members Needed

(1) PWCL
(1) HTD
(1) PWMW
(1) PWL

Equipment Needed

Truck, 10-yard dump
Truck, pickup
District Safety manual for Entry, Inspection, and Work in Confined Spaces Appropriate barrel and buckets to remove debris from sump District Safety Manual for Crane Operation.

Tools Needed

Amount	Type
As required	Safety equipment as described in the District Safety Manual for Entry, Inspection, and Work in Confined Spaces
3	Shovels, square-point
2	Squeegees, floor
1	Broom, push with handle, 18-inch
1	Key for station lock
1	Pan, dust, steel, 12-inch x 9-inch
2	Hose, fire, 50-feet long, 1 ½-inch diameter
1	Hose, garden, 50-foot

Materials Needed

Amount	Type
5 pounds	Rags, wiping

Procedure

7. Refer to and follow lobo procedures prior to starting work.
8. If a telephone is available, notify BATS that the security of the station is open.
9. Refer to the station status board for the operation status of the equipment in the station.
10. At least one of the crew members must be certified, by the District, to operate floor cranes and that member must operate the crane.
11. Refer to the District Safety Manual for Crane Operation and follow Standard Procedure No. 549 to perform a pre-operation inspection of the floor operated crane.
12. Refer to the District Safety Manual for Entry, Inspection, and work in Confined Spaces.
13. Turn the sump pump to the “off” position and use manually in the “hand” position when pumping is required to dewater the sump work area.
14. Run the sump pumps only long enough to keep the work area dewatered. At locations with submersible sump pumps, DO NOT run these pumps while they are exposed to the air. A fire hose with a fog nozzle trained on the motor, can be used for cooling the motor when it is exposed to the air for short periods of time while pumping to keep the work area dewatered.
15. Conduct periodic gas and oxygen deficiency tests of the sump and fore bay area work environment as long as work is in progress, and keep records of the results.
16. Using Vactor Truck, remove mud debris. Take to drying bin at Imperial Yard.
17. Make a visual inspection of the interior of each pump bowl, checking for damage and debris inside the bowl.
18. When the sump cleanout is completed, the top-side work area must also be cleaned to remove water debris.
19. Reset the pump plant operations according to the instructions on the station status board.
20. Report any deficiencies to the Superintendent verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP'S)
California Storm Water Best Management Handbook
BMP Category Nos. CA20, CA30, CA31, CA32, CA40, and ESC1

- All soiled rags are to be properly disposed of and/or properly stored.

- Ensure that all debris is properly disposed of at an appropriate facility.

- Remove all tools, equipment, and project generated debris before leaving.

- Dispose of trash immediately per County requirement and standard operating procedures.

- Document all findings on the MMS work order, and return it to your supervisor.

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 615
PUMP PLANT SUMP CLEANOUT USING A VACUUM TRUCK

Introduction

This procedure provides for the use of a vacuum truck for the removal of mud and debris from pump station sumps when the entrance to the sump is located within a public street. It also provides for the inspection of the sump, fore-bay, floor, walls, trash racks, and pumps for defects.

Crew Members Needed

(1) PWCL
(1) PWMW
(2) PWL
(1) HTD (optional)

Equipment Needed

AMOUNT	TYPE
1	Truck, vacuum (large rented truck required at most locations
1	Truck, pickup
1	Work Area Traffic Control Handbook

District Safety Manual for Entry, Inspection, and Work in Confined Spaces.

Tools Needed

Amount	Type
2 each	Fork, five-tine

Materials Needed

Amount	Type
10 each	Bags, burlap
30 feet	Rope, 3/8-inch

<u>Procedure</u>

1. Park the vacuum truck at the entrance to the sump and place the traffic detour delineators in compliance with the Work Area Traffic Control Handbook.
2. Enter the pump plant and telephone BATS to notify them that the security of the station is open.
3. Refer to District’s Safety Manual for Entry, Inspection, & Work in Confined Spaces.
4. If there is pollution in the water, such as (a) turbid or discolored water, (b) the presence of petroleum related products on the water surface, or (c) the presence of unusual or noxious odors, phone this information to the Superintendent immediately and discontinue work with this standard procedure.
5. If no pollution is present in the sump, dewater the sump.
6. Turn the sump pump to the “off” position and use manually in the “hand” position when pumping is required to dewater the sump work area.
7. Run the sump pump only long enough to keep the work area dewatered. At locations with submersible sump pumps, DO NOT run these pumps while they are exposed to the air. A fire hose with a fog nozzle trained on the motor, can be used for cooling when the motor is exposed to air for short periods of time while pumping to keep the work area dewatered. ‘
8. Remove trash and debris form the sump and forebay area using the vacuum truck.
9. All materials that are too big or too long for the vacuum truck intake are to be removed by land with the use of ropes and/or burlap bags.
10. Inspect the sump area walls, floors, and forebay area for defects.
11. Inspect pump columns and pump bowls for defects.
12. Set the operation of the pump plant as required by the Status Board.
13. Report any deficiencies to the supervisor verbally and in writing at the end of the work shift.

BEST MANAGEMENT PRACTICES (BMP’S)
California Storm Water Best Management Handbook
BMP Category No’s CA20, CA30, CA31, CA32, CA40, and ESC1

- All soiled rags are to be properly disposed of and/or properly stored.
- Ensure that all debris is properly disposed of at an appropriate facility.
- Remove all tools, equipment, and project generated debris before leaving.
- Dispose of trash immediately per County requirement and standard operating procedures.
- Document all findings on the MMS work order, and return it to your supervisor.
- Identify and report evidence of major repairs and vehicle maintenance.

Appendix F-8: Debris Basins

Appendix F-8: Debris Basins

County of Los Angeles Department of Public Works
Flood Maintenance Division

STANDARD PROCEDURE NO. 064
INSPECTION OF THE US CORPS OF ENGINEERS DEBRIS BASINS

Introduction

This procedure describes the periodic inspection of debris basins maintained as required by the U.S. Corps of Engineers. Inspectors will record violations of the National Pollutant Discharge Elimination System (NPDES) permit requirements.

Crew Members Needed

(1) FCCS
(1) PWMW

Equipment Needed

Four wheel drive vehicle (Blazer or equal)

Tools Needed

Amount	Type
1 each	Tape measure, 100 feet cloth (tenths of a foot)
1 each	Tape measure, 8 feet steel
1 each	Shovel, round point with long handle
1 each	Hammer, 4 lbs.
1 each	Cutter, bolt, No. 1
1 each	Broom, push, 18 inch
1 each	Camera - Polaroid
1 each	Thomas Guide
1 each	Reduced size construction drawings for each debris basin to be inspected.
1 each	Set of Acceptable Maintenance Conditions

Materials Needed

Amount	Type
6 packages	Film, Polaroid, black and white
1 lb.	Rags, wiping
1 oz.	Graphite for locks
1 each	First Aid Kit
5 each	Locks, gate
15 feet	Chain, 1/4 Inch
1 roll	Flagging, orange

Procedure

1. Inspect all of the pertinent components of each debris basin specified (excluding landscaping and buildings).
2. Personally inspect the spillway walls, access roads, facing slab and downstream toe of the dam on each inspection.
3. Whenever possible mark each reported AMC deficiency in the field with orange flagging.
4. Report all conditions exceeding the District's Acceptable Maintenance Conditions to the supervisor by the end of the day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)
California Storm Water Best Management Handbook
BMP Category Nos: CA20, CA32

* Report dumping or discharge of hazardous waste to an immediate supervisor or call 1(888) CLEAN LA.
* Report illegal dumping of non hazardous waste to Planning and Estimating Unit (P&E). Consult SWPPP manuals for guidance on responding to hazardous and nonhazardous materials. SWPPP manuals are located in public book case at all FMD field yards.
* Place spill containment pans under truck when not in operation.
* Remove excessive mud from vehicles before entering public roads and highways.
* Dispose of used rags in accordance with Department's SWPPP and applicable permit requirements.

Appendix G – Erosion Repair Guidelines

– ASTM Testing Procedures

Erosion Repair Guidelines
Geotechnical □ Materials Engineering Division

The following procedures are utilized to repair significant instances of erosion within flood control channels and levees. When performing work on earthen materials:

1. The surface to receive fill placement shall be plowed or scarified to a depth of at least eight (8) inches until the surface is free from ruts or other uneven features, which inhibit uniform compaction.

2. The selected fill material shall be placed in layers which, when compacted, shall not exceed six (6) inches in thickness. Deleterious material such as trash, brush, vegetation, and debris be removed from selected fill and disposed of off-site. This removal must be concluded prior to fill placement. Where fills are to be placed on slopes steeper than 5:1 (horizontal:vertical) gradient, the fill shall be keyed and benched into component material. Fill material shall not be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests indicate that the moisture content of the fill material complies with compaction requirements.

3. When the moisture content of fill material is not sufficient to achieve the required compaction, water shall be added until the soils attain a moisture content to achieve the required compaction. When the moisture content of the fill material is excessive, the fill material shall be aerated by scarification or blended with drier material, until the moisture content is reduced to an acceptable content to achieve the required compaction.

4. After each layer has been evenly spread, moisture-conditioned, and mixed, it shall be uniformly compacted to a minimum of 90 percent of maximum dry density, as determined by the latest version of **American Standard for Testing Materials Method** (**ASTM**) **Test Designation D-1557** (see attached**)**. Relative compaction shall be expressed as a ratio between in-situ dry density determined by field density tests and the maximum dry density obtained in the laboratory by the foregoing standard procedure.

5. Compaction shall be achieved with sheepsfoot rollers, vibrating sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other mechanical means such as Gradall with sheepsfoot roller attachment or hand operated tamping device. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to ensure that the required relative compaction has been obtained.

6. Field density tests, per **ASTM D-1556** or **D-2922**, shall be performed during grading operations. Sufficient tests of the fill soils shall be made to determine relative compaction of the fill material in accordance with the following guidelines:

1) one test for each 2-foot vertical lift; 2) one test for each 1000 cubic yards of material placed. Where sheepsfoot rollers are used, the compacted soil may be distributed to a depth of several inches. Density tests shall be taken in compacted material below the distributed zone. The approximate area where density tests are being conducted shall be "shut down" and no activities permitted that may disturb the testing operations. When these tests indicate that the required relative compaction is not achieved, the particular layer or portion, thereof, shall be reworked until the required density has been obtained. A minimum of 10% of the field density tests shall be conducted per **ASTM D-1556**.

7. If additional soil is needed to repair a slope, it may be imported from a Department approved site after representative soil samples have been reviewed and approved.

8. If a location becomes a recurring problem, the local drainage facilities may be evaluated and improvements made to prevent and/or minimize future erosion in the area. In some cases this may involve DES and/or GMED comments and recommendations.

Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method[1]

This standard is issued under the fixed designation D 1556; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

$^{\epsilon 1}$ Note—The title was corrected editorially in November 1991.
$^{\epsilon 2}$ Note—Editorial changes were made November 1993.

1. Scope

1.1 This test method may be used to determine the in-place density and unit weight of soils using a sand cone apparatus.

1.2 This test method is applicable for soils without appreciable amounts of rock or coarse materials in excess of 1½ in. (38 mm) in diameter.

1.3 This test method may also be used for the determination of the in-place density and unit weight of undisturbed or *in situ* soils, provided the natural void or pore openings in the soil are small enough to prevent the sand used in the test from entering the voids. The soil or other material being tested should have sufficient cohesion or particle attraction to maintain stable sides on a small hole or excavation, and be firm enough to withstand the minor pressures exerted in digging the hole and placing the apparatus over it, without deforming or sloughing.

1.4 This test method is not suitable for organic, saturated, or highly plastic soils that would deform or compress during the excavation of the test hole. This test method may not be suitable for soils consisting of unbound granular materials that will not maintain stable sides in the test hole, soils containing appreciable amounts of coarse material larger than 1½ in. (38 mm), and granular soils having high void ratios.

1.5 When materials to be tested contain appreciable amounts of particles larger than 1½ in. (38 mm), or when test hole volumes larger than 0.1 ft^3 (2830 cm^3) are required, Test Method D 4914 or D 5030 are applicable.

1.6 It is common practice in the engineering profession to concurrently use pounds to represent both a unit of mass (lbm) and a unit of force (lbf). This implicitly combines two separate systems of units, that is, the absolute system and the gravitational system. It is scientifically undesirable to combine the use of two separate sets of inch-pound units within a single standard. This test method has been written using the gravitational system of units when dealing with the inch-pound system. In this system the pound (lbf) represents a unit of force (weight). However, the use of balances or scales recording pounds of mass (lbm), or the recording of density in lbm/ft^3 should not be regarded as non-conformance with this test method.

1.7 *This standard does not purport to address the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 653 Terms and Symbols Relating to Soil and Rock[2]
D 698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (304.8-mm) Drop[2]
D 1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop[2]
D 2216 Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures[2]
D 3584 Practice for Indexing Papers and Reports on Soil and Rock for Engineering Purposes[2]
D 4253 Test Method for Maximum Index Density of Soils Using a Vibratory Table[2]
D 4254 Test Method for Minimum Index Density of Soils and Calculation of Relative Density[2]
D 4643 Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method[2]
D 4718 Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles[2]
D 4753 Specification for Evaluating, Selecting, and Specifying Balances and Scales for Use in Soil and Rock Testing[2]
D 4914 Test Method for Density and Unit Weight of Soil and Rock in Place by the Sand Replacement Method[2]
D 4944 Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method[3]
D 4959 Test Method for Determination of Water (Moisture) Content of Soil by Direct Heating Method[3]
D 5030 Test Methods for Density and Unit Weight of Soil and Rock in Place by the Water Replacement Method[3]

[1] This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.08 on Special and Construction Control Tests.

Current edition approved June 29, 1990. Published November 1990. Originally published as D 1556 – 58 T. Last previous edition D 1556 – $82^{\epsilon 1}$

[2] *Annual Book of ASTM Standards*, Vol 04.08.

[3] *Annual Book of ASTM Standards*, Vol 04.09.

3. Terminology

3.1 *Definitions*—All definitions are in accordance with Terminology D 653.

4. Summary of Test Method

4.1 A test hole is hand excavated in the soil to be tested and all the material from the hole is saved in a container. The hole is filled with free flowing sand of a known density, and the volume is determined. The in-place wet density of the soil is determined by dividing the wet mass of the removed material by the volume of the hole. The water content of the material from the hole is determined and the dry mass of the material and the in-place dry density are calculated using the wet mass of the soil, the water content, and the volume of the hole.

5. Significance and Use

5.1 This test method is used to determine the density of compacted soils placed during the construction of earth embankments, road fill, and structural backfill. If often is used as a basis of acceptance for soils compacted to a specified density or percentage of a maximum density determined by a test method, such as Test Methods D 698 or D 1557.

5.2 This test method can be used to determine the in-place density of natural soil deposits, aggregates, soil mixtures, or other similar material.

5.3 The use of this test method is generally limited to soil in an unsaturated condition. This test method is not recommended for soils that are soft or friable (crumble easily) or in a moisture condition such that water seeps into the hand excavated hole. The accuracy of the test may be affected for soils that deform easily or that may undergo a volume change in the excavated hole from vibration, or from standing or walking near the hole during the test (see Note 1).

NOTE 1—When testing in soft conditions or in soils near saturation, volume changes may occur in the excavated hole as a result of surface loading, personnel performing the test, and the like. This can sometimes be avoided by the use of a platform that is supported some distance from the hole. As it is not always possible to detect when a volume change has taken place, test results should always be compared to the theoretical saturation density, or the zero air voids line on the dry density versus water content plot. Any in-place density test on compacted soils that calculates to be more than 95 % saturation is suspect and an error has probably occurred, or the volume of the hole has changed during testing.

6. Apparatus

6.1 *Sand-Cone Density Apparatus*, consisting of the following:

6.1.1 An attachable jar or other sand container having a volume capacity in excess of that required to fill the test hole and apparatus during the test.

6.1.2 A detachable appliance consisting of a cylindrical valve with an orifice approximately ½ in. (13 mm) in diameter, attached to a metal funnel and sand container on one end, and a large metal funnel (sand-cone) on the other end. The valve will have stops to prevent rotating past the completely open or completely closed positions. The appliance will be constructed of metal sufficiently rigid to prevent distortion or volume changes in the cone. The walls of the cone will form an angle of approximately 60 % with the base to allow uniform filling with sand.

6.1.3 A metal base plate or template with a flanged center hole cast or machined to receive the large funnel (cone) of the appliance described in 6.1.2. The base plate may be round or square and will be a minimum of 3 in. (75 mm) larger than the funnel (sand-cone). The plate will be flat on the bottom and have sufficient thickness or stiffness to be rigid. Plates with raised edges, ridges, ribs, or other stiffners of approximately ⅜ to ½ in. (10 to 13 mm) high may be used.

6.1.4 The mass of the sand required to fill the apparatus and base plate will be determined in accordance with the instructions in Annex A1 prior to use.

6.1.5 The details for the apparatus shown in Fig. 1 represents the minimum acceptable dimensions suitable for testing soils having maximum particle sizes of approximately 1½ in. (37.5 mm) and test hole volumes of approximately 0.1 ft^3 (2830 cm^3). When the material being tested contains a small amount of oversize and isolated larger particles are encountered, the test should be moved to a new location. Larger apparatus and test hole volumes are needed when particles larger than 1½ in. (37.5 mm) are prevalent. The apparatus described here represents a design that has proven satisfactory. Larger apparatus, or other designs of similar proportions may be used as long as the basic principles of the sand volume determination are observed. When test hole volumes larger than 0.1 ft^3 (5660 cm^3) are required Test

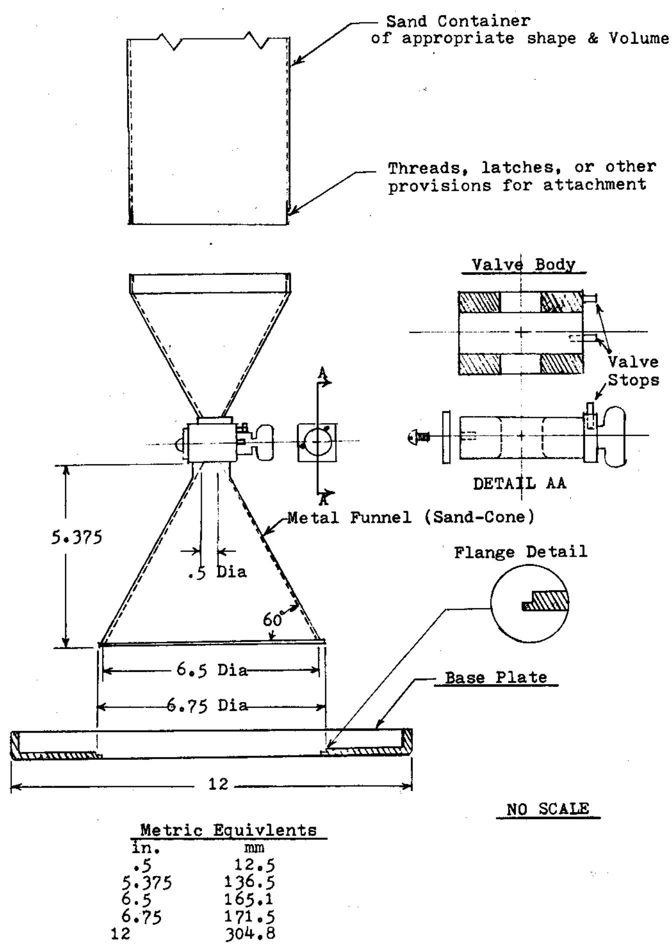


FIG. 1 Density Apparatus

Method D 4914 should be utilized.

6.2 *Sand*—Sand must be clean, dry, uniform in density and grading, uncemented, durable, and free-flowing. Any gradation may be used that has a uniformity coefficient ($C_u = D_{60}/D_{10}$) less than 2.0, a maximum particle size smaller than 2.0 mm (No. 10 sieve), and less than 3 % by weight passing 250 μm (No. 60 sieve). Uniformly graded sand is needed to prevent segregation during handling, storage, and use. Sand free of fines and fine sand particles is required to prevent significant bulk-density changes with normal daily changes in atmospheric humidity. Sand comprised of durable, natural subrounded, or rounded particles is desirable. Crushed sand or sand having angular particles may not be free-flowing, a condition that can cause bridging resulting in inaccurate density determinations (see Note 2). In selecting a sand from a potential source, a gradation and five separate bulk-density determinations in accordance with the procedure in Annex A2 should be made on each container or bag of sand. To be an acceptable sand, the bulk-density variation between any one determination shall not be greater than 1 % of the average. Before using sand in density determinations, it shall be dried, then allowed to reach an air-dried state in the general location where it is to be used (see Note 3). Sand shall not be re-used without removing any contaminating soil, checking the gradation, drying and redetermining the bulk-density (see Note 4). Bulk-density tests of the sand will be made at time intervals not exceeding 14 days, always after any significant changes in atmospheric humidity, before reusing, and before use of a new batch from a previously approved supplier (see Note 5).

NOTE 2—Some manufactured (crushed) sands such as blasting sand have been successfully used with good reproducibility. The reproducibility of test results using angular sand should be checked under laboratory controlled testing situations before selecting an angular sand for use.

NOTE 3—Many organizations have found it beneficial to store sands in moisture resistant containers. Sand should be stored in dry areas protected from weather. The use of a lighted bulb or other heat source in, or adjacent to the storage containers has also been found to be beneficial in areas of high humidity.

NOTE 4—As a general rule, reclaiming sand after testing is not desirable.

NOTE 5—Most sands have a tendency to absorb moisture from the atmosphere. A very small amount of absorbed moisture can make a substantial change in bulk-density. In areas of high humidity, or where the humidity changes frequently, the bulk-density may need to be determined more often than the 14 day maximum interval indicated. The need for more frequent checks can be determined by comparing the results of different bulk-density tests on the same sand made in the same conditions of use over a period of time.

6.3 *Balances or Scales*—Meeting Specification D 4753, with 5.0 g readability, or better, to determine the mass of sand and excavated soils. A balance or scale having a minimum capacity of 20 kg and 5.0 g readability is suitable for determining the mass of the sand and the excavated soil when apparatus with the dimensions shown in Fig. 1 is used.

6.4 *Drying Equipment*—Equipment corresponding to the method used for determining water content as specified in Test Methods D 2216, D 4643, D 4959, or D 4944.

6.5 *Miscellaneous Equipment*—Knife, small pick, chisel, small trowel, screwdriver, or spoons for digging test holes, large nails or spikes for securing the base plate; buckets with lids, plastic-lined cloth sacks, or other suitable containers for retaining the density samples, moisture sample, and density sand respectively; small paint brush, calculator, notebook or test forms, etc.

7. Procedure

7.1 Select a location/elevation that is representative of the area to be tested, and determine the density of the soil in-place as follows:

7.1.1 Inspect the cone apparatus for damage, free rotation of the valve, and properly matched baseplate. Fill the cone container with conditioned sand for which the bulk-density has been determined in accordance with Annex A2, and determine the total mass.

7.1.2 Prepare the surface of the location to be tested so that it is a level plane. The base plate may be used as a tool for striking off the surface to a smooth level plane.

7.1.3 Seat the base plate on the plane surface, making sure there is contact with the ground surface around the edge of the flanged center hole. Mark the outline of the base plate to check for movement during the test, and if needed, secure the plate against movement using nails pushed into the soil adjacent to the edge of the plate, or by other means, without disturbing the soil to be tested.

7.1.4 In soils where leveling is not successful, or surface voids remain, the volume horizontally bounded by the funnel, plate and ground surface must be determined by a preliminary test. Fill the space with sand from the apparatus, determine the mass of sand used to fill the space, refill the apparatus, and determine a new initial mass of apparatus and sand before proceeding with the test. After this measurement is completed, carefully brush the sand from the prepared surface (see Note 6).

NOTE 6—A second calibrated apparatus may be taken to the field when this condition is anticipated (instead of refilling and making a second determination). The procedure in 7.1.4 may be used for each test when the best possible accuracy is desired, however, it is usually not needed for most production testing where a relatively smooth surface is obtainable.

7.1.5 Dig the test hole through the center hole in the base plate, being careful to avoid disturbing or deforming the soil that will bound the hole. Test hole volumes are to be as large as practical to minimize errors and will in no case be smaller than the volumes indicated in Table 1 for the maximum size of soil particle removed from the test hole. The sides of the hole should slope slightly inward and the bottom should be reasonably flat or concave. The hole should be kept as free as possible of pockets, overhangs, and sharp obtrusions since these affect the accuracy of the test. Soils that are essentially granular require extreme care and may require digging a conical-shaped test hole. Place all excavated soil, and any soil loosened during digging, in a moisture tight container that is marked to identify the test number. Take care to avoid losing any materials. Protect this material from any loss of moisture

TABLE 1 Minimum Test Hole Volumes Based on Maximum Size of Included Particle

Maximum Particle Size		Minimum Test Hole Volumes	
in.	(mm)	cm^3	ft^3
½	(12.5)	1420	0.05
1	(25.0)	2120	0.075
2	(50)	2830	0.1

until the mass has been determined and a specimen has been obtained for a water content determination.

7.1.6 Clean the flange of the base plate hole, invert the sand-cone apparatus and seat the sand-cone funnel into the flanged hole at the same position as marked during calibration (see Annex A1). Eliminate or minimize vibrations in the test area due to personnel or equipment. Open the valve and allow the sand to fill the hole, funnel, and base plate. Take care to avoid jarring or vibrating the apparatus while the sand is running. When the sand stops flowing, close the valve.

7.1.7 Determine the mass of the apparatus with the remaining sand, record, and calculate the mass of sand used.

7.1.8 Determine and record the mass of the moist material that was removed from the test hole. When oversized material corrections are required, determine the mass of the oversized material on the appropriate sieve and record, taking care to avoid moisture losses. When required, make appropriate corrections for the oversized material using Practice D 4718.

7.1.9 Mix the material thoroughly, and either obtain a representative specimen for water content determination, or use the entire sample.

7.1.10 Determine the water content in accordance with Test Method D 2216, D 4643, D 4944, or D 4959. Correlations to Method D 2216 will be performed when required by other test methods.

7.2 Water content specimens must be large enough and selected in such a way that they represent all the material obtained from the test hole. The minimum mass of the water content specimens is that required to provide water content values accurate to 1.0 %.

8. Calculation

8.1 Calculations shown are for mass in grams and volumes in cubic centimetres. Other units are permissible provided the appropriate conversion factors are used to maintain consistency of units throughout the calculations. See 1.6 for additional comments on the usage of inch-pound units.

8.2 Calculate the volume of the test hole as follows:

$$V = (M_1 - M_2)/\rho_1$$

where:

V = volume of the test hole, cm^3,

M_1 = mass of the sand used to fill the test hole, funnel and base plate, g (from 7.1.7),

M_2 = mass of the sand used to fill the funnel and base plate (from Annex A1.2.2.6), g, and

ρ_1 = bulk density of the sand (from Annex A2.3.5), g/cm^3.

8.3 Calculate the dry mass of material removed from the test hole as follows:

$$M_4 = 100\ M_3/(w + 100)$$

where:

w = water content of the material removed from test hole, %, (from 7.1.10),

M = moist mass of the material from test hole, g, (from 7.1.8), and

M = dry mass of material from test hole, g, or multiply by 0.002205 for lb.

8.4 Calculate the in-place wet and dry density of the material tested as follows:

$$\rho_m = M_3/V$$
$$\rho_d = M_4/V$$

where:

V = volume of the test hole, cm^3 (from 8.2),

M_3 = moist mass of the material from the test hole, g, (from 7.1.8),

M_4 = dry mass of the material from the test hole, g, (from 8.3),

ρ_m = wet density of the tested material g/cm^3 or its wet unit weight, γ_m in lb/ft^3 where $\gamma_m = \rho_m \times 62.43$, and

ρ_d = dry density of the tested material, g/cm^3 or its dry unit weight, γ_d in lb/ft^3 where $\gamma_d = \rho_d \times 62.43$.

8.5 It may be desired to express the in-place density as a percentage of some other density, for example, the laboratory densities determined in accordance with Test Method D 698, D 1557, D 4253 or D 4254. This relation can be determined by dividing the in-place density by the laboratory density and multiplying by 100. Calculations for determining relative density are provided in Test Method D 4254. Corrections for oversize material, if required, should be performed in accordance with Practice D 4718.

9. Report

9.1 Report, as a minimum, the following information:

9.1.1 Test location, elevation, thickness of layer tested, or other pertinent data to locate or identify the test.

9.1.2 Test hole volume, cm^3 or ft^3.

9.1.3 In-place wet density, g/cm^3 or lb/ft^3.

9.1.4 In-place dry density, ρ_d, g/cm^3.

9.1.5 In-place dry unit weight, KN/m^3 ($\rho_d \times 9.807$), or lb/ft^3 ($\rho_d \times 62.43$), expressed to the nearest .1 KN/m^3, or 1.0 for lb/ft^3.

9.1.6 In-place water content of the soil expressed as a percentage of dry mass, and the test method used.

9.1.7 Test apparatus identity and calibrated volume.

9.1.8 Bulk density of the sand used, g/cm^3, or lb/ft^3.

9.1.9 Visual description of the soil or material designation.

9.1.10 Mass and percentage of oversized particles and the size sieve used, if performed.

9.1.11 Comments on the test, as applicable.

9.1.12 If the in-place dry density or unit weight is expressed as a percentage of another value, include the following:

9.1.12.1 The laboratory test method used.

9.1.12.2 The comparative dry density or unit weight value and water content used.

9.1.12.3 Correction for oversized material and details, if applicable.

9.1.12.4 The comparative percentage of the in-place material to the comparison value.

9.1.13 If the in-place density, unit weight, or water content are to be used for acceptance, include the acceptance criteria applicable to the test.

10. Precision and Bias

10.1 *Statement of Precision*—Due to the nature of the soil or rock materials tested by the method it is either not feasible or too costly at this time to produce multiple specimens that have uniform physical properties. Any variation observed in the data is just as likely to be due to specimen variation as to operator or laboratory testing variation. Subcommittee D18.08 welcomes proposals that would allow for development of a valid precision statement.

10.2 *Statement of Bias*—There is no accepted reference value for this test method, therefore, bias cannot be determined.

10.3 While no formal round-robin testing has been completed, it is estimated by Subcommittee D18.08 from available data that the results of two properly conducted tests performed by a skilled operator on the same material at a given time and location should not differ by more than approximately 2 lb/ft^3 (3.2 Kg/m^3). Tests performed by unskilled operators on the same material would be expected to yield substantially greater differences.

11. Keywords

11.1 The following keywords are applicable to this test method in accordance with Practice D 3584: acceptance tests; compaction tests; degree of compaction; density tests; earthfill; embankments; field control density; field tests; inplace density; inplace dry density; *in situ* density; relative density; sand cone; soil compaction; soil tests; unit weight.

ANNEXES

(Mandatory Information)

A1. CALIBRATION OF SAND CONE APPARATUS

A1.1 Scope

A1.1.1 This annex describes the procedure for determining the mass of sand contained in the funnel and base plate of the sand-cone apparatus.

A1.1.2 The mass of sand contained in the apparatus and base plate is dependent on the bulk-density of the sand. Consequently, this procedure must be performed for each apparatus whenever there are changes in the sand bulk-densities.

A1.2 Calibration Procedure

A1.2.1 Calibration of the apparatus can be accomplished by either of two methods:

A1.2.1.1 *Method A*—By determining the mass of calibrated sand that can be contained in each funnel and base plate set, or

A1.2.1.2 *Method B*—By determining the volume of sand needed to fill each funnel and base plate set and applying this volume constant whenever new sand bulk-densities are calculated.

A1.2.1.3 Since the mass of sand contained in the apparatus funnel and base plate is dependent on the bulk density of the sand, if Method A is used, it must be repeated whenever the bulk-density of the sand changes.

A1.2.2 All determinations of mass are to be made to the nearest 5 g.

A1.2.3 *Method A:*

A1.2.3.1 Fill the apparatus with sand that is dried and conditioned to the same state anticipated during use in testing.

A1.2.3.2 Determine the mass of the apparatus filled with sand, g.

A1.2.3.3 Place the base plate on a clean, level, plane surface. Invert the container/apparatus and seat the funnel in the flanged center hole in the base plate. Mark and identify the apparatus and base plate so that the same apparatus and plate can be matched and reseated in the same position during testing.

A1.2.3.4 Open the valve fully until the sand flow stops, making sure the apparatus, base plate, or plane surface are not jarred or vibrated before the valve is closed.

A1.2.3.5 Close the valve sharply, remove the apparatus and determine the mass of the apparatus and remaining sand. Calculate the mass of sand used to fill the funnel and base plate as the difference between the initial and final mass.

A1.2.3.6 Repeat the procedure a minimum of three times. The maximum variation between any one determination and the average will not exceed 1 %. Use the average of the three determinations for this value in the test calculations.

A1.2.4 *Method B (Optional):*

A1.2.4.1 When large numbers of tests and batches of sand are anticipated, it may be advantageous to determine the volume of each apparatus and base plate. Baring damage to the apparatus or mismatching of the base plates, this volume will remain constant, and will eliminate the need to repeat Method A when the sand bulk-density changes (see Note A1.1). If this alternative is chosen, the calculations in the field test must be altered to determine the total volume of the sand in the field test hole and apparatus. The volume of the apparatus is then subtracted to determine the volume of the test hole.

A1.2.4.2 Determine the mass of sand required to fill the apparatus funnel and base plate in accordance with A1.2.3, following steps A1.2.3.1 through A1.2.3.6 for each batch of sand.

A1.2.4.3 Calculate the volume of the funnel and base plate by dividing the bulk-density of the sand (as determined in Annex A2) by the mass of sand found in A1.2.3.6. Perform a minimum of three determinations and calculate an average value. The maximum volume variation between any one determination and the average will not exceed 1 %. Use the average of the values when performing test calculations.

NOTE A1.1—The sand-cone apparatus should be routinely inspected for damage that may affect the volume of the cone. Dings, out-of-round, or other damage will affect the volume and will necessitate a redetermination of the volume (if repairable).

A2. CALIBRATION OF DENSITY SAND

A2.1 Scope

A2.1.1 This annex is used for determining the bulk-density (calibration) of the sand for use in this test method.

A2.1.2 The calibration determines an average density of the sand for use in calculating the volume of the test hole.

A2.2 Equipment Required

A2.2.1 *Container*—Select a container of known volume that is approximately the same size and allows the sand to fall approximately the same distance as the hole excavated during a field test. The 1/30 ft^3 (944 cm^3) and 1/13.33 ft^3 (2124 cm^3) molds specified in Test Methods D 698, or the 0.1 ft^3 (2830 cm^3) mold specified in Test Method D 4253 are recommended. Alternatively, cast duplicates of actual test holes may be used. This is accomplished by forming plaster of paris negatives in actual test holes over a range of test volumes, and using these as forms for portland cement concrete castings. These should be cast against a flat plane surface, and after the removal of the negative, sealed water tight and the volume determined in accordance with the procedure in Test Method D 4253.

A2.2.1.1 Determine the container volume to 1 % using water in accordance with the procedures described in Test Method D 4253.

A2.2.2 *Sand-Cone Apparatus*—Use a sand cone apparatus of the same size and design as will be used during field testing.

A2.2.2.1 Flow characteristics through different value assemblies have been shown to cause different bulk-density values. Bulk-density determinations will be required for each apparatus set unless other assemblies are determined to provide the same results.

A2.2.3 *Balance or Scale*—A balance or scale having a sufficient capacity to determine the mass of the calibration container filled with sand. For 0.500 ft^3 (14 200 cm^3) containers, a balance having a minimum capacity of 50 lb (20 kg) and meeting the requirements of Specification D 4753 for 0.01 lb (5 g) readability is required.

A2.2.4 *Metal Straightedge*, about 2 in. (50 cm) wide, at least ⅛ in. (3 mm) thick, and length approximately 1.5 times the diameter of the calibration container.

A2.3 Bulk-Density Determination

A2.3.1 Fill the assembled apparatus with sand. The sand is to be dried and conditioned to the same state anticipated during use.

A2.3.2 Determine and record the mass of the calibration container when empty.

A2.3.3 *Method A (Preferred):*

A2.3.3.1 When the calibration container has the same diameter as the flanged center hole in the base plate, invert and center the sand filled apparatus and base plate on the calibration container.

A2.3.3.2 Fully open the valve and allow the sand to fill the container. When the sand flow stops, close the valve.

A2.3.3.3 Determine the mass of the apparatus and remaining sand. Calculate the net mass of sand in the calibration container by subtracting the mass of sand contained in the cone and base plate (as determined in Annex A1) and record.

A2.3.4 *Method B (Alternative):*

A2.3.4.1 Invert and support the apparatus over the calibration container so that the sand falls approximately the same distance and location as in a field test, and fully open the valve.

A2.3.4.2 Fill the container until it just overflows and close the valve. Using a minimum number of strokes and taking care not to jar or densify the sand, carefully strike off excess sand to a smooth level surface. Any vibration or jarring during the bulk-density determination will result in settling and densifying the sand, leading to erroneous results.

A2.3.4.3 Clean any sand from the outside of the calibration container. Determine the mass of the container and sand. Record the net mass of the sand by subtracting the mass of the empty container.

A2.3.5 Perform at least three bulk-density determinations and calculate the average. The maximum variation between any one determination and the average will not exceed 1 %. Repeated determinations not meeting these requirements indicates nonuniform sand density, and the sand source should be re-evaluated for suitability. The average value obtained is to be used in the test calculations.

A2.4 Calculation

A2.4.1 Calculate the bulk-density of the sand as follows:

$$\rho_1 = M_5/V_1$$

where:

ρ_1 = bulk-density of the sand, g/cm^3, (multiply by 9.807 for KN/m^3, or 62.43 for lb/ft^3),

M_5 = mass of the sand to fill the calibration container, g, (from A2.3.4.3), and

V_1 = volume of the calibration container, cm^3 (from A2.2.1.1).

Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))[1]

This standard is issued under the fixed designation D 1557; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers laboratory compaction procedures used to determine the relationship between water content and dry unit weight of soils (compaction curve) compacted in a 4- or 6-in. (101.6 or 152.4 mm) diameter mold with a 10-lbf. (44.5-N) rammer dropped from a height of 18 in. (457 mm) producing a compactive effort of 56,000 ft-lbf/ft^3 (2,700 kN-m/m^3).

NOTE 1—Soils and soil-aggregate mixtures should be regarded as natural occurring fine- or coarse-grained soils or composites or mixtures of natural soils, or mixtures of natural and processed soils or aggregates such as silt, gravel, or crushed rock.

NOTE 2—The equipment and procedures are the same as proposed by the U.S. Corps of Engineers in 1945. The modified effort test (see 3.2.2) is sometimes referred to as the Modified Proctor Compaction Test.

1.2 This test method applies only to soils that have 30 % or less by weight of their particles retained on the ¾-in. (19.0-mm) sieve.

NOTE 3—For relationships between unit weights and water contents of soils with 30 % or less by weight of material retained on the ¾-in. (19.0-mm) sieve to unit weights and water contents of the fraction passing the ¾-in. (19.0-mm) sieve, see Practice D 4718.

1.3 Three alternative procedures are provided. The procedure used shall be as indicated in the specification for the material being tested. If no procedure is specified, the choice should be based on the material gradation.

1.3.1 *Procedure A:*

1.3.1.1 *Mold*—4-in. (101.6-mm) diameter.

1.3.1.2 *Material*—Passing No. 4 (4.75-mm) sieve.

1.3.1.3 *Layers*—Five.

1.3.1.4 *Blows per layer*—25.

1.3.1.5 *Use*—May be used if 20 % or less by weight of the material is retained on the No. 4 (4.75-mm) sieve.

1.3.1.6 *Other Use*—If this procedure is not specified, materials that meet these gradation requirements may be tested using Procedures B or C.

1.3.2 *Procedure B:*

1.3.2.1 *Mold*—4-in. (101.6-mm) diameter.

1.3.2.2 *Material*—Passing ⅜-in. (9.5-mm) sieve.

1.3.2.3 *Layers*—Five.

1.3.2.4 *Blows per layer*—25.

1.3.2.5 *Use*—Shall be used if more than 20 % by weight of the material is retained on the No. 4 (4.75-mm) sieve and 20 % or less by weight of the material is retained on the ⅜-in. (9.5-mm) sieve.

1.3.2.6 *Other Use*—If this procedure is not specified, materials that meet these gradation requirements may be tested using Procedure C.

1.3.3 *Procedure C:*

1.3.3.1 *Mold*—6-in. (152.4-mm) diameter.

1.3.3.2 *Material*—Passing ¾-inch (19.0-mm) sieve.

1.3.3.3 *Layers*—Five.

1.3.3.4 *Blows per layer*—56.

1.3.3.5 *Use*—Shall be used if more than 20 % by weight of the material is retained on the ⅜-in. (9.53-mm) sieve and less than 30 % by weight of the material is retained on the ¾-in. (19.0-mm) sieve.

1.3.4 The 6-in. (152.4-mm) diameter mold shall not be used with Procedure A or B.

NOTE 4—Results have been found to vary slightly when a material is tested at the same compactive effort in different size molds.

1.4 If the test specimen contains more than 5 % by weight oversize fraction (coarse fraction) and the material will not be included in the test, corrections must be made to the unit weight and water content of the test specimen or to the appropriate field in place density test specimen using Practice D 4718.

1.5 This test method will generally produce well defined maximum dry unit weight for non-free draining soils. If this test method is used for free draining soils the maximum unit weight may not be well defined, and can be less than obtained using Test Methods D 4253.

1.6 The values in inch-pound units are to be regarded as the standard. The values stated in SI units are provided for information only.

1.6.1 In the engineering profession it is customary practice to use, interchangeably, units representing both mass and force, unless dynamic calculations ($F = Ma$) are involved. This implicitly combines two separate systems of units, that is, the absolute system and the gravimetric system. It is scientifically undesirable to combine the use of two separate systems within a single standard. This test method has been written using inch-pound units (gravimetric system) where the pound (lbf) represents a unit of force. The use of mass (lbm) is for convenience of units and is not intended to convey the use is scientifically correct. Conversions are given in the SI system in accordance with Practice E 380. The use of balances or scales recording pounds of mass (lbm), or the recording of density in lbm/ft^3 should not be regarded as nonconformance with this standard.

1.7 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the*

[1] This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.03 on Texture, Plasticity and Density Characteristics of Soils.

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responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 *ASTM Standards:*

C 127 Test Method for Specific Gravity and Absorption of Coarse Aggregate[2]

C 136 Method for Sieve Analysis of Fine and Coarse Aggregates[2]

D 422 Method for Particle Size Analysis of Soils[3]

D 653 Terminology Relating to Soil, Rock, and Contained Fluids[3]

D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort [12,400 ft-lbf/ft^3 (600 kN-mJ/m^3)][3]

D 854 Test Method for Specific Gravity of Soils[3]

D 2168 Test Methods for Calibration of Laboratory Mechanical-Rammer Soil Compactors[3]

D 2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures[3]

D 2487 Test Method for Classification of Soils for Engineering Purposes[3]

D 2488 Practice for Description and Identification of Soils (Visual-Manual Procedure)[3]

D 4220 Practices for Preserving and Transporting Soil Samples[3]

D 4253 Test Methods for Maximum Index Density of Soils Using a Vibratory Table[3]

D 4718 Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles[3]

D 4753 Specification for Evaluating, Selecting and Specifying Balances and Scales For Use in Soil and Rock Testing[3]

E 1 Specification for ASTM Thermometers[4]

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[4]

E 319 Practice for the Evaluation of Single-Pan Mechanical Balances[4]

E 380 Practice for Use of the SI International System of Units (SI)[4]

3. Terminology

3.1 *Definitions*—See Terminology D 653 for general definitions.

3.2 *Description of Terms Specific to This Standard:*

3.2.1 *modified effort*—the term for the 56 000 ft-lbf/ft^3 (2700 kN-m/m^3) compactive effort applied by the equipment and procedures of this test.

3.2.2 *modified maximum dry unit weight, γ_{dmax} (lbf/ft^3 (kN/m^3))*—the maximum value defined by the compaction curve for a compaction test using modified effort.

3.2.3 *modified optimum water content, w_o (%)*—the water content at which the soil can be compacted to the maximum dry unit weight using modified compactive effort.

3.2.4 *oversize fraction (coarse fraction), P_c (%)*—the portion of total sample not used in performing the compaction test; it may be the portion of total sample retained on the No. 4 (3.74-mm), 3/8-in. (9.5-mm), or 3/4-in. (19.0-mm) sieve.

3.2.5 *test fraction (finer fraction), P_F (%)*—the portion of the total sample used in performing the compaction test; it may be fraction passing the No. 4 (4.75-mm) sieve in Procedure A, minus 3/8-in. (9.5-mm) sieve in Procedure B, or minus 3/4-in. (19.0-mm) sieve in Procedure C.

4. Summary of Test Method

4.1 A soil at a selected water content is placed in five layers into a mold of given dimensions, with each layer compacted by 25 or 56 blows of a 10-lbf (44.5-N) rammer dropped from a distance of 18-in. (457-mm), subjecting the soil to a total compactive effort of about 56 000 ft—lbf/ft^3 (2700 kN-m/m^3). The resulting dry unit weight is determined. The procedure is repeated for a sufficient number of water contents to establish a relationship between the dry unit weight and the water content for the soil. This data, when plotted, represents a curvilinear relationship known as the compaction curve. The values of optimum water content and modified maximum dry unit weight are determined from the compaction curve.

5. Significance and Use

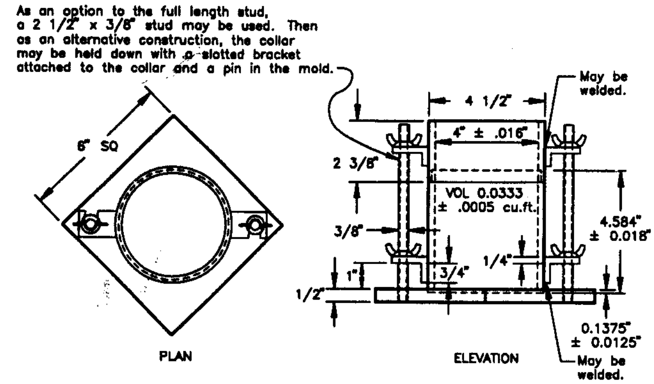
5.1 Soil placed as engineering fill (embankments, foundation pads, road bases) is compacted to a dense state to obtain satisfactory engineering properties such as, shear strength, compressibility, or permeability. Also, foundation soils are often compacted to improve their engineering properties. Laboratory compaction tests provide the basis for determining the percent compaction and water content needed to achieve the required engineering properties, and for controlling construction to assure that the required compaction and water contents are achieved.

5.2 During design of an engineered fill, shear, consolidation, permeability, or other tests require preparation of test specimens by compacting at some water content to some unit weight. It is common practice to first determine the optimum water content (w_o) and maximum dry unit weight (γ_{dmax}) by means of a compaction test. Test specimens are compacted at a selected water content (w), either wet or dry of optimum (w_o) or at optimum (w_o), and at a selected dry unit weight related to a percentage of maximum dry unit weight (γ_{dmax}). The selection of water content (w), either wet or dry of optimum (w_o) or at optimum (w_o) and the dry unit weight (γ_{dmax}) may be based on past experience, or a range of values may be investigated to determine the necessary percent of compaction.

6. Apparatus

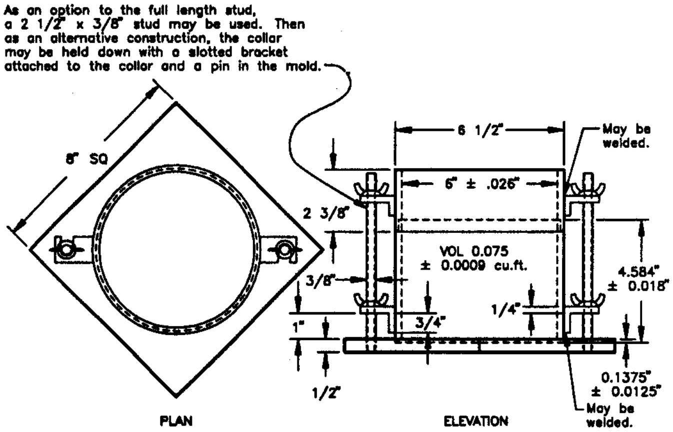
6.1 *Mold Assembly*—The molds shall be cylindrical in shape, made of rigid metal and be within the capacity and dimensions indicated in 6.1.1 or 6.1.2 and Figs. 1 and 2. The walls of the mold may be solid, split, or tapered. The "split" type, may consist of two half-round sections, or a section of pipe split along one element, which can be securely locked together to form a cylinder meeting the requirements of this section. The "tapered" type shall an internal diameter taper that is uniform and not more than 0.200 in./ft (16.7 mm/m)

[2] *Annual Book of ASTM Standards*, Vol 04.02.
[3] *Annual Book of ASTM Standards*, Vol 04.08.
[4] *Annual Book of ASTM Standards*, Vol 14.02.



see Table 2 for metric equivalents

FIG. 1 Cylindrical Mold, 4.0-in.



see Table 2 for metric equivalents

FIG. 2 Cylindrical Mold, 6.0-in.

of mold height. Each mold shall have a base plate and an extension collar assembly, both made of rigid metal and constructed so they can be securely attached and easily detached from the mold. The extension collar assembly shall have a height extending above the top of the mold of at least 2.0 in. (50.8 mm) which may include an upper section that flares out to form a funnel provided there is at least a 0.75-in. (19.0-mm) straight cylindrical section beneath it. The extension collar shall align with the inside of the mold. The bottom of the base plate and bottom of the centrally recessed area that accepts the cylindrical mold shall be planar.

6.1.1 *Mold, 4 in.*—A mold having a 4.000 ± 0.016-in. (101.6 ± 0.4-mm) average inside diameter, a height of 4.584 ± 0.018 in. (116.4 ± 0.5 mm) and a volume of 0.0333 ± 0.0005 ft^3 (944 ± 14 cm^3). A mold assembly having the minimum required features is shown in Fig. 1.

6.1.2 *Mold, 6 in.*—A mold having a 6.000 ± 0.026-in. (152.4 ± 0.7-mm) average inside diameter, a height of 4.584 ± 0.018 in. (116.4 ± 0.5 mm), and a volume of 0.075 ± 0.0009 ft^3 (2124 ± 25 cm^3). A mold assembly having the minimum required features is shown in Fig. 2.

6.2 *Rammer*—A rammer, either manually operated as described further in 6.2.1 or mechanically operated as described in 6.2.2. The rammer shall fall freely through a distance of 18 ± 0.05 in. (457.2 ± 1.6 mm) from the surface of the specimen. The mass of the rammer shall be 10 ± 0.02 lbm (4.54 ± 0.01 kg), except that the mass of the mechanical rammers may be adjusted as described in Test Methods D 2168 (see Note 5). The striking face of the rammer shall be planar and circular, except as noted in 6.2.2.3, with a diameter when new of 2.000 ± 0.005 in. (50.80 ± 0.13 mm). The rammer shall be replaced if the striking face becomes worn or bellied to the extent that the diameter exceeds 2.000 ± 0.01 in. (50.80 ± 0.25 mm).

NOTE 5—It is a common and acceptable practice in the inch-pound system to assume that the mass of the rammer is equal to its mass determined using either a kilogram or pound balance and 1 lbf is equal to 1 lbm or 0.4536 kg or 1 N is equal to 0.2248 lbm or 0.1020 kg.

6.2.1 *Manual Rammer*—The rammer shall be equipped with a guide sleeve that has sufficient clearance that the free fall of the rammer shaft and head is not restricted. The guide sleeve shall have at least four vent holes at each end (eight holes total) located with centers 3/4 ± 1/16 in. (19.0 ± 1.6 mm) from each end and spaced 90° apart. The minimum diameter of the vent holes shall be 3/8 in. (9.5 mm). Additional holes or slots may be incorporated in the guide sleeve.

6.2.2 *Mechanical Rammer-Circular Face*—The rammer shall operate mechanically in such a manner as to provide uniform and complete coverage of the specimen surface. There shall be 0.10 ± 0.03-in. (2.5 ± 0.8-mm) clearance between the rammer and the inside surface of the mold at its smallest diameter. The mechanical rammer shall meet the calibration requirements of Test Methods D 2168. The mechanical rammer shall be equipped with a positive mechanical means to support the rammer when not in operation.

6.2.2.3 *Mechanical Rammer-Sector Face*—When used with the 6.0-in. (152.4-mm) mold, a sector face rammer may be used in place of the circular face rammer. The specimen contact face shall have the shape of a sector of a circle of radius equal to 2.90 ± 0.02 in. (73.7 ± 0.5 mm). The rammer shall operate in such a manner that the vertex of the sector is positioned at the center of the specimen.

6.3 *Sample Extruder (optional)*—A jack, frame or other device adapted for the purpose of extruding compacted specimens from the mold.

6.4 *Balance*—A class GP5 balance meeting the requirements of Specification D 4753 for a balance of 1-g readability.

6.5 *Drying Oven*—Thermostatically controlled, preferably of a forced-draft type and capable of maintaining a uniform temperature of 230 ± 9°F (110 ± 5°C) throughout the drying chamber.

6.6 *Straightedge*—A stiff metal straightedge of any convenient length but not less than 10 in. (254 mm). The total length of the straightedge shall be machined straight to a tolerance of ±0.005 in. (±0.1 mm). The scraping edge shall be beveled if it is thicker than 1/8 in. (3 mm).

6.7 *Sieves*—3/4-in. (19.0-mm), 3/8-in. (9.5-mm), and No. 4 (4.75-mm), conforming to the requirements of Specification E 11.

6.8 *Mixing Tools*—Miscellaneous tools such as mixing pan, spoon, trowel, spatula, spray bottle, etc., or a suitable mechanical device for thoroughly mixing the sample of soil with increments of water.

7. Test Sample

7.1 The required sample mass for Procedures A and B is approximately 35 lbm (16 kg), and for Procedure C is approximately 65 lbm (29 kg) of dry soil. Therefore, the field sample should have a moist mass of at least 50 lbm (23 kg) and 100 lbm (45 kg), respectively.

7.2 Determine the percentage of material retained on the No. 4 (4.75-mm), ⅜-in. (9.5-mm), or ¾-in. (19.0-mm) sieve as appropriate for choosing Procedure A, B, or C. Make this determination by separating out a representative portion from the total sample and determining the percentages passing the sieves of interest by Test Methods D 422 or C 136. It is only necessary to calculate percentages for the sieve or sieves for which information is desired.

8. Preparation of Apparatus

8.1 Select the proper compaction mold in accordance with the procedure (A, B, or C) being used. Determine and record its mass to the nearest gram. Assemble the mold, base and extension collar. Check the alignment of the inner wall of the mold and mold extension collar. Adjust if necessary.

8.2 Check that the rammer assembly is in good working condition and that parts are not loose or worn. Make any necessary adjustments or repairs. If adjustments or repairs are made, the rammer must be recalibrated.

9. Calibration

9.1 Perform calibrations before initial use, after repairs or other occurrences that might affect the test results, at intervals not exceeding 1000 test specimens, or annually, whichever occurs first, for the following apparatus:

9.1.2 *Balance*—Evaluate in accordance with Specification D 4753.

9.1.3 *Molds*—Determine the volume as described in Annex A1.

9.1.4 *Manual Rammer*—Verify the free fall distance, rammer mass, and rammer face in accordance with 6.2. Verify the guide sleeve requirements in accordance with 6.2.1.

9.1.5 *Mechanical Rammer*—Calibrate and adjust the mechanical rammer in accordance with Test Methods D 2168. In addition, the clearance between the rammer and the inside surface of the mold shall be verified in accordance with 6.2.2.

10. Procedure

10.1 *Soils:*

10.1.1 Do not reuse soil that has been previously laboratory compacted.

10.1.2 When using this test method for soils containing hydrated halloysite, or where past experience with a particular soil indicates that results will be altered by air drying, use the moist preparation method (see 10.2).

10.1.3 Prepare the soil specimens for testing in accordance with 10.2 (preferred) or with 10.3.

10.2 *Moist Preparation Method (preferred)*—Without previously drying the sample, pass it through a No. 4 (4.75-mm), ⅜-in. (9.5-mm), or ¾-in. (19.0-mm) sieve, depending on the procedure (A, B, or C) being used. Determine the water content of the processed soil.

10.2.1 Prepare at least four (preferably five) specimens having water contents such that they bracket the estimated optimum water content. A specimen having a water content close to optimum should be prepared first by trial additions of water and mixing (see Note 6). Select water contents for the rest of the specimens to provide at least two specimens wet and two specimens dry of optimum, and water contents varying by about 2 %. At least two water contents are necessary on the wet and dry side of optimum to accurately define the dry unit weight compaction curve (see 10.5). Some soils with very high optimum water content or a relatively flat compaction curve may require larger water content increments to obtain a well defined maximum dry unit weight. Water content increments should not exceed 4 %.

NOTE 6—With practice it is usually possible to visually judge a point near optimum water content. Typically, soil at optimum water content can be squeezed into a lump that sticks together when hand pressure is released, but will break cleanly into two sections when "bent". At water contents dry of optimum soils tend to crumble; wet of optimum soils tend to stick together in a sticky cohesive mass. Optimum water content is typically slightly less than the plastic limit.

10.2.2 Use approximately 5 lbm (2.3 kg) of the sieved soil for each specimen to be compacted using Procedure A or B, or 13 lbm (5.9 kg) using Procedure C. To obtain the specimen water contents selected in 10.2.1, add or remove the required amounts of water as follows: to add water, spray it into the soil during mixing; to remove water, allow the soil to dry in air at ambient temperature or in a drying apparatus such that the temperature of the sample does not exceed 140°F (60°C). Mix the soil frequently during drying to maintain even water content distribution. Thoroughly mix each specimen to ensure even distribution of water throughout and then place in a separate covered container and allow to stand in accordance with Table 1 prior to compaction. For the purpose of selecting a standing time, the soil may be classified by Test Method D 2487, Practice D 2488 or data on other samples from the same material source. For referee testing, classification shall be by Test Method D 2487.

10.3 *Dry Preparation Method*—If the sample is too damp to be friable, reduce the water content by air drying until the material is friable. Drying may be in air or by the use of drying apparatus such that the temperature of the sample does not exceed 140°F (60°C). Thoroughly break up the aggregations in such a manner as to avoid breaking individual particles. Pass the material through the appropriate sieve: No. 4 (4.75 mm), ⅜ in. (9.5 mm), or ¾ in. (19.0 mm). When preparing the material by passing over the ¾ in. sieve for compaction in the 6 in. mold, break up aggregations sufficiently to at least pass the ⅜ in. sieve in order to facilitate the distribution of water throughout the soil in later mixing.

10.3.1 Prepare at least four (preferably five) specimens in accordance with 10.2.1.

10.3.2 Use approximately 5 lbm (2.3 kg) of the sieved soil for each specimen to be compacted using Procedure A or B,

TABLE 1 Required Standing Times of Moisturized Specimens

Classification	Minimum Standing Time, h
GW, GP, SW, SP	no requirement
GM, SM	3
All other soils	16

TABLE 2 Metric Equivalents for Figs. 1 and 2

in.	mm
0.016	0.41
0.026	0.66
0.032	0.81
0.028	0.71
½	12.70
2½	63.50
2⅝	66.70
4	101.60
4½	114.30
4.584	116.43
4¾	120.60
6	152.40
6½	165.10
6⅝	168.30
6¾	171.40
8¼	208.60
ft³	cm³
1/30 (0.0333)	943
0.0005	14
1/13.333 (0.0750)	2,124
0.0011	31

or 13 lbm (5.9 kg) using Procedure C. Add the required amounts of water to bring the water contents of the specimens to the values selected in 10.3.1. Follow the specimen preparation procedure specified in 10.2.2 for drying the soil or adding water into the soil and curing each test specimen.

10.4 *Compaction*—After curing, if required, each specimen shall be compacted as follows:

10.4.1 Determine and record the mass of the mold or mold and base plate.

10.4.2 Assemble and secure the mold and collar to the base plate. The mold shall rest on a uniform rigid foundation, such as provided by a cylinder or cube of concrete with a mass of not less than 200 lbm (91 kg). Secure the base plate to the rigid foundation. The method of attachment to the rigid foundation shall allow easy removal of the assembled mold, collar and base plate after compaction is completed.

10.4.3 Compact the specimen in five layers. After compaction, each layer should be approximately equal in thickness. Prior to compaction, place the loose soil into the mold and spread into a layer of uniform thickness. Lightly tamp the soil prior to compaction until it is not in a fluffy or loose state, using either the manual compaction rammer or a 2 in. (5 mm) diameter cylinder. Following compaction of each of the first four layers, any soil adjacent to the mold walls that has not been compacted or extends above the compacted surface shall be trimmed. The trimmed soil may be included with the additional soil for the next layer. A knife or other suitable device may be used. The total amount of soil used shall be such that the fifth compacted layer slightly extends into the collar, but does not exceed ¼ in. (6 mm) above the top of the mold. If the fifth layer does extend above the top of the mold by more than ¼ in. (6 mm), the specimen shall be discarded. The specimen shall be discarded when the last blow on the rammer for the fifth layer results in the bottom of the rammer extending below the top of the compaction mold.

10.4.4 Compact each layer with 25 blows for the 4 in. (101.6 mm) mold or with 56 blows for the 6 in. (152.4 mm) mold.

NOTE 7—When compacting specimens wetter than optimum water content, uneven compacted surfaces can occur and operator judgment is required as to the average height of the specimen.

10.4.5 In operating the manual rammer, take care to avoid lifting the guide sleeve during the rammer upstroke. Hold the guide sleeve steady and within 5° of vertical. Apply the blows at a uniform rate of approximately 25 blows/min and in such a manner as to provide complete, uniform coverage of the specimen surface.

10.4.6 Following compaction of the last layer, remove the collar and base plate from the mold, except as noted in 10.4.7. A knife may be used to trim the soil adjacent to the collar to loosen the soil from the collar before removal to avoid disrupting the soil below the top of the mold.

10.4.7 Carefully trim the compacted specimen even with the top and bottom of the mold by means of the straightedge scraped across the top and bottom of the mold to form a plane surface even with the top and bottom of the mold. Initial trimming of the specimen above the top of the mold with a knife may prevent tearing out soil below the top of the mold. Fill any holes in either surface with unused or trimmed soil from the specimen, press in with the fingers, and again scrape the straightedge across the top and bottom of the mold. Repeat the appropriate preceding operations on the bottom of the specimen when the mold volume was determined without the base plate. For very wet or dry soils, soil or water may be lost if the base plate is removed. For these situations, leave the base plate attached to the mold. When the base plate is left attached, the volume of the mold must be calibrated with the base plate attached to the mold rather than a plastic or glass plate as noted in Annex A1 (A1.4.1).

10.4.8 Determine and record the mass of the specimen and mold to the nearest gram. When the base plate is left attached, determine and record the mass of the specimen, mold and base plate to the nearest gram.

10.4.9 Remove the material from the mold. Obtain a specimen for water content by using either the whole specimen (preferred method) or a representative portion. When the entire specimen is used, break it up to facilitate drying. Otherwise, obtain a portion by slicing the compacted specimen axially through the center and removing about 500 g of material from the cut faces. Obtain the water content in accordance with Test Method D 2216.

10.5 Following compaction of the last specimen, compare the wet unit weights to ensure that a desired pattern of obtaining data on each side of the optimum water content will be attained for the dry unit weight compaction curve. Plotting the wet unit weight and water content of each compacted specimen can be an aid in making the above evaluation. If the desired pattern is not obtained, additional compacted specimens will be required. Generally, one water content value wet of the water content defining the maximum wet unit weight is sufficient to ensure data on the wet side of optimum water content for the maximum dry unit weight.

11. Calculation

11.1 Calculate the dry unit weight and water content of each compacted specimen as explained in 11.3 and 11.4. Plot the values and draw the compaction curve as a smooth curve through the points (see example, Fig. 3). Plot dry unit weight to the nearest 0.1 lbf/ft^3 (0.2 kN/m^3) and water content to the nearest 0.1 %. From the compaction curve, determine the optimum water content and maximum dry unit weight. If more than 5 % by weight of oversize material was removed from the sample, calculate the corrected optimum water content and corrected maximum dry unit weight of the total material using Practice D 4718. This correction may be made to the appropriate field in place density test specimen rather than to the laboratory test specimen.

11.2 Plot the 100 % saturation curve. Values of water content for the condition of 100 % saturation can be calculated as explained in 11.5 (see example, Fig. 3).

NOTE 8—The 100 % saturation curve is an aid in drawing the compaction curve. For soils containing more than approximately 10 % fines at water contents well above optimum, the two curves generally become roughly parallel with the wet side of the compaction curve between 92 % to 95 % saturation. Theoretically, the compaction curve cannot plot to the right of the 100 % saturation curve. If it does, there is an error in specific gravity, in measurements, in calculations, in test procedures, or in plotting.

NOTE 9—The 100 % saturation curve is sometimes referred to as the zero air voids curve or the complete saturation curve.

11.3 *Water Content, w*—Calculate in accordance with Test Method D 2216.

11.4 *Dry Unit Weights*—Calculate the moist density (Eq 1), the dry density (Eq 2), and then the dry unit weight (Eq 3) as follows:

$$\rho_m = 1000(M_t - M_{md})/V \tag{1}$$

where:

ρ_m = moist density of compacted specimen, Mg/m^3,
M_t = mass of moist specimen and mold, kg,
M_{md} = mass of compaction mold, kg, and

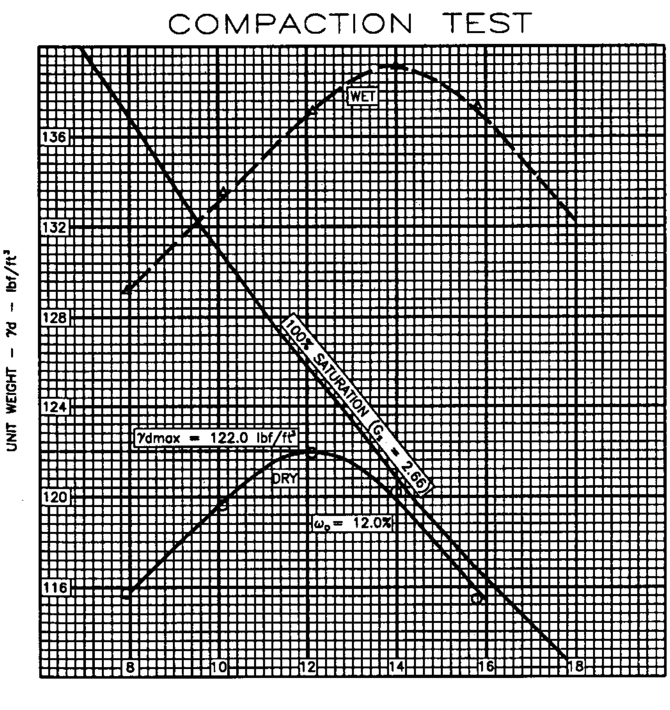


FIG. 3 Example Compaction Curve Plotting

V = volume of compaction mold, m^3 (see Annex A1).

$$\rho_d = \rho_m/(1 + w/100) \tag{2}$$

where:

ρ_d = dry density of compacted specimen, Mg/m^3, and
w = water content, %.

$$\gamma_d = 62.43\ \rho_d \text{ in lbf/ft}^3 \tag{3}$$
or
$$\gamma_d = 9.807\ \rho_d \text{ in kN/m}^3$$

where:

γ_d = dry unit weight of compacted specimen.

11.5 To calculate points for plotting the 100 % saturation curve or zero air voids curve select values of dry unit weight, calculate corresponding values of water content corresponding to the condition of 100 % saturation as follows:

$$w_{sat} = \frac{(\gamma_w)G_s - \gamma d}{(\gamma d)\,(G_s)} \times 100 \tag{4}$$

where:

w_{sat} = water content for complete saturation, %,
γ_w = unit weight of water, 62.43 lbf/ft^3 (9.807 kN/m^3),
γ_d = dry unit weight of soil, and
G_s = specific gravity of soil.

NOTE 10—Specific gravity may be estimated for the test specimen on the basis of test data from other samples of the same soil classification and source. Otherwise, a specific gravity test (Test Method D 854) is necessary.

12. Report

12.1 Report the following information:

12.1.1 Procedure used (A, B, or C).

12.1.2 Preparation method used (moist or dry).

12.1.3 As-received water content, if determined.

12.1.4 Modified optimum water content, to the nearest 0.5 %.

12.1.5 Modified maximum (optimum) dry unit weight, to the nearest 0.5 lbf/ft^3.

12.1.6 Description of rammer (manual or mechanical).

12.1.7 Soil sieve data when applicable for determination of procedure (A, B, or C) used.

12.1.8 Description of material used in test, by Practice D 2488, or classification by Test Method D 2487.

12.1.9 Specific gravity and method of determination.

12.1.10 Origin of material used in test, for example, project, location, depth, and the like.

12.1.11 Compaction curve plot showing compaction points used to establish compaction curve, and 100 % saturation curve, point of maximum dry unit weight and optimum water content.

12.1.12 Oversize correction data if used, including the oversize fraction (coarse fraction), P_c in %.

13. Precision and Bias

13.1 *Precision*—Data are being evaluated to determine the precision of this test method. In addition, pertinent data is being solicited from users of the test method.

13.2 *Bias*—It is not possible to obtain information on bias because there is no other method of determining the values of modified maximum dry unit weight and optimum water content.

14. Keywords

14.1 compaction characteristics; density; impact compaction using modified effort; laboratory tests; modified proctor test; moisture-density curves; soil compaction

ANNEX

(Mandatory Information)

A1. VOLUME OF COMPACTION MOLD

A1.1 Scope

A1.1.1 This annex describes the procedure for determining the volume of a compaction mold.

A1.1.2 The volume is determined by a water-filled method and checked by a linear-measurement method.

A1.2 Apparatus

A1.2.1 In addition to the apparatus listed in Section 6, the following items are required:

A1.2.1.1 *Vernier or Dial Caliper*, having a measuring range of at least 0 to 6 in. (0 to 150 mm) and readable to at least 0.001 in. (0.02 mm).

A1.2.1.2 *Inside Micrometer*, having a measuring range of at least 2 to 12 in. (50 to 300 mm) and readable to at least 0.001 in. (0.02 mm).

A1.2.1.3 *Plastic or Glass Plates*—Two plastic or glass plates about 8 in.^{2} by 1/4 in. thick (200 mm^2 by 6 mm).

A1.2.1.4 *Thermometer*—0 to 50°C range, 0.5°C graduations, conforming to the requirements of Specification E 1.

A1.2.1.5 *Stopcock Grease* or similar sealant.

A1.2.1.6 *Miscellaneous equipment*—Bulb syringe, towels, etc.

A1.3 Precautions

A1.3.1 Perform this procedure in an area isolated from drafts or extreme temperature fluctuations.

A1.4 Procedure

A1.4.1 *Water-Filling Method:*

A1.4.1.1 Lightly grease the bottom of the compaction mold and place it on one of the plastic or glass plates. Lightly grease the top of the mold. Be careful not to get grease on the inside of the mold. If it is necessary to use the base plate, as noted in 10.4.7, place the greased mold onto the base plate and secure with the locking studs.

A1.4.1.2 Determine the mass of the greased mold and both plastic or glass plates to the nearest 0.01 lbm (1 g) and record. When the base plate is being used in lieu of the bottom plastic or glass plate determine the mass of the mold, base plate and a single plastic or glass plate to be used on top of the mold to the nearest 0.01 lbm (1 g) and record.

A1.4.1.3 Place the mold and the bottom plate on a firm, level surface and fill the mold with water to slightly above its rim.

A1.4.1.4 Slide the second plate over the top surface of the mold so that the mold remains completely filled with water and air bubbles are not entrapped. Add or remove water as necessary with a bulb syringe.

A1.4.1.5 Completely dry any excess water from the outside of the mold and plates.

A1.4.1.6 Determine the mass of the mold, plates and water and record to the nearest 0.01 lbm (1 g).

A1.4.1.7 Determine the temperature of the water in the mold to the nearest 1°C and record. Determine and record the absolute density of water from Table A1.1.

A1.4.1.8 Calculate the mass of water in the mold by subtracting the mass determined in A1.4.1.2 from the mass determined in A1.4.1.6.

A1.4.1.9 Calculate the volume of water by dividing the mass of water by the density of water and record to the nearest 0.0001 ft^3 (1 cm^3).

A1.4.1.10 When the base plate is used for the calibration of the mold volume repeat steps A1.4.1.3 through A1.4.1.9.

A1.4.2 *Linear Measurement Method:*

A1.4.2.1 Using either the vernier caliper or the inside micrometer, measure the diameter of the mold six times at the top of the mold and six times at the bottom of the mold spacing each of the six top and bottom measurements equally around the circumference of the mold. Record the values to the nearest 0.001 in. (0.02 mm).

A1.4.2.2 Using the vernier caliper, measure the inside height of the mold by making three measurements equally spaced around the circumference of the mold. Record values to the nearest 0.001 in. (0.02 mm).

A1.4.2.3 Calculate the average top diameter, average bottom diameter and average height.

A1.4.2.4 Calculate the volume of the mold and record to the nearest 0.0001 ft^3 (1 cm^3) using Eq A1a (for inch-pound) or A1b (for SI):

$$V = \frac{(\pi)(h)(d_t + d_b)^2}{(16)(1728)} \tag{A1a}$$

$$V = \frac{(\pi)(h)(d_t + d_b)^2}{(16)(10^3)} \tag{A1b}$$

where:

V = volume of mold, ft^3 (cm^3),

TABLE A1.1 Density of Water[A]

Temperature, °C (°F)	Density of Water, γ/ml
18 (64.4)	0.99862
19 (66.2)	0.99843
20 (68.0)	0.99823
21 (69.8)	0.99802
22 (71.6)	0.99779
23 (73.4)	0.99756
24 (75.2)	0.99733
25 (77.0)	0.99707
26 (78.8)	0.99681

[A] Values other than shown may be obtained by referring to the *Handbook of Chemistry and Physics*, Chemical Rubber Publishing Co., Cleveland, OH.

h = average height, in. (mm),
d_t = average top diameter, in. (mm),
d_b = average bottom diameter, in. (mm),
$1/1728$ = constant to convert in^3 to ft^3, and
$1/10^3$ = constant to convert mm^3 to cm^3.

A1.5 Comparison of Results

A1.5.1 The volume obtained by either method should be within the volume tolerance requirements of 6.1.1 and 6.1.2.

A1.5.2 The difference between the two methods should not exceed 0.5 % of the nominal volume of the mold.

A1.5.3 Repeat the determination of volume if these criteria are not met.

A1.5.4 Failure to obtain satisfactory agreement between the two methods, even after several trials, is an indication that the mold is badly deformed and should be replaced.

A1.5.5 Use the volume of the mold determined using the water-filling method as the assigned volume value for calculating the moist and dry density (see 11.4).

Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)[1]

This standard is issued under the fixed designation D 2922; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

These methods have been approved for use by agencies of the Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

1. Scope

1.1 This test method covers the determination of the total or wet density of soil and soil-rock mixtures by the attenuation of gamma radiation where the source and detector(s) remain on the surface (Backscatter Method) or the source or detector is placed at a known depth up to 300 mm (12 in.) while the detector(s) or source remains on the surface (Direct Transmission Method).

1.2 The density in mass per unit volume of the material under test is determined by comparing the detected rate of gamma radiation with previously established calibration data.

1.3 The values tested in SI units are to be regarded as the standard. The inch-pound equivalents may be approximate.

1.4 It is common practice in the engineering profession to concurrently use pounds to represent both a unit of mass (lbm) and a unit of force (lbf). This implicitly combines two separate systems of units; that is, the absolute system and the gravitational system. It is scientifically undesirable to combine the use of two separate sets of inch-pound units within a single standard. This standard has been written using the gravitational system of units when dealing with the inch-pound system. In this system the pound (lbf) represents a unit of force (weight). However, the use of balances or scales recording pounds of mass (lbm), or the recording of density in lbm/ft^3 should not be regarded as nonconformance with this standard.

1.5 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific Hazard statements, see Section 6.

2. Referenced Documents

2.1 *ASTM Standards:*

D 698 Test Method for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in. (305-mm) Drop[2]

D 1556 Test Method for Density of Soil In-Place by the Sand-Cone Method[2]

D 1557 Test Method for Moisture-Density Relations of Soil and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop[2]

D 2167 Test Method for Density of Soil In-Place by the Rubber-Balloon Method[2]

D 2216 Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures[2]

D 2937 Test Method for Density of Soil In-Place by the Drive-Cylinder Method[2]

D 3017 Test Method for Water Content of Soil and Rock In-Place by Nuclear Methods (Shallow Depth)[2]

D 4253 Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table[2]

D 4643 Method for Determination of Water Content by the Microwave Oven Method[2]

D 4718 Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles[2]

D 4944 Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method[3]

D 4959 Test Method for Determination of Water (Moisture) Content by Direct Heating Method[3]

3. Significance and Use

3.1 The test method described is useful as a rapid, nondestructive technique for the in-place determination of density of soil and rock.

3.2 The test method is suitable for quality control and acceptance testing for construction and for research and development applications.

3.3 The nondestructive nature of the test allows repetitive measurements to be made at a single test location.

4. Interferences

4.1 The chemical composition of the sample may affect the measurement, and adjustments may be necessary.

4.2 The test method exhibits spatial bias in that the instrument is more sensitive to the density of the material in close proximity to the surface (Backscatter Method only).

NOTE 1—The nuclear gauge density measurements are somewhat biased to the surface layers of the soil being tested. This bias has largely been corrected out of the direct transmission method and any remaining bias is insignificant. The backscatter method is still more sensitive to the material within the first several inches from the surface.

[1] These test methods are under the jurisdiction of ASTM Committee D-18 on Soil and Rock and are the direct responsibility of Subcommittee D18.08 on Special and Construction Control Tests.

Current edition approved Dec. 23, 1991. Published January 1992. Originally published as D 2922 – 71. Last previous edition D 2922 – 78 (1990).

[2] *Annual Book of ASTM Standards*, Vol 04.08.

[3] *Annual Book of ASTM Standards*, Vol 04.09.

4.3 Oversize rocks or large voids in the source-detector path may cause higher or lower density determination. Where lack of uniformity in the soil due to layering, rock or voids is suspected, the test volume site should be dug up and visually examined to determine if the test material is representative of the full material in general and if rock correction (see 9.6) is required.

4.4 The sample volume is approximately 0.0028 m^3 (0.10 ft^3) for the Backscatter Method and 0.0057 m^3 (0.20 ft^3) for the Direct Transmission Method when the test depth is 15 cm (6 in.). The actual sample volume is indeterminate and varies with the apparatus and the density of the material. In general, the higher the density the smaller the volume.

5. Apparatus

5.1 *Nuclear Gauge*—An electronic counting instrument, capable of being seated on the surface of the material under test, and which contains:

5.1.1 A sealed source of high energy gamma radiation such as cesium or radium.

5.1.2 *Gamma Detector*—Any type of gamma detector such as a Geiger-Mueller tube(s).

5.2 *Reference Standard*—A block of material used for checking instrument operation and to establish conditions for a reproducible reference count rate.

5.3 *Site Preparation Device*—A plate, straightedge, or other suitable leveling tool which may be used for planning the test site to the required smoothness, and in the Direct Transmission Method, guiding the drive pin to prepare a perpendicular hole.

5.4 *Drive Pin*—A pin of slightly larger diameter than the rod in the Direct Transmission Instrument, used to prepare a hole in the material under test for inserting the rod.

5.5 *Drive Pin Extractor*—A tool that may be used to remove the drive pin in a vertical direction so that the pin will not distort the hole in the extraction process.

5.5.1 A slide hammer, with a drive pin attached, may also be used both to prepare a hole in the material to be tested and to extract the pin without distortion to the hole.

6. Hazards

6.1 This equipment utilizes radioactive materials that may be hazardous to the health of the users unless proper precautions are taken. Users of this equipment must become familiar with applicable safety procedures and government regulations.

6.2 Effective user instructions together with routine safety procedures, such as source leak tests, recording and evaluation of film badge data, etc., are a recommended part of the operation and storage of this instrument.

7. Calibration

7.1 Calibration of the instrument will be in accordance with Annex A1.

8. Standardization and Reference Check

8.1 Nuclear gauges are subject to long-term aging of the radioactive source, detectors, and electronic systems, which may change the relationship between count rate and material density. To offset this aging, the gauge may be calibrated as the ratio of the measured count rate to a count rate made on a reference standard or to an air-gap count (for the backscatter air-gap technique, see 9.5.1.3). The reference count rate should be of the same order of magnitude as the measured count rate over the useful density range of the instrument.

8.2 Standardization of the gauge shall be performed at the start of each day's work, and a permanent record of these data shall be retained. Perform the standardization with the gauge located at least 8 m (25 ft) away from other sources of radioactive material, and clear of large masses or other items which may affect the reference count rate.

8.2.1 If recommended by the instrument manufacturer to provide more stable and consistent results: (1) turn on the gauge prior to use to allow it to stabilize, (2) leave the power on during the use of the gauge for that day.

8.2.2 Using the reference standard, take at least four repetitive readings at the normal measurement period and determine the mean. If available on the gauge, one measurement period of four or more times the normal period is acceptable. This constitutes one standardization check.

8.2.3 If the value obtained above is within the limits stated below, the gauge is considered to be in satisfactory condition, and the value may be used to determine the count ratios for the day of use. If the value is outside these limits, allow additional time for the gauge to stabilize, make sure the area is clear of sources of interference, and then conduct another standardization check. If the second standardization check is within the limits, the gauge may be used, but if it also fails the test, the gauge shall be adjusted or repaired as recommended by the manufacturer. The limits are as follows:

$$|N_s - N_o| \leqq 2.0\sqrt{N_o/F}$$

where:

N_s = value of current standardization count,
N_o = average of the past four values of N_s taken for prior usage, and
F = value of prescale. [The prescale value (F) is a divisor which reduces the actual value for the purpose of display. The manufactor will supply this value if other than 1.0.] Some instruments may have provisions to compute and display these values.

8.2.3.1 If the instrument standardization has not been checked within the previous three months, perform at least four new standardization checks, and use the mean as the value for N_o.

8.3 Use the value of N_s to determine the count ratios for the current day's use of the instrument. If for any reason the measured density becomes suspect during the day's use, perform another standardization check.

9. Procedure for Field Use

9.1 Standardize the gauge. (See Section 8.)

9.2 Select a test location. If the gauge will be closer than 250 mm (10 in.) to any vertical mass that might influence the result, such as in a trench or alongside a pipe, follow the manufacturer's correction procedure.

9.3 Remove all loose and disturbed material. Remove additional material as necessary to reach the material that represents a valid sample of the zone or stratum to be tested. Surface drying and spatial bias should be considered in determining the depth of material to be removed.

9.4 Plane or scrape a smooth horizontal surface so as to obtain maximum contact between the gauge and the material being tested. The placement of the gauge on the surface of the material to be tested is always important, but is especially critical to the successful determination of density when using the *backscatter* method. The optimum condition in all cases, is total contact between the bottom surface of the gauge and the surface of the material being tested. To correct for surface irregularities, use of native fines or fine sand as a filler may be necessary. The depth of the filler should not exceed approximately 3 mm (1/8 in.) and the total area filled should not exceed 10 % of the bottom area of the instrument. The maximum depth of any void beneath the gauge that can be tolerated without filling shall not exceed approximately 3 mm (1/8 in.). Several trial seatings may be required to achieve these conditions.

9.5 Proceed with the test in the following manner:

9.5.1 *Backscatter Procedure:*

9.5.1.1 Seat the gauge firmly on the prepared test site.

9.5.1.2 Keep all other radioactive sources away from the gauge to avoid affecting the measurement so as not to affect the readings.

9.5.1.3 Secure and record one or more readings for the normal measurement period in the backscatter position.

NOTE 2—When using the backscatter air-gap procedure, follow the instrument manufacturers instructions regarding apparatus set up. Take the same number of readings for the normal measurement period in the air-gap position as in the standard backscatter position. Determine the air-gap ratio by dividing counts per minute obtained in the air-gap position by counts per minute obtained in standard backscatter position.

9.5.1.4 Determine the ratio of the reading to the standard count or to the air gap count. From this count ratio and the appropriate calibration and adjustment data, determine the in-place wet density.

9.5.2 *Direct Transmission Procedure:*

9.5.2.1 Make a hole perpendicular to the prepared surface using the guide and the hole-forming device 5.4, or by drilling if necessary. The hole shall be of such depth and alignment that insertion of the probe will not cause the gauge to tilt from the plane of the prepared area. The depth of the hole must be deeper than the depth to which the probe will be placed. The guide shall be the same size as the base of the gauge, with the hole in the same location on the guide as the probe on the gauge. The corners of the guide are marked by scoring the surface of the soil. The guide plate is then removed and any necessary repairs are made to the prepared surface.

9.5.2.2 Proceed with testing in the following manner:

9.5.2.3 Set the gauge on the soil surface, carefully aligning it with the marks on the soil so that the probe will be directly over the pre-formed hole.

9.5.2.4 Insert the probe in the hole.

9.5.2.5 Seat the gauge firmly by rotating it about the probe with a back and forth motion.

9.5.2.6 Pull gently on the gauge in the direction that will bring the side of the probe against the side of the hole that is closest to the detector (or source) location in the gauge housing.

9.5.2.7 Keep all other radioactive sources away from the gauge to avoid affecting the measurement.

9.5.2.8 Secure and record one or more readings for the normal measurement period.

9.5.2.9 Determine the ratio of the reading to the standard count. From this count ratio and the appropriate calibration and adjustment data, determine the in-place wet density.

NOTE 3—Some instruments have built-in provisions to compute the ratio, wet density, and to enter an adjustment bias. Additionally some instruments may have provisions to measure and compute moisture content, and dry density.

9.6 If the volume tested as defined in 4.4 has excess oversize material with respect to the limitations in the appropriate Test Methods D 698, D 1557 or D 4253, then a correction for wet density (unit weight) and water content must be applied. This correction will be done in accordance with Practice D 4718. This test method requires sampling from the actual test volume.

9.6.1 If samples of the measure material are to be taken for purposes of correlation with other test methods or rock correction, the volume measured can be approximated by a 200 mm (8 in.) diameter cylinder located directly under the center line of the radioactive source and detector(s). The height of the cylinder to be excavated will be the depth setting of the source rod when using the Direct Transmission method or approximately 75 mm (3 in.) when using the Backscatter Method.

9.6.2 An alternative to the correction for oversize particles, that can be used with mass density methods or minimal oversize situations, involves multiple tests. Tests may be taken at adjacent locations and the results averaged to get a representative value. Comparisons need to be made to evaluate whether the presence of a single large rock or void in the soil is producing unrepresentative values of density. Whenever values obtained are questionable, the test volume site should be dug up and visually examined.

10. Calculation of Results

10.1 The in-place wet density is determined as outlined in 9.5. If dry density is required, the in-place water content shall be determined using either gravimetric samples and laboratory determination of water content (Test Methods D 2216, D 4643, D 4959, D 4944), or an instrument which determines water content by neutron thermalization (Test Method D 3017).

10.1.1 If the water content is determined by nuclear methods, Test Method D 3017, subtract the kg/m^3 (lbf/ft^3) of moisture from the kg/m^3 (lbf/ft^3) of wet density, and obtain dry density in kg/m^3 (lbf/ft^3).

10.1.2 If the water content is determined by other methods, and is in the form of percent, proceed as follows:

$$\rho_d = \frac{100\rho_m}{100 + W}$$

where:

ρ_d = dry density in kg/m^3 (lbf/ft^3),
ρ_m = wet density in kg/m^3 (lbf/ft^3), and
W = water as a percent of the dry mass.

11. Report

11.1 The report shall include the following:

11.1.1 Standardization and adjustment data for the date of the tests.

11.1.2 Make, model and serial number of the test instrument.

11.1.3 Name of the operator(s).

11.1.4 Test site identification.

11.1.5 Visual description of material tested.

11.1.6 Test mode (backscatter or direct transmission) and test depth (if applicable).

11.1.7 Wet and dry densities in kg/m^3 or unit weights in lb/ft^3.

11.1.8 Water content in percent of dry mass or dry unit weight.

12. Precision and Bias

12.1 *Precision:*

12.1.1 Data are being evaluated to determine the precision of this test method. In addition, Subcommittee D18.08 is seeking pertinent data from users of the test method.

12.1.2 An instrument count precision of 8 kg/m^3 (0.5 lbf/ft^3) for the Backscatter Method and 4 kg/m^3 (0.25 lbf/ft^3) Direct Transmission Method are typical on a material of approximately 2000 kg/m^3 (125 lbf/ft^3) density, with a measurement time of one minute.

12.1.2.1 Instrument count precision is defined as the change in density that occurs corresponding to a one standard deviation change in the count due to the random decay of the radioactive source. The density of the material and the time period of the count must be stated. It may be determined from a series of 20 or more counts taken without moving the instrument, or alternately from the calibration data using the assumption that σ is equal to the $\sqrt{\text{count}}$ at that density. The count must be the true instrument count corrected for any pre-scaling (see 8.2.3).

$$P = \frac{\sigma}{S}$$

where:

P = instrument precision in density (kg/m^3 or lbf/ft^3)
σ = one standard deviation of the count
S = the slope of the calibration curve at the defined density value.

12.2 *Bias:*

12.2.1 There is no accepted reference value for this test method, therefore, bias cannot be determined.

13. Keywords

13.1 density; field density; nuclear methods

ANNEX

(Mandatory Information)

A1. CALIBRATION

A1.1 Verify or re-establish calibration curves, tables, or equation coefficients at least once every 12–18 months and after all major repairs which may affect the instrument geometry.

A1.2 The instrument shall be calibrated in such a way as to produce a calibration response within ± 16 kg/m^3 (± 1.0 lbf/ft^3) on blocks of materials (standards) of established densities. (This calibration may be done by the manufacturer, the user, or an independent vendor.) Nuclear instrument response is influenced by the chemical composition of measured material. This response must be taken into account in establishing the assigned standard block density. The densities of materials used to establish or verify the calibration should extend through a range representative of the density of the materials to be tested. The density of these material standards shall be determined to an accuracy of ± 0.2 %.

A1.3 Sufficient data shall be taken on each density standard to ensure an instrument count precision of at least one-half the instrument count precision required for field use. The data may be presented in the form of a graph, table, equation coefficients, or stored in the gauge, to allow covering the count rate data to material density.

A1.4 The method and test procedures used in establishing the calibration count rate data shall be the same as those used for obtaining the field count rate data.

A1.5 The material type, actual density and assigned standard block density of each calibration standard used to establish or verify the instrument calibration shall be stated as part of the calibration data.

A1.6 The standards shall be of sufficient size to not change the count rate if enlarged in any dimension. Minimum surface dimensions of approximately 610 mm long by 430 mm wide (24 × 17 in.) have proven satisfactory. For the Backscatter Method a minimum depth of 230 mm (9 inches) is adequate; for the Direct Transmission Method the depth shall be at least 50 mm (2 in.) deeper than the deepest rod depth. A larger surface area may be required for the Backscatter Air-Gap technique. Minimum surface dimensions may be reduced slightly if the standards are adjacent to a dense material.

A1.7 The most successful standards that have been established for accurate calibration have been made of aluminum, magnesium, aluminum/magnesium, granite and limestone. These standards have been used in combination with each other and with historical curve information to produce accurate and reliable calibration.

A1.7.1 Standards of soil, rock, and concrete that have the characteristics of reproducible uniformity are difficult to prepare. These standards may be of use for some special calibration or field calibration where local site material chemistry or background situation require special adaptation.

Appendix H – List of Closure Devices

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
10062.00	L	RCP	24	34.13	FLAP	Compton Creek
10250.00	R	RCP	24	37.24	FLAP	Compton Creek
11557.92	R	RCP	18	39.02	FLAP	Compton Creek
12423.00	R	RCP	18	38.85	FLAP	Compton Creek
12690.00	L	RCP	42	41.97	FLAP	Compton Creek
12819.00	L	RCP	30	41.28	FLAP	Compton Creek
12822.00	L	RCP	30	41.28	FLAP	Compton Creek
12827.00	L	RCP	30	41.28	FLAP	Compton Creek
12829.00	L	RCP	30	41.28	FLAP	Compton Creek
14075.00	R	RCP	24	40.19	FLAP	Compton Creek
14078.00	L	RCP	24	40.06	FLAP	Compton Creek
14156.00	R	RCP	18	42.34	FLAP	Compton Creek
14894.00	R	RCP	24	39.43	FLAP	Compton Creek
15502.00	L	RCP	30	40.25	FLAP	Compton Creek
15770.00	R	RCP	8	40.05	FLAP	Compton Creek
15770.00	R	RCP	16	40.05	FLAP	Compton Creek
15790.00	R	RCP	36	40.30	FLAP	Compton Creek
15790.00	R	RCP	36	40.27	FLAP	Compton Creek
16542.00	L	CIP	12	43.64	FLAP	Compton Creek
16815.00	L	CIP	10	43.82	FLAP	Compton Creek
17050.00	R	RCP	60	40.37	FLAP	Compton Creek
17065.00	R	RCP	60	40.36	FLAP	Compton Creek
17080.00	L	RCP	12	45.97	FLAP	Compton Creek
17500.00	R	RCP	36	45.57	FLAP	Compton Creek
18347.00	R	RCP	12	48.11	FLAP	Compton Creek
18485.00	L	CMP	18	48.25	FLAP	Compton Creek
19159.00	L	CMP	18	46.72	FLAP	Compton Creek
19442.83	L	CMP	18	47.21	FLAP	Compton Creek
19905.00	L	RCP	33	46.04	FLAP	Compton Creek
5700.00	L	STEEL	12	16.17	FLAP	Coyote Creek
5710.00	L	STEEL	48	16.17	FLAP	Coyote Creek
5720.00	L	STEEL	48	16.17	FLAP	Coyote Creek
5730.00	L	STEEL	48	16.17	FLAP	Coyote Creek
5740.00	L	STEEL	48	16.17	FLAP	Coyote Creek
5750.00	L	STEEL	48	16.17	FLAP	Coyote Creek

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
6564.35	R	RCP	60	6.21	FLAP	Coyote Creek
6775.00	R	CMP	30	15.79	FLAP	Coyote Creek
8252.28	R	RCP	60	10.92	FLAP	Coyote Creek
10448.00	R	CMP	30	18.53	FLAP	Coyote Creek
11344.56	R	RCP	10	20.92	FLAP	Coyote Creek
11344.56	R	RCP	10	20.92	FLAP	Coyote Creek
11344.56	R	RCP	5	20.92	FLAP	Coyote Creek
12255.00	R	CMP	30	18.36	FLAP	Coyote Creek
12500.00	L	CMP	36	17.36	FLAP	Coyote Creek
13076.00	R	RCP	48	18.97	FLAP	Coyote Creek
13076.00	R	RCP	48	18.97	FLAP	Coyote Creek
14331.26	R	CMP	30	22.57	FLAP	Coyote Creek
14528.30	R	CMP	30	22.75	FLAP	Coyote Creek
14610.00	L	RCP	48	19.83	FLAP	Coyote Creek
14610.00	L	RCP	48	19.83	FLAP	Coyote Creek
15495.00	L	RCP	30	22.49	FLAP	Coyote Creek
15549.55	L	RCP	24	15.81	FLAP	Coyote Creek
15637.00	R	RCP	24	23.17	FLAP	Coyote Creek
15781.00	L	CMP	30	23.53	FLAP	Coyote Creek
16618.23	L	RCP	24	23.08	FLAP	Coyote Creek
16618.23	L	RCP	24	23.08	FLAP	Coyote Creek
16650.71	L	RCP	18	16.65	FLAP	Coyote Creek
17926.32	R	CIP	6	29.00	FLAP	Coyote Creek
17926.32	R	RCP	36	29.00	FLAP	Coyote Creek
17926.32	R	RCP	36	29.00	FLAP	Coyote Creek
17926.32	R	RCP	36	29.00	FLAP	Coyote Creek
18288.00	L	RCP	42	18.02	FLAP	Coyote Creek
19601.19	R	RCP	36	20.41	FLAP	Coyote Creek
21015.00	R	CMP	30	24.94	FLAP	Coyote Creek
21156.00	R	CMP	30	25.54	FLAP	Coyote Creek
21247.00	L	RCP	30	25.89	FLAP	Coyote Creek
21870.00	R	CMP	36	21.09	FLAP	Coyote Creek
21874.92	L	RCP	48	21.52	FLAP	Coyote Creek
22400.00	L	RCP	30	28.83	FLAP	Coyote Creek
22449.26	R	RCP	24	30.80	FLAP	Coyote Creek

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
22516.00	R	RCP	30	27.64	FLAP	Coyote Creek
23761.52	R	CMP	36	28.00	FLAP	Coyote Creek
23957.00	L	RCP	30	29.27	FLAP	Coyote Creek
24559.00	R	RCP	30	29.65	FLAP	Coyote Creek
24772.00	L	RCP	30	30.40	FLAP	Coyote Creek
24772.00	L	RCP	30	30.40	FLAP	Coyote Creek
24793.00	L	RCP	30	29.00	FLAP	Coyote Creek
24793.00	L	RCP	30	29.00	FLAP	Coyote Creek
24835.00	L	RCP	30	29.32	FLAP	Coyote Creek
25625.87	R	RCP	36	24.54	FLAP	Coyote Creek
25745.00	R	RCP	30	29.88	FLAP	Coyote Creek
25748.00	L	RCP	30	29.88	FLAP	Coyote Creek
26332.20	R	RCP	75	28.00	FLAP	Coyote Creek
26425.00	L	RCP	24	31.80	FLAP	Coyote Creek
26530.00	L	RCP	48	28.86	FLAP	Coyote Creek
26665.00	R	RCP	48	28.41	FLAP	Coyote Creek
26824.00	L	RCP	60	31.32	FLAP	Coyote Creek
26856.00	L	RCP	24	30.87	FLAP	Coyote Creek
27692.00	L	RCP	30	32.58	FLAP	Coyote Creek
27866.47	R	RCP	72	27.27	FLAP	Coyote Creek
28235.00	L	RCP	72	25.84	FLAP	Coyote Creek
28286.00	R	RCP	30	32.95	FLAP	Coyote Creek
28800.00	L	RCP	30	32.27	FLAP	Coyote Creek
28973.15	R	RCP	30	33.55	FLAP	Coyote Creek
29278.00	R	RCP	30	32.56	FLAP	Coyote Creek
29624.93	R	RCP	36	33.95	FLAP	Coyote Creek
29794.00	L	RCP	30	32.88	FLAP	Coyote Creek
29846.00	R	RCP	30	32.45	FLAP	Coyote Creek
30284.93	R	RCP	36	33.54	FLAP	Coyote Creek
30294.00	L	RCP	24	32.50	FLAP	Coyote Creek
30800.00	L	RCP	30	33.00	FLAP	Coyote Creek
31004.93	R	RCP	36	33.92	FLAP	Coyote Creek
31050.00	R	RCP	30	33.16	FLAP	Coyote Creek
31662.51	R	RCP	24	34.00	FLAP	Coyote Creek
31937.00	R	RCP	48	37.20	FLAP	Coyote Creek

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
31940.00	L	RCP	18	34.76	FLAP	Coyote Creek
32180.78	L	RCP	60	28.52	FLAP	Coyote Creek
32225.00	R	RCP	30	34.04	FLAP	Coyote Creek
32800.00	R	RCP	24	33.59	FLAP	Coyote Creek
33130.00	L	RCP	18	35.40	FLAP	Coyote Creek
33282.00	R	RCP	18	35.54	FLAP	Coyote Creek
33440.00	R	RCP	36	36.32	FLAP	Coyote Creek
33480.00	L	RCP	24	35.44	FLAP	Coyote Creek
34360.00	R	RCP	36	33.72	FLAP	Coyote Creek
34369.36	L	RCB	72	32.61	FLAP	Coyote Creek
11025.00	R	RCP	36	1.50	FLAP	Dominguez Channel
11400.00	R	RCP	24	1.78	FLAP	Dominguez Channel
11815.00	L	RCP	30	-1.80	FLAP	Dominguez Channel
12108.50	R	RCP	48	0.00	FLAP	Dominguez Channel
12167.00	L	RCP	42	-0.87	FLAP	Dominguez Channel
12177.00	L	RCP	42	-0.84	FLAP	Dominguez Channel
13185.00	R	RCP	36	-1.00	FLAP	Dominguez Channel
13391.00	R	RCP	36	3.00	FLAP	Dominguez Channel
13420.00	L	RCP	24	4.20	FLAP	Dominguez Channel
13980.00	L	RCP	24	6.66	FLAP	Dominguez Channel
15350.00	L	RCP	36	-5.80	FLAP	Dominguez Channel
16114.00	L	RCP	66	-5.00	FLAP	Dominguez Channel
16120.58	L	RCP	36	-2.00	FLAP	Dominguez Channel
16290.00	L	RCP	36	4.00	FLAP	Dominguez Channel
16307.00	R	RCP	24	-1.80	FLAP	Dominguez Channel
16815.00	L	RCP	36	6.20	FLAP	Dominguez Channel
17085.00	L	RCP	24	7.20	FLAP	Dominguez Channel
17310.00	L	RCP	24	7.50	FLAP	Dominguez Channel
17330.00	L	RCP	36	2.80	FLAP	Dominguez Channel
17623.00	L	RCP	36	6.40	FLAP	Dominguez Channel
18000.00	L	RCP	24	8.10	FLAP	Dominguez Channel
18292.00	L	RCP	36	8.00	FLAP	Dominguez Channel
18370.00	L	CIP	24	-1.50	FLAP	Dominguez Channel
18533.00	L	CMP	36	2.50	FLAP	Dominguez Channel
18700.00	L	RCP	36	6.00	FLAP	Dominguez Channel

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
19550.00	L	RCP	24	6.00	FLAP	Dominguez Channel
19773.00	L	CMP	30	3.90	FLAP	Dominguez Channel
20000.00	L		24	0.00	FLAP	Dominguez Channel
20657.02	L	RCP	18	9.51	FLAP	Dominguez Channel
33750.00	L		18	0.00	FLAP	Dominguez Channel
33950.00	R	RCP	36	10.20	FLAP	Dominguez Channel
34477.60	R	RCB	6	4.59	RCBOX	Dominguez Channel
34477.60	R	RCB	72	4.59	RCBOX	Dominguez Channel
34477.60	R	RCB	6	4.59	RCBOX	Dominguez Channel
34495.00	L	RCP	60	8.30	FLAP	Dominguez Channel
34861.18	L	RCP	42	1.23	FLAP	Dominguez Channel
34868.00	L	RCP	42	2.80	FLAP	Dominguez Channel
34930.00	R	RCP	60	7.60	FLAP	Dominguez Channel
35125.00	L	RCP	60	8.30	FLAP	Dominguez Channel
35130.00	L	CIP	12	0.00	FLAP	Dominguez Channel
35875.00	L	RCP	60	6.20	FLAP	Dominguez Channel
35920.00	R	RCP	60	5.00	FLAP	Dominguez Channel
36020.39	R	RCP	66	6.43	FLAP	Dominguez Channel
36375.00	L	RCP	60	5.40	FLAP	Dominguez Channel
36505.00	L	RCP	96	-1.48	FLAP	Dominguez Channel
36530.00	R	RCP	60	6.30	FLAP	Dominguez Channel
36786.49	R	RCP	24	4.69	FLAP	Dominguez Channel
36875.00	R	RCP	42	-0.39	FLAP	Dominguez Channel
37250.00	R	RCP	60	5.40	FLAP	Dominguez Channel
38075.00	R	RCP	60	3.50	FLAP	Dominguez Channel
38580.00	L	RCP	60	4.20	FLAP	Dominguez Channel
38698.00	R	RCP	6	2.85	FLAP	Dominguez Channel
39010.00	L	RCP	60	2.70	FLAP	Dominguez Channel
39176.00	L	RCP	48	5.67	FLAP	Dominguez Channel
39350.00	R	RCP	60	3.10	FLAP	Dominguez Channel
39375.00	L	RCP	36	5.93	FLAP	Dominguez Channel
39840.00	L	RCP	60	3.50	FLAP	Dominguez Channel
39920.00	R	RCP	60	3.50	FLAP	Dominguez Channel
40600.00	R	RCP	36	5.30	FLAP	Dominguez Channel
41350.00	R	RCP	36	5.56	FLAP	Dominguez Channel

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
41490.00	L	RCP	24	0.00	FLAP	Dominguez Channel
41508.00	L	RCP	60	-0.16	FLAP	Dominguez Channel
42094.00	L	RCP	60	1.27	FLAP	Dominguez Channel
42110.00	R	RCP	36	4.55	FLAP	Dominguez Channel
2325.00	L	RCP	36	2.08	FLAP	San Gabriel River
2600.00	L	RCP	18	2.02	FLAP	San Gabriel River
2900.00	L	RCP	12	4.50	FLAP	San Gabriel River
3050.00	L	RCP	30	4.86	FLAP	San Gabriel River
3250.00	R	CMP	12	3.81	FLAP	San Gabriel River
3388.00	R	RCP	18	4.86	FLAP	San Gabriel River
4190.00	L	CIP	12	2.68	FLAP	San Gabriel River
4280.00	L	RCP	30	4.59	FLAP	San Gabriel River
4280.00	L	CIP	12	4.54	FLAP	San Gabriel River
4280.00	L	RCP	30	4.41	FLAP	San Gabriel River
4350.00	L	RCP	24	0.47	FLAP	San Gabriel River
6040.00	L	RCP	48	-1.00	FLAP	San Gabriel River
6407.00	L	RCP	30	2.00	FLAP*	San Gabriel River
7000.00	R	RCP	24	2.60	FLAP	San Gabriel River
8310.00	L	RCP	30	-0.80	FLAP*	San Gabriel River
9033.00	L	CIP	12	2.76	FLAP	San Gabriel River
9033.00	L	RCP	48	2.76	FLAP	San Gabriel River
9033.00	L	RCP	48	2.76	FLAP	San Gabriel River
9033.00	L	RCP	48	2.76	FLAP	San Gabriel River
9033.00	L	RCP	48	2.76	FLAP	San Gabriel River
9655.00	L	RCP	24	3.24	FLAP	San Gabriel River
9975.00	L	CIP	12	5.14	FLAP	San Gabriel River
9975.00	L	CIP	12	5.14	FLAP	San Gabriel River
15270.00	L	RCP	30	6.30	FLAP	San Gabriel River
15270.00	R	RCP	48	5.38	FLAP	San Gabriel River
23601.00	L	RCP	48	11.54	FLAP	San Gabriel River
26182.00	L	RCP	30	16.27	FLAP	San Gabriel River
28530.00	L	RCP	18	14.01	FLAP	San Gabriel River
33888.00	L	RCP	96	20.42	FLAP	San Gabriel River
36476.00	L	RCP	30	31.73	FLAP	San Gabriel River
36676.00	R	RCP	30	32.16	FLAP	San Gabriel River

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
37285.21	L	RCP	60	28.28	FLAP	San Gabriel River
37285.21	L	RCP	60	28.28	FLAP	San Gabriel River
37285.21	L	RCP	60	28.28	FLAP	San Gabriel River
37285.21	L	RCP	60	28.28	FLAP	San Gabriel River
37285.21	L	RCP	60	28.28	FLAP	San Gabriel River
37285.21	L	RCP	60	28.28	FLAP	San Gabriel River
38883.00	L	RCP	30	30.36	FLAP	San Gabriel River
38981.00	R	RCP	30	30.43	FLAP	San Gabriel River
40431.72	R	RCP	18	33.72	FLAP	San Gabriel River
41080.00	R	RCP	30	34.94	FLAP	San Gabriel River
41733.00	L	RCP	30	38.28	FLAP	San Gabriel River
42160.00	R	RCP	36	36.03	FLAP	San Gabriel River
42556.04	L	RCP	30	36.74	FLAP	San Gabriel River
42805.72	R	RCP	42	38.38	FLAP	San Gabriel River
44609.06	L	RCP	48	40.35	FLAP	San Gabriel River
44634.00	L	RCP	24	39.59	FLAP	San Gabriel River
45600.00	L	RCP	24	42.45	FLAP	San Gabriel River
46277.00	L	RCB	60	44.01	FLAP	San Gabriel River
46277.00	L	RCB	60	44.01	FLAP	San Gabriel River
46475.00	L	CIP	12	47.07	FLAP	San Gabriel River
46705.00	L	RCP	36	46.15	FLAP	San Gabriel River
46800.00	L	RCP	24	45.73	FLAP	San Gabriel River
46850.00	R	RCP	24	45.82	FLAP	San Gabriel River
48128.00	R	RCP	30	47.66	FLAP	San Gabriel River
49085.00	L	RCB	60	49.34	FLAP	San Gabriel River
49085.00	L	RCP	60	49.34	FLAP	San Gabriel River
49623.00	R	RCP	48	49.66	FLAP	San Gabriel River
51358.00	R	RCP	48	52.90	FLAP	San Gabriel River
52200.00	L	RCP	24	55.40	FLAP	San Gabriel River
52300.00	R	RCP	24	56.23	FLAP	San Gabriel River
53483.00	L	RCB	60	57.87	FLAP	San Gabriel River
53580.00	R	RCB	96	58.36	FLAP	San Gabriel River
55446.00	L	RCP	36	62.63	FLAP	San Gabriel River
57187.42	L	RCP	72	62.13	FLAP	San Gabriel River
57415.62	R	RCP	30	167.17	FLAP	San Gabriel River

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
57927.32	R	RCP	48	168.56	FLAP	San Gabriel River
60781.00	R	RCP	18	74.30	FLAP	San Gabriel River
62618.54	L	RCP	12	80.67	FLAP	San Gabriel River
62797.00	R	RCP	24	79.20	FLAP	San Gabriel River
62850.00	L	RCP	24	79.31	FLAP	San Gabriel River
64300.00	L	RCP	24	83.06	FLAP	San Gabriel River
65148.00	L	RCP	24	84.46	FLAP	San Gabriel River
65583.00	R	RCP	24	85.44	FLAP	San Gabriel River
65618.00	R	RCP	24	85.52	FLAP	San Gabriel River
65713.00	R	RCB	60	83.30	FLAP	San Gabriel River
65762.00	L	RCP	30	85.96	FLAP	San Gabriel River
65812.00	L	RCP	36	85.40	FLAP	San Gabriel River
66553.34	L	RCP	30	87.64	FLAP	San Gabriel River
67285.00	R	RCP	18	89.00	FLAP	San Gabriel River
67307.00	R	RCP	18	89.26	FLAP	San Gabriel River
67721.00	R	RCP	18	90.18	FLAP	San Gabriel River
67973.17	L	RCB	72	87.56	FLAP	San Gabriel River
67973.17	L	RCB	72	87.56	FLAP	San Gabriel River
67973.17	L	RCB	72	87.56	FLAP	San Gabriel River
67973.17	L	RCB	72	87.56	FLAP	San Gabriel River
68175.43	L	CIP	12	93.17	FLAP	San Gabriel River
68302.75	L	RCP	36	91.46	FLAP	San Gabriel River
68350.00	R	RCP	24	91.43	FLAP	San Gabriel River
69050.00	L	RCP	24	91.99	FLAP	San Gabriel River
69512.55	R	RCP	18	92.32	FLAP	San Gabriel River
69538.00	R	RCP	24	92.30	FLAP	San Gabriel River
70200.00	R	RCP	24	92.81	FLAP	San Gabriel River
70540.00	R	RCP	18	93.21	FLAP	San Gabriel River
70649.41	L	RCP	72	92.81	FLAP	San Gabriel River
70833.00	R	RCP	54	92.70	FLAP	San Gabriel River
70905.00	R	RCP	36	94.46	FLAP	San Gabriel River
71014.00	L	RCP	24	94.79	FLAP	San Gabriel River
71065.00	R	RCP	24	93.99	FLAP	San Gabriel River
71220.00	L	RCP	30	95.59	FLAP	San Gabriel River
71634.00	R	RCP	30	97.14	FLAP	San Gabriel River

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
71816.00	L	RCP	60	96.60	FLAP	San Gabriel River
72765.00	R	RCP	72	102.20	FLAP	San Gabriel River
73926.00	R	RCP	24	104.70	FLAP	San Gabriel River
74463.00	L	RCP	24	105.01	FLAP	San Gabriel River
74504.00	L	CMP	24	106.28	FLAP	San Gabriel River
76063.00	L	RCP	48	105.88	FLAP	San Gabriel River
76788.67	R	RCP	12	111.23	FLAP	San Gabriel River
77022.50	R	CMP	24	112.51	FLAP	San Gabriel River
77035.00	R	CMP	42	112.72	FLAP	San Gabriel River
77177.50	L	RCP	36	110.42	FLAP	San Gabriel River
77177.50	L	RCP	36	110.42	FLAP	San Gabriel River
77255.00	R	RCP	48	108.50	FLAP	San Gabriel River
77518.49	L	RCB	60	107.09	FLAP	San Gabriel River
77518.49	L	RCP	60	107.09	FLAP	San Gabriel River
77518.49	L	RCP	60	107.09	FLAP	San Gabriel River
77958.47	R	CMP	24	112.78	FLAP	San Gabriel River
78345.00	R	RCP	30	111.23	FLAP	San Gabriel River
79143.93	R	CMP	42	116.43	FLAP	San Gabriel River
79395.00	R	RCB	72	116.43	FLAP	San Gabriel River
79395.00	R	RCB	72	116.43	FLAP	San Gabriel River
79630.38	L	RCP	48	116.78	FLAP	San Gabriel River
79909.63	R	RCP	54	117.23	FLAP	San Gabriel River
81896.00	L	RCP	54	119.54	FLAP	San Gabriel River
81896.00	L	RCP	54	119.39	FLAP	San Gabriel River
81896.00	L	RCP	54	119.23	FLAP	San Gabriel River
81896.00	L	RCP	54	119.08	FLAP	San Gabriel River
82389.19	R	CMP	24	124.73	FLAP	San Gabriel River
83103.43	L	RCP	78	118.12	FLAP	San Gabriel River
83454.67	R	RCP	42	124.64	FLAP	San Gabriel River
84520.50	R	RCP	30	129.13	FLAP	San Gabriel River
84750.82	L	CMP	36	129.79	FLAP	San Gabriel River
85510.17	R	RCP	27	130.71	FLAP	San Gabriel River
86481.90	R	RCP	42	133.85	FLAP	San Gabriel River
87000.00	L	RCP	42	132.17	FLAP	San Gabriel River
87250.00	L	RCP	42	132.29	FLAP	San Gabriel River

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
87478.00	R	RCP	42	131.17	FLAP	San Gabriel River
87893.82	R	CMP	24	133.64	FLAP	San Gabriel River
88435.00	R	RCP	24	140.60	FLAP	San Gabriel River
88650.00	L	RCP	42	133.12	FLAP	San Gabriel River
88835.11	R	CMP	30	134.21	FLAP	San Gabriel River
89144.45	L	CMP	36	133.42	FLAP	San Gabriel River
89144.45	L	CMP	36	133.42	FLAP	San Gabriel River
89144.45	L	CMP	36	133.42	FLAP	San Gabriel River
89511.00	R	RCP	36	138.20	FLAP	San Gabriel River
90120.39	R	CMP	18	141.92	FLAP	San Gabriel River
90216.17	R	CMP	30	142.01	FLAP	San Gabriel River
90216.17	R	CMP	30	142.01	FLAP	San Gabriel River
90216.17	R	CMP	30	142.01	FLAP	San Gabriel River
91083.51	R	CMP	24	141.51	FLAP	San Gabriel River
91083.51	R	CMP	24	141.51	FLAP	San Gabriel River
91271.75	R	CMP	24	146.39	FLAP	San Gabriel River
91271.75	R	CMP	24	146.39	FLAP	San Gabriel River
91944.00	L	RCP	72	144.42	FLAP	San Gabriel River
92372.00	R	RCP	48	149.67	FLAP	San Gabriel River
92372.00	R	RCP	48	149.67	FLAP	San Gabriel River
92372.00	R	RCP	48	149.67	FLAP	San Gabriel River
92372.00	R	RCP	48	149.67	FLAP	San Gabriel River
96840.00	L	RCP	24	156.80	FLAP	San Gabriel River
96847.00	L	RCP	18	156.80	FLAP	San Gabriel River
99578.00	L	CIP	18	155.25	FLAP	San Gabriel River
100333.72	L	CMP	24	167.42	FLAP	San Gabriel River
101560.00	R	CMP	30	169.18	FLAP	San Gabriel River
101668.61	L	CMP	36	168.91	FLAP	San Gabriel River
101940.00	R	RCP	48	168.70	FLAP	San Gabriel River
102850.00	R	RCB	72	168.20	FLAP	San Gabriel River
102850.00	R	RCB	72	168.23	FLAP	San Gabriel River
103662.00	R	CMP	24	174.55	FLAP	San Gabriel River
103980.00	L	RCP	30	178.27	FLAP	San Gabriel River
104000.00	R	RCP	24	178.27	FLAP	San Gabriel River
104339.71	R	CMP	42	179.42	FLAP	San Gabriel River

CLOSURE DEVICES IN COUNTY OF LOS ANGELES LEVEE SYSTEMS

STATION	LEFT/RIGHT BANK	OPENING TYPE	OPENING SIZE	INVERT ELEVATION	CLOSING TYPE	LEVEE SYSTEM NAME
104350.00	L	RCP	12	182.41	FLAP	San Gabriel River
104500.00	R	RCP	30	177.79	FLAP	San Gabriel River
104545.00	L	RCP	30	177.84	FLAP	San Gabriel River
105217.12	L	RCB	96	179.59	FLAP	San Gabriel River
105217.12	L	RCB	96	179.25	FLAP	San Gabriel River
105557.52	R	STEEL	16	180.81	FLAP	San Gabriel River
105634.21	R	STEEL	12	183.86	FLAP	San Gabriel River
106079.20	R	CMP	30	178.70	FLAP	San Gabriel River
106079.20	R	CMP	30	178.70	FLAP	San Gabriel River
107494.76	R	CMP	24	187.89	FLAP	San Gabriel River
292265.00	L	RCP	12	1405.00	FLAP**	Santa Clara River - PAL # 12

*Flap gate scheduled to be replaced fall 2009 due to tidal constraints.

**Stationing based on HDR's Flood Insurance Study

Left/Right Bank: Looking downstream

Opening Types:

CIP: Cast in Place

CMP: Corrugated Metal Pipe

STEEL: Steel Pipe

RCB: Reinforced Concrete Box

RCP: Reinforced Concrete Pipe

VCP: Vitrified Clay Pipe

Appendix I – Detention Basin List

Active Retention/Detention Basins	Area	Address	Street	Cross Street	City
AVE S RETENTION BASIN-PD 2136	West		S OF AVENUE S	E OF 92ND STREET E	LITTLEROCK
AVE T-8 RETENTION/DETENTION BASIN-PD 2103	West		S OF AVENUE T-8	E OF 48TH STREET E	FOUR POINTS
BELVEDERE PARK LAKE	South	4900	3RD STREET	LA VERNE	EAST L A
BREA CANYON DETENTION BASIN	East		BREA CANYON CUTOFF	CREST DR	DIAMOND BAR
BULL CREEK RETENTION BASIN	West	16000	RINALDI ST		MISSION HILLS
COUNTRYWOOD DETENTION BASIN	East		GARO STREET & FIELD GATE		HACIENDA HEIGHTS
DICKASON DETENTION BASIN-PD 2490 -	West		E OF DICKASON DR	N OF FUSHIA CT	SAUGUS
FENBARD RETENTION BASIN	West		HUBBARD ST	FENTON AVE	SYLMAR
GRACE AVE DRAIN RETENTION BASIN	South		DESFORD		CARSON
HUNT CANYON DETENTION BASIN	West		E OF CHESEBORO RD	S OF AVENUE T-8	FOUR POINTS
LAGUNA REGULATING BASIN Alhambra	East	3336	HELLMAN AVENUE		ALHAMBRA
LAGUNA RETENTION BASIN	South		1540 N MCBRIDE AVE		MONTEREY PARK
OAKDALE DETENTION BASIN-PD 2389 -	West		S OF OAKDALE CYN RD	LARK WY	FAIR OAKS RANCH
OXFORD RETENTION BASIN	South		ADMIRALTY WAY	WASHINGTON ST & OXFORD	MARINA DEL REY
PAN PACIFIC DETENTION BASIN	South		STANLEY AVE		LOS ANGELES
PATHFINDER DETENTION BASIN	East		PATHFINDER RD	WELLESLEY DR	ROWLAND HEIGHTS
PD 1823 RETENTION BASIN	South		DOMINGUEZ HILLS DR	GLADWICK	RANCHO DOMINGUEZ
PD 2252 RETENTION BASIN A	West		E OF 75TH STREET E	N OF FREESTONE LN	LITTLEROCK
PD 2252 RETENTION BASIN B	West		W OF 77TH STREET E	N OF FREESTONE LN	LITTLEROCK
PEARBLOSSOM RETENTION BASIN #1-PD 2113	West		S OF PEARBLOSSOM HWY	E OF 42ND STREET E	PALMDALE
PEARBLOSSOM RETENTION BASIN #2-PD 2113	West		S OF PEARBLOSSOM HWY	E OF 43RD STREET E	PALMDALE
PEARBLOSSOM DETENTION BASIN-PD 2078	West		S OF PEARBLOSSOM HWY	E OF 77TH STREET E	LITTLEROCK
POPLINK RETENTION BASIN	South		REA DRIVE	RIO HONDO CHANNEL	MONTEBELLO
SACRAMENTO DETENTION BASIN-PD 2470	West		N OF SACRAMENTO ST	W OF WISCONSIN ST	ACTON
STRATHERN RETENTION BASIN	West		STRATHERN ST	TUJUNGA AVE	SUN VALLEY
TOURNEY DETENTION BASIN-MTD 1539 UNIT2	West		E OF TOURNEY RD	N OF VALENCIA BLVD	SANTA CLARITA

Appendix J Pump Plant List

NAME	ADDRESS	STREET	OWNED□BY	MAINTAINED
120TH ST. PUMP PLANT	5028	W. 120TH ST	RMD-3	LACDPW
17TH ST PUMP PLANT	1601	SAN FRANSISCO AVE	LACDPW	LACDPW
ALAMEDA ST. PUMP PLANT	22300	ALAMEDA ST.	CARSON	LACDPW
ALAMEDA STREET 3B PUMP PLANT	18910	ALAMEDA ST	LACDPW	LACDPW
ALAMEDA STREET PHASE 3C PUMP PLANT	18920	ALAMEDA ST.	CALTRANS	LACDPW
ALAMITOS BAY PUMP PLANT	5425	OCEAN BOULEVARD	LACDPW	LACDPW
ALOE PUMP PLANT	2020	ZOE AVE	LACDPW	LACDPW
ALONDRA PUMP PLANT		ALONDRA BLVD & UPRR	LACDPW	LACDPW
ANAHEIM PUMP PLANT		I STREET	ACTA	LACDPW
APPIAN WAY PUMP PLANT	5871	APPIAN WAY	LACDPW	LACDPW
ARENA PUMP PLANT	199	E. EL SEGUNDO BLVD	LACDPW	LACDPW
ATLANTIC PUMP PLANT		UNDER AT&SF RAILROAD BRIDGE	COMMERCE	LACDPW
AVALON PUMP PLANT	20101	GALWAY AV	LACDPW	LACDPW
BARTOLO PUMP PLANT	8305	SLAUSON AVE	LACDPW	LACDPW
BELMONT PUMP PLANT	222	CLAREMONT AVE	LACDPW	LACDPW
BOONE OLIVE PUMP PLANT	579	WASHINGTON ST	LACDPW	LACDPW
BREA CANYON PUMP PLANT		BREA CANYON RD, INDUSTRY METROLINK STA	INDUSTRY	LACDPW
CENTURY FRWY PUMP PLANT	7399	CLOVERDALE	LACDPW	LACDPW
CERRITOS PUMP PLANT	1100	DEFOREST AVE	LACDPW	LACDPW
CLARETTA PUMP PLANT	12500	226TH ST	LACDPW	LACDPW
COMPTON CREEK PUMP PLANT	19115	S. REYES	LACDPW	LACDPW
COMPTON CREEK PUMP PLANT #2	19115	S. REYES	LACDPW	LACDPW
CORDOVA WALK PUMP PLANT	141	RIO ALTO CANAL	LACDPW	LACDPW
DOMINGER PUMP PLANT		TORRANCE BLVD	LACDPW	LACDPW
DOMINGUEZ PUMP PLANT	275	DEL AMO	LACDPW	LACDPW
DORIS PUMP PLANT	2900	DORIS WAY	LACDPW	LACDPW
EAST TOLEDO PUMP PLANT	5799	5799 E. TOLEDO ST	LACDPW	LACDPW
EASTERN AVE PUMP PLANT		EASTERN AND RAILROAD	COMMERCE	LACDPW
EL DORADO PUMP PLANT	7390	E. SPRING ST	LACDPW	LACDPW
EL SEGUNDO PUMP PLANT	231	CENTER ST.	LACDPW	LACDPW
ELECTRIC AVE PUMP PLANT	314	BROOKS AVE	LACDPW	LACDPW
GARFIELD BLVD PUMP PLANT		GARFIELD S□O FERGUSON, N□O RAILROAD	COMMERCE	LACDPW
GARNET AVENUE PUMP PLANT	4229	GARNET AVE	LACDPW	LACDPW
GREENWOOD PUMP PLANT		GREENWOOD AND SYCAMORE	MONTEBELLO	LACDPW
HAMILTON BOWL SOUTH PUMP PLANT	1810	GAVIOTA ST	LACDPW	LACDPW
HAMILTON BOWL WEST PUMP PLANT	1912	WALNUT	LACDPW	LACDPW
HILL ST. PUMP PLANT	950	W. HILL	LACDPW	LACDPW
IRWINDALE PUMP PLANT	4819	CHARTER ST.	LACDPW	LACDPW
IVY STREET PUMP PLANT	232	E. WHITTIER	LACDPW	LACDPW
JOHNSON PUMP PLANT	817	N. MEADOWS	LACDPW	LACDPW
LAKEWOOD PUMP PLANT	5432	CHAMBERS COURT	LAKEWOOD	LACDPW
LENNOX BLVD P.P.	4999	LENNOX BLVD	RMD-3	LACDPW
LOS ALTOS PUMP PLANT	6560	ANAHEIM RD	LACDPW	LACDPW
LYNWOOD PUMP PLANT		SE CORNER 710 & 105	LACDPW	LACDPW
MANHATTAN BEACH PUMP PLANT	1611	MANHATTAN BEACH BLVD	LACDPW	LACDPW
MARKET ST. PUMP PLANT	190	MARKET ST	LACDPW	LACDPW
NAPLES PUMP PLANT	5401	EAST SECOND ST	LACDPW	LACDPW
NOGALES PUMP PLANT	1018	NOGALES ST	INDUSTRY	LACDPW
OXFORD PUMP PLANT	433	ADMIRALTY WAY	LACDPW	LACDPW
PARAMOUNT PUMP PLANT	6350	72ND ST	LACDPW	LACDPW
PECK ROAD PUMP PLANT		PECK ROAD	INDUSTRY	LACDPW
POPLINK PUMP PLANT	670	REA DRIVE	LACDPW	LACDPW
REDONDO BEACH BLVD PUMP PLANT		NW CORNER OF REDONDO AND CRENSHAW	RMD-3	LACDPW
SANTA FE PUMP PLANT	2200	SANTA FE AVE	CARSON	LACDPW
SEASIDE PUMP PLANT	600	SOUTH GOLDEN SHORE	LACDPW	LACDPW
WALTERIA LAKE PUMP PLANT	3800	236TH ST □HWTHORNE BLVD	LACDPW	LACDPW
WASHINGTON BLVD PUMP PLANT		WASHINGTON BLVD AND I-5	COMMERCE	LACDPW
WEST LONG BEACH PUMP PLANT	1450	1450 WEST 9TH STREET	LACDPW	LACDPW
WEST NEAPOLITAN PUMP PLANT	11	NEAPOLITAN LANE	LACDPW	LACDPW
WEST TOLEDO PUMP PLANT	5601	W. TOLEDO STREET	LACDPW	LACDPW
WILMINGTON UNIT 2 PUMP PLANT	725	PACIFIC COAST HIGHWAY	LACDPW	LACDPW
WILMINGTON UNIT 3 PUMP PLANT		SANITATION MARSH	LACDPW	LACDPW
□ACTA□Alameda Corridor Transportation Authority				
□CALTRANS□ California Department of Transportation				
□LACDPW□LA County Department of Public Works, Flood Maintenance Division				
□RMD-3□Road Maintenance Division, Westchester				

<u>**Appendix K – Debris Basin List**</u>

County of Los Angeles, Department of Public Works

DEBRIS BASINS

	FACILITY NAME	LOCATION	MAINT. AREA	THOMAS GUIDE PG & GRID (1992 +)
1	ALISO	GRANADA HILLS	WEST	501-A1
2	ARBOR DELL	LOS ANGELES	WEST	565-C4
3	AUBURN	SIERRA MADRE	EAST	567-A1
4	BAILEY	SIERRA MADRE	EAST	566-J1
5	BEATTY	AZUSA	EAST	569-A4
6	BIG DALTON	GLENDORA	EAST	569-H2
7	BIG BRIAR	PASADENA	WEST	535-B1
8	BLANCHARD	LOS ANGELES	WEST	504-C4
9	BLUE GUM	LOS ANGELES	WEST	504-B4
10	BRACE	BURBANK	WEST	533-F2
11	BRACEMAR	BURBANK	WEST	533-F2
12	BRADBURY	BRADBURY	EAST	568-B3
13	BRAND	GLENDALE	WEST	534-B6
14	BUENA VISTA	MONROVIA	EAST	568-A2
15	CARRIAGE HOUSE	PASADENA	EAST	536-H7
16	CARTER	SIERRA MADRE	EAST	567-A7
17	CASSARA	LOS ANGELES	WEST	503-B1
18	CHAMBERLAIN	PASADENA	EAST	565-D1
19	CHANDLER	LOS ANGELES	WEST	533-C1
20	CHILDS	GLENDALE	WEST	534-B6
21	CLOUD CREEK	UNINCORP.	WEST	504-F5
22	CLOUDCROFT	UNINCORP.	SOUTH	630-E4
23	COOKS	GLENDALE	WEST	504-D5

24	COOKS M-1A	GLENDALE	WEST	504-D5
25	CRESTVIEW	DUARTE	EAST	568-D3
26	CROCKER	SANTA CLARITA	WEST	4460-B7
27	DEER	GLENDALE	WEST	534-F5
28	DENIVELLE	LOS ANGELES	WEST	503-J1
29	DEVONWOOD	UNINCORP.	EAST	536-A3
30	DRY CYN - SO. FORK	UNINCORP.	WEST	559-G7
31	DUNSMUIR	GLENDALE	WEST	504-E5
32	EAGLE	UNINCORP.	WEST	504-G6
33	ELMWOOD	BURBANK	WEST	534-A6
34	EMERALD-EAST	LA VERNE	EAST	570-G6
35	ENGLEWILD	GLENDORA	EAST	569-G2
36	FAIR OAKS	ALTADENA	EAST	535-J3
37	FERN	UNINCORP.	EAST	535-H3
38	FIELDBROOK	UNINCORP.	EAST	709-B1
39	GOLF CLUB DRIVE	GLENDALE	WEST	565-B1
40	GORDON	GLENDORA	EAST	569-J4
41	GOULD	LA CAN. FLINT.	WEST	535-C2
42	GOULD UPPER	LA CAN. FLINT.	WEST	535-C1
43	HALLS	LA CAN. FLINT.	WEST	534-J1
44	HARROW	GLENDORA	EAST	569-E3
45	HAVEN WAY	BURBANK	WEST	533-G3
46	HAY	LA CAN. FLINT.	WEST	535-B1
47	HILLCREST	GLENDALE	WEST	534-D7
48	HOG	UNINCORP.	WEST	481-H1
49	HOOK EAST	GLENDORA	EAST	569-C3
50	HOOK WEST	GLENDORA	EAST	569-C3
51	INVERNESS	PASADENA	EAST	535-D7
52	IRVING DRIVE	BURBANK	WEST	533-F3
53	KINNELOA-EAST	UNINCORP.	EAST	536-G6
54	KINNELOA-WEST	UNINCORP.	EAST	536-F6
55	LA TUNA	LOS ANGELES	WEST	503-E6
56	LANNAN	SIERRA MADRE	EAST	567-C1
57	LAS FLORES	UNINCORP	EAST	536-B4

58	LAS LOMAS	DUARTE	EAST	568-D3
59	LIMEKILN	LOS ANGELES	WEST	500-F4
60	LINCOLN	UNINCORP.	EAST	535-G4
61	LINDA VISTA	GLENDALE	WEST	565-B1
62	LITTLE DALTON	GLENDORA	EAST	569-H2
63	MADDOCK	DUARTE	EAST	568-D3
64	MARSTON /PARAGON	UNINCORP.	WEST	4460-J4
65	MAY NO. 1	SYLMAR	WEST	482-C1
66	MAY NO. 2	LOS ANGELES	WEST	482-C1
67	MONUMENT	DIAMOND BAR	EAST	680-C2
68	MORGAN	GLENDORA	EAST	570-A4
69	MOUNTBATTEN	GLENDALE	WEST	534-G7
70	MULL	GLENDORA	EAST	569-J4
71	MULLALLY	UNINCORP.	WEST	504-J6
72	NICHOLS	LOS ANGELES	SOUTH	593-B3
73	OAK CREEK	GLENDALE	WEST	504-F5
74	OAKGLADE	MONROVIA	EAST	567-H1
75	OAKMONT VIEW DR.	GLENDALE	WEST	534-G4
76	OLIVER	LOS ANGELES	WEST	503-C1
77	PICKENS	UNINCORP.	WEST	534-H1
78	PINELAWN	UNINCORP.	WEST	504-F5
79	ROWLEY (UPPER)	LOS ANGELES	WEST	504-A2
80	ROWLEY	LOS ANGELES	WEST	504-A3
81	RUBIO	ALTADENA	EAST	536-B4
82	RUBY (LOWER)	MONROVIA	EAST	567-G2
83	RYE	UNINCORP.	WEST	4460-C7
84	SANTA ANITA	ARCADIA	EAST	567-E1
85	SAWPIT	MONROVIA	EAST	567-H1
86	SCHOLL	GLENDALE	WEST	565-B4
87	SCHOOLHOUSE	LOS ANGELES	WEST	481-H1
88	SCHWARTZ	LOS ANGELES	WEST	503-D1
89	SHIELDS (UPPER)	UNINCORP.	WEST	504-G5
90	SHIELDS	UNINCORP.	WEST	504-F6
91	SIERRA MADRE	SIERRA MADRE	EAST	567-B7

92	SIERRA MADRE VILLA	PASADENA	EAST	566-G1
93	SNOVER	LA CAN. FLINT.	WEST	504-H7
94	SOMBRERO	UNINCORP.	WEST	481-G1
95	SPINKS	BRADBURY	EAST	568-C3
96	STARFALL	UNINCORP.	WEST	504-G5
97	STETSON	LOS ANGELES	WEST	481-F1
98	STOUGH	BURBANK	WEST	533-H4
99	STURTEVANT	SIERRA MADRE	EAST	567-C1
100	SULLIVAN	LOS ANGELES	SOUTH	631-C1
101	SUNNYSIDE	PASADENA	EAST	536-J7
102	SUNSET (LOWER)	BURBANK	WEST	533-J5
103	SUNSET (UPPER)	BURBANK	WEST	534-A4
104	SUNSET CYN-DEER	BURBANK	WEST	534-A4
105	TURNBULL	WHITTIER	SOUTH	677-E5
106	VERDUGO	GLENDALE	WEST	534-G4
107	WARD	GLENDALE	WEST	504-F5
108	WEST RAVINE	UNINCORP.	EAST	535-H3
109	WESTRIDGE	GLENDORA	EAST	569-D3
110	WILDWOOD	SANTA CLARITA	WEST	4640-H3
111	WILLIAM S HART PARK	SANTA CLARITA	WEST	4640-H2
112	WILSON	SYLMAR	WEST	482-A1
113	WINERY	LA CAN. FLINT.	WEST	535-A1
114	ZACHAU	LOS ANGELES	WEST	504-A2
115	WILBUR DRI	NORTHRIDGE	WEST	500-G7
116	BELL CREEK	LOS ANGELES	WEST	529-D5
117	BRAMHALL	ROWLAND HEIGHTS	EAST	679-C7
118	CALLE ROBLEDA-PD1505	CALABASAS	WEST	558-D7
119	CONTENTO DB - MTD 1221	GLENDALE	WEST	564-J3
120	CRESCENT GLEN	GLENDORA	EAST	570-A5
121	FULLERTON (PD2202-U2)	UNINCORP LA COUNTY	EAST	708-H1
122	GOOSEBERRY	ALTADENA	EAST	536-B5
123	GOSS INLET - PD655B	LA CANADA-FLINTRIDGE	WEST	535-C2
124	HARBOR	UNINCORP LA COUNTY	EAST	708-J1
125	HARTER LANE - PD22	LA CANADA-FLINTRIDGE	WEST	535-C2
126	HAZEL NUT DB (PD 2466)	CORNELL	WEST	587-G5

127	HILLMAN	ROWLAND HEIGHTS	EAST	679-C7
128	LOPEZ INLET	LOS ANGELES	WEST	482-E5
129	MTD 0510 MONTANA	BURBANK	WEST	534-G7
130	MTD 1317-SKYRIDGE	GLENDALE	WEST	534-G7
131	OAK PARK	GLENDORA	EAST	570-A5
132	PD2099 SHADOW	BOUQUET CANYON	WEST	4461-E4
133	PD 2157 YUCCA	VAL VERDE	WEST	4459-E3
134	PD 2176 LINE "A"	NEWHALL	WEST	4551-A7
135	PD 2444 WHITNEY	VAL VERDE	WEST	4459-E5
136	PD 2247 SADDLEBACK #1	SAND CANYON	WEST	4552-E5
137	PD 2247 SADDLEBACK #2	SAND CANYON	WEST	4552-E5
138	PD 2247 SADDLEBACK #3	SAND CANYON	WEST	4552-E5
139	PD 2275 VICTORIA	CASTAIC	WEST	4369-E6
140	PD 2279 KNOLL DB	VAL VERDE	WEST	4459-F3
141	PD 2467 WEDGEWOOD	VAL VERDE	WEST	4459-H4
142	PD1258-LA SALLE	SANTA CLARITA	WEST	4640-G5
143	PD1386-COPPER HILL LINE "B"	BOUQUET CANYON	WEST	4461-C5
144	PD1683-HIPSHOT#1	CASTAIC	WEST	4369-F6
145	PD1920-ROYAL TERMINUS	CASTAIC	WEST	4369-F6
146	PD1974-GREEN HILL #1	CASTAIC	WEST	4369-F5
147	PD1974-GREEN HILL #2	CASTAIC	WEST	4369-F5
148	PD2049-MUSTANG	CASTAIC	WEST	4369-F5
149	PD2097-CARDIFF	NEWHALL	WEST	4550-J5
150	PD2097-STRATFORD	PEARLAND	WEST	4550-J5
151	PD2101-FT. TEJON RD BASIN	PEARLAND	WEST	4287-A4
152	PD2103-AVE T-8 RET BASIN	FOUR POINTS	WEST	4287-A7
153	PD2136-AVE S RET BASIN	PALMDALE	WEST	4288-A4
154	PD2223-CRYSTAL SPRINGS #1	SAND CANYON	WEST	4552-E5
155	PD2284- CORDOBA	VAL VERDE	WEST	4459-E3
156	PD2389- OAKDALE	FAIR OAKS	WEST	4551-J5
157	PD354-CAMP PLENTY	CANYON COUNTRY	WEST	4551-F2
158	SLOAN - PD1726	OAK PARK	WEST	559-A4
159	THOUSAND OAKS -PD1726	HIDDEN HILLS	WEST	559-A4
160	Greensbrier DB -PD2495	STEVENSON RANCH	WEST	4640-C5

161	STEVENSON RANCH (PD 2528)	STEVENSON RANCH	WEST	4640-C1
162	Wellington DB PD-2202 Unit B	UNINCORP LA COUNTY	South	708-J2

Appendix L – Dam Information

LOS ANGELES COUNTY

DEPARTMENT OF PUBLIC WORKS

DAM PROFILES □ TASK LISTS
(14 DAMS TOTAL)

LIVE OAK DAM-PCA AND TASK LIST — FREQUENCY

DAM OPERATIONS-F4001842-TASK 446

Task	Item	Frequency
• Adjust and Repair Boom Logs		as needed
• Boom Debris		as needed
• Field Data Sheet		
Measure:	Expansion Joints, {(3) on crest of Dam}	weekly
	Leakage Points (31 total)	monthly
	Piezometers (7 primary, 11 secondary)	monthly
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		weekly
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol (perimeter and upstream end at the inflow)		twice weekly
• Secure Dam Area (refer to Homeland Security Procedures)		daily
• Valve/Gate Operations		as needed
• Visually Inspect Grout Joints on Downstream/Upstream Face of Dam For New Cracks		weekly
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F4001843-TASK 416

Task	Item	Frequency
• Clean:	Collection Points at Toe of Dam (2-SD1, SD2)	as needed
	Drains (2 total, D2L, D3L)	as needed
	Leakage Points (31 total)	weekly
	Spillway	as needed
	Toe of Dam	as needed
	Weir (1)	as needed
• Exercise Slide Gate		semi-annually (as directed by WRD)

FACILITY MAINTENANCE-HOUSEKEEPING F4001844-TASK 461

Task	Item	Frequency
• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory (located in Operator's house)	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	weekly
	Bench Drains	as needed
	Dam Area	weekly
	Gage Boards (left bank of reservoir)	as needed
	Slides (at any location)	as needed
	Shelter House	as needed
	Stairways	as needed
	Trail (left abutment from top of dam to gage boards)	as needed
• Inspect Facility for Painting Service		monthly
• Maintain Fire Breaks around Shelter House		as needed
• Paint:	Expansion Joint Marker	as needed
	Gage Boards	as needed
	Leakage Point Markers (31 total)	as needed
	Piezometer Markers (18 total)	as needed
	Sign Maintenance	as needed
• Pest Control (Department of Agriculture)		as needed

FACILITY MAINTENANCE LANDSCAPING-F4001845-TASK 413

Task	Item	Frequency
• Contract Landscaping (FEU)		as needed
• General Landscaping		weekly

- Trim Trees and Shrubs as needed
- Weed Abatement as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001847-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) as needed
- Post Seismic Shock Inspection according to BEC protocol
- Storm Operations as needed

09/23/2009 12:10 PM

BIG DALTON DAM-PCA AND TASK LIST		**FREQUENCY**

DAM OPERATIONS-F4001814-TASK 446

• Adjust and Repair Boom Logs		as needed
• Adjust or Relocate Boat Moorage		as needed
• Boom Debris		as needed
• Field Data Sheet		
Measure:	Expansion Joints (5 total)	weekly
	Leakage Points (5 total)	daily/monthly
	Piezometers (8 total)	daily/monthly
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		weekly
• Inspect/Service District Boat		as needed
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol		daily
• Secure Dam Area (refer to Homeland Security Procedures)		daily
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F4001815-TASK 416

• Chimney Sweep (FEU)		as needed
• Clean Weep Holes In Trapezoidal Channel (in right abutment to control house and downstream to DO house)		as needed
• Inspect and Flush Hydrants and Fire System		semi-annually
• Exercise:	Cone Valves 1 and 2	semi-annually (as directed by WRD)
	Knife Gate Valves 1A and 2A	
	Inline 12" Gate Valve A1A	
	12" Hollow Jet Valve A1	
	Butterfly Valve 3A	
• Inspect and Service Evaporation Tank		semi-annually
• Inspect inside Cone Valve 1 and 2 (boom lift required)		quarterly
• Service:	Auxiliary Generator (Fleet)	annually
	Boat Motor (Fleet)	annually

FACILITY MAINTENANCE HOUSEKEEPING-F4001816-TASK 461

• Check :	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory (located in Operator's house)	annually (Feb)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads (from main access gate to back of reservoir)	as needed
	Bench Drains (include SPS, Big Dalton D.B. and Little Dalton D.B.)	as needed
	Camp Area	as needed
	Crest of Dam	as needed
	Control House	weekly
	District Truck	weekly
	Drains	weekly
	Gage Boards (between arch 3 and 4, and reservoir)	as needed
	Generator Room	as needed
	Slides	as needed

Shelter House Big Dalton D.B.	weekly
Trails	as needed
Troughs at Arch #6	as needed

- Handrails and Walkway (from right to left abutment) — as needed
- Inspect Facility for Painting Service — monthly
- Main Ladders, Stairways — as needed
- Maintain Fire Breaks — as needed
- Paint:

Paint:	Entry Pipe Gate	as needed
	Exterior Windows, Doors	as needed
	Ext. of Gauging Station (doors and windows only)	as needed
	Diversion Gate and Shelter House Big Dalton DB	as needed
	Diversion Gate Little Dalton DB	as needed
	Gage Boards	as needed
	Leakage Point Markers (5 total)	as needed
	Piezometer Markers (8 total)	as needed
	Spot Paint Handrails, Stairways	as needed
	Spray Rust Spots	as needed

- Pest Control (Department of Agriculture) — as needed
- Remove Trash from Dam (deliver to San Dimas or Longden) — weekly
- Service Domestic Water System — as needed
- SWPPP report — monthly
- Update Chemical Inventory List (located in MSDS plan book) — annually (April)

FACILITY MAINTENANCE LANDSCAPING-F4001817-TASK 413

- Contract Landscaping (FEU) — as needed
- Fertilize Landscape — as needed
- General Landscaping — weekly
- Trim Trees and Shrubs — as needed
- Tool Maintenance (shears, saws etc.) — after each use
- Water Landscape — as needed
- Weed Abatement — as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001819-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) — as needed
- Post Seismic Shock Inspection — according to BEC protocol
- Storm Operations — as needed

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BIG TUJUNGA-PCA AND TASK LIST | **FREQUENCY**

DAM OPERATIONS-F2006000-TASK 446

- Adjust and Repair Boom Logs — as needed
- Adjust or Relocate Boat Moorage — as needed
- Boom Debris — as needed
- Clear Water Course (1/4 mile d/s of dam at confluence) — as needed
- Field Data Sheet
  Measure: Expansion Joints (11 total) — weekly
  Leakage Points (37 total) — weekly
  Piezometers (19 total, 4 w/ charts and 1 w/ pressure gage) — weekly
- Field Operation Report (collect/compute weather data, submit to WRD) — daily (based on W.S.E)
  Measure: Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings
- Inspect Dam for Leakage and Settlement — monthly
- Inspect and Clean Expansion Joints — as needed
- Inspect and Service District Boat — as needed
- Monthly Inspection of Dam — monthly
- Ponded Water Patrol — as needed
- Secure Dam Area (refer to Homeland Security Procedures) — daily
- Valve/Gate Operations — as needed
- Weather Data Report — daily
  Measure: Air Temperature, Evaporation, Precipitation

PREVENTIVE MAINTENANCE-F2006001-TASK 416

- Chimney Sweep (FEU) — as needed
- Clean: Bench Drains (including CMP's) — as needed
  Drains (Maple Canyon, Lower and Upper Big Tujunga DDA) — as needed
  Spillway (upper portion) — as needed
- Examine Fire Hoses and Charge the System — monthly
- Exercise: 72" Butterfly Valve 2A — semi-annually (as directed by WRD)
  60" Butterfly Valve 3
  12" Gate Valve A2A
  62" Slide Gate 3A
  48" Hollow Jet 1
  12" Hollow Jet A2
  72" Needle Valve 2
  48" Slide Gate 1A
  5'x5' Sluice Gate
- Inspect and Flush Hydrants and Fire System — monthly
- Inspect and Service: Aboveground Storage Tank (AST) — as needed
  Evaporation Tank — daily
  Ladders and Hand Rails — monthly
- Maintenance and Repair of the Slope (u/s left abutment) — as needed
- Service: Auxiliary Generator (Fleet) — annually
  Boat Motor (Fleet) — annually
  Electric Entrance Gate to Dam (remove from operator) — as needed
- Test Electrical Equipment (e.g.) — monthly
- Test Run Generator (check fluid levels) — weekly

FACILITY MAINTENANCE HOUSEKEEPING-F2006002-TASK 461

- Check: Bio-Hazard Kit — monthly
  Earthquake Supply Inventory (located in Operator's house) — annually (April)
  Fire Alarms and Extinguishers — monthly
  First AID Kit — monthly

• Clean:	Access Roads	as needed
	Camp Area	as needed
	Heliport	as needed
	Control House	daily
	Crest of Dam	as needed
	District Truck	weekly
	Gage Boards	as needed
	Slides	as needed
	Stairways	as needed
	Trails	as needed
• Inspect Facility for Painting Service		monthly
• Inspect and Service Septic Tanks (contractor services septic tanks)		as needed
• Maintain Fire Breaks		as needed
• Maintain Osmosis Water System (add salt)		as needed
• Paint:	Leakage Point Markers (37 total)	as needed
	Piezometer Markers (19 total)	as needed
	Sign Maintenance	as needed
	Spot Paint Handrails, Stairways	as needed
• Pest Control (Department of Agriculture)		as needed
• Service Domestic Water System		monthly
• SWPPP Report		monthly
• Update Chemical Inventory (located in MSDS plan book)		annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F2006003-TASK 413

• Contract Landscaping (FEU)	as needed
• Fertilize Landscape	as needed
• General Landscaping	weekly
• Sprinkler/Irrigation Line	as needed
• Tool Maintenance (shears, saws, etc.)	after each use
• Trim Trees and Shrubs	as needed
• Water Landscape	as needed
• Weed Abatement	as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F2006004-TASK 447

• Assist Emergency Response Personnel (e.g. open entrance gates)	as needed
• Post Seismic Shock Inspection	according to BEC protocol
• Storm Operations	as needed

09/23/2009 12:10 PM

COGSWELL DAM-PCA AND TASK LIST		**FREQUENCY**

DAM OPERATIONS-F4001821-TASK 446

• Adjust and Repair Boom Logs		as needed
• Adjust or Relocate Boat Moorage		as needed
• Boom Debris		as needed
• Field Data Sheet		
Measure:	Expansion Crack, {(1) on crest of Dam}	weekly
	Leakage Points	weekly
	Piezometers (6 total, measure 5, 1 is under water)	weekly
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		weekly
• Inspect/Service District Boats (3 total)		
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol		daily
• Secure Dam Area (refer to Homeland Security Procedures)		daily
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F4001822-TASK 416

• Chimney Sweep (FEU)		as needed
• Clean Spillway		as needed
• Exercise:	Hoist	as needed
	Butterfly Valve 1, 3, 4 and 5	as needed
	Butterfly Valve 2B	as needed
	14” Hollow Jet 2	monthly
• Inspect and Flush Hydrants and Fire System		semi-annually
• Inspect and Service Evaporation Tank		as needed
• Inspect and Service Underground Storage Tank (UST)		as needed
• Service:	Auxiliary Generator (Fleet)	annually
	Boat Motor (Fleet)	annually

FACILITY MAINTENANCE HOUSEKEEPING-F4001823-TASK 461

• Back Flush and Maintenance of Filtration System		annually
• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory (located in Operator’s house)	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads (including West Fork)	as needed
	Bench Drains (including West Fork)	as needed
	Camp Area	as needed
	Concrete Ramp to Heliport	as needed
	Control House	daily
	Crest of Dam	as needed
	District Truck	weekly
	Gage Boards	as needed
	Slides	as needed
	Stairways	as needed
	Trails	as needed
• Grade High Road		annually
• Inspect Facility for Painting Service		monthly
• Maintain Fire Breaks (perimeter of Dam)		as needed
• Paint:	Leakage Point Marker (D-1-L)	as needed
	Piezometer Markers (5 total)	as needed

Sign Maintenance	as needed
Spot Paint Handrails, Stairways	as needed

- Pest Control (Department of Agriculture) — as needed
- Service Domestic Water System (filtration system) — quarterly
- SWPPP Report — monthly
- Update Chemical Inventory (located in MSDS plan book) — annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F4001824-TASK 413

- Contract Landscaping (FEU) — as needed
- Fertilize Landscape — as needed
- General Landscaping — weekly
- Sprinkler/Irrigation Line — as needed
- Tool Maintenance (shears, saws, etc.) — after each use
- Trim Trees and Shrubs — as needed
- Water Landscape — as needed
- Weed Abatement (including West Fork Road and Devil's Canyon) — as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001826-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) — as needed
- Post Seismic Shock Inspection — according to BEC protocol
- Storm Operations — as needed

09/23/2009 12:10 PM

DEVIL□S GATE DAM-PCA AND TASK LIST		**FREQUENCY**

DAM OPERATIONS-F5001814-TASK 446

• Adjust and Repair Boom Logs		as needed
• Boom Debris (crew)		as needed
• Field Data Sheet		
Measure:	Leakage Points in Gallery (2 total)	monthly/daily
	Piezometers (11 total)	monthly/daily
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		as needed
• Inspect Outlet Tunnel		as needed
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol		daily
• Secure Dam Area (refer to Homeland Security Procedures)		daily
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F5001815-TASK 416

• Clean Leakage Points in Gallery (2 total)		monthly
• Exercise:	18” Hollow Cone 1	monthly
	18” Gate Valve 1A	
	7’x10’ Slide Gates 2 and 3	
	5’x5’ Sluice Gate	
• Inspect and Flush Hydrants and Fire System		semi-annually
• Inspect Drainage Gallery Discharge Line		as needed

FACILITY MAINTENANCE HOUSEKEEPING-F5001816-TASK 461

• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory (located in Operator’s house)	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	weekly
	Control House	daily
	Drains	weekly
	Gage Boards	s needed
	Slides	as needed
	Stairways	as needed
	Trails	as needed
• Earthquake Supply Inventory		annually (April)
• Inspect Facility for Painting Service		monthly
• Paint:	Gage Boards	as needed
	Leakage Point Markers (2 total)	as needed
	Piezometer Markers (11 total)	as needed
	Spot Paint Handrails, Stairways	as needed
	Spray Rust Spots	as needed
• Pest Control (Department of Agriculture)		as needed

FACILITY MAINTENANCE LANDSCAPING-F5001817-TASK 413

• Contract Landscaping (FEU)		as needed

- Trim Trees and Shrubs as needed
- Tool Maintenance (shears, saws etc.) after each use
- Weed Abatement as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F5001819-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) as needed
- Post Seismic Shock Inspection according to BEC protocol
- Storm Operations as needed

09/23/2009 12:10 PM

EATON WASH DAM-PCA AND TASK LIST — FREQUENCY

DAM OPERATIONS-F5001807-TASK 446

• Adjust and Repair Boom Logs (crew)	as needed
• Inspect Reservoir/Boom Debris (crew)	as needed
• Field Data Sheet Measure Piezometers (16 total)	daily/monthly
• Field Operation Report (collect/compute weather data, submit to WRD) Measure: Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	daily (based on W.S.E)
• Inspect Dam for Leakage and Settlement	as needed
• Inspect Outlet Tunnel	as needed
• Monthly Inspection of Dam	monthly
• Ponded Water Patrol	daily
• Secure Dam Area (refer to Homeland Security Procedures)	daily
• Valve/Gate Operations	as needed
• Weather Data Report Measure: Air Temperature, Evaporation, Precipitation	daily

PREVENTIVE MAINTENANCE-F5001808-TASK 416

• Exercise 5'x7' Slide Gates 1, 2, 3 and 4	monthly
• Inspect and Flush Hydrants and Fire System	monthly
• Inspect u/s Face of Dam for Erosion/Rock Displacement	monthly

FACILITY MAINTENANCE HOUSEKEEPING-F5001809-TASK 461

• Check:	Bio-Hazard Kit	monthly
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	as needed
	Control House	daily
	District Truck	weekly
	Drains	weekly
	Gage Boards	as needed
	Relief Quarters	weekly
	Stairways	as needed
	Trails	as needed
• Earthquake Supply Inventory (located at Eaton Yard)		annually (April)
• Inspect Facility for Painting Service		monthly
• Paint:	Gage Boards	as needed
	Piezometer Markers (16 total)	as needed
	Spot Paint Handrails, Stairways	as needed
	Spray Rust Spots	as needed
• Pest Control (Department of Agriculture)		as needed
• Repair Fencing		as needed
• Update Chemical Inventory (located in MSDS plan book)		annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F5001810-TASK 413

• Contract Landscaping (FEU)	as needed
• Trim Trees and Shrubs	as needed
• Tool Maintenance (shears, saws etc.)	after each use

- Weed Abatement as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F5009819-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) as needed
- Post Seismic Shock Inspection according to BEC protocol
- Storm Operations as needed

09/23/2009 12:10 PM

MORRIS DAM-PCA AND TASK LIST — **FREQUENCY**

DAM OPERATIONS-F4001871-TASK 446

- Adjust and Repair Boom Logs — as needed
- Adjust or Relocate Boat Moorage — as needed
- Boom Debris — as needed
- Field Data Sheet
  Measure:
  - Abutment Yield Device — monthly
  - Ambient Air Temperature Gages (3 total) — monthly
  - Crack Meter at Interior Open Joint (2 total) — monthly
  - Dial Gages (2 total) — monthly
  - Extendo Meters (52 total) — monthly
  - Leakage Points (3 total) — monthly
  - Pendulum (for tilt and yaw) — monthly/post seismic event
  - Piezometers (21 total) — monthly
  - Water Temperature — monthly
- Field Operation Report (collect/compute weather data, submit to WRD) — daily (based on W.S.E)
  Measure: Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings
- Inspect Dam for Leakage and Settlement — as needed
- Inspect Tunnels — as needed
- Inspect/Service District Boat — as needed
- Monthly Inspection of Dam (Underground Assistance-Valves 1A-6A) — monthly
- Ponded Water Patrol — twice weekly
- Secure Dam Area (refer to Homeland Security Procedures) — daily
- Valve/Gate Operations — as needed
- Weather Data Report — daily
  Measure: Air Temperature, Evaporation, Precipitation

PREVENTIVE MAINTENANCE-F4001872-TASK 416

- Chimney Sweep (FEU) — as needed
- Clean Leakage Points (Drillers) — as needed
- Exercise: — semi-annually (as directed by WRD)
  - 96”x72” Needle Valve 1
  - 96” Butterfly Valve 1A
  - 48” Slide Gate 2A
  - 48”x36” Needle Valve 3
  - 48” Gate Valve 3A
  - 24” Needle Valve 4
  - 54” Slide Gate 4A
  - 48” Slide Gate 5A
  - 96”x72” Needle Valve 6
  - 96” Butterfly Valve 6A
  - 4” Gate Valve A-4
  - 8” Gate Valve B-8
  - 12” Plug Valve C-12
  - 96”x120” Slide Gate Cat
  - 24”x72” Slide Gates 1,2,3,4
  - 48”x60” Cnty Slide Gate
  - 20” Drum Gate 1 (east)
  - 20” Drum Gate 2 (center)
  - 20” Drum Gate 3 (west)
  - 20” Gate Valves 3B and 4B feed from Penstocks 3&4
- Inspect and Flush Hydrants and Fire System — semi-annually
- Service:
  - Auxiliary Generators (Fleet) — annually
  - Boat Motors (Fleet) — annually

FACILITY MAINTENANCE HOUSEKEEPING-F4001873-TASK 461

• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory (located in Operator's house)	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	weekly
	Camp Area	as needed
	Control House	daily
	District Truck	weekly
	Toe of Dam	as needed
	Drains	weekly
	Gage Boards	as needed
	Heliport	as needed
	Slides	as needed
	Stairways	as needed
	Trails	as needed
• Inspect Facility for Painting Service		monthly
• Maintain Fire Breaks		as needed
• Paint:	Gage Boards	as needed
	Leakage Point Markers (3 total)	as needed
	Piezometer Markers (21 total)	as needed
	Sign Maintenance	as needed
	Spot Paint Handrails, Stairways	as needed
	Spray Rust Spots	as needed
• Pest Control (Department of Agriculture)		as needed
• Service:	Domestic Water System	as needed
	Electric Entrance Gate to Dam	s needed
• SWPPP Report		monthly
• Update Chemical Inventory (located in MSDS plan book)		annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F4001874-TASK 413

• Contract Landscaping (FEU)	as needed
• Fertilize Landscape	as needed
• General Landscaping	weekly
• Trim Trees and Shrubs	as needed
• Tool Maintenance (shears, saws etc.)	after each use
• Water Landscape	as needed
• Weed Abatement	as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001876-TASK 447

• Assist Emergency Response Personnel (e.g. open entrance gates)	as needed
• Post Seismic Shock Inspection	according to BEC protocol
• Storm Operations	as needed

09/23/2009 12:10 PM

PACOIMA-PCA AND TASK LIST **FREQUENCY**

DAM OPERATIONS-F2007500-TASK 446

Task			Frequency
•	Adjust and Relocate Debris Curtain		as needed
•	Adjust or Relocate Boat Moorage		as needed
•	Assist GMED:	Electro-Conductivity Test	semi-annually
		Inclinometers	semi-annually
•	Boom Debris		as needed
•	Field Data Sheet		
	Measure:	Expansion Crack (7 total)	weekly
		Expansion Joints (11 total w/ 2 measurements each)	weekly
		Extensometers (7 total w/ 30 measuring points)	weekly
		Leakage Points (45 total)	weekly
		Piezometers (12 total)	weekly
		Tendons (45 total, 8 are measured w/ 48 measuring points)	monthly
		Leakage Weirs (6 total)	weekly
•	Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
	Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
•	Hydrostatic Testing of Piezometers		annually
•	Inspect Dam for Leakage and Settlement		daily
•	Inspect Penstocks 2, 3 and 4		monthly
•	Inspect/Service District Boats (2 total, check: fluid levels, flotation devices, oars)		as needed
•	Monthly Inspection of Dam		monthly
•	Ponded Water Patrol		as needed
•	Patrol Dam Area (refer to Homeland Security Procedures)		daily
•	Valve/Gate Operations		as needed
•	Weather Data Report		daily
	Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F2007501-TASK 416

Task			Frequency
•	Assist Aerial Tram Contractor		monthly/contract schedule
•	Clean Leakage Points (36 total)		as needed
•	Clean Trash racks		as needed
•	Clean Weepholes and Re-Pack with Pea Gravel (spillway, 47 total)		annually
•	Exercise:	30” Gate Valve 2A	semi-annually (as directed by WRD)
		30” Gate Valve 3A	
		30” Gate Valve 4A	
		8” Gate Valve A1	
		8” Gate Valve A1A	
		18” Gate Valve A1B	
		18” Gate Valve A1C	
		10” Hollow Jet A2	
		30” Hollow Jet 2	
		30” Hollow Jet 3	
		30” Hollow Jet 4	
		5’x5’ Sluice Gate (when permitted by WRD & State)	
•	Inspect and Clean Expansion Joints		annually
•	Inspect and Flush Hydrants and Fire System (including hoses)		semi-annually
•	Inspect:	Landslide Barriers	monthly/as needed
		Propane Tanks	
		Total Waste Containment	
•	Inspect and Service Aboveground Storage Tank (AST)		as needed
•	Inspect and Service Auxiliary Power Units		monthly
•	Inspect and Service Fire Hoses and Charge the System		annually
•	Inspect and Service Evaporation Tank		daily
•	Inspect and Service Tendon Vaults		as needed
•	Inspect Outlet Tunnels (upper spillway, lower spillway and diversion tunnel)		monthly

- Maintain Tendons (remove condensation) — as needed
- Operate Auxiliary Power Units (Generators, Tram) — as needed
- Operate Tendons (liftoff and read) — as needed
- Service:
  - Auxiliary Generator (Fleet) — annually
  - Boat Motor (Fleet) — annually
  - Electric Entrance Gate to Dam (lube/clean chain, remove dust) — as needed
  - Pumps (grease fittings) — as needed
- Test Run Generators (3 total, Garage, top of Dam, Tram) (check fluid levels) — weekly
- Test Run Hoist Engine — weekly

FACILITY MAINTENANCE HOUSEKEEPING-F2007502-TASK 461

- Back Flush and Maintenance of Fire Pond — as needed
- Check:
  - Bio-Hazard Kit — monthly
  - Earthquake Supply Inventory (located in Camp Office) — annually (April)
  - Fire Alarms and Extinguishers — monthly
  - First AID Kit — monthly
- Clean:
  - Access Roads — as needed
  - Bench Drains — as needed
  - Camp Area — as needed
  - Heliport — as needed
  - Control House — daily
  - Crest of Dam — as needed
  - District Truck — weekly
  - Gage Boards — as needed
  - Slides — as needed
  - Stairways — as needed
  - Trails — as needed
- Inspect Facility for Painting Service — monthly
- Inspect and Service Septic Tank (assist contractor services septic tanks) — as needed
- Maintain Fire Breaks — as needed
- Paint:
  - Leakage Point Markers (45 total) — as needed
  - Piezometer Markers (12 total) — as needed
  - Sign Maintenance — as needed
  - Spot Paint Handrails, Stairways — as needed
- Pest Control (Department of Agriculture) — as needed
- Service Domestic Water System (plumbers) — as needed
- SWPPP Report — monthly
- Update Chemical Inventory (located in MSDS plan book) — annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F2007503-TASK 413

- Contract Landscaping (FEU) — as needed
- Fertilize Landscape — as needed
- General Landscaping — weekly
- Inspect and Service Sprinkler/Irrigation Line — as needed
- Tool Maintenance (shears, saws, etc.) — after each use
- Trim Trees and Shrubs — as needed
- Water Landscape — as needed
- Weed Abatement — as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F2007504-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) — as needed
- Post Seismic Shock Inspection — according to BEC protocol

  Measure:
  - Expansion Crack (7 total)
  - Expansion Joints (11 total w/ 2 measurements each)
  - Extensometers (7 total w/ 30 measuring points)
  - Leakage Points (45 total)

Piezometers (12 total)
Tendons (45 total, 8 are measured w/ 48 measuring points)
Leakage Weirs (6 total)

- Storm Operations as needed

09/23/2009 12:10 PM

PUDDINGSTONE DIVERSION DAM-PCA AND TASK LIST		FREQUENCY
DAM OPERATIONS-F4001856-TASK 446		
• Field Data Sheet		
Measure:	Leakage Points (2 total)	monthly
	Piezometers (14 total)	monthly
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam For Leakage and Settlement		as needed
• Monthly Inspection of Dam		monthly
• Divert Water to By-Pass or Spreading Ground		as needed
• Ponded Water Patrol		twice weekly
• Secure Dam Area (refer to Homeland Security procedures)		daily
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	
PREVENTIVE MAINTENANCE-F4001857-TASK 416		
• Clean:	Leakage Points (2 total)	weekly
	Spillway	monthly
	Weepholes	as needed
• Exercise Slide Gates (unless water elevation exceeds 1145.50)		quarterly (as directed by WRD)
• Service Auxiliary Generator (Fleet)		annually
FACILITY MAINTENANCE HOUSEKEEPING-F4001858-TASK 461		
• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory (located in Operator's house)	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	as needed
	Bench Drains	as needed
	Gage Boards	as needed
	Shelter House	as needed
	Slides	as needed
	Stairways	as needed
	Storage Buildings	as needed
	Trails	as needed
	Valve Platform for Gate Operator	as needed
	Walkway	as needed
• Maintain Fire Breaks		as needed
• Earthquake Supply Inventory		annually (April)
• Inspect Facility for Painting Service		monthly
• Paint:	Access Gate	as needed
	Gage Boards	as needed
	Hand Rails	as needed
	Leakage Markers (2 total)	as needed
	Piezometer Markers (14 total)	as needed
	Sign Maintenance	as needed
• Pest Control (Department of Agriculture)		as needed
FACILITY MAINTENANCE LANDSCAPING-F4001859-TASK 413		
• Contract Landscaping (FEU)		as needed

- General Landscaping weekly
- Trim Trees and Shrubs as needed
- Weed Abatement as needed

STORM OPERATION-EMERGENCY RELATED PM-F4001861-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) as needed
- Post Seismic Shock Inspection according to BEC protocol
- Storm Operations as needed

09/23/2009 12:10 PM

PUDDINGSTONE DAM-PCA AND TASK LIST — **FREQUENCY**

DAM OPERATIONS-F4001849-TASK 446

Task	Item	Frequency
• Field Data Sheet		
Measure:	Cracks in Facing Slab (3 cracks on Dam No. 1)	weekly
	Leakage Points (6 total)	monthly
	Piezometers	(19 weekly, 28 monthly)
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		weekly
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol		weekly
• Secure Dam Area (refer to Homeland Security Procedures)		daily
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F4001850-TASK 416

Task	Item	Frequency
• Chimney Sweep (FEU)		as needed
• Clean:	Bench Drains	as needed
	Channel Invert	as needed
	Leakage Points (6 total)	weekly
	Spillway	as needed
• Inspect and Flush Hydrants and Fire System		semi-annually
• Exercise Slide Gates		semi-annually (as directed by WRD)
• Inspect and Clean:	Expansion Joints (D.O. inspects, crew cleans)	annually
	Gunite Drains	weekly
	Weep Holes on Spillway Face	as needed
• Inspect and De-Water Earthquake Valves (confined space)		quarterly
• Inspect and Service:	Earthquake Valves	quarterly
	Evaporation Tank	daily
	Nitrogen Bottles	monthly
• Service Auxiliary Generator (Fleet)		annually

FACILITY MAINTENANCE HOUSEKEEPING-F4001851-TASK 461

Task	Item	Frequency
• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	weekly
	Camp Area	as needed
	Control House	daily
	District Truck	as needed
	Gage Boards	as needed
	Slides	as needed
	Stairways (face of Dam)	as needed
	Trails (at leakage points, Parks and Rec. takes care of this)	as needed
	Upstream Faces 1, 2, 3 (e.g. trash, graffiti, aesthetics)	as needed
	Valve House	weekly
• Maintain Fire Breaks		as needed
• Earthquake Supply Inventory		annually (April)
• Inspect Facility for Painting Service		monthly
• Paint:	Access Gate	as needed
	Fire-Hose Cabinet	as needed
	Gage Boards	as needed
	Leakage Point Markers (6 total)	as needed
	Piezometer Markers (47 total)	as needed

Sign Maintenance — as needed

- Pest Control (Department of Agriculture) — as needed
- Service Domestic Water System — as needed
- SWPPP report — monthly
- Update Chemical Inventory (located in MSDS plan book) — annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F4001852-TASK 413

- Contract Landscaping (FEU) — as needed
- Fertilize Landscape — as needed
- General Landscaping — weekly
- Sprinkler/Irrigation Lines — as needed
- Trim Trees and Shrubs — as needed
- Tool Maintenance (shears, saws etc.) — after each use
- Water Landscape — as needed
- Weed Abatement — as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001854-TASK 447

- Assist Emergency Response Personnel (e.g. open entrance gates) — as needed
- Post Seismic Shock Inspection — according to BEC protocol
- Storm Operations — as needed

During storm patrol DO and ADO take 2 and 4 hour readings. These readings take place at Puddingstone, Live Oak and Thompson Creek. Because this requires a lot of focus, this is often the only number used on their time sheets.

09/23/2009 12:10 PM

SAN DIMAS DAM-PCA AND TASK LIST		**FREQUENCY**

DAM OPERATIONS-F4001828-TASK 446

• Adjust and Repair Boom Logs		as needed
• Boom Debris		as needed
• Field Data Sheet		
Measure:	Expansion Joints (5 total)	weekly
	Leakage Points (56 total)	monthly
	Piezometers {(13) primary, (10) secondary}	monthly
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		weekly
• Inspect/Service District Boat		as needed
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol		daily
• Secure Dam Area (refer to Homeland Security Procedures)		daily
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F4001829-TASK 416

• Chimney Sweep (FEU)		as needed
• Clean:	Leakage Points (56 total)	as needed
	Weir (4 total)	as needed
• Inspect and Flush Hydrants and Fire System		semi-annually
• Exercise Slide Gates 2 & 3 and Hydraulic Unit		semi-annually
• Inspect and Service Weather Gage Station		daily
• Service:	Auxiliary Generator (Fleet)	annually
	Boat Motor (Fleet)	annually
	Electrical System (outlets, smoke alarms)	monthly
	Hydraulic Level Indicator (in control house)	monthly
• Maintain Tendons		as needed
• Operate Tendons		as needed

FACILITY MAINTENANCE HOUSEKEEPING-F4001830-TASK 461

• Change Filter System (16 filters)		as needed
• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Check Water Tank Indicator Lights		daily
• Clean:	Access Roads (camp to spillway, ramp to reservoir)	as needed
	Bench Drain (right abutment)	as needed
	Camp Area	as needed
	Control House	daily
	Debris/Trash from Reservoir	weekly
	District Truck	weekly
	Drain (across from Control House)	as needed
	Gage Boards (6 total)	as needed
	Generator	as needed
	Heliport	as needed
	Slides	as needed
	Storage Buildings (4 total)	monthly

	Spillway	monthly
	Trails (camp area, right abutment)	as needed
• Maintain Fire Breaks		as needed
• Earthquake Supply Inventory		annually (April)
• Inspect Facility for Painting Service		monthly
• Paint:	Access Gate	as needed
	Gage Boards	as needed
	Ladders	as needed
	Leakage Point Markers (56 total)	as needed
	Piezometer Markers (23 total)	as needed
	Safety Cages and Handrails	as needed
	Sign Maintenance	as needed
• Pest Control (Department of Agriculture)		as needed
• Service:	Domestic Water System	as needed
	Electric Entrance Gate to Camp Area	as needed
• SWPPP Report		monthly
• Update Chemical Inventory (located in MSDS plan book)		annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F4001831-TASK 413

• Contract Landscaping (FEU)	as needed
• Fertilize Landscape	as needed
• General Landscaping	weekly
• Slopes in Vicinity of Propane Tanks	as needed
• Trim Trees and Shrubs	as needed
• Tool Maintenance (shears, saws etc.)	after each use
• Water Landscape	as needed
• Weed Abatement	as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001833-TASK 447

• Assist Emergency Response Personnel (e.g. open entrance gates)	as needed
• Post Seismic Shock Inspection	according to BEC protocol
• Storm Operations	as needed

09/23/2009 12:10 PM

SAN GABRIEL DAM-PCA AND TASK LIST			**FREQUENCY**

DAM OPERATIONS-F4001800-TASK 446

• Adjust and Repair Boom Logs			as needed
• Adjust or Relocate Boat			as needed
• Boom Debris			as needed
• Field Data Sheet			
Measure:	Leakage Points (4 total)		weekly
	Piezometers (6 total)		weekly
• Field Operation Report (collect/compute weather data, submit to WRD)			daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings		
• Inspect Dam for Leakage and Settlement (including tunnel and donut)			as needed
• Inspect and Clean Outlet Tower			as needed
• Inspect/Service District Boat			as needed
• Monthly Inspection of Dam			monthly
• Ponded Water Patrol			daily
• Sand-Box Operations:		Divert Water	as needed
		Measure Outflow	daily
• Secure Dam Area (refer to Homeland Security Procedures)			daily
• Valve/Gate Operations			as needed
• Weather Data Report			daily
Measure:	Air Temperature, Evaporation, Precipitation		

PREVENTIVE MAINTENANCE-F4001801-TASK 416

• Change HPU Filters in Donut			annually
• Chimney Sweep (FEU)			as needed
• Clean Leakage Points (4 total)			as needed
• Exercise:	48” Hollow Jet 1		semi-annually
	51” Butterfly 1A		
	51” Butterfly A1A (never used)		
	12” Gate Valve C1A		
	30” Butterfly TSV 2		
	16” Globe Valve BP1		
	84” Hollow Jet 2		
	96” Butterfly 2A		
	30” Butterfly B2A		
	16” Gate Valve A2		
	18” B2 (Azusa Conduit)		
	48” Butterfly TSV 1		
	129”x117” Pelton Needle 3		
	123” Butterfly 3A		
	129”x117” Pelton Needle 4		
	123” Butterfly 4A		
	72”x72” Sluice Gate		
	Hydraulic Unit for Butterfly Valves		
• Inspect and Flush Hydrants and Fire System			annually
• Inspect and Clean Underground Storage Tank Spill Buckets (UST, 2 total)			monthly
• Service:	Auxiliary Generators (2 total, Fleet)		annually
	Boat Motor (Fleet)		annually
	Electric Motor Operator (4 total)		annually
	Sand-Box:	Change Boards	as needed
		Grease Valve Stems (5 total)	annually
		Grease Zurk Fittings (9 total)	annually
• Test Run Generator (check fluid levels)			weekly

FACILITY MAINTENANCE HOUSEKEEPING-F4001802-TASK 461

•	Check:	Bio-Hazard Kit	monthly
		Earthquake Supply Inventory (located in Operator's house)	annually (April)
		Fire Alarms and Extinguishers	monthly
		First AID Kit	monthly
•	Clean:	Access Roads	weekly
		Buildings	as needed
		Camp Area	weekly
		Control House and Restroom	daily
		District Truck	weekly
		Drains (including North Canyon Channel and Inlet)	as needed
		Footbridge Abutments	as needed
		Gage Boards	as needed
		Penstocks	as needed
		Sand-Box	as needed
		Slides (e.g. along access roads)	as needed
		Stairways	as needed
		Trails	as needed
		Valve Chamber (donut)	as needed
		Well Head	monthly
•	Maintain Fire Breaks		as needed
•	Earthquake Supply Inventory		annually (April)
•	Grade Access Roads (remind crew)		as needed
•	Inspect Facility for Painting Service		monthly
•	Inspect and Service Blowers (Blower House)		semi-annually
•	Paint:	Gage Boards	as needed
		Leakage Point Markers (4 total)	as needed
		Piezometer Markers (6 total)	as needed
		Sign Maintenance	as needed
		Spot Paint Handrails, Stairways	as needed
		Spray Rust Spots	as needed
		Windows, Doors	as needed
•	Pest Control (Department of Agriculture)		as needed
•	Service:	Domestic Water System	as needed
		Electric Entrance Gate to Dam	as needed
		Water Pump (1.5M gallon water tank)	semi-annually
•	SWPPP Report		monthly
•	Update Chemical Inventory (located in MSDS Plan Book)		annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F4001803-TASK 413

• Contract Landscaping (FEU)	as needed
• Fertilize Landscape	as needed
• General Landscaping	weekly
• Trim Trees and Shrubs	as needed
• Tool Maintenance (shears, saws etc.)	after each use
• Water Landscape	weekly
• Weed Abatement	as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001805-TASK 447

• Assist Emergency Response Personnel (e.g. open entrance gates)	as needed
• Complete Tunnel and Donut Inspection (confined space)	as needed
• Post Seismic Shock Inspection	according to BEC protocol
• Storm Operations	as needed

SANTA ANITA DAM-PCA AND TASK LIST — **FREQUENCY**

DAM OPERATIONS-F4001807-TASK 446

Task		Frequency
• Adjust and Repair Boom Logs		as needed
• Adjust or Relocate Boat Moorage		as needed
• Boom Debris		as needed
• Change Piezometer Charts (3 total)		weekly
• Field Data Sheet		
Measure:	Expansion Joints (9 joints, 18 measurements)	weekly
	Leakage Points (76 total)	weekly
	Piezometers	6 primary-weekly, 4 secondary-monthly
	Wells (manually)	3-weekly, 6-monthly
	(frequencies are for normal reservoir elevation, if elevation is high, twice daily)	
• Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
• Inspect Dam for Leakage and Settlement		as needed
• Inspect/Service District Boat		as needed
• Monthly Inspection of Dam		monthly
• Ponded Water Patrol		daily
• Stand-By Relief		as needed
• Valve/Gate Operations		as needed
• Weather Data Report		daily
Measure:	Air Temperature, Evaporation, Precipitation	

PREVENTIVE MAINTENANCE-F4001808-TASK 416

Task		Frequency
• Chimney Sweep (FEU)		as needed
• Clean Leakage Points (6 accessible points)		weekly
• Exercise:	18" Hollow Jet 2	semi-annually (as directed by WRD)
	20" Gate Valve 2A	
	30" Hollow Jet 3	
	30" Gate Valve 3A	
	30" Hollow Jet 4	
	30" Gate Valve 4A	
	Hydraulic Power Unit (circulate fluid)	
• Inspect and Flush Hydrants and Fire System		semi-annually
• Inspect Flume (d/s toe of Dam to gauging station-crew)		monthly
• Service:	Auxiliary Generator (Fleet)	annually
	Boat Motor (Fleet)	annually
• Test Run Generator		weekly

FACILITY MAINTENANCE HOUSEKEEPING-F4001809-TASK 461

Task		Frequency
• Check:	Bio-Hazard Kit	monthly
	Earthquake Supply Inventory	annually (April)
	Fire Alarms and Extinguishers	monthly
	First AID Kit	monthly
• Clean:	Access Roads	weekly
	Bench Drains (along access roads)	as needed
	Camp Area	as needed
	Crest of Dam	as needed
	Control House	daily
	District Truck	weekly
	Gage Boards	as needed
	Relief Quarters	as needed

Slides	as needed
Sluice Gate House	as needed
Stairways	as needed
Storage Buildings	as needed
Trails	as needed
Valve House 2, 3, 4	as needed
• Maintain Fire Breaks	as needed
• Earthquake Supply Inventory	annually (April)
• Inspect Facility for Painting Service	monthly
• Paint: Gage Boards	as needed
Leakage Point Markers (76 total)	as needed
Piezometer Markers (10 total)	as needed
Sign Maintenance	as needed
Spot Paint Handrails, Stairways	as needed
Spray Rust Spots	as needed
• Pest Control (Department of Agriculture)	as needed
• Service Domestic Water System (change filters)	quarterly
• SWPPP report	monthly
• Update Chemical Inventory (located in MSDS plan book)	annually (Feb)

FACILITY MAINTENANCE LANDSCAPING-F4001810-TASK 413

• Contract Landscaping (FEU)	as needed
• Fertilize Landscape	as needed
• General Landscaping	weekly
• Trim Trees and Shrubs	as needed
• Tool Maintenance (shears, saws etc.)	after each use
• Water Landscape	as needed
• Weed Abatement	as needed

STORM OPERATIONS EMERGENCY RELATED PM-F4001812-TASK 447

• Assist Emergency Response Personnel (e.g. open entrance gates)	as needed
• Post Seismic Shock Inspection	according to BEC protocol
• Storm Operations	as needed

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THOMPSON CREEK DAM-PCA AND TASK LIST			FREQUENCY
DAM OPERATIONS-F4001835-TASK 446			
•	Field Data Sheet		
	Measure:	Leakage Points {(3) primary, (5) secondary}	monthly
		Piezometers (3 weekly, 5 monthly-0 when no water)	monthly
•	Field Operation Report (collect/compute weather data, submit to WRD)		daily (based on W.S.E)
	Measure:	Change in Acre-Feet, Change in CFS, Change in Water Surface Elevation, Evaporation, Gage Boards, Inflow, Outflow, Rainfall, Storage, Valve Settings	
•	Inspect Dam for Leakage and Settlement		weekly
•	Monthly Inspection of Dam		monthly
•	Ponded Water Patrol		twice weekly
•	Secure Dam Area (refer to Homeland Security Procedures)		daily
•	Valve/Gate Operations		as needed
•	Weather Data Report		daily
	Measure:	Air Temperature, Evaporation, Precipitation	
PREVENTIVE MAINTENANCE-F4001841-TASK 416			
•	Exercise Slide Gates		semi-annually (as directed by WRD)
•	Exercise Pomona Valley Protective Association Gates (after servicing stems)		annually
•	Clean Leakage Points-(2 total, east and west side of Dam) (DO can do basic cleaning of leakage points, otherwise drillers clean them)		as needed
FACILITY MAINTENANCE HOUSEKEEPING-F4001837-TASK 461			
•	Check:	Bio-Hazard	monthly
		Earthquake Supply Inventory (located in Operator's House)	annually (April)
		Fire Alarms and Extinguishers	monthly
		First AID Kit	monthly
•	Clean:	Access Gates	as needed
		Access Roads	as needed
		Catwalk	as needed
		Drain (top of right abutment to toe)	weekly
		Gage Boards	as needed
		Shelter House	as needed
		Slides	as needed
		Stairways	as needed
		Trails (including trail to leakage points and piezometers)	as needed
•	Inspect Facility for Painting Service		monthly
•	Maintain Fire Breaks		as needed
•	Paint:	Gage Boards	as needed
		Leakage Point Markers (8 total)	as needed
		Piezometer Markers (8 total)	as needed
		Sign Maintenance	as needed
•	Pest Control (Department of Agriculture)		as needed
FACILITY MAINTENANCE LANDSCAPING-F4001838-TASK 413			
•	Contract Landscaping (FEU)		as needed
•	General Landscaping		weekly
•	Trim Trees and Shrubs		as needed
•	Weed Abatement		as needed

STORM OPERATIONS-EMERGENCY RELATED PM-F4001840-TASK 447

• Assist Emergency Response Personnel (e.g. open entrance gates)	as needed
• Post Seismic Shock Inspection	according to BEC protocol
• Storm Operations	as needed

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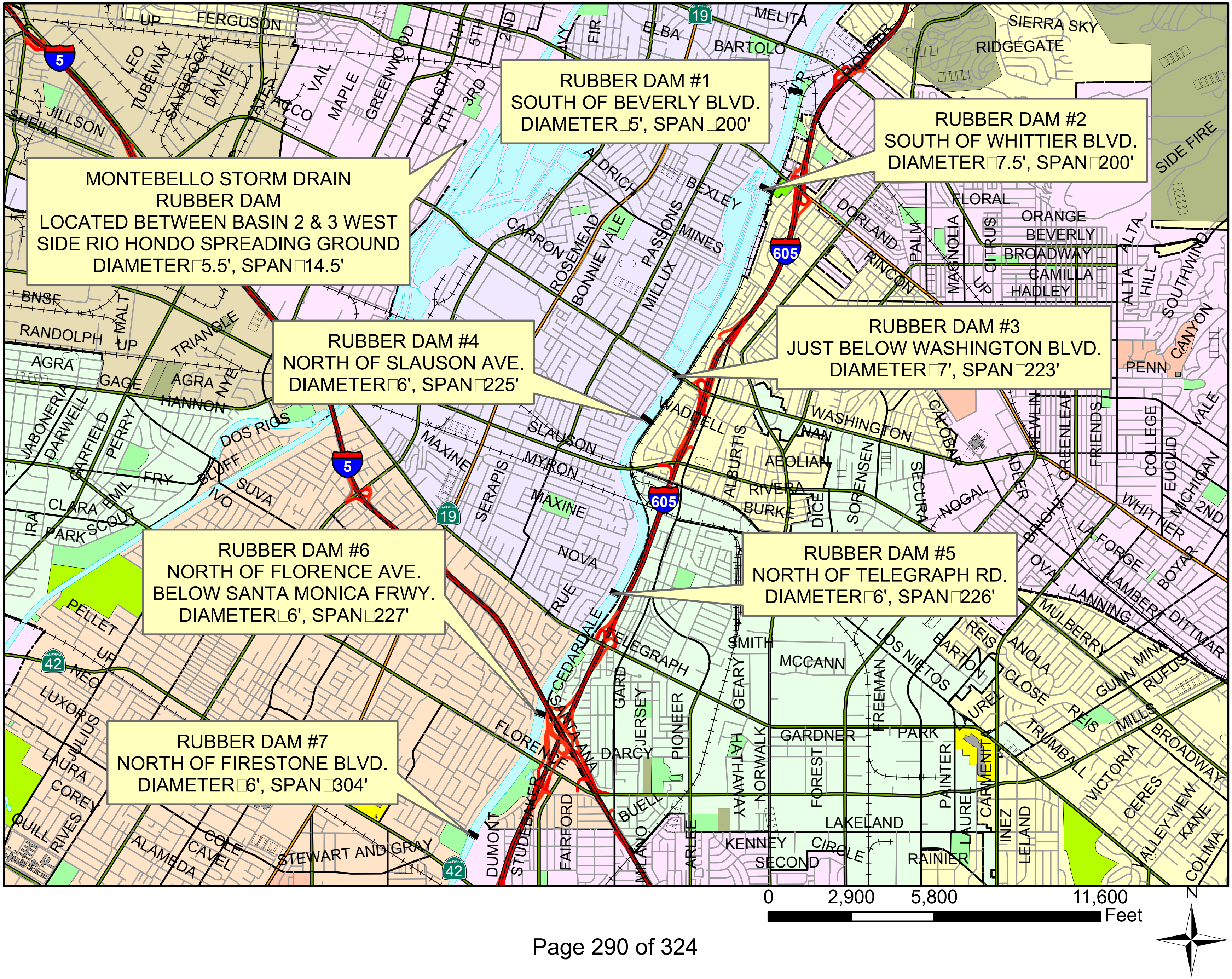
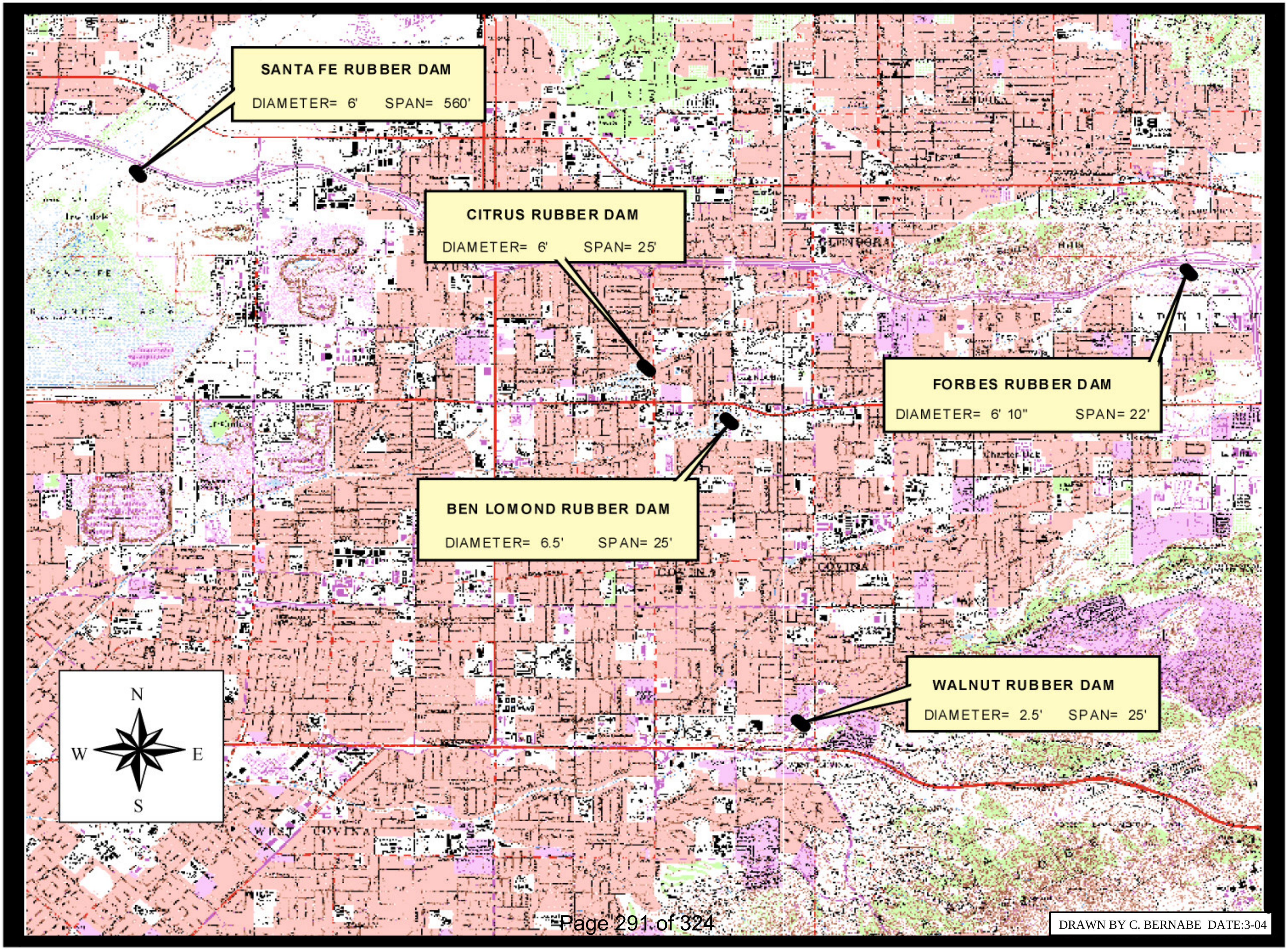
Appendix M – Rubber Dam Location Maps

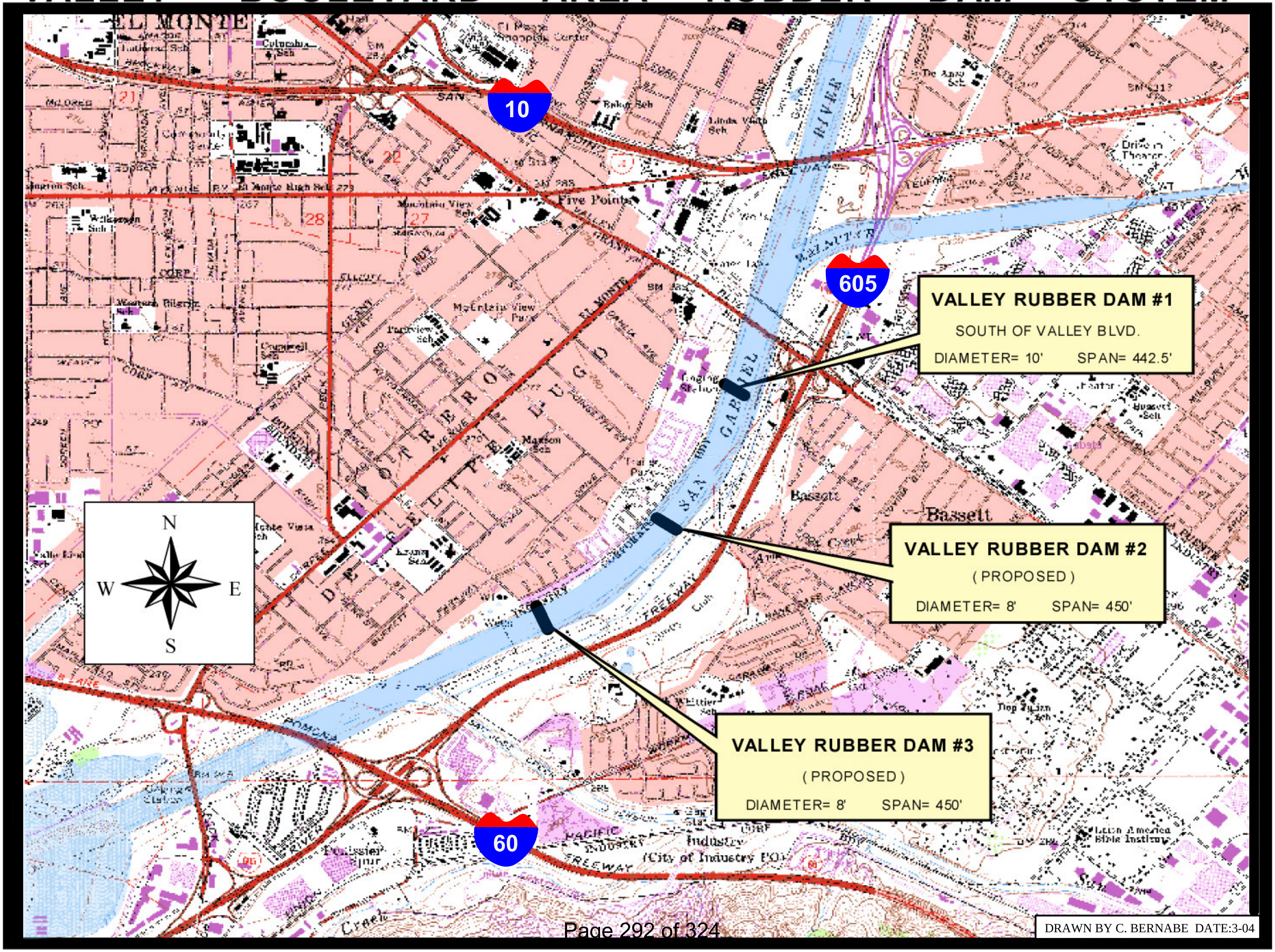
SOUTH AREA RUBBER DAM SYSTEM



EAST AREA RUBBER DAM SYSTEM



VALLEY BOULEVARD AREA RUBBER DAM SYSTEM



Appendix N – Sandbag Policy

(Flood Preparedness and Emergency Response)

SANDBAG POLICY

SANDBAG COORDINATOR

Under NIMS/SEMS, Logistics is responsible for procuring needed supplies, equipment and personnel. For Public Works, procuring supplies is the responsibility of ASD (as part of Logistics). ASD has the role of Sandbag Coordinator for the Flood Control District.

SANDBAG INVENTORY

Approval by the Deputy over the Flood Fund is required for sandbag restocking and emergency orders of significant quantity requested by Fire Department. Managing the Flood Fund is delegated to WMD. As Fund Manager, WMD shall review and approve annual budgets for sandbags as well as extraordinary orders above the annual allocation. WMD shall provide a contact to the ASD Central Warehouse Manager to provide a valid Project Number (job number) so that bags can be officially processed through the DPW financial system.

After a major fire event, the Material Management Section of the Administrative Services Division shall review the inventory of sand bags and recommend increasing if needed. The rule of thumb is to have at least 750,000 sandbags available at ASD's Central Warehouse. When there are large burn areas and the storm season is anticipated to be high, the Sandbag Coordinator shall review and recommend a stockpile increase if warranted. As an example, the Department increased the stockpile in 2001, which proved to be beneficial as the demand for sandbags was so great, sandbags from the Midwest had to be brought in to satisfy the State's needs.

During Storm Season (Oct. 15th through April 15th) ASD shall maintain the sandbag excel file located at P:\wmpub\General\Sandbag Dist\ on a monthly basis. The Sandbag Coordinator is ultimately responsible for maintaining up-to-date tracking of the sandbag inventory.

INTERFACE WITH FIRE DEPARTMENT

For general sandbag coordination, Sandbag Coordinator has a single point of contact with the County Fire Department. The current contact is Bob Lancaster (818-890-5717).

During the first week in August, the Central Warehouse Manager shall coordinate with the Fire Department contact (Mr. Lancaster) to confirm the telephone numbers, locations and sandbag information for fire stations are current. This information is used to update the distribution location table found at:
http://dpw.lacounty.gov/wrd/fire/file/sandbags.pdf
The Sandbag Coordinator shall also obtain the total number of requested sandbags for *all* fire stations from the Fire Department contact. The Sandbag Coordinator shall work with the Fire Department contact to make transfer arrangements for the requested sandbags from DPW warehouse to the Fire Department's Heavy Equipment yard at their Pacoima Facility for eventual distribution to individual fire stations. WMD shall provide a contact to the ASD Central Warehouse Manager to provide a valid Project Number (job number) so that bags can be officially processed through the DPW financial system.

Prior to each storm season, the Fire Department sends out an "Executive Advisory" policy (EA) to all fire stations that applies to all Fire personnel. The intent of the EA is to set policy and procedures relating to sandbag procurement, distribution and caches for fire stations. The Sandbag Coordinator shall obtain a copy of the EA from the Fire Department prior to the Storm Season for reference.

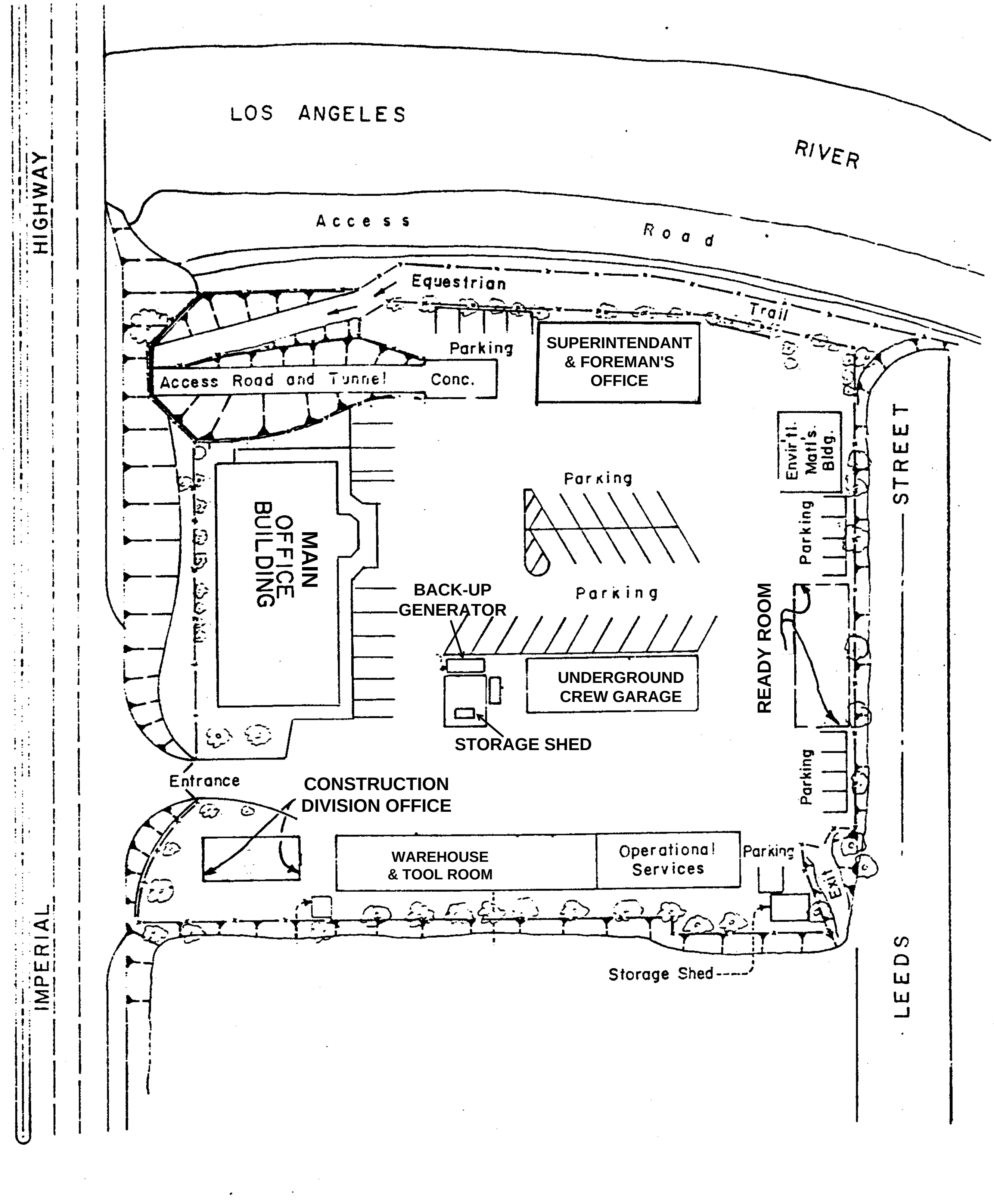
As outlined in the EA, it is the responsibility of individual fire stations to maintain their sandbag stockpile and request additional sandbags from their chain of command in advance throughout the storm season. During non-emergency situations, fire stations requesting sandbags from Flood/Road yards shall be directed to follow the protocol as outlined in the EA. During emergency situations, the fire station shall make direct contact with the Sandbag Coordinator (through Public Works' Dispatch 626-458-HELP) before contacting individual Flood/Road yards for sandbags if the fire station runs low/out. The sandbags at the Flood/Road yards are there for Road/Flood yard use. *Under no circumstance shall the fire station send residences to Flood/Road yards*. The requesting fire station shall be reminded that this is a courtesy and that they need to work through their chain of command to obtain sandbags from their Heavy Equipment yard – Pacoima Facility as outlined in the EA.

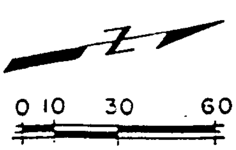
The Fire Department shall use their funding and procurement procedures to obtain sand for the sandbags. When a fire station requests sand during non-emergency situations, Flood/Road yards shall remind the fire station that they need to work through their procurement process as outlined in the EA to obtain; DPW provides the sandbags but procuring sand is the responsibility of the Fire Department. During emergency situations, the Road/Flood yard may provide earth material from excess moved/stored at road shoulders, debris basin sediment and spreading grounds. Road shoulder material shall be devoid of weeds/plants. Because of cost, construction grade sand may be given but only as a last resort. The requesting fire station shall be reminded that this is a courtesy and that they need to work through their chain of command to obtain sand from their Heavy Equipment yard – Pacoima Facility as outlined in the EA.

INTERFACE WITH CITIES

Cities have requested sandbags from the County to provide to their residences. During non-emergency situations, cities requesting sandbags in anticipation of upcoming storm events shall be referred to independent sandbag suppliers. In emergency situations, city request for sandbags must be approved by the Deputy over the Flood Fund prior to giving the city the requested sandbags. A valid Project Number (job number) will be provided to the Central Warehouse Managers. A maximum of 5,000 sandbags shall be provided to the city for distribution if approved.

Appendix O Typical Storage Site Plan

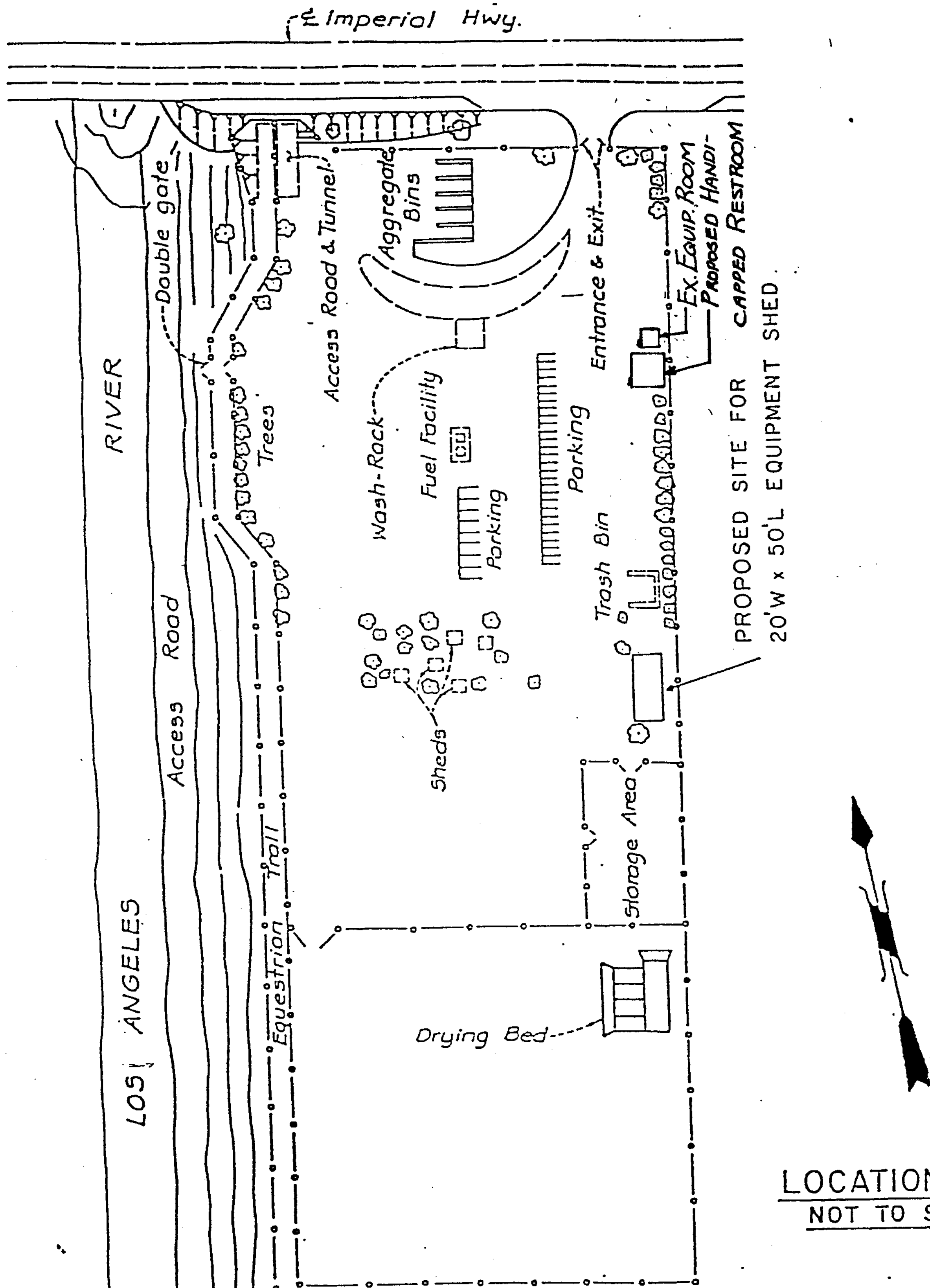




*REVISED. 05/09

PREPARED	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
G.M.	
DATE 05/09	IMPERIAL YARD NORTH
SCALE As Shown	

0005 FCD 1/73

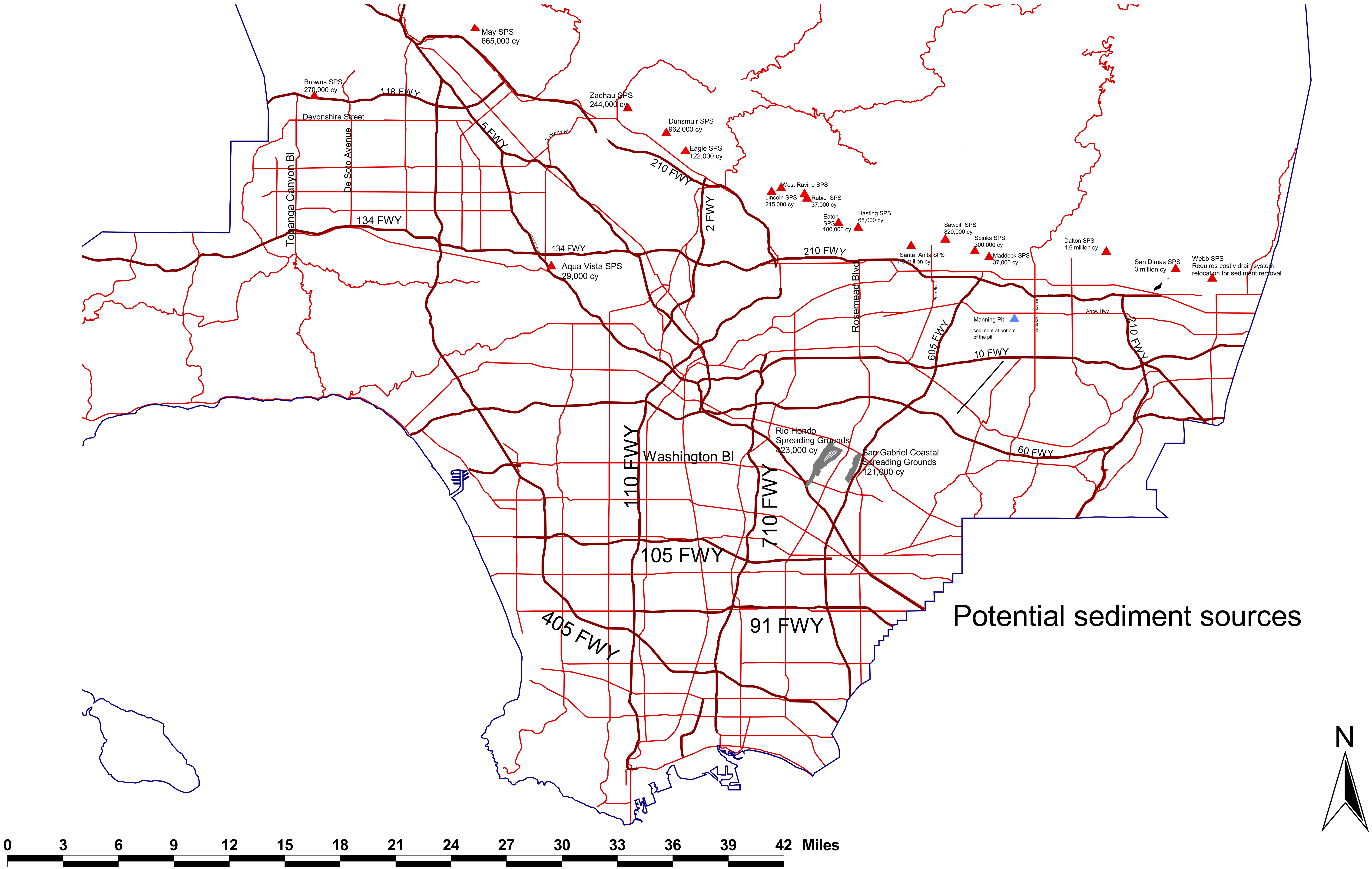


LOCATION MAP

NOT TO SCALE

PREPARED J.A	LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS
DATE 2/21/91	ERECTION OF PREFABRICATED EQUIPMENT SHED & HANICAPPED ACCESSIBLE RESTROOM.
SCALE NONE	

Appendix P Sediment Placement Site Location Map



Potential sediment sources

Appendix Q – Storm Routines – Hot Spots

STORM ROUTINES - SOUTH AREA 2008-2009

BEGINNING OF STORM		MAG I		MAG II		END OF STORM	
PUMP PLANT PATROLS		***PUMP PLANT PATROLS***		***PUMP PLANT PATROLS***		***PUMP PLANT PATROLS***	
(83) Oxford Basin	F7009533	(I) Group 1	F6009530	(I) Group 1	F6009530	(I) Group 1	F6009506
/ Rose Ave.		(I) Group 2	F6009531	(I) Group 2	F6009531	(I) Group 2	F6009507
		(I) Group 3	F6009535	(I) Group 3	F6009535	(I) Group 3	F6009510
		(I) Carson City	F9182864	(I) Carson City	F9182864	(83) Western	F7009508
		(83) Western	F7009532	(83) Western	F7009532	(83) Oxford Basin	F7009534
		(83) Pan Pacific	F7009599	(83) Pan Pacific	F7009599	(83) Doris P.P.	F7057539
		(83) Doris P.P.	F7057539	(83) Doris P.P.	F7057539	(83) Road P.P.	F7009555
						(I) City P.P.	F6009574
CLOSE RECREATION GATES		***INLET PATROLS***		***INLET PATROLS***		***OPEN RECREATION GATES***	
(I) Los Angeles River	F6009536	(I) Palos Verdes Peninsula	F6009505	(I) Palos Verdes Peninsula	F6009505	(I) Los Angeles River	F6009537
(I) San Gabriel R {upper}	F6009538	(83) Proj No 513 & 507	F7009509	(83) Proj No 513 & 507	F7009509	(I) San Gabriel R {upper}	F6009540
(I) San Gabriel R {lower}	F6009539	(83) Rustic, Rivas, Temescal,	F7009584	(83) Rustic, Rivas, Temescal,	F7009584	(I) San Gabriel R {lower}	F6009541
(I) Rio Hondo Channel	F6009542	Sullivan, Mandevill Canyon		Sullivan, Mandevill Canyon		(I) Rio Hondo Channel	F6009543
(I) Coyote Creek &	F6009579					(I) Coyote Creek and	F6009578
Los Cerritos Channel		(83) Laurel Ridge,MTD 622 , Project 9302	F7009586	(83) Laurel Ridge,MTD 622 , Project 9302	F7009586	Los Cerritos Channel	
(83) Ballona Creek	F7009547	Winter Drn, PD 537 Sturat Ranch Rd. Drn		Winter Drn, PD 537 Sturat Ranch Rd. Drn		(83) Ballona Creek	F7009548

						DAMAGE OR DEBRIS DEPOSITS	
		(I) Rancho Palos Verdes	F6009591	(I) Whittier (Turnbull D. B.)	F6009588	(I) Turnbul D. B. Proj No 590	F6009544
		(I) San Pedro		(I) East L.A.	F6009589	& 8502 Rosehedge Drain	
		/ Rancho Palos Verdes	F6009592	(I) Rancho Palos Verdes	F6009591	(83) Proj No 513 & 507	F7009545
				(I) San Pedro		(83) Proj No 501 & 20544	F7009551
				/ Rancho Palos Verdes	F6009592	Roca Chica	
				(83) Hollywood &		(I) Proj. 570 & 558	F6009552
				Culver City	F7009594	(I) Wilmington Drain	F6009580
				(83) Trancas	F7009598	(83) Rustic, Rivas, Temescal,	F7009584
						Sullivan, Mandevill Canyon	
						(83) Landslide Area	F7009585
						(83) Laurel Ridge,MTD 622 , Project 9302	F7009586
CLEAN SCREEN INSPECTION		***STREAM PATROLS***		***STREAM PATROLS***		Winter Drn, PD 537 Sturat Ranch Rd. Drn	
(I) All Screens & Traps	F6009107F	All Streams & Projects	F6009560	All Streams & Projects	F6009560		
(83) All Screens & Traps	F7009107F	YARD		YARD		(83) Hollywood and Culver City	F7009594
		(I) Complaint Crew	F6009501	(I) Complaint Crew	F6009501		
		(83) Complaint Crew	F7009502	(83) Complaint Crew	F7009502	(83) Trancas	F7009598
		(I) Supervision	F6009503	(I) Supervision	F6009503		
		(83) Supervision	F7009504	(83) Supervision	F7009504		

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FLOOD MAINTENANCE DIVISION - EAST AREA
STORM PATROLS 2008-09 STORM SEASON

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9802-01	Alburn DB	DB	Check basin for debris buildup and drainage problems. Check spillway	JARVIE	1	EATON - EAST	537 A7
9802-02	MTD 264						567 A1
9802-03	Carter DB	DB					537 B7
9802-04	Sierra Madre Wash	CHANNEL	North on Woodland Drive to base of Sierra Madre Dam, west side.	JARVIE	1	EATON - EAST	537 B-7
9802-05	Yucca Fire Structure	FIRE STRUCT					537 B7
9802-06	Sierra Madre Dam	DB	End of Canyon Crest. Check reservoir inflow /trash rack. Call Longden if elev is over 1128.9	JARVIE	1	EATON - EAST	537 B-7
9802-07	Sturtevant/MTD 12	DB	Check basin for debris buildup and drainage problems. Check spillway	JARVIE	1	EATON - EAST	567 C-1
9802-08	Stone House/BI 573	FIRE STRUCT					567 C1
9802-09	Lannon DB	DB	Check basin for debris build-up and drainage problems. Check Spillway	JARVIE	1	EATON - EAST	537 C-7
9804 - 01	BI 524 - Line A	INLET	End of Barlett s/o Broadway along the RR. Check inlet for obstructions.	JARVIE	1	EATON - NORTH	596 G-5
9804 - 02	BI 524 - Line A	INLET	End of Muscatel s/o Broadway along the RR . Check inlet for obstructions.	JARVIE	1	EATON - NORTH	596 G-5
9804 - 03	BI 529 - Unit 2, Line A	INLET	Corner of Artson & Rockhold inside rw fence. Check inlet for obstruction.	JARVIE	1	EATON - NORTH	636 G-1
9804 - 04	BI 1261 - Unit 2, Line A	INLET	Adjacent to driveway at 1253 Delta. Check inlet for obstruction.	JARVIE	1	EATON - NORTH	636 G-4
9804 - 05	BI 1226, Line A	INLET	In backyard of 8459 Yarro. Check inlet for obstruction.	JARVIE	1	EATON - NORTH	636 G-4
9804 - 06	BI 1225	INLET	In backyard of 1335 Centurion. Check inlet for obstruction.	JARVIE	1	EATON - NORTH	636 F-4
9804 - 07	LAGUNA REG BASIN □□□	DB	Adjacent to 3340 Hellman. r/w along Fwy, Check outlet structure for obstruction.	JARVIE	1	EATON - NORTH	635 G-5
9820 - 01	ARBORETUM DRAIN	OUTLET - 3	Inside of County Arboretum - check 3 outlets for debris buildup.	JARVIE	1	EATON - EAST	567 A-4
9820 - 02	FAIR OAKS SD	PRO. BARR.	New York Dr, from Allen to Vernanda . Check 7 protection barriers for obstruction..	JARVIE	1	EATON - WEST	536 C-6
9820 - 03	ALTADENA GOLF CLUB DB □	DB & OUTLET	Check basin and trash rack	JARVIE	1	EATON - WEST	536 C-7

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9820 - 04	FAIR OAKS SD	INLET	Allen Ave. from New York Dr. to Altadena Dr. Check inlets for obstruction	JARVIE	1	EATON - WEST	536 C-5
9820 - 05	BI 9624	INLET	Check inlet for obstruction	JARVIE	1	EATON - WEST	536 C-5
9820 - 06	ALLEN CRIB STRUCTURE	CRIB	Check for debris build-up	JARVIE	1	EATON - WEST	536 C-5
9820 - 07	TANOBLE FIRE STRUCTURE	FIRE STRUCT	Across from 2883 Tanoble Dr. Check structure for debris build up.	JARVIE	1	EATON - WEST	536 C-5
9820 - 08	PD 0054	INLET	1605, 06, 07 Woodglen Ln driveway, behind private residence. Check inlet for obstruction.	JARVIE	1	EATON - WEST	536 C-5
9820 - 09	GOOSEBERRY CHAN INLET	INLET	Behind 2945 Stone Hill, check inlet for obstruction.	JARVIE	1	EATON - WEST	536 C-5
9820 - 10	GOOSEBERRY DB □	DB	Check tower elevation and basin inflow and debris build up.	JARVIE	1	EATON - WEST	536 B-4
9820 - 11	RUBIO DB □□	DB	Check storage elevation, basin inflow and debris build up	JARVIE	1	EATON - WEST	536 B-4
9820 - 12	PD 0331 (EAST)	INLET	1351 Pleasant Ridge Drive, behind private residence. Check inlet.	JARVIE	1	EATON - WEST	536 B-4
9820 - 13	PD 0331 (WEST)	INLET	1248 Pleasant Ridge Drive, behind private residence. Check inlet.	JARVIE	1	EATON - WEST	536 B-4
9820 - 14	LAS FLORES DB □	DB	Check storage elevation, basin inflow and debris build-up	JARVIE	1	EATON - WEST	536 B-4
9820 - 15	RUBIO WASH	CHANNEL	Enter from private drive 1415-1417 Palm Street. Check amount of flow at diversion area.	JARVIE	1	EATON - WEST	536 B-4
9820 - 16	BI 0544	INLET	491 Concha Street west of Lake Avenue. Check inlet for obstruction	JARVIE	1	EATON - WEST	536 A-4
9820 - 17	PD 0059 - DEVONWOOD DB□	INLET	Inside gate to Devonwood DB, right side. Check inlet for debris buildup.	JARVIE	1	EATON - WEST	536 A-3
9820 - 18	BI 1223	INLET - 2	302, 315, 325, 355 Anna Maria Dr. Check 4 inlets for debris build up.	JARVIE	1	EATON - WEST	536 A-3
9820 - 19	FAIR OAKS DB □	DB	Check reservoir, storage elevation, and debris build-up. Operate pumps. After Storm Pumpout	JARVIE	1	EATON - WEST	535 J-3
9820 - 20	WEST RAVINE DB □	DB	Check reservoir, storage elevation and debris build-up.	JARVIE	1	EATON - WEST	535 H-3
9820 - 21	FERN CANYON DB □	DB	Check reservoir, storage elevation, and debris build-up.	JARVIE	1	EATON - WEST	535 H-3
9820 - 22	LINCOLN SPS	SPS	Check for erosion. Check small inlet. Check dewatering tower.	JARVIE	1	EATON - WEST	535 G-3
9820 - 23	LINCOLN DB □	DB	Check reservoir storage elevation, and inlets for debris build up. Operate pump.	JARVIE	1	EATON - WEST	535 G-3
9820 - 24	BI 9623 - d□s INVERNESS DB	INLET	Across from 1345 Inverness Dr. Check inlet for obstruction.	JARVIE	1	EATON - WEST	535 D-7

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9821 - 01	KINCLAIRE DRI UPPER INLET	DRI	Check inlet for obstruction	JARVIE	1	EATON - EAST	536 F-6
9821 - 02	KINCLAIRE DRI LOWER INLET	DRI	Check inlet for obstruction	JARVIE	1	EATON - EAST	536 F-6
9821 - 03	PD 0194	INLET	Check inlet for obstruction.	JARVIE	1	EATON - EAST	536 F-7
9821 - 04	BI 9640	INLET	Access gate is across from 1955 Kinclair Dr. Check inlet for obstruction.	JARVIE	1	EATON - EAST	536 F-7
9821 - 05	KINNELOA WEST DB	DB	Check inlet for obstruction. Code to enter #1474 (if the gate is closed)	JARVIE	1	EATON - EAST	536 F-6
9821 - 06	KINNELOA EAST DB	DB	Check inlets for obstruction. Code to enter #1474 (if the gate is closed)	JARVIE	1	EATON - EAST	536 F-7
9821 - 07	PD 0084	INLET	Check inlet for obstruction.	JARVIE	1	EATON - EAST	536 F-7
9821 - 08	SIERRA MADRE VILLA DB	DB	Check inlet for obstruction.	JARVIE	1	EATON - EAST	533 G-1
9821 - 09	MTD 995	INLET	Behind 3535 Ranchtop. Check inlet for obstruction.	JARVIE	1	EATON - EAST	536 H-7
9821 - 10	HASTINGS CHANNEL	INLET	Check inlet (U S of Ranch Top Rd., east side of channel) for obstruction. Check trashrack for obstruction	JARVIE	1	EATON - EAST	536 H-7
9821 - 11	CARRIAGE HOUSE DB	DB	Check basin for debris buildup and drainage problems. Check spillway	JARVIE	1	EATON - EAST	536 H-7
9821 - 12	SUNYSIDE DB	DB	End of Park Vista Drive. Check inlet for obstruction.	JARVIE	1	EATON - EAST	536 J-7
9821 - 13	BAILEY DB	TOWER OUTLET	Check basin inflow, outlet and surface drains.	JARVIE	1	EATON - EAST	536 J-7
9821 - 14	NEW YORK DRAIN	INLET - 4	Check debris & Timber structure. Check 8 inlets for obstruction.	JARVIE	1	EATON - EAST	566 FG-1
9823 - 01	PD 0217	INLET	End of Arlista Street. Check inlet for obstructions.	BRIONES	2	HACIENDA HEIGHTS	637 H-4
9823 - 02	PD 0250	INLET	Behind 605 Redburn Drive. Check inlet for obstruction.	BRIONES	2	HACIENDA HEIGHTS	637 J-6
9823 - 03	BI 1221, LINE D	INLET	1611 Vallecito Dr. Near Turnbull Cyn. Inspect Inlet.	BRIONES	2	HACIENDA HEIGHTS	678 A-2
9823 - 04	PD 0526 - Frankton channel	BRIDGE PIER	Check channel where it goes underground. Access from Ameluxen Ave	BRIONES	2	HACIENDA HEIGHTS	677 H-1
9823 - 05	TURNVALLE DRAIN	INLET	(See Storm Patrol Books)	BRIONES	2	HACIENDA HEIGHTS	677 J-3
9823 - 06	PD 1613	INLET	South of 15008 Los Altos, check inlet on west side of street for plugging and debris build-up	BRIONES	2	HACIENDA HEIGHTS	677 J-4
9823 - 07	PD 0968 - BLUE SKY (Inlets B &	INLET	2 inlets 14545 Blue Sky Rd & 1 inlet 14627 - check for plugging debris build-up.	BRIONES	2	HACIENDA HEIGHTS	677 J-4

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9823 - 08	EL SELINDA DB □	DB	Check - erosion/debris flow □ upper inflow, buildup □ basin/outlet & bench drain on so r/w	BRIONES	2	HACIENDA HEIGHTS	677 J-4
9823 - 09	PD 0968 - BLUE SKY (Inlet A)	INLET	50 Ft w/o left rear corner of Fire Station. Check inlet for plugging and debris build-up.	BRIONES	2	HACIENDA HEIGHTS	677 H-4
9823 - 10	PD 0818	INLET	Dead end of Camino Del Tomasini, west of Valdemar, check inlet trash rack for debris obstruction.	BRIONES	2	HACIENDA HEIGHTS	677 J-5
9823 - 11	PD 0630	INLET	Behind block wall in backyard to right of house-3023 Belle River. Check inlet A&B for obstruction.	BRIONES	2	HACIENDA HEIGHTS	677 J-5
9823 - 12	PD 2149	INLET - 2	Inlet A - 250' so 3360 Viewfield. Inlet B 150' eo Inlet A. Check for obstruction.	BRIONES	2	HACIENDA HEIGHTS	678 A-6
9823 - 13	GUNTREE DRI East & West	DRI	Check both DRI's for any abnormalities or obstructions.	BRIONES	2	HACIENDA HEIGHTS	678 B-6
9823 - 14	PD 0166	BRIDGE PIER	Ns of Los Altos Dr, wo Hacienda Blvd. Check bridge pier for obstruction.	BRIONES	2	HACIENDA HEIGHTS	678 B-5
9823 - 15	PD 1187	INLET	Access from Colima Road. First driveway past Avalo Drive, dirt road	BRIONES	2	HACIENDA HEIGHTS	678 B-5
9824 - 01	BI 519		400' n/o San Bernardino Rd. Check inlets e/s of Cutter Way for obstructions.				598 H-5
9824 - 02	PD 0014	CHANNEL	Downstream on Inyo at Valley Blvd Between 16550 & 16612 Inyo St..	BRIONES	2	HACIENDA HEIGHTS	678 E-1
9824 - 03	PD 0507	DEFLECT WALL	N/w Wedgeworth at channel check side drain deflector wall.	BRIONES	2	HACIENDA HEIGHTS	678 F-4
9824 - 04	PD 1268- Inlet A	INLET	Enter ws of 2478 Lazy Brook Lane.	BRIONES	2	HACIENDA HEIGHTS	678 E-5
9824 - 05	PD 1268 - Inlet B	INLET	Enter 2569 Apple Creek Lane	BRIONES	2	HACIENDA HEIGHTS	678 E-5
9824 - 06	PD 1268 - Inlet C	INLET	2568 Anvil Tree Lane. Check inlet for obstruction	BRIONES	2	HACIENDA HEIGHTS	678 E-5
9824 - 07	PD 1268 - Inlet D	INLET	Between 2568 & 2569 Cranberry. Up between wooden/chain link fences, down to the left.	BRIONES	2	HACIENDA HEIGHTS	678 E-5
9824 - 08	COUNTRYWOOD DET. BASIN	DB	End of Garo Street. Check inlet for obstruction	BRIONES	2	HACIENDA HEIGHTS	678 E-5
9824 - 09	PD 1210	INLET	Behind 2425 Lazy Brook Lane, enter from Edison right of way, at Circle Hill Lane. Check inlet for obstruction.	BRIONES	2	HACIENDA HEIGHTS	678 D/E-5
9824 - 10	PD 1011	INLET	Inlet between 3254 and 3260 Pozo Dr. Check inlet for obstruction	BRIONES	2	HACIENDA HEIGHTS	678 D-7
9824 - 11	PD 0967	INLET	End of Gotera Drive	BRIONES	2	HACIENDA HEIGHTS	678 D-6
9824 - 12	PD 0279	INLET	15813 Lone Crest Drive. Check catch basins for plugging or overflow	BRIONES	2	HACIENDA HEIGHTS	678 B-6
9824 - 13	PD 0279	INLET	East of Hacienda Blvd., south side of Colima Rd. Check inlet for obstruction.	BRIONES	2	HACIENDA HEIGHTS	678 B-6

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9824 - 14	PD 0940	INLET	300 feet w/o cul-de-sac White Cloud Dr, behind residences. Walk west along asphalt path to inlet.	BRIONES	2	HACIENDA HEIGHTS	678 B-6
9824 - 15	PD 0387	INLET	Eo Stimson Ave ss La Monde between school & library. Check inlets for obstruction.	BRIONES	2	HACIENDA HEIGHTS	678 C-4
9826 - 01	GIANO CHANNEL	CHANNEL	Check for debris trash rack u/s Glendel & bridge peir Gendel & La Seda.	BROWN	4	ROWLAND HEIGHTS	679 B-1
9826 - 02	PD 238 - Alvarado Channel	CHANNEL	Check Channel for debris. Keep debris from entering the UG section under of Colima.	BROWN	4	ROWLAND HEIGHTS	679 B-4
9826 - 03	PD 0208	BRIDGE PIER	At Sierra Leone and Jellick Ave. Check bridge pier for obstructions.	BROWN	4	ROWLAND HEIGHTS	679 B-6
9826 - 04	PD 0184	BRIDGE PIER	At Los Padres Drive. Check bridge pier.	BROWN	4	ROWLAND HEIGHTS	679 A-5
9826 - 05A	AGUIRO DRAIN	CB - 3	Front yard, at 18304 & 18326 Aguiro St. Check 3 rear-opening CB for obstructions.	BROWN	4	ROWLAND HEIGHTS	678 J-7
9826 - 05B	PD 1426 - 2 INLETS	INLET	Check inlet between 17428 and 17434 Pamela Court.	BROWN	4	ROWLAND HEIGHTS	678 G-6
9826 - 06	PD 1426 - 2 INLETS	INLET	Check inlet between 2533 and 2539 Saleroso.	BROWN	4	ROWLAND HEIGHTS	678 G-6
9826 - 07	FIELDBROOK DB PD 1156	DB	End of Fieldbrook Street. Check outlet towers and overflow inlet for obstructions.	BROWN	4	ROWLAND HEIGHTS	709 B-1
9826 - 08	PD 1156	INLET	South of cul-de-sac of Blakeman Street access from stairway	BROWN	4	ROWLAND HEIGHTS	709 B-1
9826 - 09	HILLMAN DB - PD 1787	INLET	Check inlet and tower south side of Hillman at Allwood Court.	BROWN	4	ROWLAND HEIGHTS	679 C-7
9826 - 10	BLEVINS DB - PD 1816	TOWER	Blevins DB along Windrose Drive. East side of park. Check inlets and tower for debris.	BROWN	4	ROWLAND HEIGHTS	679 D-7
9826 - 11	WINDROSE DB- PD 1927	DB	Windrose Drive south of Pathfinder - check outlet (spillway) and basin for debris buildup.	BROWN	4	ROWLAND HEIGHTS	679 D-7
9826 - 12	Thelma DB - PD 1774	INLET	Check trash rack, debris basins for debris build-up. At Thelma Lane	BROWN	4	ROWLAND HEIGHTS	679 E-6
9826 - 13	PD 1370	INLET	Check trash rack & inlet for debris. Use access road wo 19634 Castlebar for access.	BROWN	4	ROWLAND HEIGHTS	679 E-6
9826 - 14	PD 1509	INLET - 5	Check 5 inlets: 3 inside gate (gate combination #2332) 2 on Brea Cyn Cut off.	BROWN	4	ROWLAND HEIGHTS	679 F-6
9826 - 15	PD 0443	INLET	So of 20042 Emerald Meadow Dr, check for debris build-up.	BROWN	4	ROWLAND HEIGHTS	679 E-7
9826 - 16	PD 1467	INLET	Enter 1477 Fairlance. Check inlet for debris behind 1485 Fairlance Dr. Use access road to inlet	BROWN	4	ROWLAND HEIGHTS	679 F-4
9826 - 17	PD 506	INLET	Enter ws of Colima, no Tierra Luna (golf cart entrance). Check inlet for debris buildup	BROWN	4	ROWLAND HEIGHTS	679 F-4
9827 - 01	MTD 003	INLET	End of Hill Top Drive, north of Clearhaven Drive. Check inlet for obstruction.	BROWN	4	GLENDORA	568 J-3

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9827 - 02	BEATTY DB	TOWER	Check tower and basin for debris build-up	BROWN	4	GLENDORA	569 A-3
9827 - 03	BI 1601	INLET	Pasadena Ave. at railroad tracks northeast corner. Check inlet for obstruction.	BROWN	4	GLENDORA	568 J-5
9827 - 04	PD 0126	INLET	So RR 167 Oakbank Dr (Knock on door for access . . . DOG) Check inlet for obstruction	BROWN	4	GLENDORA	569 C-5
9827 - 05	MTD 1072	INLET	Enter thru access road ns 7433 N. Yucca. Check grate for debris or obstructions.	BROWN	4	GLENDORA	569 B-4
9827 - 06	HOOK EAST & WEST DB	DB	Check towers and basins for debris build-up. To open gate push start, then #, then 4722.	BROWN	4	GLENDORA	569 C,D-2
9827 - 07	BI 1219	INLET	North on Grand Ave. to Palm Drive. Inlet on north west side. Check for debris	BROWN	4	GLENDORA	569 D-3
9827 - 08	WESTRIDGE DB	DB	Check tower and basin for debris build-up.	BROWN	4	GLENDORA	569 D-3
9827 - 09	HARROW DB	DB	Check tower and basin for debris build-up. Lock combination # 1129	BROWN	4	GLENDORA	569 E-2
9827 - 10	ENGLEWILD DB	DB	Palm Dr. to Englewild Dr., North to DB. Check for debris flows	BROWN	4	GLENDORA	569 G-2
9827 - 11	BIG DALTON SPS (EAST)	SPS	Check east and west inlets for debris, basin and tower	BROWN	4	GLENDORA	569 G-2
9827 - 12	LIL DALTON DB	DB	Sierra Madre Ave. to Glendora Mtn Road. North to DB. Check for debris flows.	BROWN	4	GLENDORA	569 H-2
9827 - 13	BIG DALTON DB	TOWER	Sierra Madre Ave. to Glendora Mtn. Road.	BROWN	4	GLENDORA	569 H-2
9827 - 14	MTD 813	INLET	Check grate basin. Basin located near back wall rear of 910 Glendora Mountain Rd.	BROWN	4	GLENDORA	569 H-3
9827 - 15	GORDON DB	DB	Foothill to Gordon Ranch Road. North to DB. Check Roads, Basins & Bench Drains	BROWN	4	GLENDORA	569 J-4
9827 - 16	MULL DB	DB	Foothill to Gordon Ranch Road. North to DB. Check Roads, Basins & Bench Drains	BROWN	4	GLENDORA	569 J-4
9828 - 01	PD 0612	INLET	Rear of 20224 Alta Hacienda Dr. Check inlet for obstruction. Combination Lock #000	BROWN	4	DIAMOND BAR	639 F-3
9828 - 02	PD 0472	INLET	North side of Camelback Drive. (Approx. 500 feet through field) Check inlet for obstruction.	BROWN	4	DIAMOND BAR	639 F-3
9828 - 03	PD 1968	INLET	Inlet behind Gateway Corporate Center. Inspect inlet at 21660 Copley Drive.	BROWN	4	DIAMOND BAR	679 J-3
9828 - 04	DEEPSPRINGS DRI	DRI	End of Deepsprings Drive. Check for debris build-up.	BROWN	4	DIAMOND BAR	640 E-7
9828 - 05	MEANDERING CREEK DRI	DB	Check inlet and tower at dead end of Meandering Creek	BROWN	4	DIAMOND BAR	680 C-2
9828 - 06	MOUNMENT CANYON DB	DB	Check inlet and tower at dead end of Monument Canyon Drive.	BROWN	4	DIAMOND BAR	680 C-2

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9828 - 07	PD 1493	INLET	Check inlet for debris at end of Gold Nugget Avenue.	BROWN	4	DIAMOND BAR	680 C-3
9828 - 08	PD 1324 - BRONZE KNOLL	INLET	Behind 1678 Bronze Knoll Rd. Enter along side of garage. Check inlet for debris build-up.	BROWN	4	DIAMOND BAR	680 C-4
9828 - 09	PD 1324	INLET	23596 Coyote Spring Dr.	BROWN	4	DIAMOND BAR	680 C-4
9828 - 10	DIAMOND BAR VILLAGE DRI □- PD 2060	DB	1850 Diamond Bar Blvd. Es Diamond Bar Blvd □ Maple Hill. Check for debris build-up.	BROWN	4	DIAMOND BAR	680 A-4
9828 - 11	PD 1441	INLET TRASHRA	Check inlet & trash rack for debris. Inlet behind Apt eo Diamond Bar. (Comb #9966)	BROWN	4	DIAMOND BAR	679 J-5
9828 - 12	PD 0946 (INLET A)	INLET	Behind 21853 Tenderfoot Wy. Through bench drain along wall between 21849 & 21853.	BROWN	4	DIAMOND BAR	679 J-6
9828 - 13	PD 1481	INLET	End of Calmbrook Lane cul de sac. Use paved road to access inlet.	BROWN	4	DIAMOND BAR	709 H-1
9828 - 14	PD 1203	INLET	Line A - end of Trigger Lane. In front of 20900 Trigger Lane. Check inlet for debris build-up.	BROWN	4	DIAMOND BAR	679 G-6
9828 - 15	PD 1203 - 20901 TRIGGER LN	INLET	Inlet □ rear & nw 20901 Trigger Lane. Check inlet for debris build-up. Line J	BROWN	4	DIAMOND BAR	670 G-6
9828 - 16	PD 0395	INLET - 2	Brea Canyon, check inlet r□b, d□s Diamond Bar Blvd. Check for obstruction.	BROWN	4	DIAMOND BAR	679 G-7
9838 - 01	MORGAN DB □□□	DB	Foothill to Oakhart, north to Morgan Ranch Rd. DB on right. Check Basin & Drains.	BROWN	4	SAN DIMAS	570 A-4
9838 - 02A	CRESCENT GLENN DB □	DB	At end of Crescent Glenn Dr. Check tower and basin.	BROWN	4	SAN DIMAS	570 A-5
9838 - 02B	OAK PARK DB □	DB	At end of Oak Park Road. Check tower and basin	BROWN	4	SAN DIMAS	570 A-5
9838 - 03	PUDDINGSTONE CHANNEL	INLET	North side of Juanita Avenue at Puddingstone Channel east side of channel check 18" inlet	BROWN	4	SAN DIMAS	600 D-2
9838 - 04	SAN DIMAS SPS	SPS	Check 2 inlets - one at sw cor and the other west of that	BROWN	4	SAN DIMAS	570 E-5
9838 - 05	PUDDINGSTONE DIVERSION	CHANNEL	Rte 66 to San Dimas Cyn Check spillway and debris.	BROWN	4	SAN DIMAS	570 E-5
9838 - 06	MARSHALL INLET DRI(WEST F	DB & INLET	North of Via De Mansion 500' RB. Check inlet for debris obstructions.	BROWN	4	SAN DIMAS	570 G-6
9838 - 07	MARSHALL INLET DRI (EAST)	DRI	Orangewood Street □ Marshall Canyon Channel. Check trash rack.	BROWN	4	SAN DIMAS	570 D-4
9838 - 08	EMERALD WEST DRI	DRI	Orangewood St □ Emerald Avenue. Check for debris flows	BROWN	4	SAN DIMAS	570 G-6
9838 - 09	EMERALD EAST	DB	Enter □ Morgan Way & Raymond Dr. Check tower for debris build-up.	BROWN	4	SAN DIMAS	570 G-6
9838 - 10	LIVEOAK DRI	DRI	Enter Driveway ns Baseline wo channel. At new Live Oak Canyon Rd.	BROWN	4	SAN DIMAS	571 A-5

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9838 - 11	WEBB SPS	SPS	Webb Cyn Rd- gate on es, before Dam entrance. Check upper & lower inlets & tower.	BROWN	4	SAN DIMAS	571 A-5
9838 - 12	SYCAMORE CANYON PARK	PARK ?	Check debris flow (new rail & timber	BROWN	4	SAN DIMAS	
9838 - 13	GAIL CANYON R & T	R&T	Check debris flow (upper & lower rail & timbers)	BROWN	4	SAN DIMAS	
9838 - 14	PALMER DIVERSION		Check debris flow	BROWN	4	SAN DIMAS	
9838 - 15	POMALAMAR DRAIN	INLET - 4	North side of Pomello between Grand and Elmira Avenues. Check 4 inlets	BROWN	4	SAN DIMAS	571 E-5
9845 - 01	SANTA ANITA DB □□□	DB	Elkins gate-check bench drain, DB tower elev., & bench drain along e□s access rd to south SPS	BRIONES	2	DUARTE□FOOTHILL	567 E-1
9845 - 02	SANTA ANITA SPS	SPS	Check inlets at 2nd level of SPS and grate on east side of channel, approx. 600' north of gate	BRIONES	2	DUARTE□FOOTHILL	567 D-2
9845 - 03	RUBY LOWER DB □	DB	Check grate on right side of r□w access road. 20' inside of gate	BRIONES	2	DUARTE□FOOTHILL	567 G-2
9845 - 04	UPPER RUBY	INLET	Before 981 Bliarcliff, check inlet north side of street	BRIONES	2	DUARTE□FOOTHILL	567 G-2
9845 - 05	OAKGLADE DB □	DB	Oakglade Rd to DB, Check tower elevation and debris build up	BRIONES	2	DUARTE□FOOTHILL	537 H-7
9845 - 06	SAWIPT DB □□□	DB	Check tower elevation and debris build up	BRIONES	2	DUARTE□FOOTHILL	567 J-3
9845 - 07	SAWPIT SPS	SPS	Check all bench drains along the four levels and inlet on the access road.	BRIONES	2	DUARTE□FOOTHILL	567 H-2
9845 - 08	BUENA VISTA DB □	TOWER	Check tower elevation and debris build up	BRIONES	2	DUARTE□FOOTHILL	568 A-2
9845 - 09	BUENA VISTA DRAIN INLET 'I'	INLET	Enter between 986 & 982 Norumbega. Check inlet for obstruction.	BRIONES	2	DUARTE□FOOTHILL	568 A-3
9845 - 10	BRADBURY DB □	TOWER	Check tower elevation and debris build up.	BRIONES	2	DUARTE□FOOTHILL	568 B-3
9845 - 11	SPINKS DB □	DB	Check tower elevation and debris build up	BRIONES	2	DUARTE□FOOTHILL	568 C-3
9845 - 12	MADDOCK DB □	DB	Check tower elevation and debris build up	BRIONES	2	DUARTE□FOOTHILL	568 D-3
9845 - 13	CRESTVIEW DB □	DB	Check tower elevation and debris build up	BRIONES	2	DUARTE□FOOTHILL	568 D-3
9845 - 14	CEDARWOOD DRI	DRI	Check debris build up	BRIONES	2	DUARTE□FOOTHILL	568 D-3
9845 - 15	LAS LOMAS DB □	DB	Check tower elevation for debris build up.	BRIONES	2	DUARTE□FOOTHILL	568 D-3
9845 - 16	MTD 1654 - Irwindale	PP	Check CDS Unit pump for operation.	BRIONES	c	DUARTE□FOOTHILL	598 F-3

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9850 - 01	BI 6201	UG	On Winding Way and at Hastings Ranch Road. Open manholes (2) and check underground drain for material	ROMAIN	3	UG CREW - WEST	536 C-5
9850 - 02	PD 0331 - East	UG	1342 Rubio Vista Rd. Remove manhole cover and inspect main drain for obstructions for buildup of material.	ROMAIN	3	UG CREW - WEST	536 B-4
9850 - 03	PD 0331 - West	UG	1309 Pleasant Ridge Dr. Remove manhole cover and inspect main drain for obstructions or buildup of material.	ROMAIN	3	UG CREW - WEST	536 B-4
9850 - 04	BI 1223	UG	(B) 325 Anna Maria Dr.	ROMAIN	3	UG CREW - WEST	536 A-3
9850 - 05	BI 9633	UG	Open manhole on Canon at Vinehill Dr. (private road), and check for buildup of material. Check catch basins for	ROMAIN	3	UG CREW - WEST	565 E-7
9850 - 06	BI 0025	UG	Open manhole on Peck Rd. at Jeffries Ave., check divider downstream 100 feet. Check for obstructions.	ROMAIN	3	UG CREW - WEST	597 G-1
9850 - 07	WALNUT GROVE PP	PUMP PLANT	Check pump plant operation	ROMAIN	3	UG CREW - WEST	636 G-1
9850 - 08	DEL MAR PP	PUMP PLANT	Check pump plant operation	ROMAIN	3	UG CREW - WEST	636 E-1
9850 - 09	SAN GABRIEL PP	PUMP PLANT	Check pump plant operation	ROMAIN	3	UG CREW - WEST	636 F-1
9852 - 01	BI 0442, UNIT 2, LINE B	UG	Check transition structure	ROMAIN	3	UG CREW - EAST	678 D-2
9852 - 02	TURNVALE DRAIN	UG	Check line for material buildup	ROMAIN	3	UG CREW - EAST	677 J-3
9852 - 03	BI 0527	UG	Check divider for buildup	ROMAIN	3	UG CREW - EAST	637 I-7
9852 - 04	BI 9703	UG	Check divider for buildup	ROMAIN	3	UG CREW - EAST	678 J-2
9852 - 05	PD 1441, UNIT 2	UG	Check divider for buildup	ROMAIN	3	UG CREW - EAST	679 J-5
9852 - 06	PD 1031	UG	Check divider for buildup	ROMAIN	3	UG CREW - EAST	679 B-4
9852 - 07	PD 0472	UG	Check drain invert for buildup	ROMAIN	3	UG CREW - EAST	639 F-4
9852 - 08	BI 1219, LINE A	UG	Check channel invert at box section	ROMAIN	3	UG CREW - EAST	569 F-5
9852 - 09	HACIENDA PP	PUMP PLANT	Check pump plant operation	ROMAIN	3	UG CREW - EAST	638 C-7
9852 - 10	AZUSA PP	PUMP PLANT	Check pump plant operation	ROMAIN	3	UG CREW - EAST	678 G-3
9890 - 01	WALNUT CREEK	GATE	COVINA HILLS ROAD, s e CORNER	BROWN	4	WALNUT CREEK	599 E-6
9891 - 01	MARSHALL CYN CHANNEL	GATE	ORANGEWOOD ST	BROWN	4	MARSHALL CYN CHAN	570 G-6

ROUTINE	FACILITY	TYPE	LOCATION AND DESCRIPTION	SUPT	DIST	DESCRIPTION	TG
9891 - 02	MARSHALL CYN CHANNEL	GATE	BASELINE ROAD	BROWN	4	MARSHALL CYN CHAN	570 F-7
9891 - 03	MARSHALL CYN CHANNEL	GATE	D/S OF FOOTHILL	BROWN	4	MARSHALL CYN CHAN	600 F-1
9891 - 04	MARSHALL CYN CHANNEL	GATE	AT&SF RR TRACKS, U/S ARROW HWY	BROWN	4	MARSHALL CYN CHAN	600 E-3
9891 - 05	MARSHALL CYN CHANNEL	GATE	PUDDINGSTONE Dr, u/s LIVE OAK WASH	BROWN	4	MARSHALL CYN CHAN	600 E-4
9892 - 01	RIO HONDO CHANNEL	GATE	d/s OF LOWER AZUSA ROAD	JARVIE	1	RIO HONDO CHAN	597 D-5
9892 - 02	RIO HONDO CHANNEL	GATE	D/S OF VALLEY BLVD	JARVIE	1	RIO HONDO CHAN	597 C-7
9892 - 03	RIO HONDO CHANNEL	GATE	PIONEER PARK, d/s VALLEY BLVD	JARVIE	1	RIO HONDO CHAN	597 B-7
9892 - 04	RIO HONDO CHANNEL	GATE	U/S OF RTD BUSWAY	JARVIE	1	RIO HONDO CHAN	597 B-7
9892 - 05	RIO HONDO CHANNEL	GATE	D/S OF RTD BUSWAY	JARVIE	1	RIO HONDO CHAN	597 B-7
9892 - 06	RIO HONDO CHANNEL	GATE	U/S OF SAN BERNARDINO FWY	JARVIE	1	RIO HONDO CHAN	637 B-1
9892 - 07	RIO HONDO CHANNEL	GATE	D/S OF SAN BERNARDINO FWY	JARVIE	1	RIO HONDO CHAN	637 B-1
9892 - 08	RIO HONDO CHANNEL	GATE	TOWNWAY DR AND BROCKWAY ST	JARVIE	1	RIO HONDO CHAN	637 A-1
9892 - 09	ARBORETUM DRAIN	GATE	Inside Arboretum	JARVIE	1	RIO HONDO CHAN	567 A-4
9893 - 01	ARROYO SECO CHANNEL	GATE	N/E OF ARROYO SECO PARK □ STABLES	JARVIE	1	ARROYO SECO CHAN	595 E-2
9893 - 02	ARROYO SECO CHANNEL	GATE	N/E OF AVE 60 ENTER PARK □ VIA MARSOIL	JARVIE	1	ARROYO SECO CHAN	595 D-3
9893 - 03	ARROYO SECO CHANNEL	GATE	ENTER DRIVEWAY, D/S FROM WALK BRIDGE	JARVIE	1	ARROYO SECO CHAN	595 D-3
9894 - 01	SANTA ANITA WASH	GATE	LIVE OAK AVE, SW CORNER	BRIONES	1	SANTA ANITA WASH	597 E-2
9894 - 02	SANTA ANITA WASH	GATE	DAINES DR, W/S OF CHANNEL (U/S & D/S)	BRIONES	1	SANTA ANITA WASH	597 E-3
9894 - 03	SANTA ANITA WASH	GATE	W/B OF RIO HONDO CHANNEL D/S PECK	BRIONES	1	SANTA ANITA WASH	597 E-4

RED □ HOT SPOTS

□HEIGHT OF OUTLET TOWER TO SPILLW
□□RADIO IN THE ELEVATION AT THE END

STORM STATUS BOARD - WEST AREA
HANSEN YARD
2008-2009 HOT SPOTS

Date: ____________

Time Sent: ____________

ITEM	FACILITY AND LOCATION	TIME	A	B	C	D	E	COMMENTS
1	Lopez Inlet							
2	PD 1657 - David Inlets							
3	PD 1873- Malibu Dri							
4	Dayton Creek - Inlet to Bell Creek							
5	Bell Cree/Dayton Creek confluence							
6	Santa Susanna Creek - Inlet to Browns Creek							
7	Long Valley Drain - 2ea Inlets at treminus of Long Valley Rd							
8	Sloan DRI - PD 1726							
9	Thousand Oaks DRI - PD 1726							
10	PD 1684 - Inlet to Las Virgenes Creek							
11	Las Vergenes Creek (PD's 1684, 1522, 1463, 492, 1410)							
12	PD 1684 Line E & Line F DRI							
13	PD 562 Inlet							
14	PD 1522 Inlet							
15	Las Virgenes Creek - PD 2055 Lines A&B							
16	Inlet to Driver Drain							

COLUMN	INDICATE ACCORDINGLY
A - Patroled	Y - Yes N - No
B - Raining	L - Light, M - Moderate, H - Heavy
C - Flows	L - Light, M - Moderate, H - Heavy
D - Crew	Y - Yes N - No
E - Hazrad	L - No immediate threat, M - Immediate threat, H - Damage to private property reported

OTHER DSOD FACITILITIES				
ITEM	FACILITY	WATER SURFACE LEVEL	TIME	COMMENTS
1	Bull Retention Basin			

All DSOD facilities must have the water surface level recorded during storm patrol.

COMMENTS: ____________

DOC FAX # 626-458-6335

STORM STATUS BOARD - WEST AREA
PICKENS YARD
2008-2009 HOT SPOTS

Date: ____________________
Time Sent: ____________________

ITEM	FACILITY AND LOCATION	TIME	A	B	C	D	E	COMMENTS
1	PD 245 Inlets							
2	PD 655 Inlets - TG 535 C1							

COLUMN	INDICATE ACCORDINGLY
A - Patroled	Y - Yes N - No
B - Raining	L - Light, M - Moderate, H - Heavy
C - Flows	L - Light, M - Moderate, H - Heavy
D - Crew	Y - Yes N - No
E - Hazrad	L - No immediate threat, M - Immediate threat, H - Damage to private property reported

OTHER DSOD FACITILITIES				
ITEM	FACILITY	WATER SURFACE LEVEL	TIME	COMMENTS
1	Blanchard DB			
2	Brand DB			
3	La Tuna DB			
4	Stough DB			
5	Sunset Lower DB			

All DSOD facilities must have the water surface level recorded during storm patrol.

COMMENTS: ____________________

DOC FAX # 626-458-6335

STORM STATUS BOARD - WEST AREA
SANTA CLARITA YARD
2008-2009 HOT SPOTS

Date: ____________

Time Sent: ____________

ITEM	FACILITY AND LOCATION	TIME	A	B	C	D	E	COMMENTS
1	Whites Canyon / Bakerton Ave #28108 PD 780							
2	PD 354 (Camp Plenty)							
3	PD 1798 (Wildwind)							
4	PD 1307 (Sand Canyon)							
5	Bouquet Cyn Channel -L/B U/S Bouquet Cyn Rd at turnaround - Inspect Rail and Timber and Earthen Levee							
6	PD 2528 – Pico D/B and close gates along channel during storms ***DSOD***							
7	Hasley Canyon / Sharp Rd PD 1496							
8	San Martinez / Val Verde - Fire Structures, Pipe and Wire, and Channel							

COLUMN	INDICATE ACCORDINGLY
A - Patroled	Y - Yes N - No
B - Raining	L - Light, M - Moderate, H - Heavy
C - Flows	L - Light, M - Moderate, H - Heavy
D - Crew	Y - Yes N - No
E - Hazrad	L - No immediate threat, M - Immediate threat, H - Damage to private property reported

OTHER DSOD FACITILITIES				
ITEM	FACILITY	WATER SURFACE LEVEL	TIME	COMMENTS
1	Schoolhouse DB			
2	Wilson			

All DSOD facilities must have the water surface level recorded during storm patrol.

COMMENTS: ____________________

DOC FAX # 626-458-6335

FLOOD MAINTENANCE
SANTA CLARITA YARD - SYLMAR AREA
2008-2009 HOT SPOTS

Date: ____________________

Time Sent: ____________________

ITEM	FACILITY AND LOCATION	TIME	A	B	C	D	E	COMMENTS
1	Somberro DB							
2	Hog DB							
3	Schoolhouse DB ***DSOD***							
4	Wilson DB ***DSOD***							
5	May SPS							
6	May #1							
7	May #2							
8	Stetson DB							

COLUMN	INDICATE ACCORDINGLY
A - Patroled	Y - Yes N - No
B - Raining	L - Light, M - Moderate, H - Heavy
C - Flows	L - Light, M - Moderate, H - Heavy
D - Crew	Y - Yes N - No
E - Hazrad	L - No immediate threat, M - Immediate threat, H - Damage to private property reported

All DSOD facilities must have the water surface level recorded during storm patrol.

COMMENTS: ____

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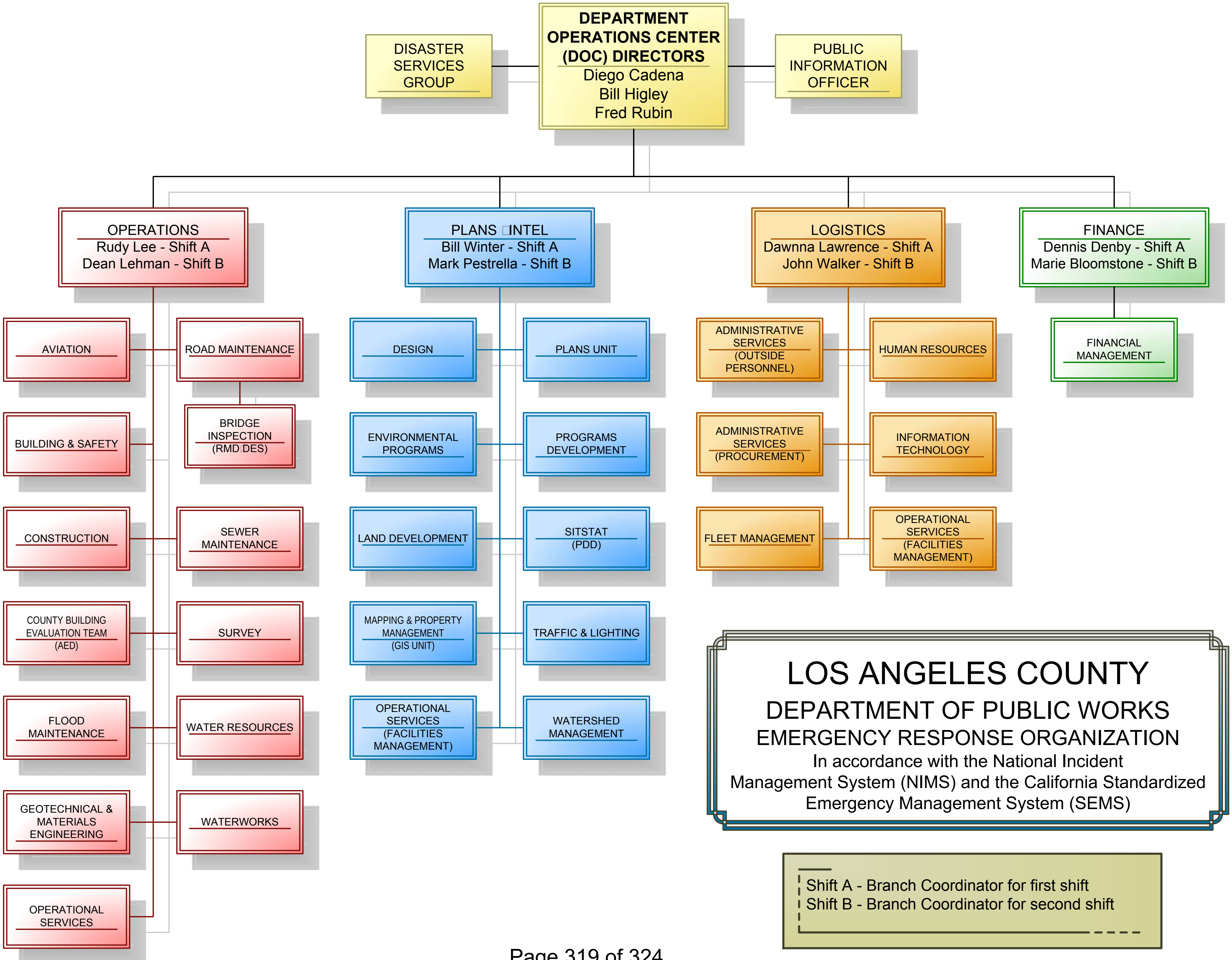
DOC FAX # 626-458-6335

Appendix R – DOC Activation – Organization Charts


DEPARTMENT OPERATIONS CENTER (DOC) DIRECTORS
Diego Cadena
Bill Higley
Fred Rubin
DISASTER SERVICES GROUP
PUBLIC INFORMATION OFFICER
OPERATIONS
Rudy Lee - Shift A
Dean Lehman - Shift B
PLANS /INTEL
Bill Winter - Shift A
Mark Pestrella - Shift B
LOGISTICS
Dawnna Lawrence - Shift A
John Walker - Shift B
FINANCE
Dennis Denby - Shift A
Marie Bloomstone - Shift B
AVIATION
ROAD MAINTENANCE
BRIDGE INSPECTION (RMD/DES)
BUILDING & SAFETY
CONSTRUCTION
SEWER MAINTENANCE
COUNTY BUILDING EVALUATION TEAM (AED)
SURVEY
FLOOD MAINTENANCE
WATER RESOURCES
GEOTECHNICAL & MATERIALS ENGINEERING
WATERWORKS
OPERATIONAL SERVICES
DESIGN
PLANS UNIT
ENVIRONMENTAL PROGRAMS
PROGRAMS DEVELOPMENT
LAND DEVELOPMENT
SITSTAT (PDD)
MAPPING & PROPERTY MANAGEMENT (GIS UNIT)
TRAFFIC & LIGHTING
OPERATIONAL SERVICES (FACILITIES MANAGEMENT)
WATERSHED MANAGEMENT
ADMINISTRATIVE SERVICES (OUTSIDE PERSONNEL)
HUMAN RESOURCES
ADMINISTRATIVE SERVICES (PROCUREMENT)
INFORMATION TECHNOLOGY
FLEET MANAGEMENT
OPERATIONAL SERVICES (FACILITIES MANAGEMENT)
FINANCIAL MANAGEMENT
LOS ANGELES COUNTY
DEPARTMENT OF PUBLIC WORKS
EMERGENCY RESPONSE ORGANIZATION
In accordance with the National Incident Management System (NIMS) and the California Standardized Emergency Management System (SEMS)
Shift A - Branch Coordinator for first shift
Shift B - Branch Coordinator for second shift

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

DOC ACTIVATION DEACTIVATION GUIDELINES FOR STORM RESPONSE

STORM CONDITIONS	ACTIVATION LEVEL	STAFFING LEVEL	LEVEL OF INTERNAL REPORTING	CEOC ACTIVATION
NONE	-0- (Zero)	NONE	-	-
• Less than 1 inch of rainfall expected in next 24 hours; localized showers. Minimal runoff expected. • Water Conservation Operations	**M** Monitoring Rainfall, Runoff and Weather	No DOC Activation • WRD	• Update DOC Director as necessary to increase level of activation.	No Activation
• **Flood Watch** - Issued by National Weather Service. • Storm Operations Center is activated. • Up to 2" of rain in a 24-hour period. • Few complaints. • Minor localized disruption to public and minor localized damage anticipated considering rainfall amount and intensities.	**ONE** Minimum Activation	• DOC Director - in communication with the DOC • CON • ITD • Dispatchers • RMD • FMD • WRD • SITSTAT Notification only for: • Branch Coordinators • DSG • GMED • PIO • SMD • WWD • FACM (As needed)	• Report from Water Resources to the DOC Director.	Potential Activation
• **Flood Warning** - Issued by National Weather Service. • Weather forecast for continuous heavy rain. • 2" to 6" of rain in 24-hour period. • Many complaints. • Many localized disruptions to public and significant local damage anticipated.	**TWO** **Mid-Level** Activation	All divisions in Level One plus – • ASD/Procurement • GMED • B & S (As needed) • M & PM • Branch Coordinators (As needed) • OSD • PIO • DSG • PDD • DOC Director- (present in DOC) • SUR • SMD • T & L (As needed) (Complaint calls) • WMD • FMG • WWD	• SITSTAT reports every four hours. • An 8 a.m. report to Board of Supervisors and/or CEOC.	Partial Activation
• **Major Storm** - • 6" or greater in 24-hour period. • Requests from cities for resources. • Significant disruptions to public and major problems anticipated.	**THREE** Full Activation	All storm response divisions.	• SITSTAT reports every four hours . • An 8 a.m. report to Board of Supervisors and/or CEOC.	**Full Activation**

NOTE: These are only guidelines for the DOC Director to determine staffing levels. Activations are event driven.

RF/10-15-08/P:STORM OPERATIONS ORIENTATION/DOC 2008 ACTIVATION-DEACTIVATION

Appendix S Equipment Training List

OJT List

Name	EMP #	Title	Location	Aeriel Lift	Arrow Board	Backhoe	Chipper	Dozers	Guardrail Straightener	Loaders	Loader Truck	Motor Graders	Pavement Grinder	Paving Machines	Pull Broom	Rollers	Rotomist Sprayer	Rubberized Crack Sealer	Sand Spreader	Clean & High Pressure	Stump Cutter	Tractors	Trailers	Trucks 1 ton to 3 Axle

Appendix T Rainfall Intensities Form

Los Angeles County Department of Public Works
Los Angeles County Flood Control District

Flood Maintenance Division
Emergency Flood Patrol

Rainfall Intensities

Station Imperial Yard Observer ____________

Date	Duration of of Rain Start - End	Time of Reading	Gauge Reading	Amount in Inches For Period	Storm	Season	24 Hr Period 7 am - 7 am	Remarks

Show under remarks : E = Emptied
RCJ/1/95