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KIER+WRIGHT

# STORMWATER POLLUTION PREVENTION PLAN

FOR

## U.S. Department of Energy
## National Nuclear Security
## Administration (NNSA)/Sandia Field Office (SFO)
## Sandia National Laboratories, California (SNL/CA)
## SNL/CA Limited Area, CA Site Landscaping Project

**RISK LEVEL 2**

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**SWPPP Preparation Date:**
December 8, 2022

**SWPPP Amendment Date:**
March 23, 2023

**Estimated Project Dates:**

| | | | |
|---|---|---|---|
| Start of Construction: | **02/01/2023** | Completion of Construction: | **12/31/2024** |

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## ABBREVIATIONS

| | | |
|---|---|---|
| AC | - | Asphalt Concrete |
| AS | - | Approved Signatory |
| ATS | - | Active Treatment System |
| Att. | - | Attachment (to the General Permit) |
| BAT | - | Best available technology (economically achievable) |
| BCT | - | Best conventional pollutant control technology |
| BMP | - | Best management practice |
| California State Water Board | - | California State Water Resources Control Board |
| CASQA | - | California Stormwater Quality Association |
| CFR | - | Code of Federal Regulations |
| CGP | - | State Board NPDES General Permit for Stormwater Discharges from Construction General Permit Activities |
| COC | - | Chain of Custody |
| CSMP | - | Construction Site Monitoring Plan |
| DOE | - | Department of Energy |
| LRP | - | Legally Responsible Person (for SWPPP implementation/activities) |
| LUP | - | Linear Underground/Overhead Project |
| MBAS | - | Methylene Blue Activated Substances |
| MS4 | - | Municipal Separate Storm Sewer System |
| N/A | - | Not applicable |
| NAL | - | Numeric action level |
| NEL | - | Numeric effluent limitation |
| NNSA | - | National Nuclear Security Administration |
| NOI | - | Notice of Intent |
| NOT | - | Notice of Termination |
| NPDES | - | National Pollutant Discharge Elimination System |
| NTESS | - | National Technology & Engineering Solution of Sandia |
| NTU | - | Nephelometric Turbidity Unit |
| PCC | - | Portland Cement Concrete |
| pH | - | Symbol for measure of degree of acidity |
| PRD | - | Permit Registration Document |
| QA/QC | - | Quality Assurance and Quality Control |
| QSD | - | Qualified SWPPP Developer |
| QSP | - | Qualified SWPPP Practitioner |

REAP - Rain Event Action Plan
§ - Referenced section of the General Permit
SDR - Sandia Delegated Representative
SFO - Sandia Field Office
SMARTS - Stormwater Multiple Application and Report Tracking System
SNL/CA - Sandia National Laboratories, California
SSC - Suspended Sediment Concentration
SWPPP - Stormwater Pollution Prevention Plan
TMDL - Total Maximum Daily Load
TOC - Total Organic Carbon
USEPA - United State Environmental Protection Agency
VOC - Volatile Organic Contaminants
WDID - Waste Discharger Identification Number

## LEGALLY RESPONSIBLE PERSON & CERTIFICATION OF SWPPP

Project Name: *SNL/CA Site Landscaping Project*

Project Number: A17546-61

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

| | |
|---|---|
| Legally Responsible Person Signature | Date |
| Dr. Daryl Hauck | 505-845-6063 |
| Legally Responsible Person Name | Telephone Number |
| US DOE/NNSA/Sandia Field Office | |
| Legally Responsible Person Title | |

## SWPPP CERTIFICATION BY QUALIFIED SWPPP DEVELOPER (QSD)

*The General Permit requires that a certified Qualified SWPPP Developer (QSD) prepares the plan to ensure water quality. This Storm Water Pollution Plan and Attachments were prepared under my direction to meet the requirements of the California Construction General Permit (State Water Resources Control Board Orders No. 2009-009-DWQ as amended by Order 2010-0014-DWQ and Order 2012-0006-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below.*

| QSD Signature | Date |
|---|---|
| | 10/27/2022 |

| QSD Name | Telephone Number |
|---|---|
| R. Michael Ebenal | 209-328-1123 |

Certificate #: 26242

QSD Qualification Details

| Title and Affiliation | Email Address |
|---|---|
| Chuck McCallum, Principal at Kier and Wright Civil Engineers and Surveyors | cmccallum@kierwright.com |

## Executive Summary

Kier + Wright, as Qualified SWPPP Developer (QSD), puts forth this Storm Water Pollution Prevention Plan (SWPPP) for the SNL/CA Site Landscaping Project at Sandia National Laboratories/California (SNL/CA), 7011 East Avenue, Livermore, California (SNL/CA). The property is owned by the U.S. Department of Energy, and managed and operated by National Technology & Engineering Solutions of Sandia (NTESS), LLC. The project proposes landscape improvements throughout SNL/CA. Per the California State Water Resources Control Board's (California State Water Board) Construction General Permit (CGP), a SWPPP is required when 1 acre or more of land is disturbed. The project site area exceeds the minimum acreage threshold of 1 acre and therefore requires SWPPP implementation. QSD has determined the sediment risk for this project, based on soil type at the site and starting and ending dates of construction, to be low (Section 3.4.1 and ***Appendix B***). Receiving water for this project is the Arroyo Seco. QSD has determined the Arroyo Seco to be a high-risk receiving water because it has the three beneficial uses of "spawn", "cold", and "migratory" (Sections 3.3 and 3.4.2 and ***Appendix B***). QSD has determined the overall risk level for the site to be Risk Level 2, based on a combination of low sediment risk and high receiving water risk (***Appendix B***). As such, QSD has delineated a variety of Best Management Practices (BMPs) to be employed during project construction to reduce or eliminate pollutants in stormwater runoff or any other discharges from the Project site. In addition to site-specific BMPs, this SWPPP report provides instruction for on site monitoring. Electronic copies of required documentation such as inspection reports, REAPs, annual report documentation, etc. shall be submitted to NTESS Sandia Delegated Representative via Newforma.

# SECTION 1 Introduction

## 1.1 General SWPPP Purpose

A site-specific Storm Water Pollution Prevention Plan (SWPPP1) is needed for most construction activities/projects that disturb one (1) acre or more of land to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated With Construction and Land Disturbance Activities (General Permit) issued by the California State Water Resources Control Board (California State Water Board). This Order No. 2009-0009-DWQ (i.e. amended by 2010-0014-DWQ & 2012-0006-DWQ) was adopted by the California State Water Board on September 2, 2009 and became effective July 1, 2010.

This SWPPP has been prepared to comply with the General Permit, a copy of which is included as ***Appendix A*** and to be kept on site with the SWPPP.

Based on the details of the SNL/CA Site Landscaping Project and the requirements of the General Permit, the project's Legally Responsible Person (LRP) has determined that a site-specific SWPPP is required for this project.

A Qualified SWPPP Developer (QSD) has prepared the SWPPP to meet the requirements of the General Permit per the determined Risk Level. The SWPPP shall be implemented when a construction project begins under the guidance of the LRP by a Qualified SWPPP Practitioner (QSP). During construction, the SWPPP shall be referred to frequently and amended by a QSD, as necessary. The contractor is responsible for providing a certified Qualified SWPPP Practitioner (QSP).

## 1.2 Terms and Definitions

All command references (e.g. "shall", "must"), whether explicitly stated or implied, are to the "Discharger"[2], and shall be read as "The Discharger shall," unless otherwise noted.

All terms and acronyms shall be as defined in the General Permit, unless noted otherwise.

Relevant references to sections of the General Permit are indicated in parenthesis and preceded by the section symbol "§."

## 1.3 SWPPP Objectives

The SWPPP is designed to address the following specific objectives (§XIV.A.):

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

[1] All abbreviations used in this SWPPP are as used in the General Permit and summarized in Section 8 of the SWPPP.

[2] The project LRP has ultimate responsibility per the General Permit for proper SWPPP development and implementation to meet the requirements of the General Permit. However, LRP has hired a QSD and will hire a QSP via contractor to execute the development of the plan and the SWPPP.

2. Where not otherwise required to be under a Regional Water Board permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;
3. Site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard;
4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and
5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

Though not called out as explicit SWPPP objectives in the General Permit, the following are two additional objectives of the SWPPP:

6. Identify post-construction BMPs, which are those measures to be installed during construction but intended to reduce or eliminate pollutants after completed construction (required for all site per §XIII.B).
7. Identify and provide methods to implement BMP inspection, visual monitoring, Rain Event Action Plans (REAPs), and the Construction Site Monitoring Program (CSMP) requirements to comply with the General Permit.

To demonstrate compliance with requirements of the General Permit, the SWPPP includes information that supports the conclusions, selections, use, and maintenance of BMPs (§XIV.B.).

# SECTION 2 SWPPP Requirements

## 2.1 Permit Registration Documents (§ II.B)

Required Permit Registration Documents (PRDs) shall be submitted to the California State Water Board via the Stormwater Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP), or authorized personnel (i.e., Approved Signatory) under the direction of the LRP. The project specific PRDs include the following:

- Notice of Intent (NOI)
- Risk Assessment
- Site Maps
- SWPPP
- Annual Fee
- Signed Certification Statement

The appropriate annual fee has been mailed to the California State Water Board. All other PRDs shall be submitted electronically by the LRP[3] or the LRP's Approved Signatory (AS) via the California State Water Board's SMARTS webpage.

The annual fee shall be mailed no later than seven (7) days prior to the commencement of construction activities. PRDs shall be submitted prior to the commencement of construction activities. Coverage under the General Permit has not been obtained until the PRDs and annual fee are received and a Waste Discharge Identification (WDID) number is assigned and sent by SMARTS.

Submitted PRDs, as well as confirmation of the project's WDID are included in ***Appendix B*** of this SWPPP.

## 2.2 SWPPP Availability and Implementation

The QSP shall make the SWPPP available at the construction site during working hours while construction is occurring and upon request by a State or Municipal inspector. By contract, the QSP and contractor is responsible for executing the SWPPP as part of their work. When the original SWPPP is retained by a crewmember in a construction vehicle and not currently at the construction site, current copies of the BMPs and map/drawing with shall be left with the field crew, and the original SWPPP shall be made available via a radio/telephone request (§XIV.C.).

The SWPPP shall be implemented by the QSP concurrently with the start of ground disturbing activities.

[3] Consult the General Permit, which has specific requirements for the various responsible parties, for clarification.

### 2.3 SWPPP Amendments/Changes to Permit Coverage

Ensure that a SWPPP for all traditional project sites is developed and amended or revised by a QSD (§XIV.A.). A QSD is a professional who prepares SWPPP documents and meets California State Water Board certification requirements as set forth in the General Permit.

The discharger may reduce or increase the total acreage covered under the General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to the General Permit, is added to the site (§II.C.1). Within thirty (30) days of change in (total) disturbed acreage for the project (i.e., project scope change), revised PRDs, including any appropriate SWPPP revisions and certification of new owner notification, shall be electronically filed in accordance with requirements of the General Permit (§II.C.2).

Coverage shall be continued under the General Permit for any parcel that has not achieved Final Stabilization, as clarified later in this report (§II.C.3). The new owner of any transferred parcel under this SWPPP shall become the LRP to that parcel, and the new LRP shall be informed that he or she must submit PRDs to meet the General Permit requirements and continue with construction on that parcel (§II.C.4).

Any amendments to this SWPPP shall be noted and dated in the SWPPP – Amendment Log (***Appendix C***) per the General Permit (§VII.B.6). The text of the Amendments shall also be included in ***Appendix C,*** and the corresponding text in the original SWPPP shall be struck through and marked as “superseded” and/or the original SWPPP pages replaced. Any other updates to the PRDs shall be included in ***Appendix D***.

### 2.4 Retention of Records

Per the General Permit, any and all SWPPP-related records and reports, or at least a paper or electronic copy thereof, shall be retained onsite for at least three (3) years from the date generated or date submitted, whichever is last (§IV.G.1, §I.J.69, §XVI.C, Att. C, D, E §I.9). Such records and reports shall include, but are not limited to, any and all monitoring information and the annual report.

These records shall be available at the construction site at least until construction is completed.

Records shall be kept with the SWPPP in the construction trailer onsite with a reproduction method readily available to make copies if so requested by the State or Municipal regulatory authorities.

### 2.5 Required Non-Compliance Reporting

Discharges from the site in violation of the General Permit or other non-compliance activities shall be properly documented and reported to the California State Water Board. Specific discharge prohibitions are clarified in §III of the General Permit and include, for example, any discharges that violate applicable Basin Plans or statewide water quality control plans, debris from construction activities, and contaminated soils.

Reporting shall be done via the SMARTS system.

The SNL/CA Site Landscaping Project is categorized as a **Risk Level 2** project, and thusly will be required to comply with the following items:

- Self-reports of any discharge non-compliance;
- Report of discharges which contain a hazardous substance equal to or in excess of reportable quantities established in 40 CFR §117.3 and 302.4, unless a separate NPDES permit has been issued to regulate those discharges; and
- Any discharge outside the pH NAL of 6.5-8.5 and/or with a turbidity NAL higher than 250 NTU.
- In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers shall electronically submit all storm event sampling results to the California State Water Board no later than 10 days after the conclusion of the storm event.

Regional Boards have the authority to require the submittal of an NAL Exceedance Report. Further details of the required reporting are given in Section 6.9 of this SWPPP.

Advance notice of potential non-compliance is required to be given to the local stormwater authorities including the City of Livermore and the San Francisco Bay Regional Water Quality Control Regional Board (§IV.K).

***Attachment 3*** is allotted for collection of any documentation generated to document non-compliance of the project with the General Permit. Field inspection forms are included as ***Appendix G***. Care should be taken to include all information required by the General Permit.

### 2.6 Annual Report

A project-specific Annual Report of SWPPP implementation shall be prepared, certified, and electronically submitted via the SMARTS website no later than September 1st of each year. Annual Reports shall include, at a minimum, a summary of any and all:

- Date, time, place, and name(s) of the inspector(s) for sampling, inspections, and field measurement activities;
- Visual observation and sample collection exception records;
- Violations of the General Permit;
- Corrective actions and compliance activities, including those not implemented;
- Sampling and analysis results including laboratory reports, analytical methods, and reporting limits and chain-of-custody forms (for Risk Levels 2);
- Training documentation of all personnel responsible for General Permit compliance activities.

***Attachment 4*** of this SWPPP has been allotted for retention of copies of the Annual Reports. Since the Annual Report includes copies of data from other attachments, redundant information will be removed upon inclusion of the Annual Reports.

## 2.7 Notice of Termination

Certain conditions must be met to terminate a project's coverage under the General Permit. To demonstrate compliance with these conditions, a Notice of Termination (NOT) shall be filed via the SMARTS website within ninety (90) days of when construction is complete or ownership has been transferred.

The NOT certifies that the General Permit requirements for termination and final stabilization, which include the following, have been met (§II.D.1):

1. The site will not pose any additional sediment discharge risk than it did prior to construction activity (i.e., has reached "final stabilization").
2. There is no potential for construction-related stormwater pollutants to be discharged into site runoff.
3. Construction materials and wastes have been disposed of properly.
4. Post-construction stormwater management measures, in demonstrated compliance with §XIII, are installed.
5. A long-term maintenance plan of post-construction measures that is designed for a minimum of five (5) years and describes procedures to ensure that the measures are adequately maintained has been developed.
6. All construction related equipment, materials and any temporary BMPs no longer needed are removed from the site.

Along with the NOT, current photos of the construction site, a final site map showing location and direction from which photos were taken, and a certification that final stabilization conditions are satisfied shall also be filed. The site shall meet the General Permit coverage termination requirements by one of the following methods:

- 70% final cover method; or
- RUSLE/RUSLE2 method; or
- A custom method.

# SECTION 3 Project Information

## 3.1 Project and Site Description – SNL/CA Site Landscaping Project

The project is for landscape improvements across SNL/CA. The SNL/CA Site Landscaping Project is located at 7011 East Avenue, Livermore, CA 94550 (see Figure 1 – Vicinity Map). Figure 3 depicts the Erosion Control Plan.

As a traditional construction project, the project has the potential to generate pollutants that can then be mobilized to receiving waters. The project SWPPP has been developed to identify potential pollutants and their sources and minimize the impact of the project construction on the water quality of the receiving waters. The SWPPP includes various Best Management Practices (BMPs) to accomplish the stated goals.

## 3.2 Project Site Soils

A Geotechnical Investigation Report was not required for this project.

## 3.3 Project Rainfall, Drainage, and Receiving Waters

The Project Site has a mean annual precipitation of 13.34 inches. Typical of the Mediterrean climate in the San Francisco Bay Area, rainfall occurs generally in the fall, winter, and early spring months, October through April. Rainfall is typically negligible in the summer months.

The project currently drains to a private onsite storm drain system that outfalls to the Arroyo Seco, which then flows into the Arroyo Las Positas.

Although the Arroyo Seco is not listed on the California State Water Board's 303d list for impaired waters, the Arroyo Las Positas is listed as impaired for eutrophication (nutrients), diazinon (pesticides), urban runoff, and storm sewers. The Arroyo Las Positas is not impaired for sediment.

Based on a preivous Geotechnical Investigation Report, groundwater was not encountered within the maximum depth of exploration of fifty feet below the surface on the Project Site.

## 3.4 Sediment and Receiving Water Risk Determination

The General Permit requires (§VIII and Appendix 1) a determination of the onsite sediment and receiving waters risk of erosion.

The following sections detail the determination of the project's sediment and receiving waters risk level. The General Permit allows for three different levels of risk (1, 2, 3), which then determine the level and types of required BMPs and level and types of sampling and monitoring.

### 3.4.1 Sediment Risk

Based on the RUSLE method originally provided by the US Department of Agriculture and widely used in the United States, the sediment risk has been determined to be MEDIUM. The following table summarizes the RUSLE factors used in this determination. Please see ***Appendix B*** for the Risk Determination Support Documentation.

**Table 1 - RUSLE Calculation**

| ID | Symbol | Value |
|---|---|---|
| Rainfall/runoff | R | 70.01 |
| Soil erodibility | K | 0.37 |
| Length and steepness of slope | LS | 0.82 |
| Cover factor | C | 1.0 |
| Management operations and support practices | P | 1.0 |
| Rate of sheet and rill erosion | A | 21.24 |

### 3.4.2 Receiving Waters Risk

The receiving waters risk is determined to be HIGH, since the project's receiving water bodies have all three of the designated beneficial uses of "spawn", "cold", and "migratory". Please see ***Appendix B*** for the Risk Determination Support Documentation.

### 3.4.3 Overall Risk

Based on sediment risk of MEDIUM, and a receiving waters risk of HIGH, the project has been determined to be at Risk Level 2.

### 3.4.4 Specific Risk Requirements

As a Risk Level 2 project, the specific risk requirements can be found in ***Appendix A*** – Risk Level 2 requirements. Within ***Appendix A*** is the Construction General Permit and Attachment D of that permit, which specifies the Risk Level 2 requirements. This SWPPP has been prepared to meet the requirements in Attachment D. The requirements for this risk level are summarized as follows:

- Comply with narrative effluent standards to not release hazardous substances and to minimize pollutant discharges through BAT/BCT.
- Implement at least the minimum good site management BMPs for construction materials, waste management, vehicle storage and maintenance, and landscape materials.
- Assess potential pollutant sources.
- Implement BMPs for control of non-stormwater discharges, erosion, sediment, run-on, and run-off, including at least the minimum measures prescribed.
- Develop and implement effective inspection, maintenance, and repair procedures.
- Develop and implement a Construction Site Monitoring Program.
- Include a description of Rain Even Action Plans (REAPs) for all phases of construction
- Monitor and report NALs

The details of how these requirements will be met are included in the remainder of this SWPPP.

### 3.5 Stormwater Run-On From Offsite Areas

Run-on to the site shall be diverted away from all disturbed areas, per the BMPs described in the next section.

### 3.6 Potential Construction Site Pollutant Sources

The project will entail mass grading, as well as transportation, storage, and use of standard construction materials.

Per the General Permit, an assessment is required of construction materials and activities and the potential pollutants they may generate (Att. C,D,E §B.5). Contained in ***Appendix I***, Table I.1, and following is a list of possible construction materials that will be used and activities that will be performed that will have the potential to contribute pollutants, other than sediment, to stormwater runoff. The BMPs that will be implemented to control these potential pollutants are listed in Section 4 and attached as Attachment 1.

- Demolition and removal of existing materials.
- Asphalt Concrete (AC) and related materials.
- Portland Cement Concrete and related materials.
- Recycled base rock and related materials.
- Building construction products and related materials.
- Dewatering operations (if applicable).
- Vehicle fluids, including oil, grease, petroleum and coolant.
- Sanitary and septic wastes.
- Paint, sealants, solvents, thinners, acids and adhesives.
- Landscaping and related materials.
- General construction waste and litter.

Project BMPs described in the next section have been developed to address these potential pollutants and sources.

### 3.7 Non-Stormwater Discharges

Non-stormwater discharges consist of discharges which do not originate from precipitation events. The General Permit provides allowances for specified non-stormwater discharges that do not cause erosion or carry other pollutants.

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit and listed in the SWPPP, or authorized under a separate NPDES permit, are prohibited.

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

- Discharges that do not cause or contribute to a water quality standard violation;
- Discharges that do not violate other provision of the General Permit;
- Discharges that are not prohibited by the applicable Basin Plan;
- Discharges that do not contain toxic pollutants in toxic amounts or other significant quantities of pollutants;
- Discharges that meets applicable NALs;

These authorized non-stormwater discharges will be managed with the stormwater and non-stormwater BMPs described in Section 3 of this SWPPP and will be minimized by the QSP.

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

- Vehicle and equipment cleaning, fueling and maintenance operations;
- Vehicle and equipment wash water, including concrete washout water;
- Slurries from concrete cutting and coring operations, PCC grinding or AC grinding operations;
- Slurries from concrete or mortar mixing operations;
- Slurries from drilling or boring operations;
- Blast residue from high-pressure washing of structures or surfaces;
- Wash water from cleaning painting equipment;
- Runoff from dust control applications of water or dust palliatives;
- Sanitary and septic wastes;
- Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, cure compounds, etc.

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

Discharges of construction materials and wastes, such as fuel or paint, resulting from dumping, spills, or direct contact with rainwater or stormwater runoff, are also prohibited.

### 3.8 Construction Schedule

The SNL/CA Site Landscaping Project started in August 2022 and originally qualified for a SWPPP waiver, as the expected completion date was end of October 2022. However, the SNL/CA Site Landscaping Project ran into challenges and was not be completed by the original end date. Due to the need to extend the duration, the Project no longer qualifies for a waiver. Therefore a full SWPPP is now required. The Project is anticipated to be completed by December 2024.

# SECTION 4 Best Management Practices

This section details BMPs that are required and/or otherwise determined to be necessary to meet the General Permit requirements. The subsections are used to delineate certain types of BMPs (e.g., erosion and sediment control, post-construction). However, some of the management and structural BMPs employed will serve multiple functions. For instance, the first subsection below details good site management BMPs for potential pollutants, but other site management BMPs are discussed in other subsections.

The QSP shall be thoroughly familiar with this entire section and the referenced BMP Fact Sheets in ***Attachment 1*** prior to the start of construction and ensure adequate implementation of these BMPs throughout project construction. A schedule of anticipated BMP implementation is given at the end of the section.

## 4.1 Good Site Management of Potential Pollutants

The following table includes the minimum required Good Site Management BMPs in the General Permit that shall thus be implemented with this SWPPP. References are to sections in the Attachments C,D, and E of the General Permit. Several of these BMPs have been implemented with development of Section 3.5 above. These BMPs should continue to be employed during construction to verify that the nature and scope of potential pollutants and construction materials (sources) are adequately considered in BMP implementation.

**Table 2 - Minimum Good Site Management BMPs**

| Permit § | Prescribed BMP | CASQA BMP Sheet(s) | Implementation directions |
|---|---|---|---|
| §B.5.a | Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site. | N/A | Contractor's QSP to implement an on-going plan during construction. |
| §B.5.b | Consider the degree to which pollutants associated with identified materials may be exposed to and mobilized by contact with stormwater. | N/A | Contractor's QSP to implement an on-going plan during construction. |
| §B.5.c | Consider direct and indirect pathways that pollutants may be exposed to stormwater or authorized non-stormwater discharges, including an assessment of past spills or leaks, non-stormwater discharges, and discharges from adjoining areas. | N/A | Contractor to identify and evaluate potential pathways and note on Erosion Control Plan Sheet or Site Plan. |
| §B.5.d | Ensure the retention of sampling, visual observation, and inspection records. | N/A | Contractor to maintain records on-site. Contractor to upload to SMARTS if violation has occurred. |

| Permit § | Prescribed BMP | CASQA BMP Sheet(s) | Implementation directions |
|---|---|---|---|
| §B.5.e | Ensure the effectiveness of existing BMPs to reduce or prevent pollutants in stormwater discharges and authorized non-stormwater discharges | N/A | Contractor's QSP to inspect BMP's for effectiveness. QSP to recommend adjustments to QSD for updating of Erosion Control Plans. |
| §B.1.a | Conduct inventory of products used. | WM-1 | Contractor to identify inventory with all sub-contractors. |
| §B.1.b | Cover/berm loose construction materials. | WM-3 | Contractor to monitor all sub-contractors for compliance. |
| §B.1.c | Store chemicals in watertight containers. | WM-4<br>WM-6 | Contractor to monitor all sub-contractors for compliance. |
| §B.1.d | Minimize exposure of construction materials to precipitation. | WM-3 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.a | Prevent disposal of rinse/wash waters or materials on impervious or pervious site surfaces or into the stormdrain system. | WM-10<br>NS-3 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.b | Ensure secondary containment of sanitation facilities to prevent discharges of pollutants to stormwater drainage/receiving waters. | WM-9 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.c | Clean/replace sanitation facilities and inspect them regularly for leaks/spills. | WM-9 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.d | Cover waste disposal containers at the end of every business day and during a rain event. | WM-3 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.e | Prevent discharges from waste disposal containers to the stormdrain system/receiving waters. | WM-5<br>WM-6 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.f | Contain/securely protect stockpiled waste material from wind and rain at all times unless actively being used. | WM-3 | Contractor to monitor all sub-contractors for compliance. |
| §B.2.g | Implement procedures that effectively address hazardous/non-hazardous spills. | WM-4 | Contractor to monitor and ensure training and education including sub-contractors. |
| §B.2.h | Develop spill response and implementation element prior to commencement of construction activities. | WM-4 | Contractor to develop spill response plan and educate all sub-contractors. Spill kits shall be kept on-site and noted on site plan in a clear visible area at the job-site. |
| §B.2.i | Ensure containment of concrete washout areas and other washout areas that may contain additional pollutants. | WM-8<br>NS-12<br>NS-13 | Contractor to designate tire washing location on Erosion Control Plan and ensure compliance by all subcontractors. |
| §B.3.a | Prevent oil, grease, or fuel oil from leaking into ground, stormdrains, or surface waters. | NS-8<br>NS-9 | Contractor to monitor all sub-contractors for compliance. |

| Permit § | Prescribed BMP | CASQA BMP Sheet(s) | Implementation directions |
|---|---|---|---|
| §B.3.b | Place all equipment/vehicles to be fueled/maintained in a designated area fitted with appropriate BMPs. | NS-8<br>NS-9<br>NS-10 | Contractor to develop a designate area and mark on site plan. Contractor to educate all sub-contractors of location. |
| §B.3.c | Clean leaks immediately and dispose of leaked materials properly. | WM-4 | Contractor to monitor all sub-contractors for compliance. |
| §B.3.6 | Implement BMPs to control air deposition of site materials and from site operations. | WE-1<br>NS-9<br>WM-3 | Dust control shall be implemented for this site. Contractor to monitor grading operations for compliance. |
| §B.4.a | Contain stockpiled landscape materials such as mulches and topsoil when not actively being used. | WM-3 | Contractor to monitor landscaping contractor for compliance. |
| §B.4.b | Contain fertilizers and other landscape materials when not actively being used. | WM-1 | Contractor to monitor landscaping contractor for compliance. |
| §B.4.c | Discontinue application of any erodible landscape material within two (2) days before a forecasted rain event or during periods of precipitation. | WM-1 | Contractor to monitor landscaping contractor for compliance. |
| §B.4.d | Apply erodible landscape material at quantities and application rates according to the manufacturer's recommendations or based on written specifications by knowledgable and experienced field personnel. | WM-2 | Contractor to monitor landscaping contractor for compliance. |
| §B.4.e | Stack erodible landscape material on pallets and cover or store such materials when not being used or applied. | WM-1 | Contractor to monitor landscaping contractor for compliance. |
| §B.7 | Document all housekeeping BMPs and REAPs in accordance with the nature/phase of the construction project. | N/A | Contractor to maintain documents on-site. |

For further details of implementing these BMPs, consult the respective BMP Fact Sheets in ***Attachment 1***.

### 4.2 Erosion Control and Sediment Control

The following table includes the minimum required Erosion and Sediment Control BMPs in the General Permit that thus shall be implemented with this SWPPP. References are to sections in the Attachments C,D, and E of the General Permit.

**Table 3 - Minimum Erosion and Sediment Control BMPs**

| Permit § | Prescribed BMP | CASQA BMP Sheet(s) | Implementation directions |
|---|---|---|---|
| §D.1 | Implement effective wind erosion control. | WE-1 | Cover and dampen soil as required. |
| §D.2 | Provide effective soil cover for inactive areas and all finished slopes, open space, utility backfill, and completed lots. | EC-3<br>EC-7 | Contractor to designate stock-pile location and ensure compliance. |
| §D.3 | Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, consider use of plastic materials resistant to solar degradation. | WM-3 | Implement with BMP selection/ordering. |
| §E.1 | Describe/illustrate BMPs to control the site perimeter and stabilize construction entrances/exits against erosion and sediment discharges to the site. | SE-10 | Fiber Rolls, and gravel access road shall be implemented per the Erosion Control Plan. Contractor to modify as necessary and indicate tire wash out location. |
| §E.4 | Apply linear sediment controls along toe of slope, face of slope, and at grade breaks of exposed slopes to comply with specified sheet flow lengths. | SE-5 | Contractor to monitor all sub-contractors for compliance. |
| §E.6 | Ensure that all stormdrain inlets and perimeter controls, runoff control BMPs, and pollutant control at entrances/exits are maintained and protected from activities that reduce their effectiveness. | SE-10 | Contractor to monitor all sub-contractors for compliance. |

For further details of implementing these BMPs, consult the respective BMP Fact Sheets in ***Attachment 1***.

### 4.3 Non-Stormwater and Materials Management

The following table includes the minimum required Non-Stormwater Management BMPs in the General Permit that thus shall be implemented with this SWPPP. References are to sections in the Attachments C,D, and E of the General Permit.

**Table 4 - Minimum Non-Stormwater Management BMPs**

| Permit § | Prescribed BMP | CASQA BMP Sheet(s) | Implementation directions |
|---|---|---|---|
| §C.1 | Describe non-stormwater discharges to receiving waters. | N/A | Completed in Section 3.7 of the SWPPP. |
| §C.2 | Wash vehicles in such a manner as to prevent non-stormwater discharges to surface waters or MS4 drainage systems. | NS-8 | Contractor to monitor all sub-contractors for compliance. |

For further details of implementing these BMPs, consult the respective BMP Fact Sheets in ***Attachment 1***.

### 4.4 Run-On/Run-Off Controls

All run-on and run-off within the site shall be effectively managed to meet the General Permit requirements (Att. C,D,E §F). The main run-on control for this project shall be rerouting of offsite flows around the project site. Run-off controls are specified in the various other BMPs in this section (e.g., EC-9).

### 4.5 Post-Construction Stormwater Management Measures

The project site is within the City of Livermore, subject to the Bay Area Regional NPDES Permit for post-construction stormwater quality management. Therefore, post-construction stormwater management BMPs are required of the built project. These post-construction BMPs fall into three (3) separate categories: site controls, source controls, and treatment controls. The site controls and source controls are implemented mostly in the design phase of the project, whereas the treatment controls are structural BMPs that must be installed with the project construction.

### 4.6 Schedule for BMP Implementation

The following table summarizes the specified BMPs and indicates the schedule for when they shall be installed/begun and removed/finished. The maintenance schedule for these BMPs shall be according to the respective BMP Fact Sheets or as otherwise prescribed in this report. In order to be effective, some BMPs must be installed before the site is disturbed.

**Table 5 - Schedule of BMP Implementation**

| BMP ID | BMP Description | Start Date/Phase | Finish Date/Phase |
|---|---|---|---|
| SE-5 | Fiber Roll | 02/01/2023 | 12/31/2024 |
| SE-6 | Gravel Bag Berm | 02/01/2023 | 12/31/2024 |
| SE-7 | Street Sweeping & acuuming | 02/01/2023 | 12/31/2024 |
| SE-8 | Sandbag Barrier | 02/01/2023 | 12/31/2024 |
| SE-10 | Storm Drain Inlet Protection | 02/01/2023 | 12/31/2024 |
| WE-1 | Wind Erosion Control | 02/01/2023 | 12/31/2024 |
| NS-1 | Water Conservation Practices | 02/01/2023 | 12/31/2024 |
| NS-3 | Paving and Grinding Operations | 02/01/2023 | 12/31/2024 |
| NS-7 | Potable Water/Irrigation | 02/01/2023 | 12/31/2024 |
| NS-8 | Vehicle and Equipment Cleaning | 02/01/2023 | 12/31/2024 |
| NS-9 | Vehicle and Equipment Fueling | 02/01/2023 | 12/31/2024 |
| NS-10 | Vehicle & Equipment Maintenance | 02/01/2023 | 12/31/2024 |
| NS-12 | Concrete Curing | 02/01/2023 | 12/31/2024 |
| NS-13 | Concrete Finishing | 02/01/2023 | 12/31/2024 |

| BMP ID | BMP Description | Start Date/Phase | Finish Date/Phase |
|---|---|---|---|
| WM-1 | Material Delivery and Storage | 02/01/2023 | 12/31/2024 |
| WM-2 | Material Use | 02/01/2023 | 12/31/2024 |
| WM-3 | Stockpile Management | 02/01/2023 | 12/31/2024 |
| WM-4 | Spill Prevention and Control | 02/01/2023 | 12/31/2024 |
| WM-5 | Solid Waste Management | 02/01/2023 | 12/31/2024 |
| WM-6 | Hazardous Waste Management | 02/01/2023 | 12/31/2024 |
| WM-8 | Concrete Waste Management | 02/01/2023 | 12/31/2024 |
| WM-9 | Sanitary/Septic Waste Management | 02/01/2023 | 12/31/2024 |
| WM-10 | Liquid Waste Management | 02/01/2023 | 12/31/2024 |
| EC-1 | Scheduling | 02/01/2023 | 12/31/2024 |
| EC-3 | Hydraulic Mulch | 02/01/2023 | 12/31/2024 |
| EC-6 | Straw Mulch | 02/01/2023 | 12/31/2024 |
| EC-7 | Geotextiles and Mats | 02/01/2023 | 12/31/2024 |
| EC-15 | Soil Preparation/Roughening | 02/01/2023 | 12/31/2024 |

# SECTION 5 BMP Inspection, Maintenance, and Rain Event Action Plans

## 5.1 BMP Inspection and Maintenance

BMPs that need maintenance to operate effectively should be identified (Att. C,D,E §G.2). BMPs should be inspected at frequencies required by their manufacturers, at least weekly on a routine basis and at least daily during extended storm events (Att. C,D,E §G.2). Repairs or design changes to BMPs shall be implemented within 72 hours of identifying failures or other shortcomings and completed as soon as possible (Att. C,D,E §G.3).

The following table summarizes the inspection and maintenance requirements of the planned BMPs for the project. The inspection and maintenance schedule prescribed shall be followed by the QSP.

**Table 6 - Schedule of BMP Implementation**

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| SE-5 | Fiber Roll | Prior to forecast rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Repair or replace torn, split, unraveling, or slumping fiber rolls<br>• Sediment should be removed from rolls regularly<br>• Ensure fiber rolls are secured properly (i.e. use of weighted fiber rolls or staking of non-weighted fiber rolls) |
| SE-6 | Gravel Bag Berm | Inspect weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events. | • Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.<br>• Reshape or replace gravel bags as needed.<br>• Repair washouts or other damage as needed.<br>• Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.<br>• Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area. |
| SE-7 | Street Sweeping and Vacuuming | Prior to forecast rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Points of ingress and egress inspected daily while actively in use<br>• When tracked or spilled sediement is observed outside of construction limits<br>• Do now sweet any unkown substance or object<br>• Adjust brooms frequently<br>• Properly dispose of sweeper wastes at an approved dumpsite after sweeping |

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| SE-8 | Sandbag Barrier | Inspect weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events. | • Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.<br>• Reshape or replace as needed.<br>• Repair washouts or other damage as needed.<br>• Sediment that accumulates behind the BMP should be removed with the accumulation reaches one-third of the barrier height. |
| SE-10 | Storm Drain Inlet Protection | Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Filter fabric fences.<br>• Gravel filters.<br>• Remove accumulated sediment.<br>• Remove the storm drain inlet protection once the drainage area is stabilized. |
| WE-1 | Wind Erosion Control | Inspect and verify that all activity-based BMPs are in place prior to commencement of activities. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Check area protected to ensure cover.<br>• Most dust control measures require frequent, often daily or multiple times a day, attention. |
| NS-1 | Water Conservation Practices | Inspect and verify that activity based BMPs are in place prior to commencement of authorized non-stormwater discharges. | • Repair water equipment (water trucks, reservoirs, irrigation systems, hydrant connections) as needed to prevent unintended discharges.<br>• Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring. |
| NS-3 | Paving and Grinding Operations | Inspect and verify that activity based BMPs are in place prior to commencement of paving and grinding operations. Inspect prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Sample stormwater runoff required by General Permit.<br>• Keep ample supplies of drip pans or absorbent materials onsite.<br>• Inspect and maintain machinery regularly to minimize leaks and drips. |

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| NS-7 | Potable Water/Irrigation | Inspect and verify that all activity-based BMPs are in prace prior to commencement of activties. Prior to forecast rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.<br>• Repair broken water lines as soon as possible<br>• Inspect irrigated areas regularly for signs of erosion and/or discharge. |
| NS-8 | Vehicle and Equipment Cleaning | Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Inspection and maintenance is minimal, although berm repair may be necessary.<br>• Monitor employees and subcontractors to ensure appropriate practices are being implemented.<br>• Inspect sump and remove liquid and sediment as needed.<br>• Prohibit employees and subcontractors from washing personal vehicles and equipment onsite. |
| NS-9 | Vehicle and Equipment Fueling | Inspect daily. | • Leaks should be repaired immediately or problem vehicles and equipment should be removed from the project site.<br>• Keep ample supplies of spill cleanup materials onsite.<br>• Immediately cleanup spills and properly dispose of contaminated soil and cleanup materials. |
| NS-10 | Vehicle and Equipment Maintenance | Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Keep ample supplies of spill cleanup materials onsite.<br>• Maintain waste fluid containers in leak proof condition.<br>• Leaks should be repaired immediately or problem vehicles and equipment should be removed from the project site.<br>• Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed. |

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| NS-12 | Concrete Curing | Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect activity-based BMPs prior to commencement of curing.<br>• Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.<br>• Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.<br>• Inspect cure containers and spraying equipment for leaks. |
| NS-13 | Concrete Finishing | Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect activity-based BMPs prior to commencement of curing.<br>• Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Sample non-stormwater discharges and stormwater runoff that contacts uncured and partially cured concrete as required by the General Permit.<br>• Sweep or vacuum up debris from sandblasting at the end of each shift.<br>• Remove and contain waste from containment structures and from general work area at the end of each work shift. |
| WM-1 | Material Delivery and Storage | Inspect and verify that all activity-based BMPs are in place prior to commencement of activties. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Keep ample supplies of spill cleanup materials near the storage area.<br>• Keep storage areas clean, well organized, and equipped with ample cleanup supplies appropriate for materials being stored.<br>• Repair and replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function. |
| WM-2 | Materials Use | Inspect and verify that all activity-based BMPs are in place prior to commencement of activties. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Maintenance of this best management practice is minimal.<br>• Spot check employees and subcontractors throughout the job to ensure appropriate practices are being employed. |

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| WM-3 | Stockpile Management | Inspect and verify that all activity-based BMPs are in place prior to commencement of activties. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Repair and/or replace perimeter controls and covers as needed. |
| WM-4 | Spill Prevention and Control | Inspect and verify that all activity-based BMPs are in place prior to commencement of activties. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect BMPs subject to non-stomwater discharge daily while non-stormwater discharges occur.<br>• Keep ample supplies for spill cleanup materials onsite.<br>• Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite. |
| WM-5 | Solid Waste Management | Inspect and verify that all activity-based BMPs are in place prior to commencement of activities. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Inspect construction waste area regularly.<br>• Arrange for regular waste collection. |
| WM-6 | Hazardous Waste Management | Inspect and verify that all activity-based BMPs are in place prior to commencement of activities. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Hazardous waste should be collected regularly.<br>• A foreman or a construction supervisor should monitor onsite hazardous waste storage and disposal procedures.<br>• Keep storage areas clean, well organized, and equipped with ample cleanup supplies appropriate for materials being stored.<br>• Perimeter controls, containment structures, covers and liners should be repaired or replaced as needed to maintain proper function.<br>• Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site. |

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| WM-8 | Concrete Wash Management | Inspect and verify that all activity-based BMPs are in place prior to commencement of activities. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Temporary concrete washout facilites should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilites. Maintaining temporary concrete washout facitlies should include removing and disposing of hardened concrete and returning the facilties to functional condition. Hardened concrete materials should be removed and disposed of.<br>• Washout facilites should be cleaned, or new facilties must be constructed and ready for use once the washout is 75% full. |
| WM-9 | Sanitary/Septic Waste Management | Inspect and verify that all activity-based BMPs are in place prior to commencement of activities. Prior to forecasted rain, daily during rain events, after rain events. Weekly during rainy season and every two weeks during non-rainy season. | • Arrange for regular waste collection.<br>• If high winds are expected, portable sanitary facilites must be secured with spikes or weighted down to prevent over turning. |
| WM-10 | Liquid Waste Management | Inspect and verify that all activity-based BMPs are in place prior to commencement of activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and on two-week intervals in the non-rainy season to verify continued BMP implementation. | • Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.<br>• Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.<br>• Inspect containment areas and capturing devices and repair as needed. |
| EC-1 | Scheduling | Prior to any rainy season and when schedule changes. | • Work progressing according to schedule.<br>• Amend schedule when warranted and prior to rainy season. |
| EC-3 | Hydraulic Mulch | Weekly, prior to forecast rain, daily during rain event, after rain event | • Repair areas where erosion is evident |
| EC-6 | Straw Mulch | Inspect weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events. | • Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs.<br>• Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas. |

| BMP ID | BMP Description | Inspection Frequency | Maintenance Frequency/Conditions |
|---|---|---|---|
| EC-7 | Geotextiles and Mats | Inpsect weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events. | • Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs.<br>• If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel. |
| EC-15 | Soil Preparation / Roughening | Weekly, prior to forecast rain, daily during rain event, after rain event | • Check seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible. |

Inspection checklists/reports shall be completed and kept onsite with the SWPPP. ***Attachment 2*** is allotted for collection of these reports. Checklists should include at a minimum the date, weather conditions, descriptive site info, BMPs evaluated and deficiencies, photos and inspector's name, title, and signature. At instances where photos are required, contractor shall request these photos from NTESS's Sandia Delegating Representative or Construction Manager. ***Appendix G*** includes a form for construction site inspection reports.

### 5.2 Rain Event Action Plans

Requirements for Rain Event Action Plans (REAPs) are stated in the General Permits Attachments D and E, §H. REAPs must be developed by the QSP and are required for all Risk Level 2 and 3 dischargers for each construction phase. Although the SWPPP includes a REAP template (***Appendix H***), the QSP shall customize one for each rain event.

Prepared REAPs shall be maintained onsite by inclusion in ***Attachment 5*** and implemented 24 hours in advance of the predicted precipitation event (Att. D,E §H.6).

The QSP shall develop a REAP 48-hours in advance of any precipitation event forecast to have a 50% or greater chance of producing precipitation in the project area. Printed copies of precipitation forecasts can be obtained from the National Weather Service Forecast Office: https://www.weather.gov/srh/nwsoffices.

The REAP shall be designed to protect all exposed portions of the project site and to ensure that the discharger has adequate materials, staff, and time to implement erosion and sediment control measures intended to reduce the amount of sediment and other pollutants that could be generated during the rain event.

The QSP shall ensure that REAPs include at least the following site and phase-specific information (Att. D,E §H.3 and §H.4):

- Project address
- Calculated Risk Level 2
- Name, company, and 24-hour emergency telephone number for site stormwater manager, erosion/sediment control provider, and stormwater sampling agent
- Activities associated with each construction phase

- Trades active onsite during each construction phase
- Trade contractor information
- Suggested actions for each project phase.

The QSP shall develop additional REAPs when construction activities are indefinitely halted/postponed (inactive construction). Inactive construction REAPs shall include at least the following (Att. D,E §H.5):

- Project address
- Calculated Risk Level 2
- Name, company, and 24-hour emergency telephone number for site stormwater manager, erosion/sediment control provider, and stormwater sampling agent
- List of trades active onsite during inactive construction
- Trade contractor information
- Suggested actions.

## SECTION 6 Construction Site Monitoring Program

The General Permit requires the development of a written, site-specific Construction Site Monitoring Plan (CSMP) that includes all monitoring procedures/instructions, location maps, forms, and checklists as required (Att. C,D,E §I.1.a). This section details the project's CSMP based on the project's determined *Risk Level 2*.

### 6.1 Purpose

The CSMP has been developed to meet the following objectives:

- To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Actions Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.
- To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.
- To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in stormwater discharges and authorized non-stormwater discharges.
- To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in stormwater discharges and authorized non-stormwater discharges.

### 6.2 Applicability of Permit Requirements

**Table 7 - Summary of Monitoring Requirements**

| Risk Level | Visual Inspections | | | | | Sample Collection | |
|---|---|---|---|---|---|---|---|
| | Quarterly Non-stormwater Discharge | Pre-storm Event | | Daily Storm Event | Post Storm | StormWater Discharge | Receiving Water |
| | | Baseline | REAP | | | | |
| 2 | X | X | X | X | X | X | |

The following details the visual monitoring (inspection) requirements for qualifying rain events:

a) Risk Level 2 dischargers shall hire a QSP to visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b) Risk Level 2 dischargers shall hire a QSP to visually observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at time of discharge. Stored or contained stormwater that will like discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c) Risk Level 2 dischargers shall hire a QSP to conduct visual observations (inspections) during business hours only.

d) Risk Level 2 dischargers shall hire a QSP to record the time, date and rain gauge reading of all qualifying rain events.

e) Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 2 dischargers shall hire a QSP to visually observe (inspect):

   i. All stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

   ii. All BMPs to idenitfy where they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

   iii. Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f) For visual observations (inspections) described in e.i. and e.iii above, Risk Level 2 dischargers shall hire a QSP to observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g) Within two business days (48 hours) after each qualifying rain event, Risk Level 2 dischargers shall hire a QSP to conduct post rain event visual observations (inspections) to (1) idenitfy whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h) Risk Level 2 dischargers shall hire a QSP to maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

The following details the water quality sampling and analysis requirements for qualifying rain events:

a) Risk Level 2 dischargers shall hire a QSP to collect stormwater grab samples from sampling locations, as defined in section 6.3. The stormwater grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b) At minumum, Risk Level 2 dischargers shall hire a QSP to collect 3 samples per day of qualifying event.

c) Risk Level 2 dischargers shall hire a QSP to ensure that the grab samples collected of stored or contained stormwater are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

d) Risk Level 2 dischargers shall hire a QSP to analyze their effluent samples for:

i. pH and turbidity

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

The following details visual observation and sample collection exemptions for this site:

a) Risk Level 2 dischargers shall hire a QSP to be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of section 6.2 above are completed. Risk Level 2 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

   i. During dangerous weather conditions such as flooding and electrical storms.

   ii. Outside of schedules business hours.

b) If no required samples of visual observation (inspections) are collected due to these exceptions, Risk Level 2 dischargers shall hire a QSP to include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

### 6.3 Monitoring Locations

Visual observation locations are as identified in the Erosion Control Plan (Figure 3).

### 6.4 Safety

For safety reasons, do not conduct visual inspections during dangerous weather conditions such as flooding and electrical storms.

### 6.5 Visual Monitoring (Inspections)

Visual monitoring (inspection) shall be implemented for qualifying rain events (Att. C,D,E §I.3, §I.4). Inspections shall be conducted by the QSP or an individual under the supervision of and trained by the QSP. Inspection can usually be performed as part of a regular oversight and inspection of the project site.

Repairs or design changes to BMPs shall be implemented within 72 hours of identifying failures or other shortcomings and completed as soon as possible (Att. C,D,E §G.3).

### 6.6 Water Quality Sampling and Analysis

The SNL/CA Site Landscaping Project site, being a Risk Level 2 site, is required to collect the following:

- Samples of runoff and contained rainwater (when it is released) from qualifying storm events and analyze samples for pH and turbidity.
- Samples of non-stormwater (authorized and un-authorized) to characterize the discharge.

### 6.6.1 Sampling and Analysis Plan for Non-Visible Pollutants in Stormwater Runoff Discharges

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

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

The following construction materials, wastes, or activities, as identified in Section 3.6, are potential sources of non-visible pollutants to stormwater discharges from the project.

- Demolition and removal of existing materials.
- Asphalt Concrete (AC) and related materials.
- Portland Cement Concrete and related materials.
- Recycled base rock and related materials.
- Building construction products and related materials.
- Dewatering operations (if applicable).
- Vehicle fluids, including oil, grease, petroleum and coolant.
- Sanitary and septic wastes.
- Paint, sealants, solvents, thinners, acids and adhesives.
- Landscaping and related materials.
- General construction waste and litter.

#### 6.6.1.1 Sampling Schedule

Samples for the potential non-visible pollutants and a sufficiently large unaffected background sample shall be collected during the first two hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples shall be collected during the site's scheduled hours and shall be collected regardless of the time of year and phase of the construction.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during site inspections conducted prior to or during a rain event.

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) protected by

temporary cover and containment that prevents stormwater contact and runoff from the storage area.

- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- A construction activity, including but not limited to those in Section 3.6, with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) BMPs were observed to be breached, malfunctioning, or improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- Stormwater runoff from an area contaminated by historical usage of the site has been observed to combine with stormwater runoff from the site, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.

#### 6.6.1.2 Sampling Locations

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence or use, accessibility for sampling, and personnel safety. Planned non-visible pollutant sampling locations are shown on the Site Maps in Figure 3.

#### 6.6.1.3 Analytical Constituents

Table 8 lists the specific sources and types of potential non visible pollutants on the project site and the water quality indicator constituents for that pollutant.

**Table 8 – Potential Non-Visible Pollutants and Water Quality Indicator Constituents**

| **Common Non-Visible Pollutants and Water Quality Indicator Constituents** | |
|---|---|
| **General Work Activity/Potential Pollutants** | **Water Quality Indicators of Potential Constituents** (Review product literature and Material Safety Data Sheets to confirm potential constituents) |
| **Adhesives** | **COD, Phenols, SVOCs** |
| **Asphalt Work** | VOCs |
| **Cleaning** | |
| Acids | pH |
| Bleaches | Residual chlorine |

| Common Non-Visible Pollutants and Water Quality Indicator Constituents | |
|---|---|
| **General Work Activity/Potential Pollutants** | **Water Quality Indicators of Potential Constituents** (Review product literature and Material Safety Data Sheets to confirm potential constituents) |
| TSP | Phosphate |
| Solvents | VOCs, SVOCs |
| Detergents | MBAS |
| **Concrete / Masonry Work** | |
| Sealant (Methyl methacrylate) | SVOC |
| Curing compounds | VOCs, SVOCs, pH |
| Ash, slag, sand | pH, Al, Ca, Va, Zn |
| **Drywall** | Cu, Al, General Minerals |
| **Framing / Carpentry** | |
| Treated Wood | Cu, Cr, As, Zn |
| Particle board | Formaldehyde |
| Untreated wood | BOD |
| **Grading / Earthworks** | |
| Gypsum / Lime amendments | pH |
| Contaminated Soil | Constituents specific to known contaminants, check with Laboratory |
| **Heating, Ventilation, Air Conditioning** | Freon |
| **Insulation** | Al, Zn |
| **Landscaping** | |
| Pesticides/Herbicides | Product dependent, see label and check with Laboratory |
| Fertilizers | TKN, NO3, BOD, COD, DOC, Sulfate, NH3, Phosphate, Potassium |
| Aluminum sulfate | Al, TDS, Sulfate |
| **Liquid Waste** | Constituents specific to materials, check with Laboratory |
| **Painting** | |
| Resins | COD, SVOCs |
| Thinners | COD, VOCs |
| Paint strippers | VOCs, SVOCs, metals |
| Lacquers, varnishes, enamels | COD, VOCs, SVOCs |
| Sealants | COD |
| Adhesives | Phenols, SVOCs |

| Common Non-Visible Pollutants and Water Quality Indicator Constituents | |
|---|---|
| **General Work Activity/Potential Pollutants** | **Water Quality Indicators of Potential Constituents** (Review product literature and Material Safety Data Sheets to confirm potential constituents) |
| **Planting / Vegetation Management** | |
| Vegetation stockpiles | BOD |
| Fertilizers | TKN, $NO_3$, BOD, COD, DOC, sulfate, $NH_3$, Phosphate, Potassium |
| Pesticides/Herbicides | Product dependent, see label and check with Laboratory |
| **Plumbing** | |
| Solder, flux, pipe fitting | Cu, Pb, Sn, Zn |
| **Pools and Fountains** | Residual chlorine, Cu, chloramines |
| **Removal of existing structures** | Zn, VOCs, PCBs (see also other applicable activity categories, e.g., grading, painting) |
| **Roofing** | Cu, Pb, VOCs |
| **Sanitary Waste** Sewer line breaks and Portable Toilets (using clear fluid – blue fluid is visible if | BOD, Total/Fecal coliform |
| **Soil Preparation / Amendments/Dust** | |
| Polymer/Co-polymers | TKN, $NO_3$, BOD, COD, DOC, Sulfate, Ni |
| Lignin sulfate | TDS, alkalinity |
| Psyllium | COD, TOC |
| Guar/Plant Gums | COD, TOC, Ni |
| **Solid Waste (leakage)** | BOD |
| **Utility Line Testing and Flushing** | Residual chlorine, chloramines |
| **Vehicle and Equipment Use** | |
| Batteries | Sulfuric acid; Pb, pH |

Adapted from *Attachment S, Caltrans SWPPP/WPCP Preparation Manual, February 2003*, and *CASQA Construction BMP Handbook, 2003*

#### 6.6.1.4 Data Evaluation and Reporting

The QSP shall complete an evaluation of the water quality sample analytical results.

Runoff/downgradient results shall be compared with the associated upgradient/unaffected results and any associated run-on results. Should the runoff/downgradient sample show an increased level of the tested analyte relative to the unaffected background sample, which cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences shall be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate BMPs shall be repaired or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs shall be recorded as an amendment to the SWPPP.

### 6.6.2 Sampling and Analysis Plan for Ph and Turbidity in Stormwater Runoff Discharges

Sampling and analysis of runoff for pH and turbidity is required for this project. This Sampling and Analysis Plan describes the strategy for monitoring turbidity and pH levels of stormwater runoff discharges from the project site and run-on that may contribute to an exceedance of a Numeric Action Level (NAL).

Samples for pH and turbidity will be collected at all discharge points where stormwater is discharged off-site.

#### 6.6.2.1 Sampling Schedule

Stormwater runoff samples shall be collected for pH and turbidity from each day of a qualifying rain event that results in a discharge from the project site. A minimum of three samples will be collected per day of discharge during a qualifying event. Samples should be representative of the total discharge from the project each day of discharge during the qualifying event. Typically, representative samples will be spaced in time throughout the daily discharge event.

Stored or collected water from a qualifying storm event when discharged shall be tested for turbidity and pH. Stored or collected water from a qualifying event may be sampled at the point it is released from the storage or containment area or at the site discharge location.

Run on samples shall be collected whenever the QSP identifies that run on has the potential to contribute to an exceedance of a NAL.

#### 6.6.2.2 Sampling Locations

Sampling locations are based on the site runoff discharge locations and locations where run-on enters the site, accessibility for sampling, and personnel safety. Planned pH and turbidity sampling locations are shown on the Site Maps in Figure 3.

#### 6.6.2.3 Field Parameters

Samples shall be analyzed for the constituents indicated in the Table 9.

**Table 9 – Sample Collection and Analysis for Monitoring Turbidity and pH**

| Parameter | Test Method | Minimum Sample Volume (1) | Sample Collection Container Type | Detection Limit (minimum) |
|---|---|---|---|---|
| Turbidity | Field meter/probe with calibrated portable instrument | 500 mL | Polypropylene or glass (Do not collect in meter sample cells) | 1 NTU |

| Parameter | Test Method | Minimum Sample Volume [1] | Sample Collection Container Type | Detection Limit (minimum) |
|---|---|---|---|---|
| pH | Field meter/probe with calibrated portable instrument or calibrated pH test kit | 100 mL | Polypropylene | 0.2 pH units |

Notes: [1] Minimum sample volume recommended. Specific volume requirements will vary by instrument; check instrument manufacturer instructions.

L – Liter
mL – Milliliter
NTU – Nephelometric Turbidity Unit

#### 6.6.2.4 Data Evaluation and Reporting

Immediately upon completing the measurements for the sampling event, provide the *Effluent Sampling Field Log Sheets* **(*Appendix G*)** to the QSP for evaluation.

**Numeric Action Levels**

This project is subject to NALs for pH and turbidity (Table 10). Compliance with the NAL for pH and turbidity is based on a daily average. Upon receiving the field log sheets, the QSP shall immediately calculate the arithmetic average of the turbidity samples, and the logarithmic average of the pH samples to determine if the NALs, shown in the table below, have been exceeded.

**Table 10 – Numeric Action Levels**

| Parameter | Unit | Daily Average |
|---|---|---|
| pH | pH units | Lower NAL = 6.5<br>Upper NAL = 8.5 |
| Turbidity | NTU | 250 NTU |

The QSP shall within five (5) days of the sample collection submit copies of the completed *Effluent Sampling Field Log Sheets* ***(Appendix G)*** to Joel Stauber.

In the event that the pH or turbidity NAL is exceeded, the QSP shall immediately notify Joel Stauber and investigate the cause of the exceedance and identify corrective actions.

Exceedances of NALs shall be electronically reported to the State Water Board by Joel Stauber through the SMARTs system within 10 days of the conclusion of the storm event. If requested by the Regional Board, a NAL Exceedance report will be submitted. The NAL Exceedance Report must contain the following information:

- Analytical method(s), method reporting unit(s), and MDL(s) of each parameter;
- Date, place, time of sampling, visual observation, and/or measurements, including precipitation; and
- Description of the current BMPs associated with the sample that exceeded the NAL and the proposed corrective actions taken.

### 6.6.3 Sampling and Analysis Plan for Non-Stormwater Runoff Discharges

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

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

The following authorized non-stormwater discharges identified in Section 3.7, have the potential to be discharged from the project site.

- Discharges that do not cause or contribute to a water quality standard violation;
- Discharges that do not violate other provision of the General Permit;
- Discharges that are not prohibited by the applicable Basin Plan;
- Discharges that do not contain toxic pollutants in toxic amounts or other significant quantities of pollutants;
- Discharges that meets applicable NALs;

In addition to the above authorized stormwater discharges, some construction activities have the potential to result in an unplanned (unauthorized) non-stormwater discharge if BMPs fail. These activities include:

- Vehicle and equipment cleaning, fueling and maintenance operations;
- Vehicle and equipment wash water, including concrete washout water;
- Slurries from concrete cutting and coring operations, PCC grinding or AC grinding operations;
- Slurries from concrete or mortar mixing operations;
- Slurries from drilling or boring operations;
- Blast residue from high-pressure washing of structures or surfaces;
- Wash water from cleaning painting equipment;
- Runoff from dust control applications of water or dust palliatives;

- Sanitary and septic wastes;
- Chemical leaks and/or spills of any kind including but not limited to petroleum, paints, cure compounds, etc.

#### 6.6.3.1 Sampling Schedule

Samples of authorized or unauthorized non-stormwater discharges shall be collected when they are observed.

#### 6.6.3.2 Sampling Locations

Samples shall be collected from the discharge point of the construction site where the non-stormwater discharge is running off the project site. Site discharge locations are shown on the Site Maps in SWPPP Figure 3.

#### 6.6.3.3 Analytical Constituents

All non-stormwater discharges that flow through a disturbed area shall, at minimum, be monitored for turbidity.

All non-stormwater discharges that flow through an area where they are exposed to pH altering materials shall be monitored for pH.

The QSP shall identify additional pollutants to be monitored for each non-stormwater discharge incident based on the source of the non-stormwater discharge. If the source of an unauthorized non-stormwater discharge is not known, monitoring for pH, turbidity, MBAS, TOC, and residual chlorine or chloramines is recommended to help identify the source of the discharge.

Non-stormwater discharge run-on shall be monitored, at minimum, for pH and turbidity. The QSP shall identify additional pollutants to be monitored for each non-stormwater discharge incident based on the source of the non-stormwater discharge. If the source of an unauthorized non-stormwater discharge is not known, monitoring for pH, turbidity, MBAS, TOC, and residual chlorine or chloramines is recommended to help identify the source of the discharge.

Table 11 lists the specific sources and types of potential non-visible pollutants on the project site and the water quality indicator constituent(s) for that pollutant.

**Table 11 – Potential Non-Stormwater Discharge Pollutants and Water Quality Indicator Constituents**

| ***Pollutant Source*** | ***Pollutant*** | ***Water Quality Indicator Constituent*** |
|---|---|---|
| *Disturbed Areas* | *Sediment* | *Turbidity* |
| *Concrete Work* | *pH* | *pH* |

#### 6.6.3.4 Data Evaluation and Reporting

The QSP shall complete an evaluation of the water quality sample analytical results.

Turbidity and pH results shall be evaluated for compliance with NALs as identified in Section 6.6.24.

Runoff results shall also be evaluated for the constituents suspected in the non-stormwater discharge. Should the runoff sample indicate the discharge of a pollutant which cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences shall be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate BMPs shall be repaired or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs shall be recorded as an amendment to the SWPPP.

Non-stormwater discharge results shall be submitted with the Annual Report.

The General Permit prohibits the non-stormwater discharges that contain hazardous substances equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities shall be immediately reported to the Regional Water Board.

### 6.7 Watershed Monitoring Option

Watershed monitoring is not required for this project.

### 6.8 Quality Assurance and Quality Control

An effective Quality Assurance and Quality Control (QA/QC) plan shall be implemented as part of the CSMP to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs;
- Clean sampling techniques;
- Chains of Custody (CoCs);
- QA/QC Samples; and
- Data verification.

Each of these procedures is discussed in more detail in the following sections.

#### 6.8.1 Field Logs

The purpose of field logs is to record sampling information and field observations during monitoring that may explain any uncharacteristic analytical results. Sampling information to be included in the field log include the date and time of water quality sample collection, sampling personnel, sample container identification numbers, and types of samples that were collected. Field observations should be noted in the field log for any abnormalities at the sampling location (color, odor, BMPs, etc.). Field measurements for pH and turbidity should also be recorded in the field log.

### 6.8.2 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. Adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

### 6.8.3 Chain of Custody

The sample CoC is an important documentation step that tracks samples from collection through analysis to ensure the validity of the sample. Sample CoC procedures include the following:

- Proper labeling of samples;
- Use of CoC forms for all samples; and
- Prompt sample delivery to the analytical laboratory.

### 6.8.4 QA/QC Samples

QA/QC samples provide an indication of the accuracy and precision of the sample collection; sample handling; field measurements; and analytical laboratory methods. The following types of QA/QC may be conducted for this project:

- Field Duplicates at a frequency of 5 percent or 1 duplicate minimum per sampling event (Required for all sampling plans with field measurements or laboratory analysis)
- Equipment Blanks
  (Only needed if equipment used to collect samples could add the pollutants to sample)
- Field Blanks
  (Only required if sampling method calls for field blanks)
- Travel Blanks
  (Required for sampling plans that include VOC laboratory analysis)

### 6.8.5 Data Verification

After results are received from the analytical laboratory, the QSP shall verify the data to ensure that it is complete, accurate, and the appropriate QA/QC requirements were met. Data must be verified as soon as the data reports are received. Data verification shall include:

- Check the CoC and laboratory reports.
  *Make sure all requested analyses were performed and all samples are accounted for in the reports.*
- Check laboratory reports to make sure hold times were met and that the reporting levels meet or are lower than the reporting levels agreed to in the contract.
- Check data for outlier values and follow up with the laboratory.
  *Occasionally typographical errors, unit reporting errors, or incomplete results are*

*reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory. The QSP should especially note data that is an order of magnitude or more different than similar locations, or is inconsistent with previous data from the same location.*

- Check laboratory QA/QC results.
  *EPA establishes QA/QC checks and acceptable criteria for laboratory analyses. These data are typically reported along with the sample results. The QSP shall evaluate the reported QA/QC data to check for contamination (method, field, and equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results.*

- Check the data set for outlier values and, accordingly, confirm results and re-analyze samples where appropriate.
  *Sample re-analysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out of the accepted range. Sample results may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met and confirms this in writing.*

Field data including inspections and observations must be verified as soon as the field logs are received, typically at the end of the sampling event. Field data verification shall include:

- Check field logs to make sure all required measurements were completed and appropriately documented;
- Check reported values that appear out of the typical range or inconsistent; Follow-up immediately to identify potential reporting or equipment problems, if appropriate, recalibrate equipment after sampling;
- Verify equipment calibrations;
- Review observations noted on the field logs; and
- Review notations of any errors and actions taken to correct the equipment or recording errors.

### 6.9 Reporting Requirements and Records Retention

The General Permit requires annual reporting of monitoring information, including at least a summary and evaluation of all sampling and analysis results, original laboratory reports, chain-of-custody forms, a summary of all corrective actions taken during the compliance year, inspection reports, and details of non-compliance (§XVI.D). Water quality sampling and analysis data shall be retained with the SWPPP and collected into the Annual Reports as described in Section 2 above **(See *Appendix D*)**.

A sample form for Construction Site Inspection is included as ***Appendix G***. Retain all completed Construction Site Inspecton Forms in ***Attachment 2***. Retain all completed documentation of non-compliance in ***Attachment 3***.

# SECTION 7 Personnel and Training

The General Permit includes various requirements for parties responsible for SWPPP development and implementation (§VII). This section addresses these requirements.

## 7.1 Responsible Parties

The table below lists the parties responsible for the project SWPPP and required contact information and training/qualifications details. Copies of the written authorizations of duly authorized representatives are included in ***Appendix E***. Copies of training certificates or other verifications of training are included in ***Appendix F***.

**Table 12 - List of Authorized SWPPP Personnel**

| **Name** | Dr. Daryl Hauck | Conrad Valencia | R. Michael Ebenal, PE | TBD |
|---|---|---|---|---|
| **Project Role** | LRP | Designated Signatory | QSD | QSP |
| **Phone #(s)** | 505-845-6036 | 505-845-4776 | 209-328-1123 | |
| **Date of Designation** | | | December 8, 2022 | |
| **Qualification Details** | | | Certification: #26242 | |
| **Licensed Dates** | | | 02/01/2021 – 02/15/2025 | |

## 7.2 Contractor List

***Appendix E*** includes a list of all contractors, subcontractors, and individuals who will be directed by the QSP. The list includes telephone numbers, work addresses, the specific areas of responsibility of each subcontractor, and emergency contact numbers.

## 7.3 Training

*Include a discussion of training requirements and documentation. These will vary depending on the level and types of BMPs planned.*

The General Permit requires (§VII) that all elements of the SWPPP be developed by a QSD and implemented by a QSP. The QSP may delegate tasks to trained employees provided adequate supervision and oversight is provided.

Personnel at the site shall receive formal and informal, ongoing training appropriate for individual roles and responsibilities on the project. Appropriate personnel shall receive training on the SWPPP implementation, BMP inspection and maintenance, and record keeping.

All training activities (formal and informal) shall be documented and a record of training activities retained in ***Appendix F*** of this SWPPP. As discussed in *Section 2.6 Annual Report*, training documentation shall also be submitted in the Annual Report. The annual report is submitted by NTESS, but required documentation within the annual report should be provided by QSP (such as stormwater training records and weather forecast documentation).

# FIGURE 1

# VICINITY MAP

# FIGURE 1

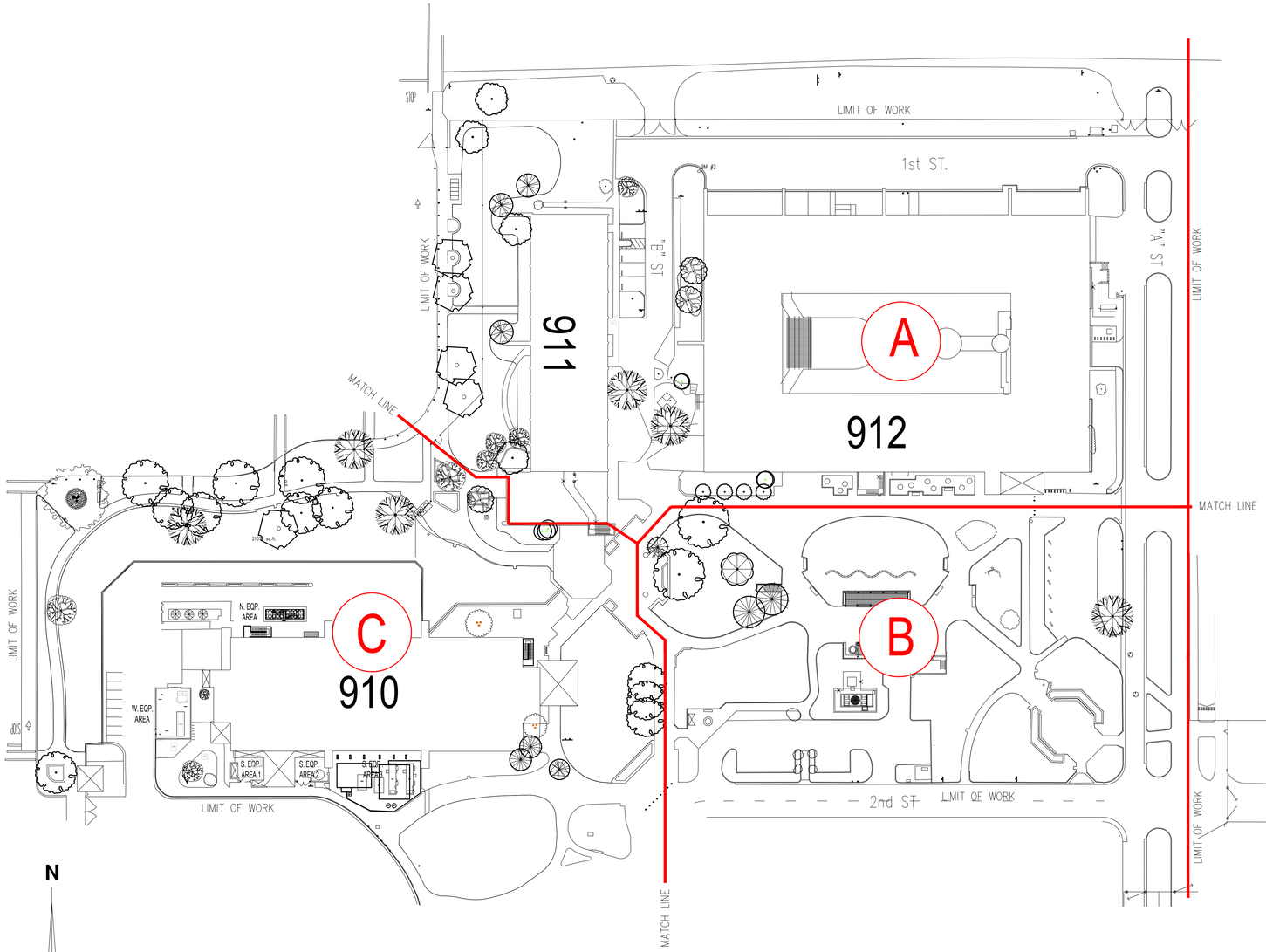
## VICINITY MAP (from Google Earth)

**SNL/CA Site Landscaping Project**

**Livermore, CA**

# FIGURE 2

# LANDSCAPE PLANS




DRAWING INDEX


| | |
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| L–1 | MASTER SHEET LAYOUT – DRAWING INDEX |
| L–2 | DEMOLITION NOTES |
| L–3 | DEMOLITION 'A' |
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| L–22 | IRRIGATION NOTES – LEGEND |


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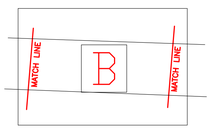
GRAPHIC SCALE

40 0 20 40 80 160

( IN FEET )
1 inch = 40 ft.

# MASTER SHEET LAYOUT–INDEX

SCALE: 1" = 40'–0"




TYPICAL SHEET NUMBER WITH MATCH LINES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Martinez, California 94553
Phone: 925/372-5306


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MASTER SHEET LAYOUT PLAN
PHASE A

| | |
|---|---|
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## EXISTING TREE PRESERVATION NOTES

PRE GRADING / PRE CONSTRUCTION

PRIOR TO WORK, THE LANDSCAPE/IRRIGATION CONTRACTOR AND ANY OTHER CONTRACTOR WHOSE WORK MAY IMPACT THE TREES SHALL MEET WITH THE SANDI REPRESENTATIVE TO DISCUSS THE PARAMETERS WHILE WORKING AROUND THE TREES, AND TO SET UP A LINE OF COMMUNICATION.

THE CONTRACTOR SHALL SET UP THE PROTECTION ZONE AROUND THE TREE(S) AS ESTABLISHED BY THE SANDI REPRESENTATIVE.

DURING DEMOLITION AND CONSTRUCTION

THE DEMOLITION SHALL BE PERFORMED IN A MANNER TO AVOID CONTACT WITH ANY PORTION OF SURROUNDING TREES TO BE PROTECTED. AVOID COMPACTION OVER ROOT ZONE BY CONSTRUCTION EQUIPMENT.

THE CONTRACTOR SHALL CONTACT THE SANDI REPRESENTAIVE IF THE PROTECTIVE ZONE NEEDS TO BE CHANGED.

ANY WORK THAT REQUIRES EXCAVATION WITHIN THE PROTECTION ZONE SHALL REQUIRE THE SANDI REPRESENTATIVE ON SITE TO INSURE EQUIPMENT OPERATORS ARE CAREFUL AND TO ROOT PRUNE AS NECESSARY TO AVOID TEARING AND EXTENSIVE DAMAGE TO THE ROOT SYSTEM.

KEEP ALL FOOT TRAFFIC, EQUIPMENT, FUELS AND CONSTRUCTION MATERIAL OUTSIDE OF THE PROTECTION ZONE. KEEP ALL TRENCHING, GRADING AND FILL SOILS OUTSIDE OF THE PROTECTION ZONE, OR CONSULT WITH THE SANDI REPRESENTATIVE TO MINIMIZE ANY IMPACT TO THE TREE(S).

TREES AND DRIP LINES AS SHOWN ARE LOCATED SUFFICIENTLY FOR GENERAL ARCHITECTURAL SITE PLANNING. ANY CONSTRUCTION ACTIVITY PLANNED IMMEDIATELY ADJACENT TO THE TREES OR DRIP LINES SHOULD BE REVIEWED WITH AN ARBORIST. IF IT IS DETERMINED THAT DETAILED TREE AND/OR BRANCH MEASUREMENTS ARE NEEDED, FURTHER SURVEYING MAY BE NECESSARY AND SHOULD BE ARRANGED BY THE OWNER AND/OR ARBORIST. THE HEALTH AND SPECIES AS REFERENCED ON THE DRAWING SHOULD BE CONFIRMED BY A LICENSED ARBORIST IF THE SPECIFIC TREE(S) IS SUSPECTED OF BEING A PROTECTED OR CRITICAL ONE(S).

## LANDSCAPE DEMOLITION NOTES

D-1 REFER TO AND COORDINATE WITH SANDIA NATIONAL LABORATORIES SPECIFICATIONS FOR SPECIFIC DEMOLITION REQUIREMENTS, IF APPLICABLE.

D-2 THIS PLAN IS NOT INTENDED TO DETERMINE THE METHOD, DETAILS, AND MEANS OF PERFORMING THE DEMOLITION WORK.

D-3 ALL DEMOLITION WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE STATE AND FEDERAL OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE STATE OF CALIFORNIA STATE SAFETY CODE AND APPLICABLE ORDINANCES OF THE GOVERNING MUNICIPALITY.

D-4 GENERALLY, ALL EXISTING LAWN AREAS, AND ALL EXISTING SHRUBS/GROUINDCOVER WITHIN THE SCOPE-OF-WORK AREAS SHALL BE REMOVED, UNLESS NOTED OTHERWISE ON THE PLANS.

D-5 REMOVE INDICATED LAWN/TURF AND ROOT ZONE TO 3" DEPTH AND ROTO-TILL AREA.

D-6 REMOVE ALL EXISTING TREES LABELED WITH "X", INCLUDING STUMPS DOWN TO 24" BELOW GRADE. EXISTING TREES SHOWN TO REMAIN SHALL BE PROTECTED PER TREE PROTECTION NOTES. (SEE NOTES THIS SHEET.) GENERALLY, DO NOT USE MECHANICAL EQUIPMENT TO TRENCH OR OTHERWISE DISTURB ROOTS LARGER THAT 1" WITHIN THE DRIP LINE OF ANY EXISTING TREE. COORDINATE WITH SANDI REPRESENTATIVE FOR SITE OBSERVATIONS DURING CONSTRUCTION WITHIN EXISTING TREE DRIP LINES.

D-7 PROTECT ALL EXISTING FEATURES NOT DESIGNATED FOR DEMOLITION OR REMOVAL. IF DAMAGED, PROMPTLY REPAIR DAMAGES AT NO ADDITIONAL COST TO THE OWNER.

D-8 THE CONTRACTOR SHALL OBTAIN ALL PERMITS AND APPROVALS NECESSARY FOR ANY DEMOLITION WORK.

D-9 ALL MATERIALS REMOVED FROM THE SITE SHALL BE DISPOSED OF IN ITS ENTIRETY IN AN APPROPRIATE LEGAL MANNER. FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATION WHEN DISPOSING OF HAZARDOUS MATERIALS.

D-10 ALL EXISTING UTILITIES AND OTHER DEMOLITION ITEMS TO BE REMOVED MAY OR MAY NOT BE SHOWN ON THIS PLAN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE WITH THE SANDIA REPRESENTATIVE TO FIELD VERIFY ALL EXISTING FEATURES TO BE REMOVED OR TO REMAIN.

D-11 ALL SERVICES PERMANENTLY DISCONNECTED SHALL BE CAPPED AT THE MAIN LINE PER STANDARDS AND SPECIFICATIONS OF THE GOVERNING UTILITY COMPANY.

D-12 ALL WORK TO BE DEMOLISHED SHALL BE SAW CUT / REMOVED WITH A NEAT AND TRUE EDGE.

D-13 DURING DEMOLITION, EARTH MOVING AND CONSTRUCTION ACTIVITIES, NO DIRT, DEBRIS, OR OTHER MATERIALS SHALL BE ALLOWED TO ENTER THE CHANNEL WATERS.

D-14 ALL TRAFFIC AND ROAD SIGNS SHALL REMAIN.

D-15 THE DESIGN INTENT FOR PHASE 'A' IS TO PROVIDE A CLEAN, DEBRIS, WEED AND SHRUB FREE LANDSCAPE AREA TO INSTALL THE NEW IRRIGATION AND NEW LANDSCAPING. ALL PLANTER AREAS, EXCEPT THOSE IMPACTED BY SURFACE ROOTS FROM EXISTING TREES TO REMAIN, SHALL BE ROTO-TILLED TO A MINIMUM DEPTH OF 6", AND AMENDED WITH A MINIMUM OF 4 CUBIC YARDS OF COMPOST PER 1,000 SQ. FT., UNLESS DIRECTED OTHERWISE FROM THE REQUIRED SOIL REPORT.

X = AREAS/ITEMS/PLANTS TO BE REMOVED

## IRRIGATION DEMOLITION NOTES

D-16 IT IS THE INTENT OF THIS PROJECT TO REPLACE THE IRRIGATION SYSTEMS WITHIN THE SCOPE-OF-WORK AREAS ONLY. THE INTENT IS TO PROVIDE A COMPLETE NEW SYSTEM(S) FROM THE EXISTING IRRIGATION WATER METER(S), INCLUDING NEW CONTROLLERS AND WIRING.

D-17 REMOVE AND DISCARD ALL EXISTING IRRIGATION MATERIAL. (HEADS, RISERS, FLEX-TUBING, DRIP LINES, LATERAL PIPES, VALVES AND FITTINGS)


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Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT Brian Kilian Signature 08/01/22 Date OF CALIFORNIA

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EXISTING TREE/DEMOLITION PLAN
PHASE A

| | |
|---|---|
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| DOE ACCT.NO. | |
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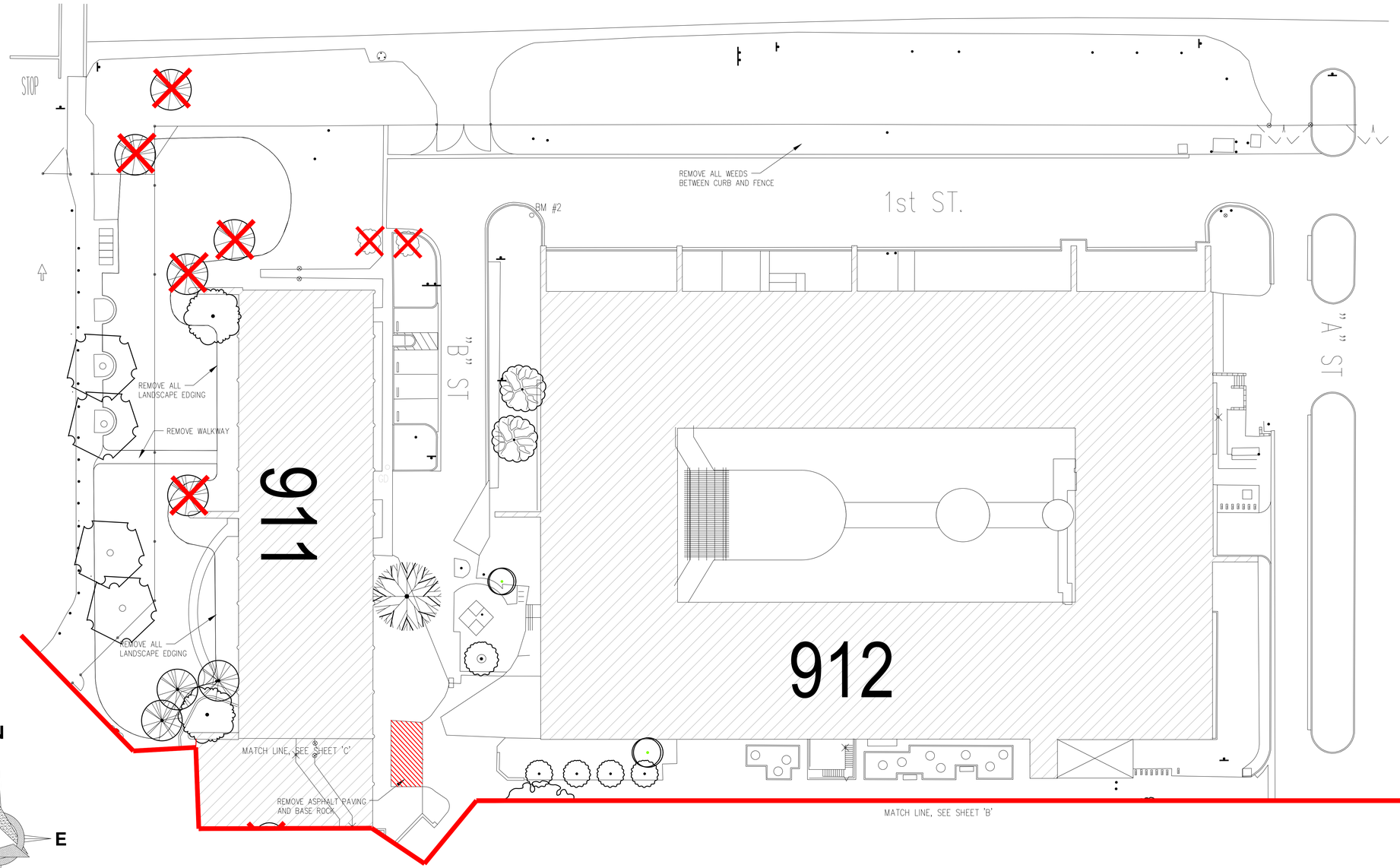


EXISTING TREE LEGEND

- ALBIIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA
- EXISTING TREE TO BE REMOVED

N W E S

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# EXISTING TREE / DEMOLITION – SHEET 'A'


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1241 Pine Street
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EXISTING TREE/DEMOLITION PLAN
PHASE A

| | |
|---|---|
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| ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
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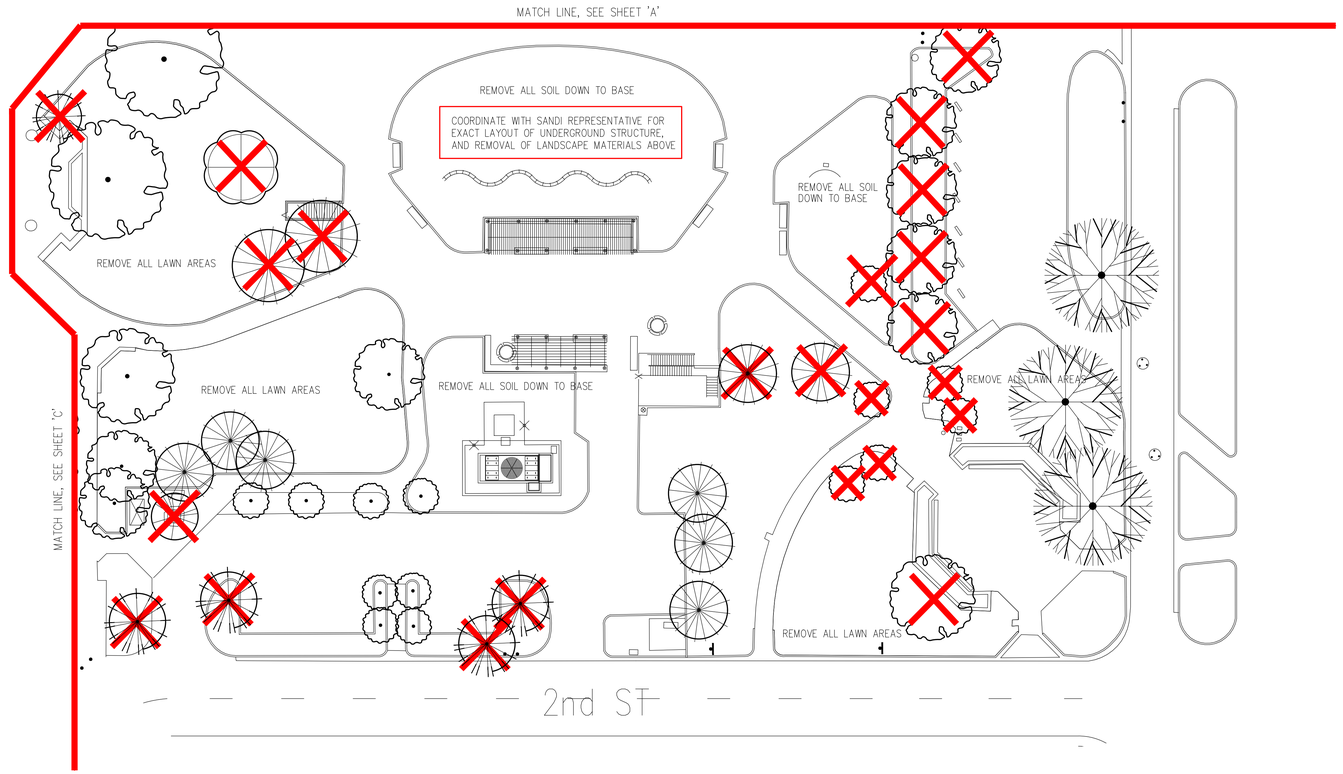


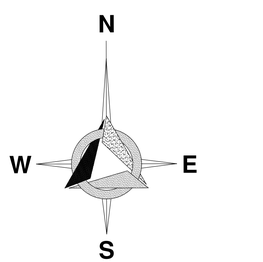


GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# EXISTING TREE / DEMOLITION – SHEET 'B'

## EXISTING TREE LEGEND

- ALBIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA
- EXISTING TREE TO BE REMOVED


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EXISTING TREE/DEMOLITION PLAN
PHASE A

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|---|---|
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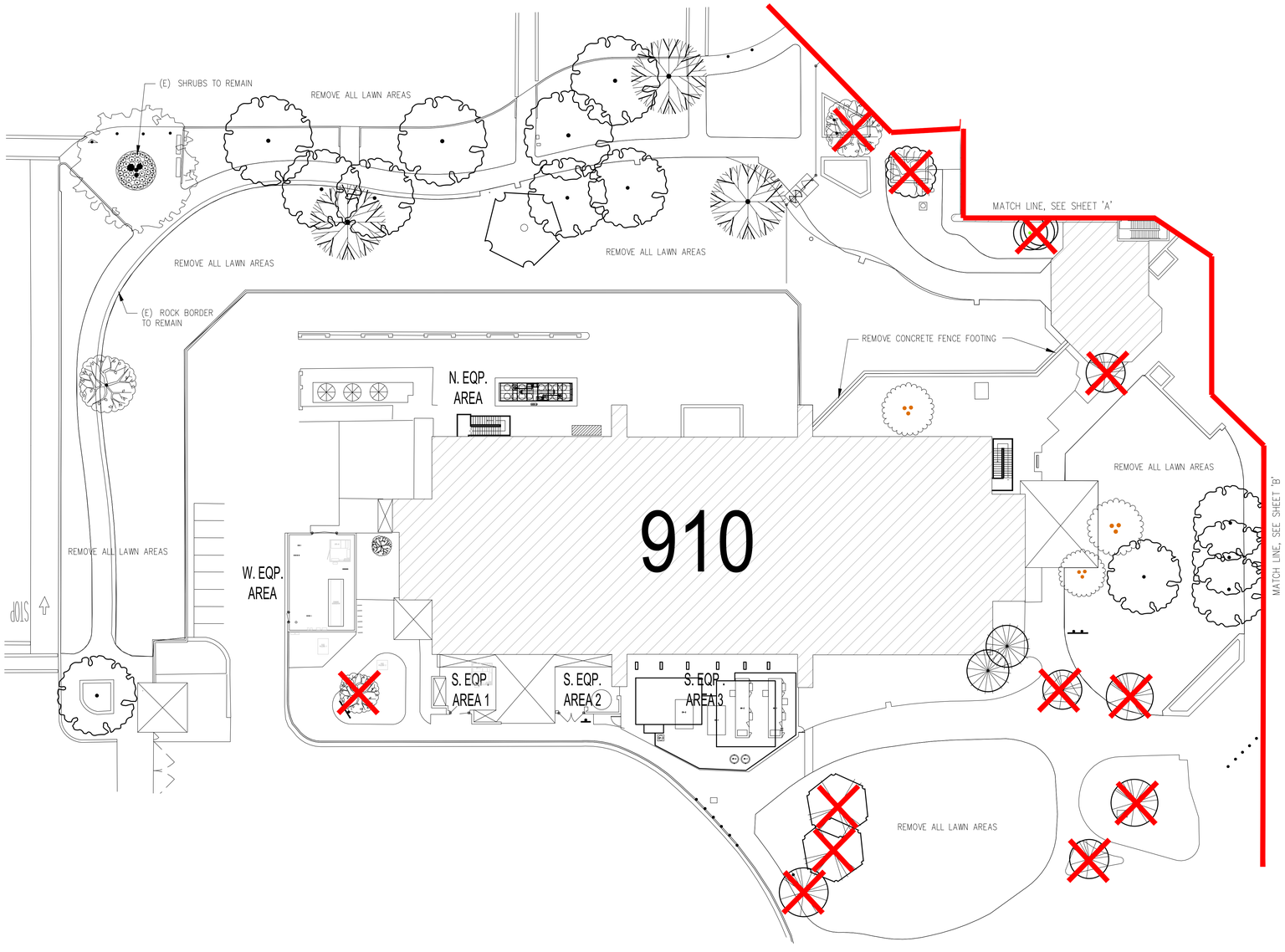


EXISTING TREE LEGEND

- ALBIIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA
- EXISTING TREE TO BE REMOVED

N
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GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

# EXISTING TREE / DEMOLITION – SHEET 'C'

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EXISTING TREE/DEMOLITION PLAN
PHASE A

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|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
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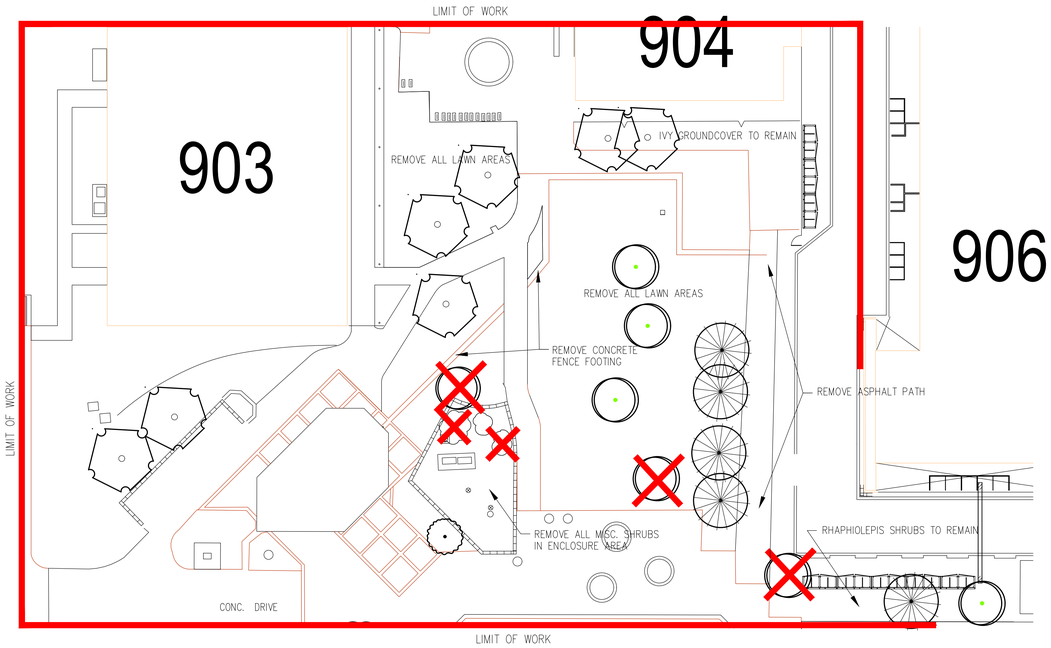


EXISTING TREE LEGEND

- ALBIIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA
- EXISTING TREE TO BE REMOVED

N
W E
S

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# EXISTING TREE / DEMOLITION – SHEET 'D'

BORRECCO/KILIAN & ASSOCIATES, INC.
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PHASE A

| | |
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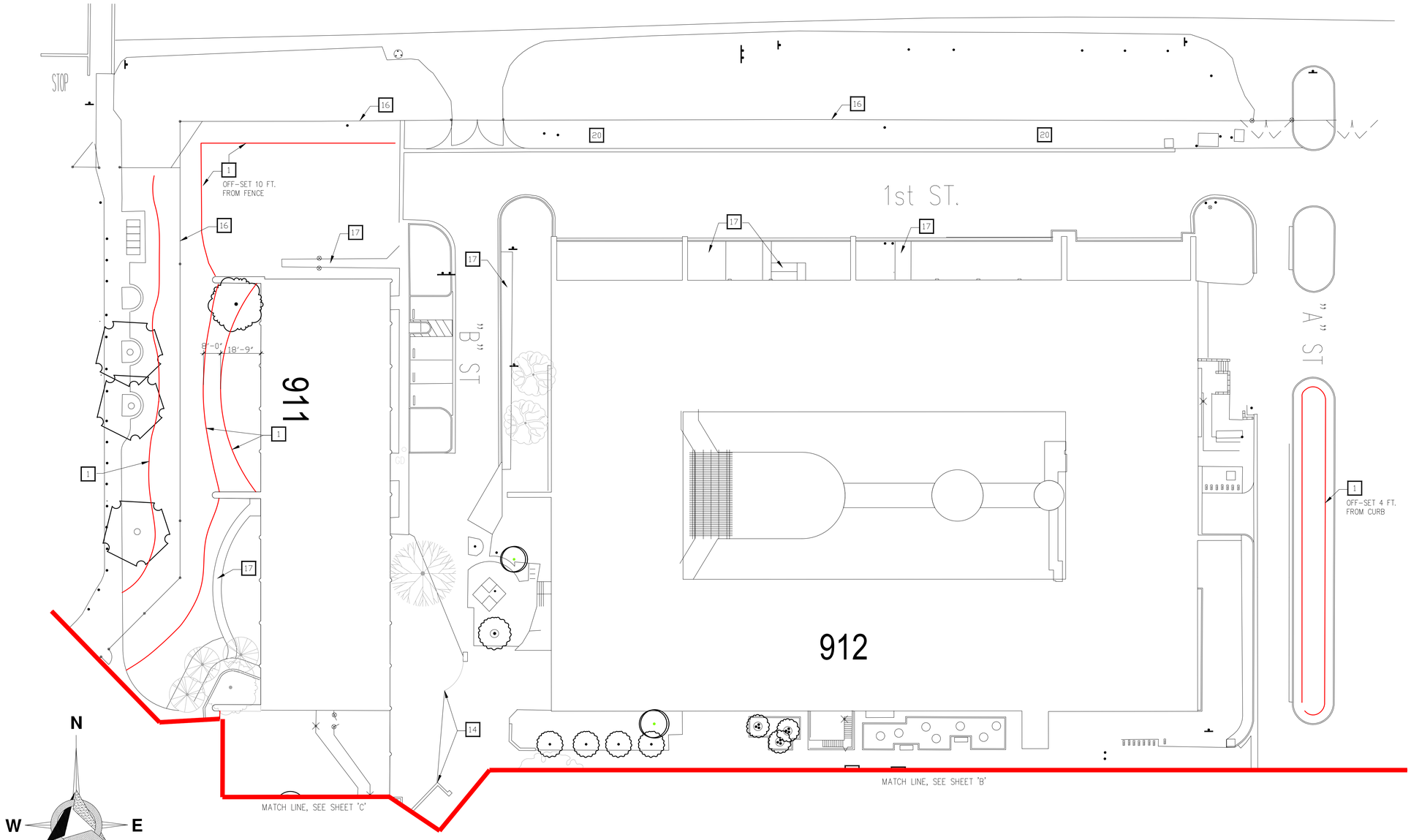


GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# SITE LAYOUT – SHEET 'A'

## SHEET NOTES

1. ALUMINUM HEADERBOARD, SEE DETAIL 1, SHEET L-11.
2. JAPANESE BLACK PEBBLE TOPDRESSING, SEE DETAIL 2, SHEET L-11.
3. ZEN GARDEN SAND, SEE DETAIL 3, SHEET L-11.
4. 3/8" DARK PEA GRAVEL, SEE DETAIL 3, SHEET L-11
5. LANDSCAPE GLASS TOPDRESSING, MEDIUM BLUE, SEE DETAIL 4, SHEET L-11
6. SYNTHETIC LAWN, SEE DETAIL 5, SHEET L-11
7. LANDSCAPE BERM, 2-3 FT. HIGH, MAX. 4:1 SLOPE.
8. PLANTERCRAFT CORTEN STEEL RECTANGLE PLANTER, SEE DETAIL 6, SHEET L-11.
9. PLANTERCRAFT CORTEN STEEL ROUND PLANTER, SEE DETAIL 7, SHEET L-11.
10. 4-6" MIXED COBBLE OVER WEED FABRIC, SEE DETAIL 8, SHEET L-11.
11. NEW SOD LAWN
12. 'GOLD' DECOMPOSED GRANITE TOPDRESSING, SEE DETAIL 9, SHEET L-11.
13. LARGE BOULDERS, SEE DETAIL 10, SHEET L-11
14. SAWCUT (E) ASPHALT
15. FUTURE MONUMENT SIGN UNDER SEPARATE WORK.
16. EXISTING SECURITY FENCE TO REMAIN
17. EXISTING SIDEWALK TO REMAIN
18. EXISTING FLAG POLE TO REMAIN
19. EXISTING MONUMENT PLAQUE TO REMAIN
20. NON-LANDSCAPE AREA WITH 3" BARK MULCH TOPDRESSING OVER WEED FABRIC.
21. EXISTING ROCK DRAINAGE SWALE TO REMAIN.


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SITE LAYOUT PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
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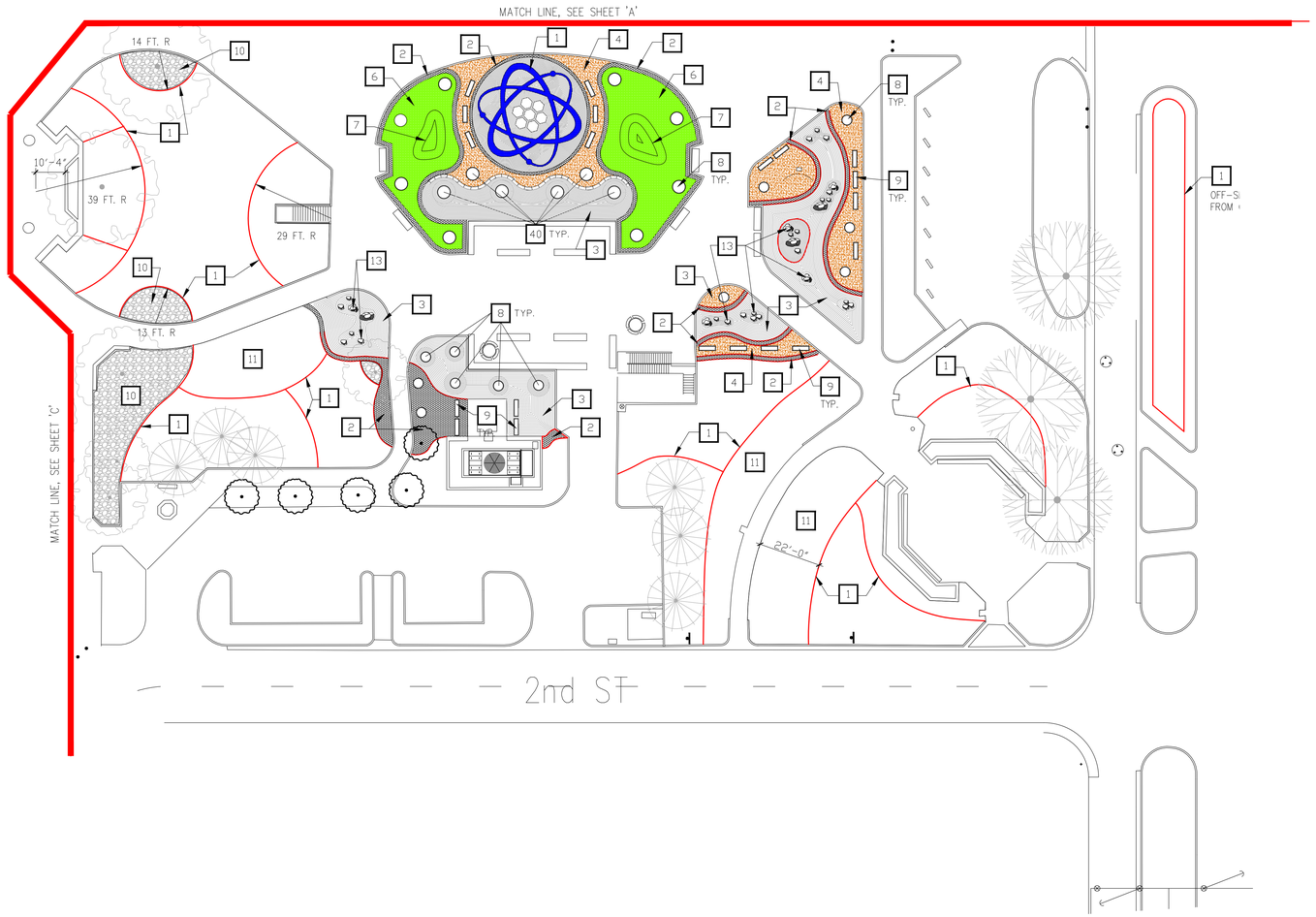


N

W E

S

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# SITE LAYOUT – SHEET 'B'

## SHEET NOTES

1. ALUMINUM HEADERBOARD, SEE DETAIL 1, SHEET L-11.
2. JAPANESE BLACK PEBBLE TOPDRESSING, SEE DETAIL 2, SHEET L-11.
3. ZEN GARDEN SAND, SEE DETAIL 3, SHEET L-11.
4. ⅜" DARK PEA GRAVEL, SEE DETAIL 3, SHEET L-11
5. LANDSCAPE GLASS TOPDRESSING, MEDIUM BLUE, SEE DETAIL 4, SHEET L-11
6. SYNTHETIC LAWN, SEE DETAIL 5, SHEET L-11
7. LANDSCAPE BERM, 2-3 FT. HIGH, MAX. 4:1 SLOPE.
8. PLANTERCRAFT CORTEN STEEL RECTANGLE PLANTER, SEE DETAIL 6, SHEET L-11.
9. PLANTERCRAFT CORTEN STEEL ROUND PLANTER, SEE DETAIL 7, SHEET L-11.
10. 4-6" MIXED COBBLE OVER WEED FABRIC, SEE DETAIL 8, SHEET L-11.
11. NEW SOD LAWN
12. 'GOLD' DECOMPOSED GRANITE TOPDRESSING, SEE DETAIL 9, SHEET L-11.
13. LARGE BOULDERS, SEE DETAIL 10, SHEET L-11
14. SAWCUT (E) ASPHALT
15. FUTURE MONUMENT SIGN UNDER SEPARATE WORK.
16. EXISTING SECURITY FENCE TO REMAIN
17. EXISTING SIDEWALK TO REMAIN
18. EXISTING FLAG POLE TO REMAIN
19. EXISTING MONUMENT PLAQUE TO REMAIN
20. NON-LANDSCAPE AREA WITH 3" BARK MULCH TOPDRESSING OVER WEED FABRIC.
21. EXISTING ROCK DRAINAGE SWALE TO REMAIN.


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT Brian K. Kilian 08/01/22 Date LIC. NO. 3962 STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|---|
| | | | | B.K. | | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE LAYOUT PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-8


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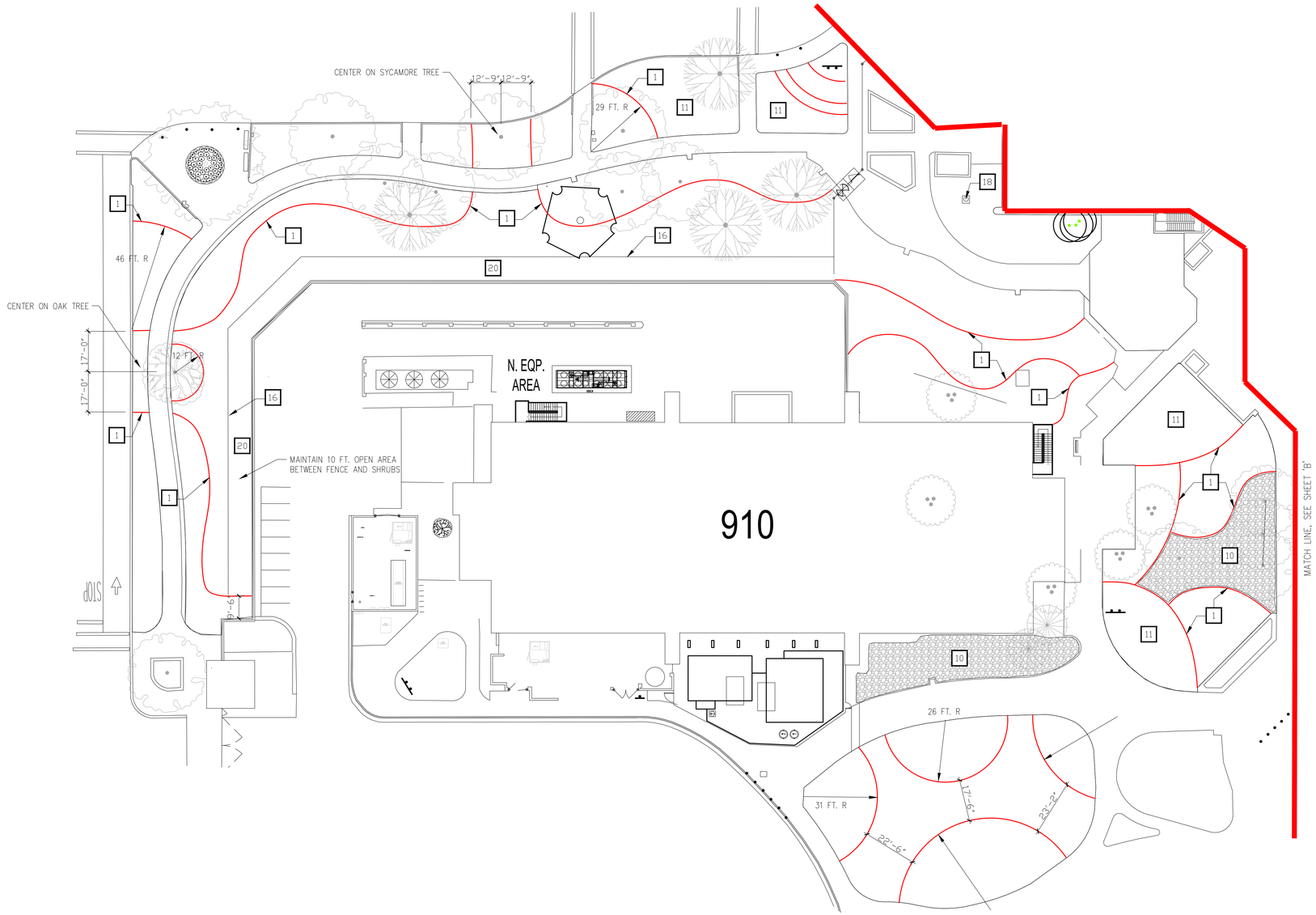
CADS DRAWING
FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420




## SHEET NOTES

1. ALUMINUM HEADERBOARD, SEE DETAIL 1, SHEET L-11.
2. JAPANESE BLACK PEBBLE TOPDRESSING, SEE DETAIL 2, SHEET L-11.
3. ZEN GARDEN SAND, SEE DETAIL 3, SHEET L-11.
4. 3/8" DARK PEA GRAVEL, SEE DETAIL 3, SHEET L-11
5. LANDSCAPE GLASS TOPDRESSING, MEDIUM BLUE, SEE DETAIL 4, SHEET L-11
6. SYNTHETIC LAWN, SEE DETAIL 5, SHEET L-11
7. LANDSCAPE BERM, 2-3 FT. HIGH, MAX. 4:1 SLOPE.
8. PLANTERCRAFT CORTEN STEEL RECTANGLE PLANTER, SEE DETAIL 6, SHEET L-11.
9. PLANTERCRAFT CORTEN STEEL ROUND PLANTER, SEE DETAIL 7, SHEET L-11.
10. 4-6" MIXED COBBLE OVER WEED FABRIC, SEE DETAIL 8, SHEET L-11.
11. NEW SOD LAWN
12. 'GOLD' DECOMPOSED GRANITE TOPDRESSING, SEE DETAIL 9, SHEET L-11.
13. LARGE BOULDERS, SEE DETAIL 10, SHEET L-11
14. SAWCUT (E) ASPHALT
15. FUTURE MONUMENT SIGN UNDER SEPARATE WORK.
16. EXISTING SECURITY FENCE TO REMAIN
17. EXISTING SIDEWALK TO REMAIN
18. EXISTING FLAG POLE TO REMAIN
19. EXISTING MONUMENT PLAQUE TO REMAIN
20. NON-LANDSCAPE AREA WITH 3" BARK MULCH TOPDRESSING OVER WEED FABRIC.
21. EXISTING ROCK DRAINAGE SWALE TO REMAIN.

N

W E

S

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# SITE LAYOUT – SHEET 'C'


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT BRIAN KILIAN Signature 08/01/22 RENEWAL 2023-2024 STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE LAYOUT PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-9


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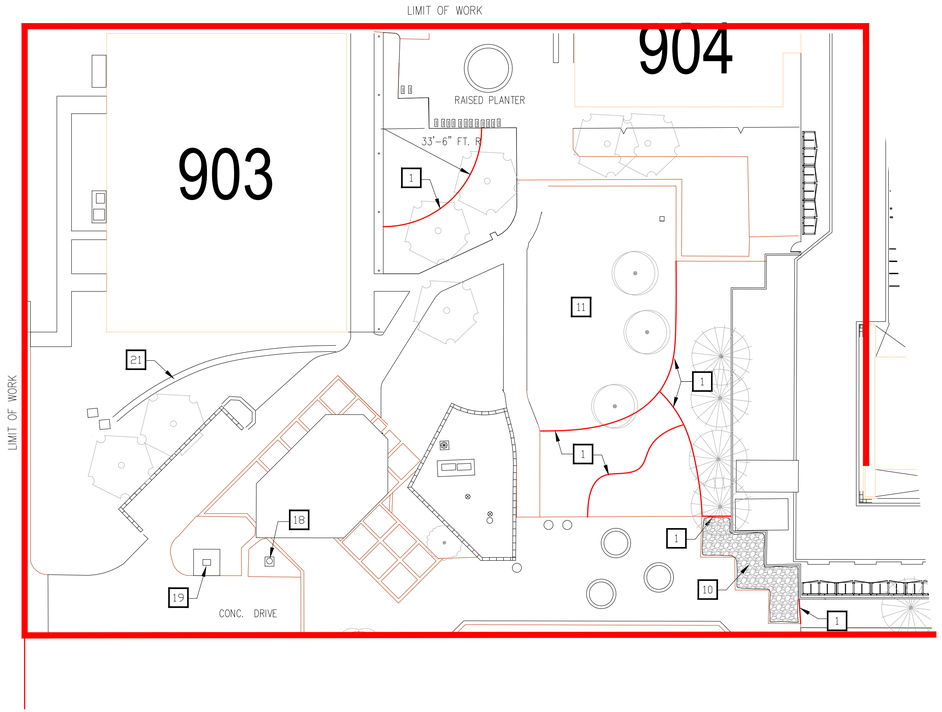
FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420




## SHEET NOTES

1. ALUMINUM HEADERBOARD, SEE DETAIL 1, SHEET L-11.
2. JAPANESE BLACK PEBBLE TOPDRESSING, SEE DETAIL 2, SHEET L-11.
3. ZEN GARDEN SAND, SEE DETAIL 3, SHEET L-11.
4. ⅜" DARK PEA GRAVEL, SEE DETAIL 3, SHEET L-11
5. LANDSCAPE GLASS TOPDRESSING, MEDIUM BLUE, SEE DETAIL 4, SHEET L-11
6. SYNTHETIC LAWN, SEE DETAIL 5, SHEET L-11
7. LANDSCAPE BERM, 2-3 FT. HIGH, MAX. 4:1 SLOPE.
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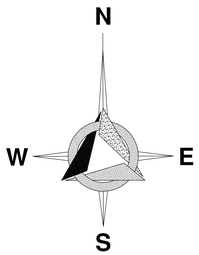
9. PLANTERCRAFT CORTEN STEEL ROUND PLANTER, SEE DETAIL 7, SHEET L-11.
10. 4-6" MIXED COBBLE OVER WEED FABRIC, SEE DETAIL 8, SHEET L-11.
11. NEW SOD LAWN
12. 'GOLD' DECOMPOSED GRANITE TOPDRESSING, SEE DETAIL 9, SHEET L-11.
13. LARGE BOULDERS, SEE DETAIL 10, SHEET L-11
14. SAWCUT <E> ASPHALT
15. FUTURE MONUMENT SIGN UNDER SEPARATE WORK.
16. EXISTING SECURITY FENCE TO REMAIN
17. EXISTING SIDEWALK TO REMAIN
18. EXISTING FLAG POLE TO REMAIN
19. EXISTING MONUMENT PLAQUE TO REMAIN
20. NON-LANDSCAPE AREA WITH 3" BARK MULCH TOPDRESSING OVER WEED FABRIC.
21. EXISTING ROCK DRAINAGE SWALE TO REMAIN.




GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# SITE LAYOUT – SHEET 'D'


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT — BRIAN KILIAN — 08/01/22 — RENEWAL DATE — LIC. NO. 2498 — STATE OF CALIFORNIA

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE LAYOUT PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
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| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-10


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FILE NAME: .dwg

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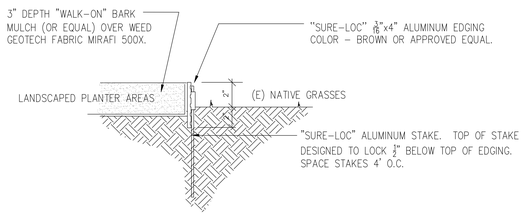
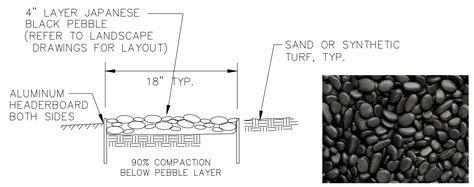
ORDER NO. 2045420

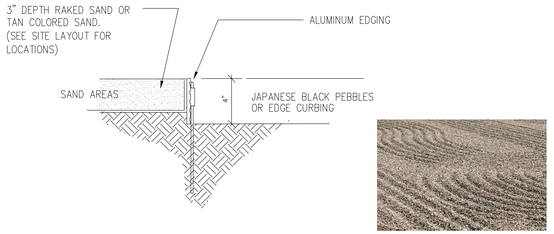



NOTES:
1. TRENCH 2" DEEP LINE TO INSTALL HEADERBOARD, RAKE OUT TO ACCOMODATE 3" LAYER OF BARK.
2. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

## 1 ALUMINUM HEADERBOARD

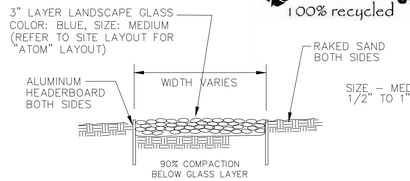



## 2 JAPANESE BLACK PEBBLE



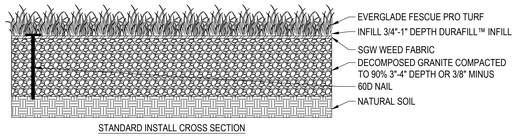

NOTES:
1. RAKED SAND - 3" LAYER WHITE OR LIGHT BEIGH COLOR "ZEN GARDEN SAND".
2. TAN COLORED SAND - 3" LAYER "LIMESTONE GRAVEL 3/8" DARK PEA GRAVEL" OR EQUAL.

## 3 RAKED SAND DETAIL

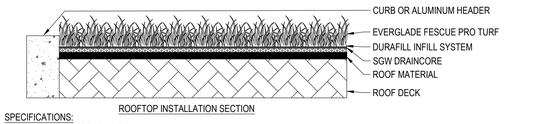



## 4 LANDSCAPE GLASS DETAIL

SYNTHETIC GRASS WAREHOUSE
1400 N DALY ST.
ANAHEIM, CA 92806
TOLL FREE: 1-800-773-9597
www.sgwcorp.com




STANDARD INSTALL CROSS SECTION




ROOFTOP INSTALLATION SECTION

SPECIFICATIONS:
BRAND: TIGER EXPRESS OR EQUAL
MODEL: EVERGLADE FESCUE PRO OR EQUAL

NOTES:
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
2. DO NOT SCALE DRAWING.
3. THIS DRAWING IS INTENDED FOR USE BY ARCHITECTS, ENGINEERS, CONTRACTORS, CONSULTANTS AND DESIGN PROFESSIONALS FOR PLANNING PURPOSES ONLY. THIS DRAWING MAY NOT BE USED FOR CONSTRUCTION.
4. ALL INFORMATION CONTAINED HEREIN WAS CURRENT AT THE TIME OF DEVELOPMENT BUT MUST BE REVIEWED AND APPROVED BY THE PRODUCT MANUFACTURER TO BE CONSIDERED ACCURATE.
5. CONTRACTOR'S NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT www.CADdetails.com/info AND ENTER REFERENCE NUMBER 5028-006.

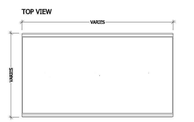
## 5 SYNTHETIC TURF

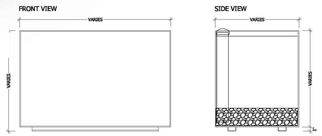
PLANTERCRAFT
AMERICAS FINEST PLANTERS

- Manufactured from .125" Corten Steel
- Finish: Non weathered corten steel - Rust devlops on site
- Fully assembled
- 1" lip profile
- 1" raised feet

STANDARD CORTEN STEEL RECTANGLE PLANTER

Standard size selection or custom size



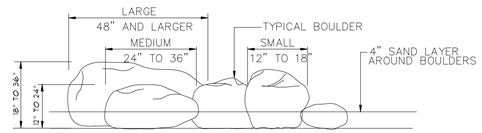




NOTE: INSTALL 4" LAYER OF DRAIN ROCK BELOW FILTER CLOTH AT BOTTOM OF EACH PLANTER. INSTALL (1) 4" PVC DRAIN PIPE PER PLANTER TO SUCTION OUT OVERFLOW WATER. FILL WITH CLEAN TOPSOIL TO 1" FROM TOP.

COUNT: 20 RECTANGLE PLANTERS
72" X 24" X 24"
NO DRAIN HOLES

PLANTERCRAFT.COM | 1200 Fuller RD. Linden NJ 07036 | 1-888-692-3000 | Sales@Plantercraft.com

## 6 STEEL RECTANGLE PLANTER



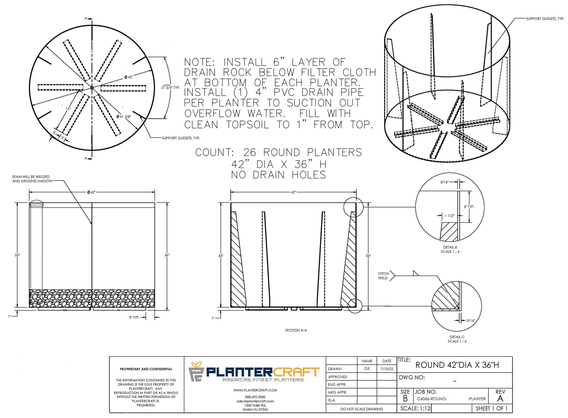

SIZE AND QUANTITY OF BOULDERS ARE SHOWN DIAGRAMMATICALLY ON THE PLAN AND SHALL BE INSTALLED ACCORDING TO FIELD LAYOUT.

CONTRACTOR SHALL PROVIDE CHALKED LAYOUT OF BOULDERS FOR APPROVAL FROM SANDI REPRESENTATIVE PRIOR TO INSTALLATION.

BOULDERS SHALL BE SET ON FINISH GRADE AS SHOWN, WITH SAND INSTALLED AROUND THE EDGES. KEEP WEATHERED AND MOSS SIDES EXPOSED TO ACHIEVE A PERMANT AND NATURAL LAYOUT.

DO NOT INSTALL BOULDERS IN ANY MANNER WHICH WILL BLOCK OR INTERFERE WITH DRAINAGE SWALES OR PIPES OR OTHER UTILITIES.

## 10 BOULDER DETAIL




| PROPRIETARY AND CONFIDENTIAL | | NAME | DATE | TITLE: ROUND 42"DIA X 36"H |
|---|---|---|---|---|
| THE INFORMATION CONTAINED IN THE DRAWING IS THE SOLE PROPERTY OF PLANTERCRAFT. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF PLANTERCRAFT IS PROHIBITED. | PLANTERCRAFT AMERICAS FINEST PLANTERS | DRAWN | GE | 7/19/22 | |
| | | APPROVED | | | DWG NO: - |
| | WWW.PLANTERCRAFT.COM 800.472.6500 ADMIN@PLANTERCRAFT.COM 1200 FULLER RD. LINDEN, NJ 07036 | ENG APPR. | | | |
| | | ENTG APPR. | | | SIZE: B JOB NO.: CADM-ROUND- PLANTER REV: A |
| | | CLA | | | |
| | | DO NOT SCALE DRAWING | | | SCALE: 1:12 SHEET 1 OF 1 |

## 7 STEEL ROUND PLANTER

COBBLE SHALL BE 'LIN CREEK', 'NOYA' OR APPROVED EQUAL 4"-6" DIA. TYP.

COBBLE TO BE SMOOTH AND ROUNDED WITH NO SHARP OR JAGGED EDGES.

ALL COBBLES TO BE WASHED CLEAN OF MUD AND DUST PRIOR TO PLACEMENT.

## 8 MIXED COBBLE DETAIL






NOTES:
1. TRENCH 2" DEEP LINE TO INSTALL HEADERBOARD, RAKE OUT TO ACCOMODATE 3" LAYER OF BARK.
2. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.

## 9 DECOMPOSED GRANITE

DIGALERT
CALL 1-800-227-2600
BEFORE YOU DIG

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT — BRIAN KILIAN — 08/01/22 — STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|---|
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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE LAYOUT PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT NO. | |
| DRAWN | BRIAN KILIAN |
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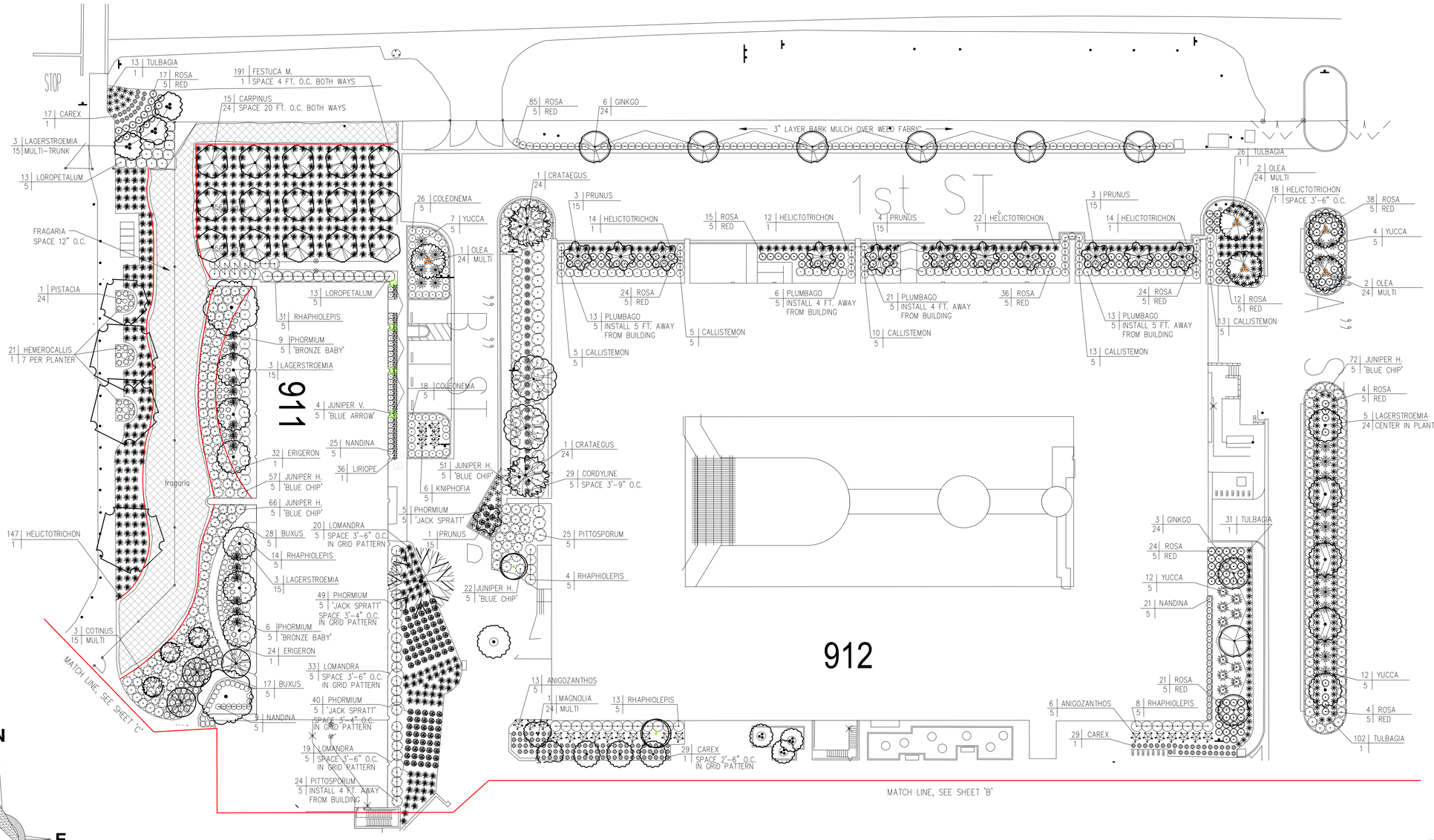


## EXISTING TREE LEGEND

- ALBIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA

# LANDSCAPE – SHEET 'A'


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOC APP. |
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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

LANDSCAPE PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO. | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
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PROJ. NO. 215791
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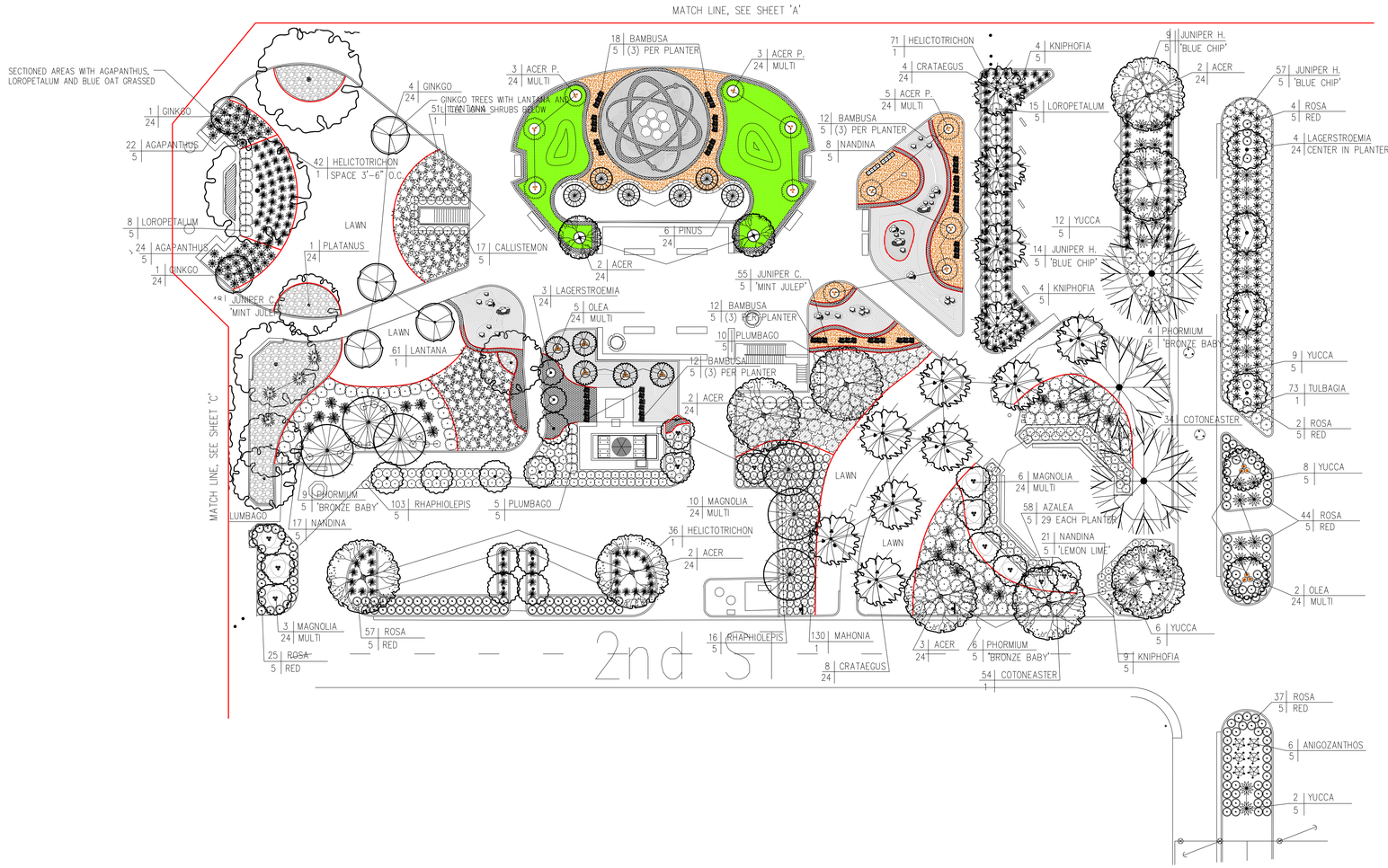


## EXISTING TREE LEGEND

- ALBIIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA

N

W E

S

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )

1 inch = 20 ft.

# LANDSCAPE – SHEET 'B'


BORRECCO/KILIAN & ASSOCIATES, INC.

LANDSCAPE ARCHITECTS

1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT 2499 08/01/22 STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DSE APP. |
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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

LANDSCAPE PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

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CADS DRAWING
FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420

(E) SILK TREE TO REMAIN
11 | HELICTOTRICHON 1
33 | HEMEROCALLIS 1 | SPACE 3 FT. O.C.
8 | ANIGOZANTHOS 5
1 | PLATANUS 24
RECONFIGURED LAWN AREA
1 | AGAVE WEBERI 5
46 | HEMEROCALLIS 1 | SPACE 3 FT. O.C.
4 | AGAVE WEBERI 5
2 | PLATANUS 24
GAZANIA SPACE 12" O.C.
12 | ANIGOZANTHOS 5
260 | COTONEASTER 1
11 | ROSA 5 | RED
49 | CAREX
2 | AGAVE WEBERI 5
8 | AGAVE SCHIDIGERAI 5
8 | ANIGOZANTHOS 5
12 | ANIGOZANTHOS 5
8 | AGAVE SCHIDIGERAI 5
41 | HEMEROCALLIS 1 | SPACE 3 FT. O.C.
6 | ANIGOZANTHOS 5
1 | AGAVE WEBERI 5
11 | BERBERIS 5
20 | SALVIA M. 5 | 'HOT LIPS'
22 | HEMEROCALLIS
5 | OLEA 24 | MULTI
3 | CO 15 | MUL
MATCH LINE. SEE SHEET 'A'
LAWN
36 | SALVIA M. 5 | 'HOT LIPS'
3" LAYER BARK MULCH OVER WEED FABRIC
2 | CERCIS 24 | MULTI
GAZANIA SPACE 12" O.C.
2 | CERCIS 24 | MULTI
84 | LOMANDRA 5 | SPACE 3'-6" O.C.
16 | PHORMIUM 5 | 'BRONZE BABY'
56 | JUNIPER C. 5 | 'MINT JULEP'
5 | ACER 24
6 | CERCIS 24 | MULTI
N. EQP. AREA
3 | CERCIS 24 | MULTI
MAINTAIN 10 FT. OPEN AREA BETWEEN FENCE AND SHRUBS
113 | COLEONEMA 5
2 | LAGERSTROEMIA 24 | MULTI
4 | ROSA 5 | RED
17 | COTONEASTER 1
6 | LOROPETALUM 5
S. EQP. AREA 1
S. EQP. AREA 2
S. EQP. AREA 3
53 | JUNIPER 'BLUE CHIP' 5 | SPACE 4'-6" O.C. IN RADIAL PATTER
14 | HEMEROCALLIS 1
21 | NANDINA 5
8 | PHORMIUM 5 | 'BRONZE BABY'
11 | PLUMBAGO 5
46 | AGAPANTHUS 5
56 | SALVIA S. 5
10 | MAGNOLIA 24 | MULTI
LAWN
24 | PLUMBAGO 5 | INSTALL 4 FT. AWAY FROM BUILDING
7 | CALLISTEMON 5
20 | LANTANA 1
5 | LAGERSTROEMIA 24
16 | AZALEA 5
2 | CERCIS 24 | MULTI
4 | CAMELLIA 5
1 | CAMELLIA 5
10 | POLYSTICHUM 5
6 | ACER 24 | MULTI
LAWN
11 | PITTOSPORUM 5
2 | PRUNUS 15
12 | SALVIA M. 5 | 'HOT LIPS'
25 | COTONEASTER 1
3 | PRUNUS 15
6 | OLEA 24 | MULTI
MATCH LINE. SEE SHEET 'B'
3 | QUERCUS 24
59 | COTONEASTER 1
24 | HEMEROCALLIS 1
1 | OLEA 24
16 | SALVIA M. 5 | 'HOT LIPS'
2 | ACER 24
85 | JUNIPER 'BLUE CHIP' 5 | SPACE 4'-6" O.C. IN RADIAL PATTER
97 | CAREX 1 | SPACE 4'-6" O.C. IN RADIAL PATTER
3 | ACER 24
37 | COTONEASTER 1
118 | HELICTOTRICHON 1 | SPACE 3'-6" O.C.
35 | ROSA 5 | RED

910

# LANDSCAPE – SHEET 'C'

N
W E
S

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

## EXISTING TREE LEGEND

- ALBIIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LIQUIDAMBAR STYRACIFLUA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT Brian K. Kilian License 08/01/22 TERM EXPIRES STATE OF CALIFORNIA

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|
| | | | B.K. | | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

LANDSCAPE PLAN
PHASE A

CONTRACT NO.(A-E)
DOE ACCT.NO.
DRAWN: BRIAN KILIAN
CHECKED:
SCALE: AS SHOWN
DATE: AUGUST 01, 2022

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-14


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FILE NAME: .dwg

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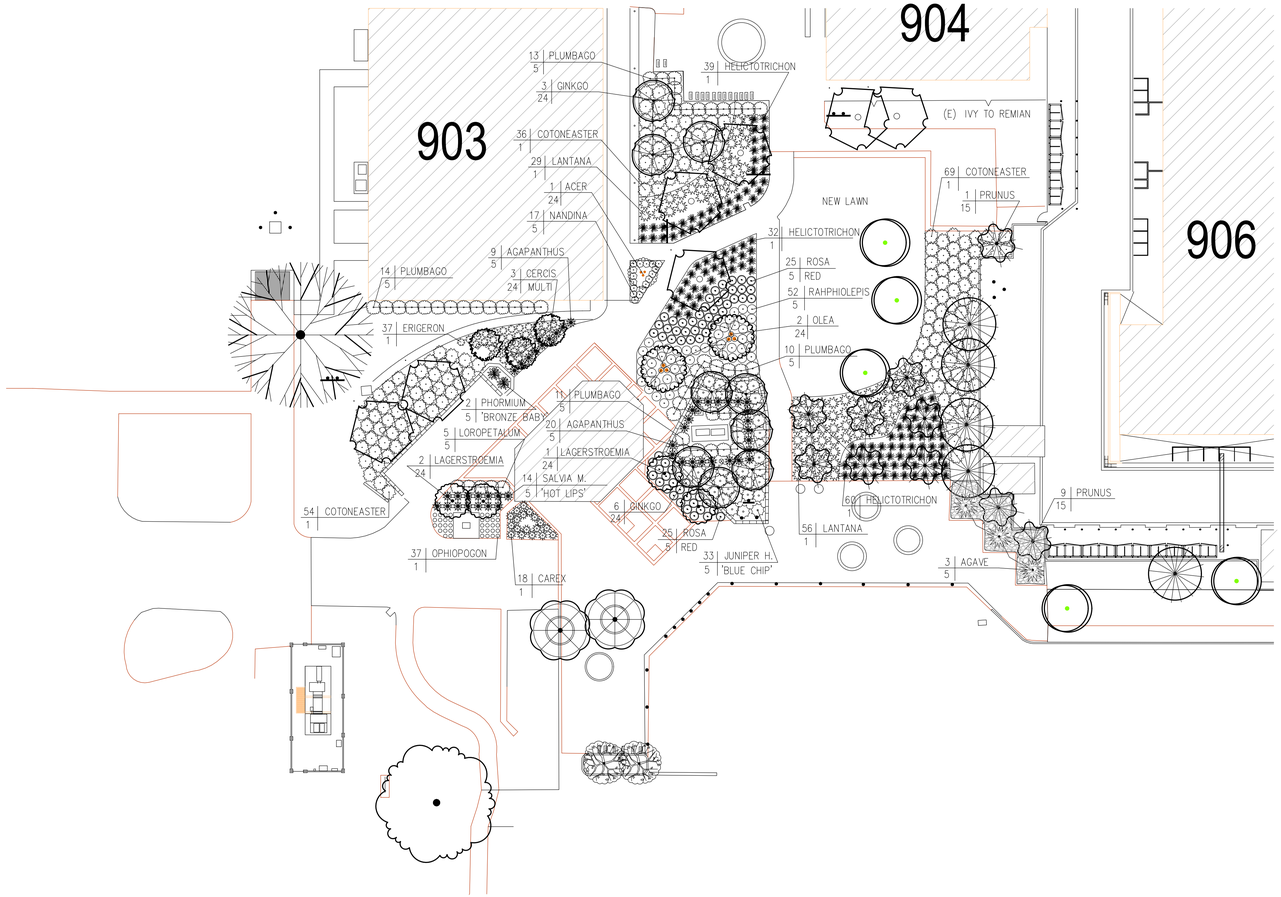
ORDER NO. 2045420




## EXISTING TREE LEGEND

- ALBIIA JULIBRISSIN
- ACER PALMATUM
- CERATONIA SILIQUA
- ERIOBOTRYA DEFLEXA
- EUCALYPTUS
- GLEDITSIA TRIACANTHOS
- LAGERSTROEMIA INDICA
- LIQUIDAMBAR STYRACIFLUA
- MORUS ALBA
- PINUS CANARIENSIS
- PISTACIA CHINENSIS
- PLATANUS RACEMOSA
- QUERCUS AGRIFOLIA
- QUERCUS SUBER
- ULMUS PARVIFOLIA

N
W E
S

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

# LANDSCAPE – SHEET 'D'


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT B. Kilian 08/01/22 STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|---|
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Sandia National Laboratories
Facilities Management
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LANDSCAPE PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
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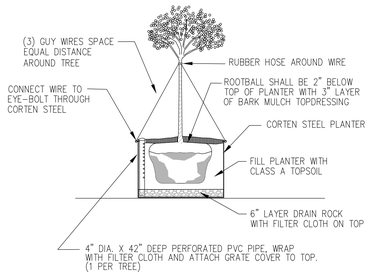
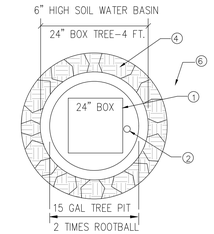
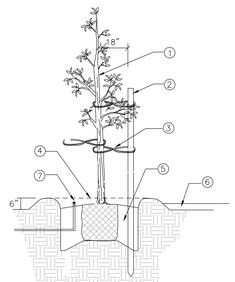



## TREE CONTAINER PLANTING DETAIL




**TOP VIEW**




**FRONT VIEW**

1. APPROVED TREE, SCARIFY SIDE OF ROOTBALL, SET ON UNDISTURBED SOIL WITH ROOT CROWN 2" ABOVE FINISH GRADE. SLOPE SIDES AWAY TO EDGE OF WATER BASIN.
2. ONE 2" x 8 FT. UNTREATED LODGEPOLE STAKES, POSITION UP WIND, INSTALL OUTSIDE OF ROOTBALL, APR. 18" FROM TRUCK, CUT STAKE 4" ABOVE HIGHEST STRAP.
3. TWO 1" WIDE RUBBER TIES PER STAKE IN FIGURE 8 PATTERN. ATTACH WITH GALV. NAILS
4. PROVIDE 6" HIGH SOIL BERMING ALL AROUND TREE TO CREATE WATER BASIN. KEEP SOIL INSIDE BASIN WEED FREE AND HAND-TILLED.
   24" BOX TREE: PROVIDE A 4 FT. INSIDE DIAMTER WATER BASIN
5. AMENDED SOIL PER SOILS REPORT.
6. 3" LAYER BARK MULCH, OUTSIDE OF WATER BASIN.
7. ONE BUBBLER PER TREE. SEE TREE BUBBLER DETAIL ON IRRIGATION PLAN.

## TREE PLANTING & STAKING DETAIL

NOTES:

1. THE LANDSCAPE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING IN ORDER TO DETERMINE EXISTING CONDITIONS. ADDITIONAL COMPENSATION RESULTING FROM ALLEGED IGNORANCE OF LOCAL AND/OR EXISTING CONDITIONS AND THEIR EFFECT UPON THE COST OF THE WORK WILL NOT BE APPROVED.

2. LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR FINISH GRADING OF ALL PLANTING AREAS. FINISH GRADE SHALL BE SMOOTH, EVEN AND UNIFORM PLANE WITH NO LOW SPOTS OR ABRUPT CHANGE OF SURFACE. FINISH GRADE SHALL BE 3" BELOW ELEVATIONS OF ADJACENT SIDEWALK TO ACCOMMODATE BARK MULCH.

3. AS PART OF THIS WORK, THE LANDSCAPE CONTRACTOR SHALL HIRE A SOIL & PLANT LABORATORY TO TAKE SAMPLES AND PROVIDE A SOILS TEST AND RECOMMENDATIONS FOR SOIL AMENDMENTS AND SOIL PREPARATION FOR THE FOLLOWING LANDSCAPE AREAS:

   PLANTER WEST OF BUILDING 912, CENTER MEDIAN ISLAND PLANTER ALONG STREET 'A'

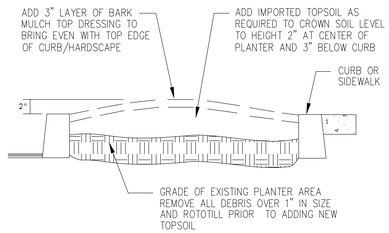
   THE TEST SHALL BE COMPLETED AFTER THE SITE IS GRADED AND PRIOR TO PLANTING. CONTRACTOR SHALL PROVIDE COPIES OF THE SOIL TEST TO THE OWNER'S REPRESENTATIVE PRIOR TO AMENDING THE SOIL.

   FOR ACTUAL CONSTRUCTION, PROVIDE TOPSOIL/SOIL AMENDMENTS PER THE SOIL REPORT, AND PROVIDE OWNER'S REPRESENTATIVE WITH WRITTEN DOCUMENTATION ON TOTAL QUANTITY OF TOPSOIL USED.

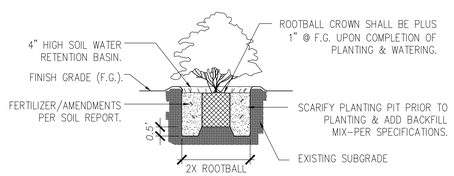
4. PERCOLATION TEST – CONTRACTOR SHALL PERFORM A PERCOLATION TEST ON TWO (2) RANDOMLY SELECTED TREE PITS AND DEMONSTRATE TO THE OWNER'S REPRESENTATIVE IN THE FIELD THEIR DRAINAGE PERFORMANCE. LOCATION OF PITS SHALL BE DOCUMENTED ON THE RECORD DRAWINGS AND RETURNED TO THE OWNER FOR ITS RECORD. IF WATER LEVEL IN TREE PITS DROPS LESS THAN 6" WITHIN A 6 HOUR PERIOD, CONTACT THE OWNER'S REPRESENTATIVE IN WRITING FOR RESOLUTION BEFORE CONTINUING WITH TREE PLANTING.

5. ALL PLANTER AREAS AS SHOWN ON THE LANDSCAPE LAYOUT PLAN SHALL BE TOPDRESSED WITH A MINIMUM OF 3" OF BARK MULCH OVER WEED FABRIC AFTER THE IRRIGATION AND LANDSCAPE INSTALLATION HAS BEEN ACCEPTED.

6. ALL CHEMICALS AND FERTILIZERS USED ON THE PROJECT SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL PRIOR TO USE.




## NEW SOIL DETAIL



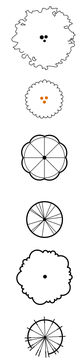

1. PROVIDE 4" HIGH SOIL BERMING ALL AROUND SHRUB TO CREATE WATER BASIN. KEEP SOIL INSIDE BASIN WEED FREE AND HAND-TILLED.
   5-GALLON SHRUB: PROVIDE A 2 FT. INSIDE DIAMTER WATER BASIN
2. AMENDED SOIL PER SOILS REPORT.
3. 3" LAYER BARK MULCH, OUTSIDE OF WATER BASIN.

## SHRUB PLANTING DETAIL

## PLANT LIST

| SIZE | BOTANICAL NAME | COMMON NAME | WATER USE |
|---|---|---|---|
| 24" BOX | ACER PALMATUM 'SANGO KAKU' | CORAL BARK MAPLE (MULTI) | MED |
| 24" BOX | ACER RUBRUM 'REDPOINTE' | SCARLET MAPLE | MED |
| 24" BOX | CARPINUS BETULUS 'FRANS FONTAINE' | EUROPEAN HORNBEAM | LOW |
| 24" BOX | CERCIS OCCIDENTALIS | WESTERN REDBUD (MULTI) | LOW |
| 15 GAL | COTINUS COGGYGRIA 'ROYAL PURPLE' | SMOKE TREE (MULTI) | LOW |
| 24" BOX | CRATAEGUS PHAENOPYRUM | WASHINGTON THORN | LOW |
| 24" BOX | GINKGO BILOBA 'AUTUMN GOLD' | MAIDENHAIR TREE | LOW |
| 24" BOX | JUNIPERUS VIRGINIANA 'BLUE ARROW' | JUNIPER TREE | LOW |
| 24" BOX | LAGERSTROEMIA HYBRID 'TUSCARORA' | CRAPE MYRTLE (STANDARD) | LOW |
| 24" BOX | LAGERSTROEMIA HYBRID 'ZUNII' | CRAPE MYRTLE (MULTI) | LOW |
| 24" BOX | MAGNOLIA STELLATA 'CENTENNIAL' | STAR MAGNOLIA (MULTI) | LOW |
| 24" BOX | OLEA EUROPAEA 'SWAN HILL' | OLIVE (MULTI) | LOW |
| 24" BOX | PINUS THUNBERGII | JAPANESE BLACK PINE | LOW |
| 24" BOX | PLATANUS RACEMOSA | CALIFORNIA SYCAMORE | LOW |
| 15 GAL | PRUNUS CERASIFERA 'KRAUTER VESUVIUS' | FLOWERING PLUM | LOW |
| 24" BOX | QUERCUS AGRIFOLIA | COAST LIVE OAK | LOW |
| 24" BOX | RHAPHIOLEPIS 'MAJESTIC BEAUTY' | ROSACEAE (STANDARD) | LOW |
| 24" BOX | THUJA PLICATA 'SUNSHINE' | WESTERN CEDAR | LOW |
| | | | |
| 5 GAL | AGAPANTHUS AFRICANUS | LILY-OF-THE-NILE | LOW |
| 5 GAL | AGAVE 'BLUE FLAME' | AGAVE | LOW |
| 5 GAL | AGAVE WEBERI | WEBER AGAVE | LOW |
| 5 GAL | AZALEA BELGIAN INDICA HYBRIDS | BELGIAN AZALEA – MIXED COLORS | MED |
| 5 GAL | ANIGOZANTHOS HYBRIDS BUSH GEMS | KANGAROO PAW | LOW |
| 5 GAL | BAMBUSA MULTIPLEX 'GOLDEN GODDESS' | GOLDEN GODDESS BAMBOO | LOW |
| 5 GAL | BERBERIS THUNBERGII 'CRIMSON PYGMY' | RED-LEAF JAPANESE BARBERRY | LOW |
| 5 GAL | BUXUS 'GREEN VELVET' | BOXWOOD | LOW |
| 5 GAL | CALLISTEMON VIMINALIS 'LITTLE JOHN' | WEEPING BOTTLEBRUSH | LOW |
| 5 GAL | CAMELLIA JAPONICA – PINK | CAMELLIA | MED |
| 1 GAL | CAREX DIVULSA | SEDGE | LOW |
| 5 GAL | COLEONEMA PULCHELLUM 'SUNSET GOLD' | BREATH OF HEAVEN | LOW |
| 5 GAL | CORDYLINE HYBRID 'FESTIVAL GRASS' | ASPARAGACEAE | LOW |
| 1 GAL | COTONEASTER DAMMERI 'LOWFAST' | BEARBERRY COTONEASTER | LOW |
| 1 GAL | ERIGERON KARVINSKIANUS | MEXICAN DAISY | LOW |
| FLATS | FRAGARIA 'PINK PANDA' | ORNAMENTAL STRAWBERRY | LOW |
| 1 GAL | HELICTOTRICHON SEMPERVIRENS | BLUE OAT GRASS | LOW |
| 1 GAL | HEMEROCALLIS HYBRIDS | DAYLILY | LOW |
| 5 GAL | JUNIPERUS HORIZONTALIS 'BLUE CHIP' | JUNIPER 'BLUE CHIP' | LOW |
| 5 GAL | JUNIPERUS CHINENSIS 'MINT JULEP' | JUNIPER 'MINT JULEP' | LOW |
| 5 GAL | KNIPHOFIA HYBRIDS | RED-HOT POKER | LOW |
| 1 GAL | LANTANA HYBRID 'GOLD RUSH' | VERBENACEAE 'GOLD RUSH' | LOW |
| 5 GAL | LEPTOSPERMUM ROTUNDIFOLIUM | TEA TREE | LOW |
| 5 GAL | LOMANDRA LONGIFOLIA | DWARD MATT RUSH | LOW |
| 5 GAL | LOROPETALUM CHINENSE 'RAZZLEBERRI' | LOROPETALUM | LOW |
| 1 GAL | MAHONIA REPENS | CREEPING MAHONIA | LOW |
| 5 GAL | MUHLENBERGIA RIGIDA | PURPLE MUHLY | LOW |
| 5 GAL | NANDINA DOMESTICA 'GULF STREAM' | HEAVENLY BAMBOO | LOW |
| 5 GAL | NANDINA DOMESTICA 'LEMON LIME' | HEAVENLY BAMBOO | LOW |
| 1 GAL | OPHIOPOGON PLANISCAPUS | BLACK MONDO GRASS | LOW |
| 5 GAL | PHORMIUM HYBRIDS 'BRONZE BABY' | PHORMIUM | LOW |
| 5 GAL | PHORMIUM HYBRIDS 'JACK SPRATT' | PHORMIUM | LOW |
| 5 GAL | PITTOSPORUM TENUIFOLIUM'GOLF BALL' | PITTOSPORUM | LOW |
| 5 GAL | PLUMBAGO AURICULATA | CAPE PLUMBAGO | LOW |
| 5 GAL | RHAPHIOLEPIS INDICA 'CLARA' | INDIAN HAWTHORN | LOW |
| 5 GAL | ROSA 'RED FLOWER CARPET' | ROSE GROUNDCOVER | LOW |
| 5 GAL | SALVIA SPATHACEA | HUMMINGBIRD SAGE | LOW |
| 5 GAL | SALVIA MICROPHYLLA 'HOT LIPS' | SAGE | LOW |
| 1 GAL | TULBAGHIA VIOLACEA 'TRICOLOR' | SOCIETY GARLIC | LOW |
| 5 GAL | YUCCA FLACCIDA 'GOLDEN SWORD' | YUCCA | LOW |
| | | | |
| SOD | DROUGHT RESISTANCT FESCUE BLEND | LAWN | MED |

## EXISTING TREE LEGEND



ALBIIA JULIBRISSIN

ACER PALMATUM

CERATONIA SILIQUA

ERIOBOTRYA DEFLEXA

EUCALYPTUS

GLEDITSIA TRIACANTHOS

LIQUIDAMBAR STYRACIFLUA

PINUS CANARIENSIS

PISTACIA CHINENSIS

PLATANUS RACEMOSA

QUERCUS AGRIFOLIA

QUERCUS SUBER

ULMUS PARVIFOLIA

EXISTING TREE TO BE REMOVED


**BORRECCO/KILIAN & ASSOCIATES, INC.**

LANDSCAPE ARCHITECTS

1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT — BRIAN KILIAN — No. 2894 — 08/01/22 — STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

LANDSCAPE PLAN
PHASE A

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|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-16


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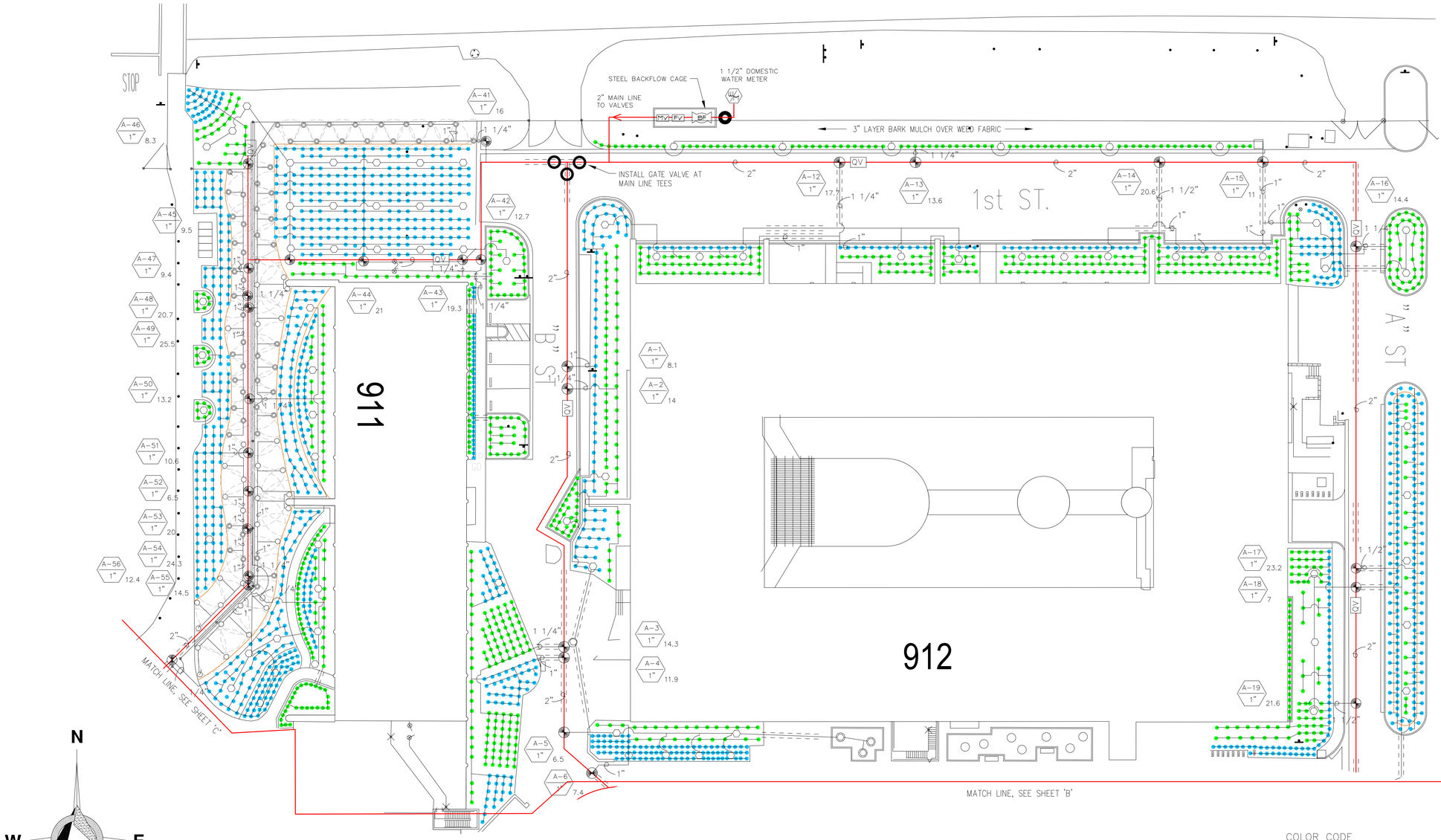


# IRRIGATION – SHEET 'A'

THIS IRRIGATION LAYOUT IS PROVIDED AS A COMPLETE DESIGN INTENDED TO WATER THE NEW LANDSCAPE WITHIN THE SCOPE-OF-WORK AREAS. SANDI NATIONAL LAB ACKNOWLEDGES AND EXPECTS FIELD REVISIONS TO THE LAYOUT/DESIGN BASED ON UNKNOWN OBSTRUCTIONS AND/OR RE-ROUTING OF PIPING/WIRING TO ACCOMODATED ACTUAL FIELD CONDITIONS THAT WERE NOT EVIDENT OR IDENTIFIED DURING THE DESIGN PHASE. DEPENDING ON THE CHANGES, INCLUDING RELOCATION OF P.O.C. AND VALVES, PIPE SIZING AND LAYOUT MAY HAVE TO BE REVISED. VERIFY AND COORDINATE WITH SANDI NATIONAL LAB REPRESENTATIVE FOR FINAL RESOLUTION.

NOTES:

1. IRRIGATION EQUIPMENT MAY BE SHOWN WITHIN HARDSCAPE FOR GRAPHIC CLARITY ONLY. INSTALL ALL IRRIGATION EQUIPMENT WITHIN PLANTED AREAS. IRRIGATION PIPE AND WIRE CROSSING BENEATH HARDSCAPE SURFACES SHALL BE CONTAINED WITHIN SLEEVING OR SCHEDULE 40 PVC CONDUIT. SLEEVING SIZE SHALL BE A MINIMUM OF TWO TIMES THE AGGREGATE DIAMETER OF ALL PIPES CONTAINED WITHIN SLEEVE. PROVIDE VERTICAL SWEEP FOR ALL ELECTRICAL CONDUIT ON EACH SIDE OF HARDSCAPE AND TERMINATE ENDS AT 12" MINIMUM DEPTH AND 12" FROM HARDSCAPE SURFACE.
2. UNSIZED LATERAL LINE PIPING LOCATED DOWN STREAM OF 1" PIPING SHALL BE 3/4" IN SIZE (TYPICAL).
3. SIZING OF LATERAL PIPE SHALL BE AS FOLLOWS:

| | |
|---|---|
| 3/4" | 0–7 GPM |
| 1" | 8–12 GPM |
| 1 1/4" | 13–20 GPM |
| 1 1/2" | 21–32 GPM |
| 2" | 33–50 GPM |
| 2 1/2" | 51–70 GPM |

4. SIZING OF ALL MAIN LINE SHALL BE 2"
5. ALL IRRIGATION PIPING SHALL BE SCHEDULE 40 PVC.

COLOR CODE

(SEE SHEET L-X FOR COMPLETE IRRIGATION LEGEND)

THE IRRIGATION PLAN IS COLOR CODED – DO NOT USE IF DRAWINGS ARE PRINTED IN BLACK AND WHITE ONLY.

- SCHEDULE 40 PVC MAINLINE, (RED) SIZE PER PLAN
- PCT-12 BUBBLER (GREEN) FOR MEDIUM WATER USE
- PCT-7 BUBBLER (BLUE) FOR LOWER WATER USE
- 1402 BUBLER FOR TREE
- ALUMINUM HEADERBOARD (BROWN)

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ORDER NO. 2045420

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LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

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IRRIGATION PLAN
PHASE A

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| CONTRACT NO. A-13 | |
| PO ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-17

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NOTES:

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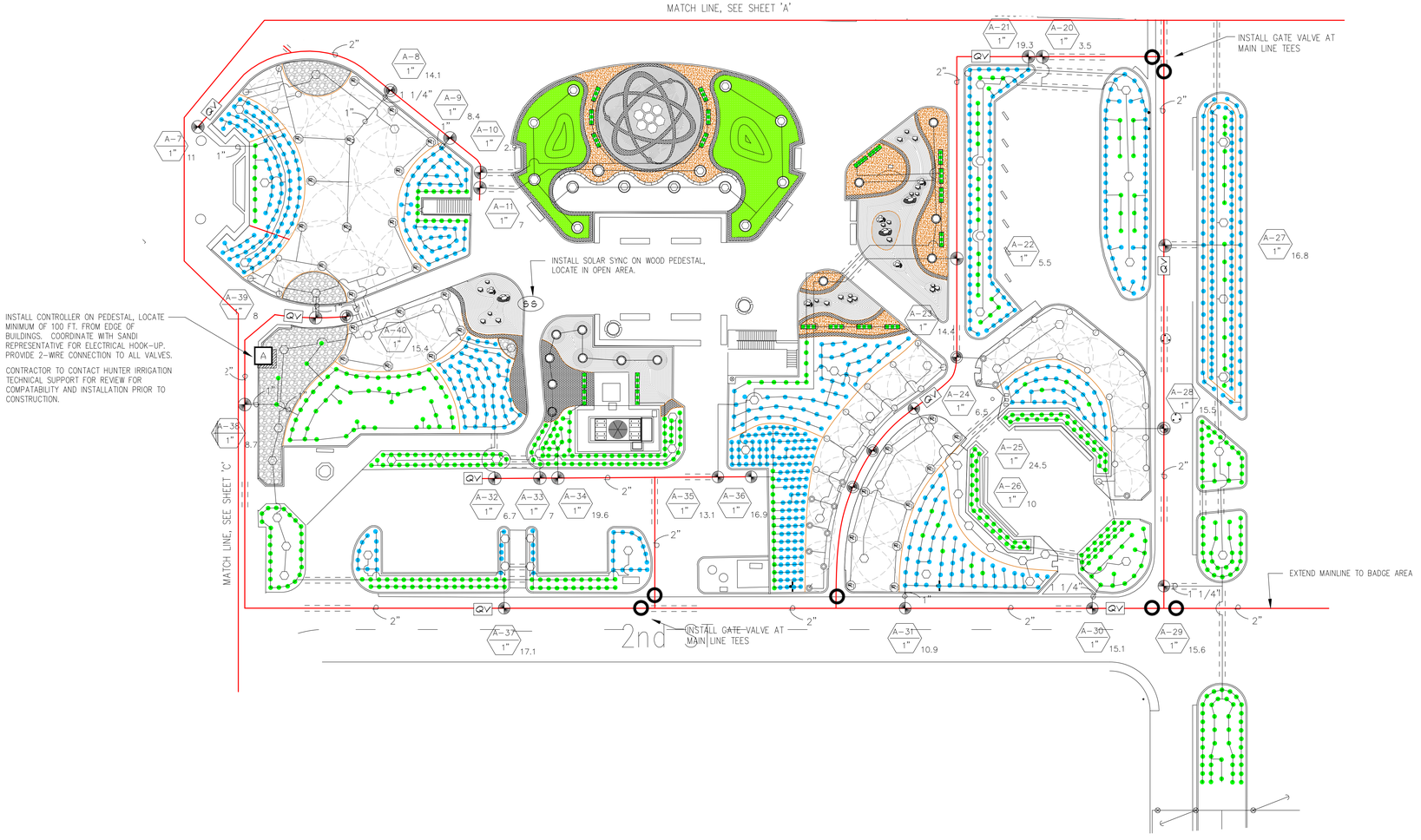
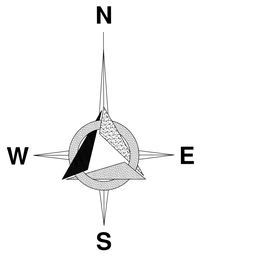
2. UNSIZED LATERAL LINE PIPING LOCATED DOWN STREAM OF 1" PIPING SHALL BE 3/4" IN SIZE (TYPICAL).
3. SIZING OF LATERAL PIPE SHALL BE AS FOLLOWS:

| | |
|---|---|
| 3/4" | 0-7 GPM |
| 1" | 8-12 GPM |
| 1 1/4" | 13-20 GPM |
| 1 1/2" | 21-32 GPM |
| 2" | 33-50 GPM |
| 2 1/2" | 51-70 GPM |

4. SIZING OF ALL MAIN LINE SHALL BE 2"
5. ALL IRRIGATION PIPING SHALL BE SCHEDULE 40 PVC.




GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# IRRIGATION - SHEET 'B'

COLOR CODE

(SEE SHEET L-X FOR COMPLETE IRRIGATION LEGEND)

THE IRRIGATION PLAN IS COLOR CODED - DO NOT USE IF DRAWINGS ARE PRINTED IN BLACK AND WHITE ONLY.

- SCHEDULE 40 PVC MAINLINE, (RED) SIZE PER PLAN
- PCT-12 BUBBLER (GREEN) FOR MEDIUM WATER USE
- PCT-7 BUBBLER (BLUE) FOR LOWER WATER USE
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- ALUMINUM HEADERBOARD (BROWN)

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PROJ. NO. 215791
ORDER NO. 2045420

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT Signature 08/01/22 Date No. 2998 STATE OF CALIFORNIA

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|
| | | | B.K. | | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

IRRIGATION PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-18

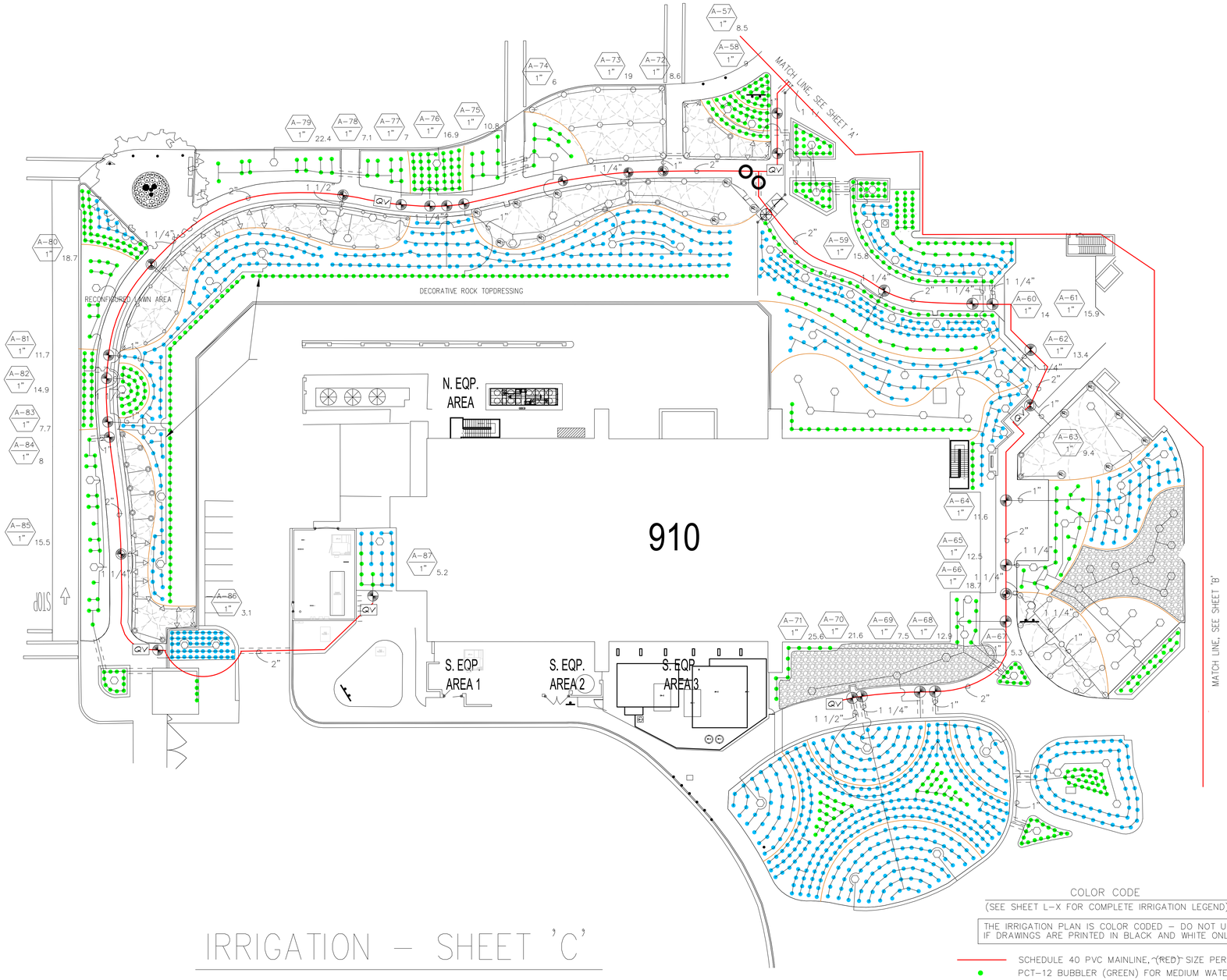
THIS IRRIGATION LAYOUT IS PROVIDED AS A COMPLETE DESIGN INTENDED TO WATER THE NEW LANDSCAPE WITHIN THE SCOPE-OF-WORK AREAS. SANDI NATIONAL LAB ACKNOWLEDGES AND EXPECTS FIELD REVISIONS TO THE LAYOUT/DESIGN BASED ON UNKNOWN OBSTRUCTIONS AND/OR RE-ROUTING OF PIPING/WIRING TO ACCOMODATED ACTUAL FIELD CONDITIONS THAT WERE NOT EVIDENT OR IDENTIFIED DURING THE DESIGN PHASE. DEPENDING ON THE CHANGES, INCLUDING RELOCATION OF P.O.C. AND VALVES, PIPE SIZING AND LAYOUT MAY HAVE TO BE REVISED. VERIFY AND COORDINATE WITH SANDI NATIONAL LAB REPRESENTATIVE FOR FINAL RESOLUTION.

NOTES:

1. IRRIGATION EQUIPMENT MAY BE SHOWN WITHIN HARDSCAPE FOR GRAPHIC CLARITY ONLY. INSTALL ALL IRRIGATION EQUIPMENT WITHIN PLANTED AREAS. IRRIGATION PIPE AND WIRE CROSSING BENEATH HARDSCAPE SURFACES SHALL BE CONTAINED WITHIN SLEEVING OR SCHEDULE 40 PVC CONDUIT. SLEEVING SIZE SHALL BE A MINIMUM OF TWO TIMES THE AGGREGATE DIAMETER OF ALL PIPES CONTAINED WITHIN SLEEVE. PROVIDE VERTICAL SWEEP FOR ALL ELECTRICAL CONDUIT ON EACH SIDE OF HARDSCAPE AND TERMINATE ENDS AT 12" MINIMUM DEPTH AND 12" FROM HARDSCAPE SURFACE.
2. UNSIZED LATERAL LINE PIPING LOCATED DOWN STREAM OF 1" PIPING SHALL BE 3/4" IN SIZE (TYPICAL).
3. SIZING OF LATERAL PIPE SHALL BE AS FOLLOWS:

| | |
|---|---|
| 3/4" | 0-7 GPM |
| 1" | 8-12 GPM |
| 1 1/4" | 13-20 GPM |
| 1 1/2" | 21-32 GPM |
| 2" | 33-50 GPM |
| 2 1/2" | 51-70 GPM |

4. SIZING OF ALL MAIN LINE SHALL BE 2"
5. ALL IRRIGATION PIPING SHALL BE SCHEDULE 40 PVC.




N
W E
S

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# IRRIGATION - SHEET 'C'

COLOR CODE

(SEE SHEET L-X FOR COMPLETE IRRIGATION LEGEND)

THE IRRIGATION PLAN IS COLOR CODED - DO NOT USE IF DRAWINGS ARE PRINTED IN BLACK AND WHITE ONLY.

- SCHEDULE 40 PVC MAINLINE, (RED) SIZE PER PLAN
- PCT-12 BUBBLER (GREEN) FOR MEDIUM WATER USE
- PCT-7 BUBBLER (BLUE) FOR LOWER WATER USE
- 1402 BUBLER FOR TREE
- ALUMINUM HEADERBOARD (BROWN)

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CADS DRAWING
FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT KILIAN EXPIRES 08/01/22 STATE OF CALIFORNIA

| PROJ.& W.O.NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|
| | | | B.K. | | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

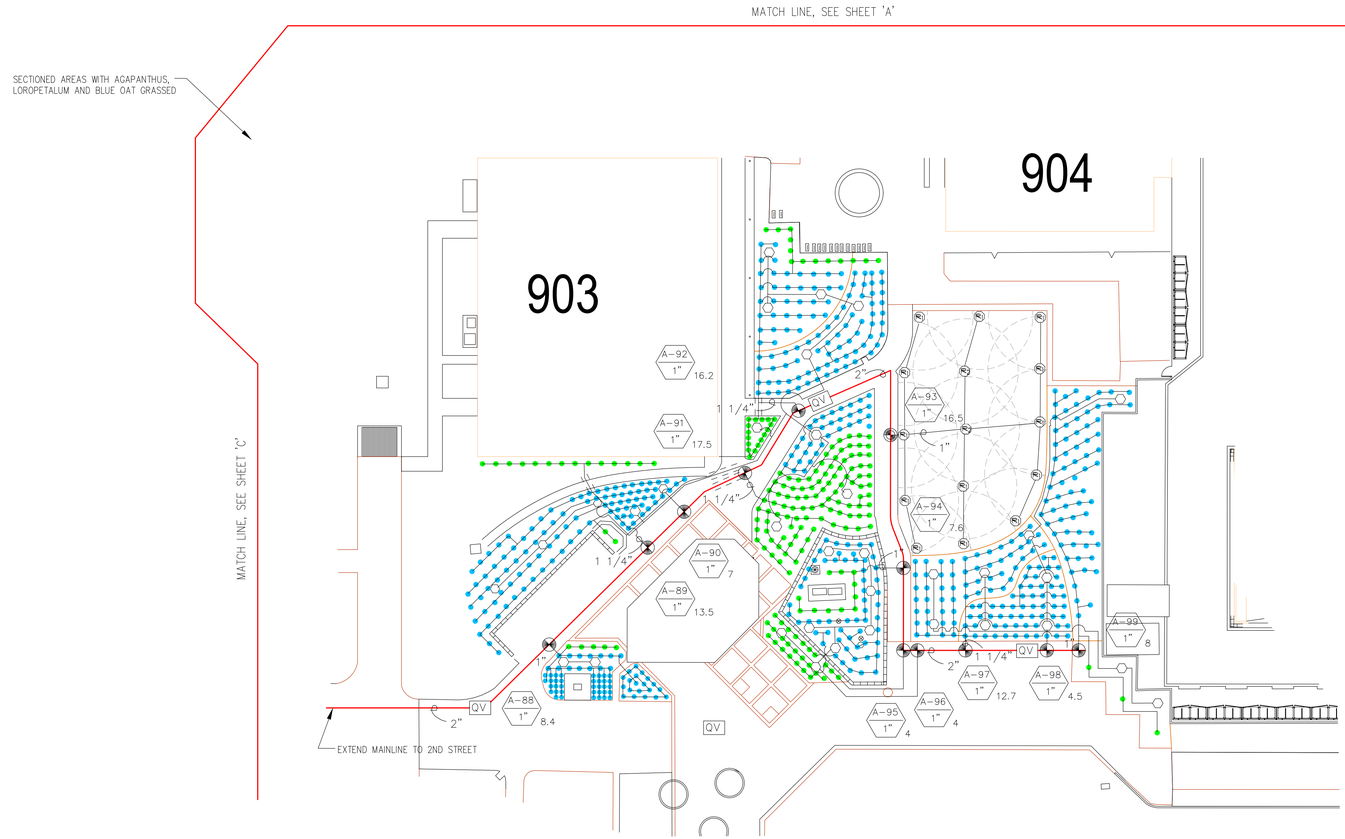
IRRIGATION PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-19

THIS IRRIGATION LAYOUT IS PROVIDED AS A COMPLETE DESIGN INTENDED TO WATER THE NEW LANDSCAPE WITHIN THE SCOPE-OF-WORK AREAS. SANDI NATIONAL LAB ACKNOWLEDGES AND EXPECTS FIELD REVISIONS TO THE LAYOUT/DESIGN BASED ON UNKNOWN OBSTRUCTIONS AND/OR RE-ROUTING OF PIPING/WIRING TO ACCOMODATED ACTUAL FIELD CONDITIONS THAT WERE NOT EVIDENT OR IDENTIFIED DURING THE DESIGN PHASE. DEPENDING ON THE CHANGES, INCLUDING RELOCATION OF P.O.C. AND VALVES, PIPE SIZING AND LAYOUT MAY HAVE TO BE REVISED. VERIFY AND COORDINATE WITH SANDI NATIONAL LAB REPRESENTATIVE FOR FINAL RESOLUTION.




NOTES:

1. IRRIGATION EQUIPMENT MAY BE SHOWN WITHIN HARDSCAPE FOR GRAPHIC CLARITY ONLY. INSTALL ALL IRRIGATION EQUIPMENT WITHIN PLANTED AREAS. IRRIGATION PIPE AND WIRE CROSSING BENEATH HARDSCAPE SURFACES SHALL BE CONTAINED WITHIN SLEEVING OR SCHEDULE 40 PVC CONDUIT. SLEEVING SIZE SHALL BE A MINIMUM OF TWO TIMES THE AGGREGATE DIAMETER OF ALL PIPES CONTAINED WITHIN SLEEVE. PROVIDE VERTICAL SWEEP FOR ALL ELECTRICAL CONDUIT ON EACH SIDE OF HARDSCAPE AND TERMINATE ENDS AT 12" MINIMUM DEPTH AND 12" FROM HARDSCAPE SURFACE.
2. UNSIZED LATERAL LINE PIPING LOCATED DOWN STREAM OF 1" PIPING SHALL BE 3/4" IN SIZE (TYPICAL).
3. SIZING OF LATERAL PIPE SHALL BE AS FOLLOWS:

| | |
|---|---|
| 3/4" | 0-7 GPM |
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| 1 1/4" | 13-20 GPM |
| 1 1/2" | 21-32 GPM |
| 2" | 33-50 GPM |
| 2 1/2" | 51-70 GPM |

4. SIZING OF ALL MAIN LINE SHALL BE 2"
5. ALL IRRIGATION PIPING SHALL BE SCHEDULE 40 PVC.

N
W E
S

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

# IRRIGATION – SHEET 'D'

COLOR CODE
(SEE SHEET L-X FOR COMPLETE IRRIGATION LEGEND)

THE IRRIGATION PLAN IS COLOR CODED – DO NOT USE IF DRAWINGS ARE PRINTED IN BLACK AND WHITE ONLY.

- SCHEDULE 40 PVC MAINLINE, (RED) SIZE PER PLAN
- PCT-12 BUBBLER (GREEN) FOR MEDIUM WATER USE
- PCT-7 BUBBLER (BLUE) FOR LOWER WATER USE
- 1402 BUBLER FOR TREE
- ALUMINUM HEADERBOARD (BROWN)

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CADS DRAWING
FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT
BRIAN KILIAN
No. 2499
08/01/22
DATE
CERTIFIED
STATE OF CALIFORNIA

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|
| | | | B.K. | | |

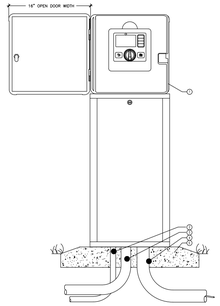
Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

IRRIGATION PLAN
PHASE A

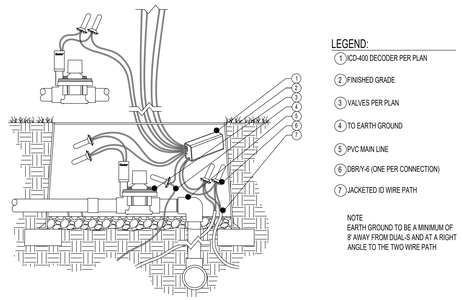
| | |
|---|---|
| CONTRACT NO.(A-E) | |
| ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

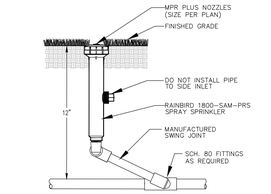
SHEET L-20



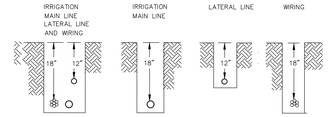

## CONTROLLER WITH PEDESTAL




## VALVE WITH MULTIPLE DECODERS

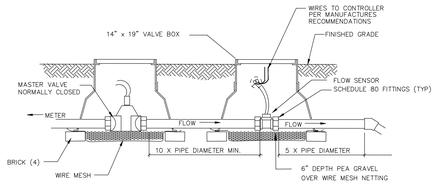



## POP-UP SPRAY DETAIL

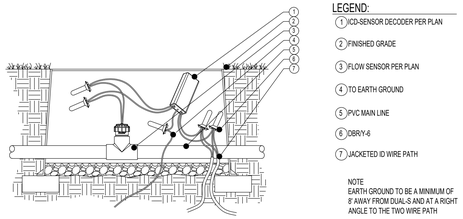



1. LAY IRRIGATION MAIN LINE ON FINE LAYER OF NATIVE SOIL. REMOVE ALL LARGE DIRT CLODS AND ROCKS AND COMPACT TRENCH TO 95 % OF ADJACENT UNDISTURBED SOIL.
2. IRRIGATION LINES TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER' S RECOMMENDATIONS .
3. TAPE AND BUNDLE WIRE EVERY TEN FEET (10') TO MAIN LINE.

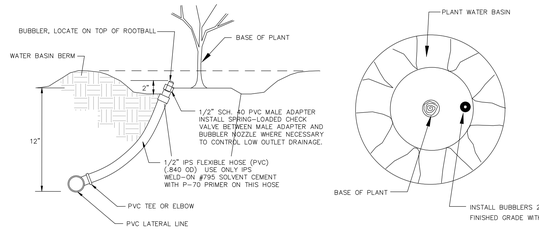
## TRENCHING DETAIL




## MASTER VALVE/FLOW CONTROL DETAIL

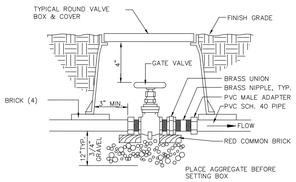



## SENSOR DECODER

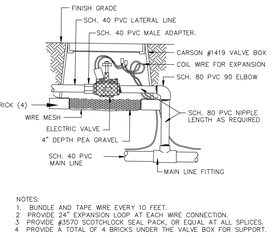



1. INSTALL BUBBLER WITHIN THE WATER BASIN NEXT TO ROOTBALL.

## TREE/SHRUB BUBBLER DETAIL

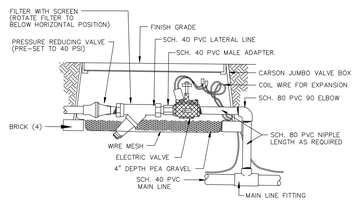



## TYPICAL GATE VALVE

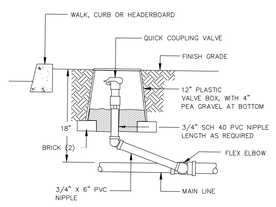



NOTES:
1. BUNDLE AND TAPE WIRE EVERY 10 FEET.
2 PROVIDE 24" EXPANSION LOOP AT EACH WIRE CONNECTION.
3 PROVIDE #3570 SCOTCHLOCK SEAL PACK, OR EQUAL AT ALL SPLICES.
4 PROVIDE A TOTAL OF 4 BRICKS UNDER THE VALVE BOX FOR SUPPORT.

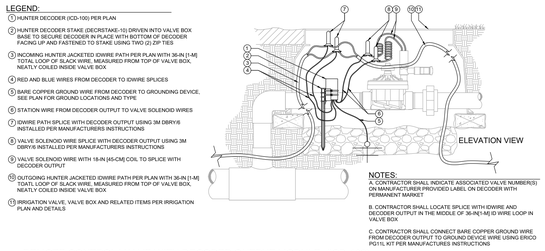
## REMOTE CONTROL VALVE DETAIL




## FILTER/PRES REG. DETAIL

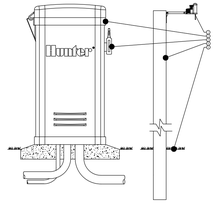



## QUICK COUPLING VALVE

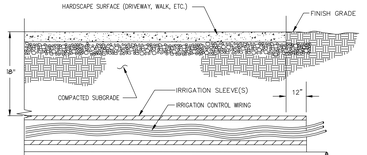



NOTES:
A. CONTRACTOR SHALL INDICATE ASSOCIATED VALVE NUMBER(S) ON MANUFACTURER PROVIDED LABEL ON DECODER WITH PERMANENT MARKET
B. CONTRACTOR SHALL LOCATE SPLICE WITH IDWIRE AND DECODER OUTPUT IN THE MIDDLE OF 36-IN(1-M) ID WIRE LOOP IN VALVE BOX
C. CONTRACTOR SHALL CONNECT BARE COPPER GROUND WIRE FROM DECODER OUTPUT TO GROUND DEVICE WIRE USING ERICO PG110, KIT PER MANUFACTURES INSTRUCTIONS

REMOTE CONTROL VALVE WITH DECODER OUTPUT MODULE (ICD-100)




## WIRELESS SOLAR SYNC




NOTE: SLEEVES ARE TO EXTEND 12" BEYOND EDGE OF PAVING, BOTH WAYS.
PROVIDE SEPARATE SLEEVE FOR MAIN LINE, LATERAL LINE AND WIRING.

## SLEEVING INSTALLATION


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


REGISTERED LANDSCAPE ARCHITECT
Brian K. Kilian
08/01/22
EXPIRES 12-31-24
STATE OF CALIFORNIA

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
|---|---|---|---|---|---|
| | | | B.K. | | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

IRRIGATION PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO. DE-AC04-94AL85000 | |
| DOE ACCT.NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| | | |

SHEET L-21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CADS DRAWING
FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420

# GENERAL IRRIGATION NOTES

THE CONTRACTOR IS CAUTIONED TO DEFEND THE HYDRAULICS OF THIS SYSTEM BY FOLLOWING THE PLANS AND SPECIFICATIONS CAREFULLY. PARTICULAR ATTENTION SHOULD BE GIVEN TO: OPERATING CONTROLLERS PROPERLY, OPERATING THE SYSTEM AFTER FLOW CONTROLS OR SECTION VALVES HAVE BEEN ADJUSTED TO DESIGNED OPERATING PRESSURE, AND FOLLOWING MANUFACTURER'S RECOMMENDATIONS FOR INSTALLATION OF ALL ITEMS. THE SIZING OF VALVES AND PIPES IS SPECIFIC TO THIS DESIGN AND LAYOUT. IF MODIFICATIONS ARE MADE IN THE FIELD, ALL VALVES AND PIPING MUST BE SIZED PROPERLY TO CONFORM WITH THE STANDARD G.P.M. AND VELOCITY REQUIREMENTS. CONTRACTOR MUST SUBMIT CALCULATIONS AND MODIFIED LAYOUT ON OVERLAY SHEET FOR WRITTEN APPROVAL PRIOR TO INSTALLING THE CHANGED ITEM(S).

SPACING OF ALL HEADS ARE SPECIFIC TO THE AREA AS SHOWN ON THE PLANS. CONTRACTOR SHALL VERIFY ALL AREAS TO BE IRRIGATED ARE THE SAME SIZE AS SHOWN ON THE PLAN. IF THE SIZE OF THE AREA HAS CHANGED IN ANY WAY, OR THE GRADE IS DIFFERENT THAN WHAT THE ORIGINAL DESIGN IS BASED ON, CONTRACTOR MUST NOTIFY OWNER'S REPRESENTATIVE IN WRITING FOR RESOLUTION TO THE CHANGE(S). UNLESS NOTIFIED IN WRITING, CONTRACTOR SHALL NOT PROCEED AHEAD WITH THE INSTALLATION UNTIL THE CHANGES HAVE BEEN REVIEWED AND ACCEPTED BY THE OWNER'S REPRESENTATIVE.

IT IS INTENDED THAT THE PIPING LAYOUT IS DIAGRAMMATIC, ALTHOUGH THE SIZING IS SPECIFIC TO THE LAYOUT. PIPING SHALL BE ROUTED AROUND TREES, SHRUBS, ARCHITECTURAL FEATURES ETC. IN SUCH A MANNER AS TO AVOID DAMAGES TO PLANTINGS OR OTHER FEATURES. ANY PIPING SHOWN WITHIN PAVED AREAS OR WITHIN THE FOOTPRINT OF A HOUSE IS FOR DESIGN CLARITY ONLY, AND SHALL BE INSTALLED IN PLANTER AREAS WHEREVER POSSIBLE.

ALL MATERIAL IS SPECIFIC TO THIS DESIGN. THE IRRIGATION SYSTEM(S) HAVE BEEN DESIGNED ACCORDING TO THE OPERATIONAL CHARACTERISTICS OF THE SPECIFIED EQUIPMENT. SUBSTITUTIONS OF ANY COMPONENT WITHOUT BK&A'S EXPRESS WRITTEN AGREEMENT IS PROHIBITED AS IT MAY ADVERSELY AFFECT THE SYSTEM(S) PERFORMANCE. IF ANY CHANGES OR SUBSTITUTIONS ARE MADE WITHOUT BK&A'S WRITTEN APPROVAL, AND WITHOUT THE APPROVED WRITTEN CALCULATIONS, THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY AND COSTS FOR THE RESULTS OF THOSE CHANGES, WHICH MAY INCLUDE LONG-TERM MAINTENANCE.

SET ALL POP-UP SPRINKLERS FLUSH WITH FINISH GRADE AND ONE INCH (1") HORIZONTALLY AWAY FROM EDGE OF WALKS, CURB, HEADERBOARD, ETC. SPRAY HEADS TO BE SUPPLIED IN ACCORDANCE WITH THE SPECIFICATIONS. NOZZLING SHALL BE IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. THE CORRECT DEGREE OF ARC OF NOZZLE SHALL BE AS SHOWN ON THE PLANS AND ADJUSTED TO THE AREA TO BE COVERED AND BY THE WIND CONDITIONS THAT MAY AFFECT COVERAGE. IF IT BECOMES APPARENT THAT WIND CONDITIONS OR OFFSETS IN PLANTING AREAS HAVE NOT BEEN CONSIDERED, CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE FOR SOLUTIONS PRIOR TO INSTALLING THAT PORTION OF THE IRRIGATION SYSTEM AFFECTED.

THE CONTRACTOR SHALL INCLUDE IN THE BID THE ADDITION OF TWENTY (20) SPRINKLER HEADS AND RISER ASSEMBLIES, AND FORTY (40) DRIP BUBBLERS AND RISER ASSEMBLIES TO ACCOMMODATE CHANGES IN THE FIELD NOT ANTICIPATED AT DESIGN PHASE, OR FOR CLOSER SPACING IF REQUIRED TO ACHIEVE BETTER COVERAGE. UNUSED IRRIGATION MATERIAL SHALL BE RETURNED TO THE OWNER FOR FUTURE MAINTENANCE AFTER THE INSTALLATION IS COMPLETED. CONTRACTOR SHALL DOCUMENT WHERE EXTRA MATERIAL HAS BEEN INSTALLED ON THE "AS-BUILT" PLANS.

ALL LATERAL LINES ARE 3/4" DIAMETER UNLESS SPECIFICALLY NOTED OTHERWISE ON THE IRRIGATION PLANS.

THESSE DRAWING ARE DESIGN DRAWINGS. ACTUAL DIMENSIONS AND/OR CONSTRUCTION MAY VARY AT THE DISCRETION OF THE OWNER. IF CHANGES OCCUR, CONTRACTOR SHALL PROVIDE AN OVERLAY SHOWING DESIGN MODIFICATIONS TO VALVES AND/OR PIPE SIZES, AND ADJUST THE LAYOUT AND NUMBER OF HEADS TO ACCOMMODATE THE DIFFERENT SIZE AREA(S). THE CONTRACTOR SHALL PREPARE A DETAILED "AS-BUILT" DRAWING FOR SUBMITTAL TO THE OWNER TO BE USED AS FINAL RECORD DRAWINGS.

THE LANDSCAPE CONTRACTOR SHALL PROVIDE ELECTRICAL WIRES FROM THE CONTROLLER TO EACH VALVE. WIRES SHALL OCCUPY THE SAME TRENCH AND SHALL BE INSTALLED ALONG SIDE OF PRESSURE LINES WHEREVER POSSIBLE. TAPE AND BUNDLE WIRES TOGETHER AT 10' (TEN FOOT) INTERVALS.

ALL WIRES SHALL BE A MINIMUM #14 U.F. 600 VOLT COPPER DIRECT BURIAL 2-WIRE OR HEAVIER GAUGE AS REQUIRED BY LENGTH OF RUN.

VERIFY: SIZE, LOCATION AND AVAILABLE PRESSURE OF P.O.C. PRIOR TO INSTALLATION. IF DIFFERENT THAN WHAT IS SHOWN ON THE IRRIGATION PLAN, STOP WORK AND CONTACT OWNER IN WRITING FOR RESOLUTION. FAILURE TO DO SO WILL MEAN THE LANDSCAPE CONTRACTOR ACCEPTS ALL RESPONSIBILITY AND COSTS FOR REPAIRS, MODIFICATIONS OR OTHER

WORK NECESSARY TO PROVIDE THE OWNER WITH A PROPER WORKING IRRIGATION SYSTEM(S). EXACT LOCATION OF CONTROLLER(S). COORDINATE WITH OWNER AND ELECTRICAL CONTRACTOR FOR LOCATION OF 110 VOLT ELECTRICAL STUBOUT FOR CONTROLLER(S).

ALL PIPING, VALVES, ETC. SHOWN WITHIN PAVED AREAS IS FOR DESIGN CLARIFICATION ONLY, AND SHALL BE INSTALLED IN PLANTING AREAS WHERE POSSIBLE.

WHERE VERTICAL OBSTRUCTIONS IN THE LANDSCAPE AREA INTERFERE WITH THE SPRAY PATTERN OF A SPRINKLER, THE CONTRACTOR SHALL ADJUST HEAD LOCATIONS OR ADD SPRINKLERS A REQUIRED TO PROVIDE FULL COVERAGE. THIS MAY REQUIRE THE ADDITION OF A VARIABLE ARC PATTERN SPRINKLER(S) TO EACH SIDE OF THE OBSTRUCTION.

# IRRIGATION LEGEND

- RAINBIRD 3504-S-PC-SAM WITH 1.0 NOZZLE
- RAINBIRD 3504-S-PC-SAM WITH 1.5 NOZZLE
- RAINBIRD 1806-SAM-P45 WITH RAINBIRD 15 SERIES HE-VAN NOZZLE
- RAINBIRD 1806-SAM-P45 WITH RAINBIRD 12 SERIES HE-VAN NOZZLE
- RAINBIRD 1806-SAM-P45 WITH RAINBIRD 8 SERIES HE-VAN NOZZLE
- RAINBIRD PCT-7 (VIOLET) ON 1\2" IPS FLEXIBLE HOSE
- RAINBIRD PCT-10 (GREEN) ON 1\2" IPS FLEXIBLE HOSE
- RAINBIRD 1402 BUBBLER ON 1\2" IPS FLEXIBLE HOSE
  INSTALL (1) BUBBLER PER TREE
- QC — RAINBIRD 44LRC QUICK-COUPLING VALVE
- RAINBIRD 100-EFB-CP 1" BRASS ELECTRIC REMOTE CONTROL VALVE
- RAINBIRD 100-EFB-CP 1" BRASS ELECTRIC REMOTE CONTROL VALVE WITH RAINBIRD LCRBY-100D FILTER AND RAINBIRD PSI-H40X PRESSURE REGULATOR
- HUNTER DECODERS
  - ICD-100 — SINGLE STATION WITH SURGE SUPPRESSION AND GROUND WIRE
  - ICD-200 — 2-STATION WITH SURGE SUPPRESSION AND GROUND WIRE
  - ICD-400 — 4-STATION WITH SURGE SUPPRESSION AND GROUND WIRE
  - ICD-600 — 6-STATION WITH SURGE SUPPRESSION AND GROUND WIRE
  - ICD-SEN — 2-INPUT SENSOR DECODER WITH SURGE SUPPRESSION AND GROUND WIRE OF RUSE WITH FLOW SENSOR
  - DECSTAKE10 — UNIVERSAL DECODER STAKES; USE ONE PER DECODER
- BRASS GATE VALVE, LINE SIZE
- A — HUNTER A2C-75D-SS CONTROLLER WITH A2C-D75 DECODER EXPANSION MODULE AND A2C-LTE CELL CONNECTION WITH PED-SS STAINLESS STEEL PEDESTAL.
- SS — WSS-SEN (WIRELESS SOLAR SYNC SENSOR AND RECEIVER)
- ROAMXL-KIT (HANDHELD SITE REMOTE – TRANSMITTER, RECEIVER)
- WM — EXISTING WATER METERS, AND BACKFLOW DEVICES TO BE VERIFIED IN THE FIELD WITH OWNER.
- HUNTER FSI-T15-001 FLOW SENSOR WITH HUNTER IBV-200 BRASS MASTER VALVE (NORMALLY CLOSED)
- A-17 / 1" / 20 — STATION CONTROL NUMBER; VALVE SIZE; GPM
- 2" SCHEDULE 40 MAIN LINE
- SCHEDULE 40 PVC LATERAL LINES. (ALL LINES ARE 3/4" SIZE UNLESS SPECIFICALLY NOTED ON THE PLAN)
- PVC SLEEVE
- ALUMINUM HEADERBOARD
- WIRE – #14 DIRECT BURIAL, ID WIRE FOR TWO-WIRE PATHWAY
- GLUE- WELD-ON 711, OR EQUAL
- PRIMER – WELD- ON P-70, OR EQUAL
- SPLICE KITS- 3M-DBY, OR EQUAL

DESIGN IS BASED ON CONNECTING TO EXISTING 1 1/2" WATER METERS, WITH EXISTING BACFLOW DEVICES.
DESIGN ASSUMES A MINIMUM WORKING PRESSURE OF 45 PSI AVAILABLE TO EACH VALVE, AND A SAFE FLOW OF 60 GPM.

CONTACT CHRISTINE HAWKINS, HUNTER REPRESENTATIVE, FOR PRE-CONSTRUCTION MEETING AND TECHNICAL SUPPORT TO REVIEW HUNTER CONTROLLER AND TWO-WIRE SYSTEM.
1 (800) 319-4796

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FILE NAME: .dwg

PROJ. NO. 215791
ORDER NO. 2045420

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT — Signature 08/01/22 — Date — EXP. 12-31-23 — STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DDE APP. |
|---|---|---|---|---|---|---|
| | | | | B.K. | | |

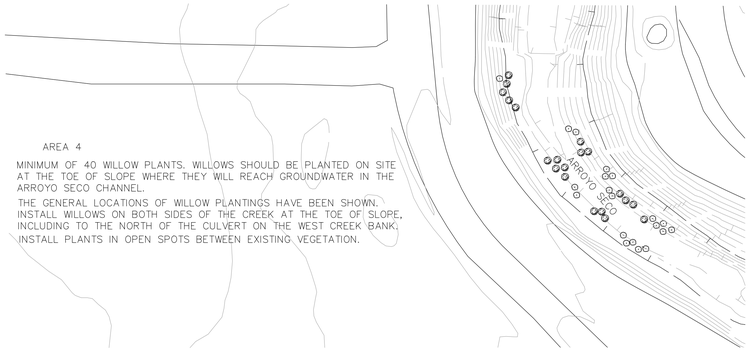
Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

IRRIGATION PLAN
PHASE A

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT NO. | |
| DRAWN | BRIAN KILIAN |
| CHECKED | |
| SCALE | AS SHOWN |
| DATE | AUGUST 01, 2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-22



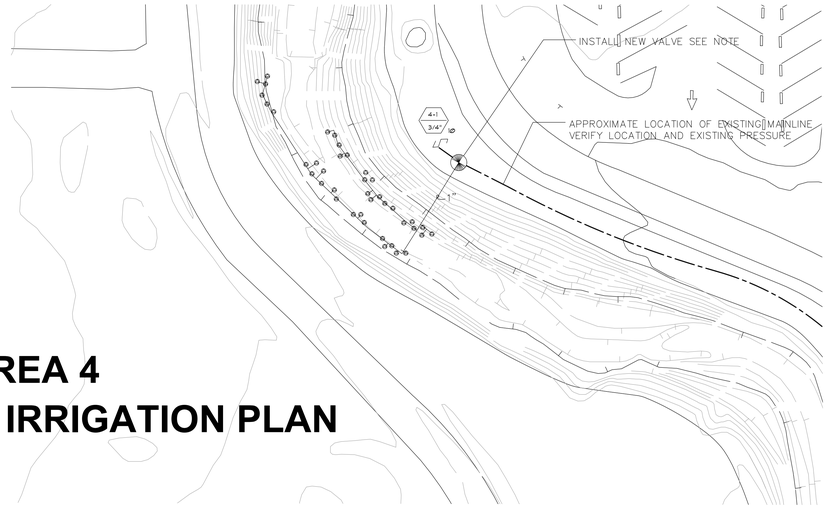

# AREA 4
# WILLOW PLANTING PLAN

AREA 4
PLANTING LEGEND

| SYMBOL | SIZE | BOTANICAL NAME | COMMON NAME | QTY |
|---|---|---|---|---|
| ⊙ | 1 GAL | SALIX LAEVIGATA | RED WILLOW | 20 |
| ⊙ | 1 GAL | SALIX LASIOLEPIS | ARROYO WILLOW | 20 |

MINIMUM OF 40 WILLOW PLANTS. WILLOWS SHOULD BE PLANTED ON SITE AT THE TOE OF SLOPE WHERE THEY WILL REACH GROUNDWATER IN THE ARROYO SECO CHANNEL.

THE GENERAL LOCATIONS OF WILLOW PLANTINGS HAVE BEEN SHOWN. INSTALL WILLOWS ON BOTH SIDES OF THE CREEK AT THE TOE OF SLOPE, INCLUDING TO THE NORTH OF THE CULVERT ON THE WEST CREEK BANK.




# AREA 4
# WILLOW IRRIGATION PLAN

LEGEND

RAIN BIRD 1401 PRESSURE COMPENSATING FULL CIRCLE BUBBLER
INSTALL ONE (1) BUBBLER PER SHRUB
FLOW .25 GPM / OPERATING PRESSURE 20 – 90 PSI

RAIN BIRD PEB–100 REMOTE CONTROL VALVE
FLOW .25 – 50 GPM / OPERATING PRESSURE 20 –200 PSI

4-
1"
STATION CONTROLLER NUMBER
VALVE SIZE
G.P.M.

HUNTER XC–4 CONTROLLER WITH OUTDOOR ENCLOSURE
FIELD VERIFY LOCATION AND POWER SOURCE

SCHEDULE 40 LATERAL LINE
(ALL LATERAL LINES ARE 3/4" SIZE UNLESS NOTED OTHERWISE ON PLAN)

EXISTING SCHEDULE 40 PVC MAIN

AREA 4

LOCATE MAINLINE AND VERIFY A MINIMUM EXISTING PRESSURE OF 40 PSI.

INSTALL NEW VALVE, CONTRACTOR TO DETERMINE IF WIRING IS IN PLACE TO UTILIZE THE EXISTING CONTROLLER.
INSTALL NEW CONTROLLER IF NECESSARY.

UTILIZE EXISTING LATERAL LINES IF POSSIBLE TO MINIMIZE DISTURBANCE TO THE ARROYO AREA.

INSTALL NEW CONTROLLER IF NECESSARY TO OPERATE IRRIGATION IN AREAS 4 AND 5. LOCATE NEW CONTROLLER CLOSEST TO NEAREST AVAILABLE POWER SOURCE.

INSTALL ONE (1) 1401 BUBBLER PER WILLOW PLANT.
LOCATE ON UPHILL SIDE AT THE EDGE OF THE ROOTBALL.

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT Robert C. Killian Signature Date LICENSE NUMBER STATE OF CALIFORNIA

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

AREA 4
PLANTING AND IRRIGATION

| | |
|---|---|
| CONTRACT NO.(A–E) | |
| DOE ACCT.NO. | |
| DRAWN | |
| CHECKED | |
| SCALE | |
| DATE | 5/2022 |

| SUBMITTED | RECOMMENDED | APPROVED |
|---|---|---|
| | SHEET | L-1 |

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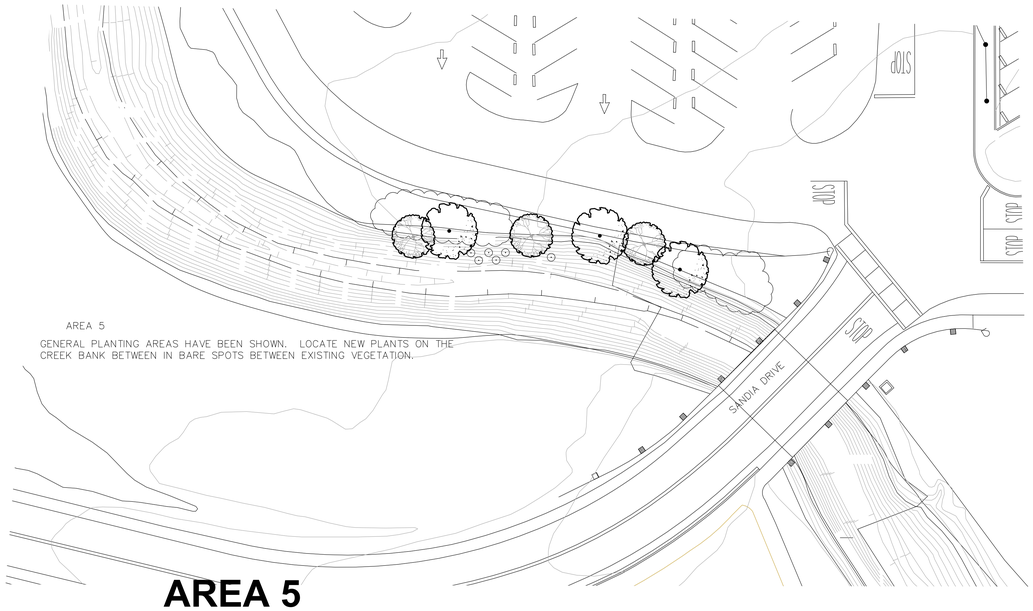



AREA 5

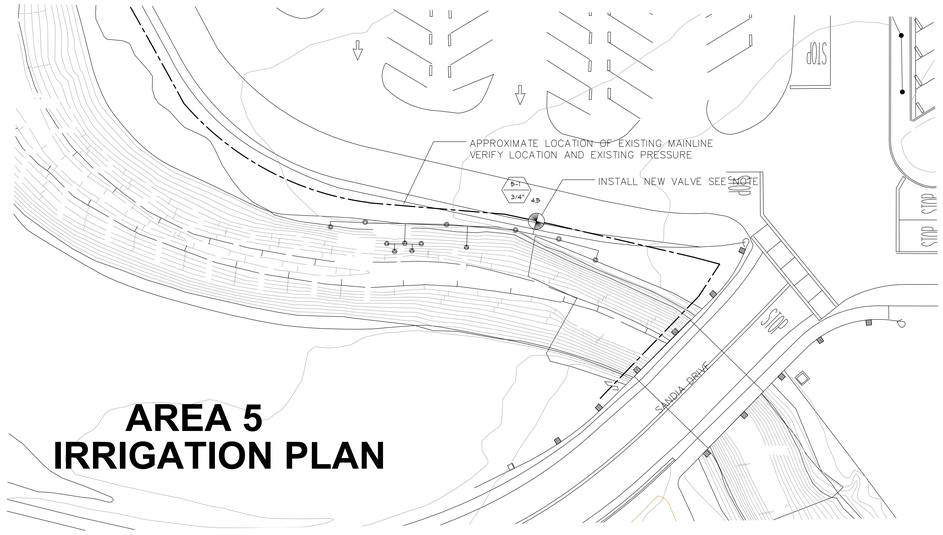
GENERAL PLANTING AREAS HAVE BEEN SHOWN. LOCATE NEW PLANTS ON THE CREEK BANK BETWEEN IN BARE SPOTS BETWEEN EXISTING VEGETATION.

# AREA 5
# PLANTING PLAN

AREA 5
PLANTING LEGEND

| SYMBOL | SIZE | BOTANICAL NAME | COMMON NAME | QTY |
|---|---|---|---|---|
| | 15 GAL | QUERCUS AGRIFOLIA | COAST LIVE OAK | 3 |
| | 15 GAL | QUERCUS LOBATA | VALLEY OAK | 3 |
| ⊙ | 1 GAL | BACCHARIS P. 'CONSANGUINEA' | COYOTE BRUSH | 6 |

MINIMUM PLANTING 6 BACCHARIS, 3 LIVE OAKS, AND 3 VALLEY OAKS. LOCATE BACCAHARIS ON THE EAST SIDE OF CREEK IN BARE AREAS ON THE SLOPE. LOCATE THE OAKS ON THE TOP OF SLOPE IN OPENINGS.




# AREA 5
# IRRIGATION PLAN

LEGEND

- RAIN BIRD 1401 PRESSURE COMPENSATING FULL CIRCLE BUBBLER
  INSTALL ONE (1) BUBBLER PER SHRUB
  FLOW .25 GPM / OPERATING PRESSURE 20 – 90 PSI
- RAIN BIRD 1402 PRESSURE COMPENSATING FULL CIRCLE BUBBLER
  INSTALL ONE (1) BUBBLER PER TREE
  FLOW .5 GPM / OPERATING PRESSURE 20 – 90 PSI
- RAIN BIRD PEB–100 REMOTE CONTROL VALVE
  FLOW .25 – 50 GPM / OPERATING PRESSURE 20 –200 PSI
- 5- / 1" / G.P.M. — STATION CONTROLLER NUMBER, VALVE SIZE, G.P.M.
- A — HUNTER XC–4 CONTROLLER WITH OUTDOOR ENCLOSURE
  FIELD VERIFY LOCATION AND POWER SOURCE
- SCHEDULE 40 LATERAL LINE
  (ALL LATERAL LINES ARE 3/4" SIZE UNLESS NOTED OTHERWISE ON PLAN)
- EXISTING SCHEDULE 40 PVC MAIN

AREA 5

LOCATE MAINLINE AND VERIFY A MINIMUM EXISTING PRESSURE OF 40 PSI.

INSTALL NEW VALVE, CONTRACTOR TO DETERMINE IF WIRING IS IN PLACE TO UTILIZE THE EXISTING CONTROLLER.

INSTALL NEW CONTROLLER IF NECESSARY TO OPERATE IRRIGATION IN AREAS 4 AND 5. LOCATE NEW CONTROLLER CLOSEST TO NEAREST AVAILABLE POWER SOURCE.

INSTALL ONE (1) 1402 BUBBLER PER 15 GALLON TREE
INSTALL ONE (1) 1401 BUBBLER PER 1 GALLON SHRUB
LOCATE BUBBLERS AT THE EDGE OF THE ROOTBALL ON THE UPHILL SIDE. (TYP)

N

GRAPHIC SCALE

20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | DOE APP. |
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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

AREA 5
PLANTING AND IRRIGATION

CONTRACT NO.
TOC ACCT. NO.
DRAWN
CHECKED
SCALE
DATE 5/2022

SUBMITTED | RECOMMENDED | APPROVED

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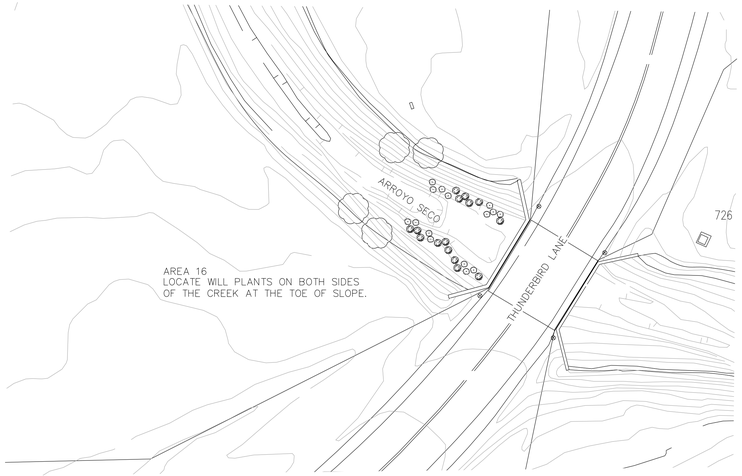


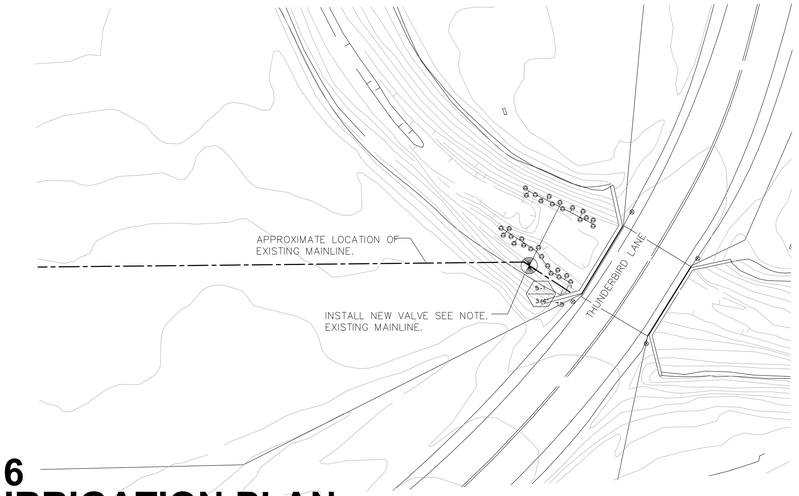

# AREA 16
# WILLOW PLANTING PLAN

## AREA 16
## PLANTING LEGEND

| SYMBOL | SIZE | BOTANICAL NAME | COMMON NAME | QTY |
|---|---|---|---|---|
| ⊙ | DEE POT | SALIX LAEVIGATA | RED WILLOW | 15 |
| ⊙ | DEE POT | SALIX LASIOLEPIS | ARROYO WILLOW | 15 |

MINIMUM 30 WILLOW PLANTS LOCATED IN AREA 16.
WILLOWS HAVE BEEN SHOWN IN GENERAL PLANTING AREA.
LOCATE WILLOWS ON SITE AT THE TOE OF THE SLOPE
WHERE THEY WILL RECIEVE SOME WATER IN THE ARROYO
SECO CHANNEL.

WILLOWS SHOULD BE PLANTED MINIMUM 1' APART.




# AREA 16
# WILLOW IRRIGATION PLAN

## LEGEND

RAIN BIRD 1401 PRESSURE COMPENSATING FULL CIRCLE BUBBLER
INSTALL ONE (1) BUBBLER PER SHRUB
FLOW .25 GPM / OPERATING PRESSURE 20 – 90 PSI

RAIN BIRD PEB–100 REMOTE CONTROL VALVE
FLOW .25 – 50 GPM / OPERATING PRESSURE 20 –200 PSI

16-
1"
9
STATION CONTROLLER NUMBER
VALVE SIZE
G.P.M.

HUNTER XC–4 CONTROLLER WITH OUTDOOR ENCLOSURE
FIELD VERIFY LOCATION AND POWER SOURCE

SCHEDULE 40 LATERAL LINE
(ALL LATERAL LINES ARE 3/4" SIZE UNLESS NOTED OTHERWISE ON PLAN)

EXISTING SCHEDULE 40 PVC MAIN

AREA 16

LOCATE MAINLINE AND VERIFY A MINIMUM EXISTING PRESSURE OF 40 PSI.

INSTALL NEW VALVE, CONTRACTOR TO DETERMINE IF WIRING IS IN PLACE TO UTILIZE THE EXISTING CONTROLLER.

INSTALL NEW CONTROLLER IF NECESSARY TO OPERATE IRRIGATION IN AREA 16. LOCATE NEW CONTROLLER CLOSEST TO NEAREST AVAILABLE POWER SOURCE.

INSTALL ONE (1) 1401 BUBBLER PER 1 GALLON SHRUB
LOCATE BUBBLERS AT THE EDGE OF THE ROOTBALL ON
THE UPHILL SIDE. (TYP)

N

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER J. KILIAN
No. 2539
Signature
Date
STATE OF CALIFORNIA

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
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AREA 16
PLANTING AND IRRIGATION

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT. NO. | |
| DRAWN | |
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| SCALE | |
| DATE | 5/2022 |

SUBMITTED | RECOMMENDED | APPROVED

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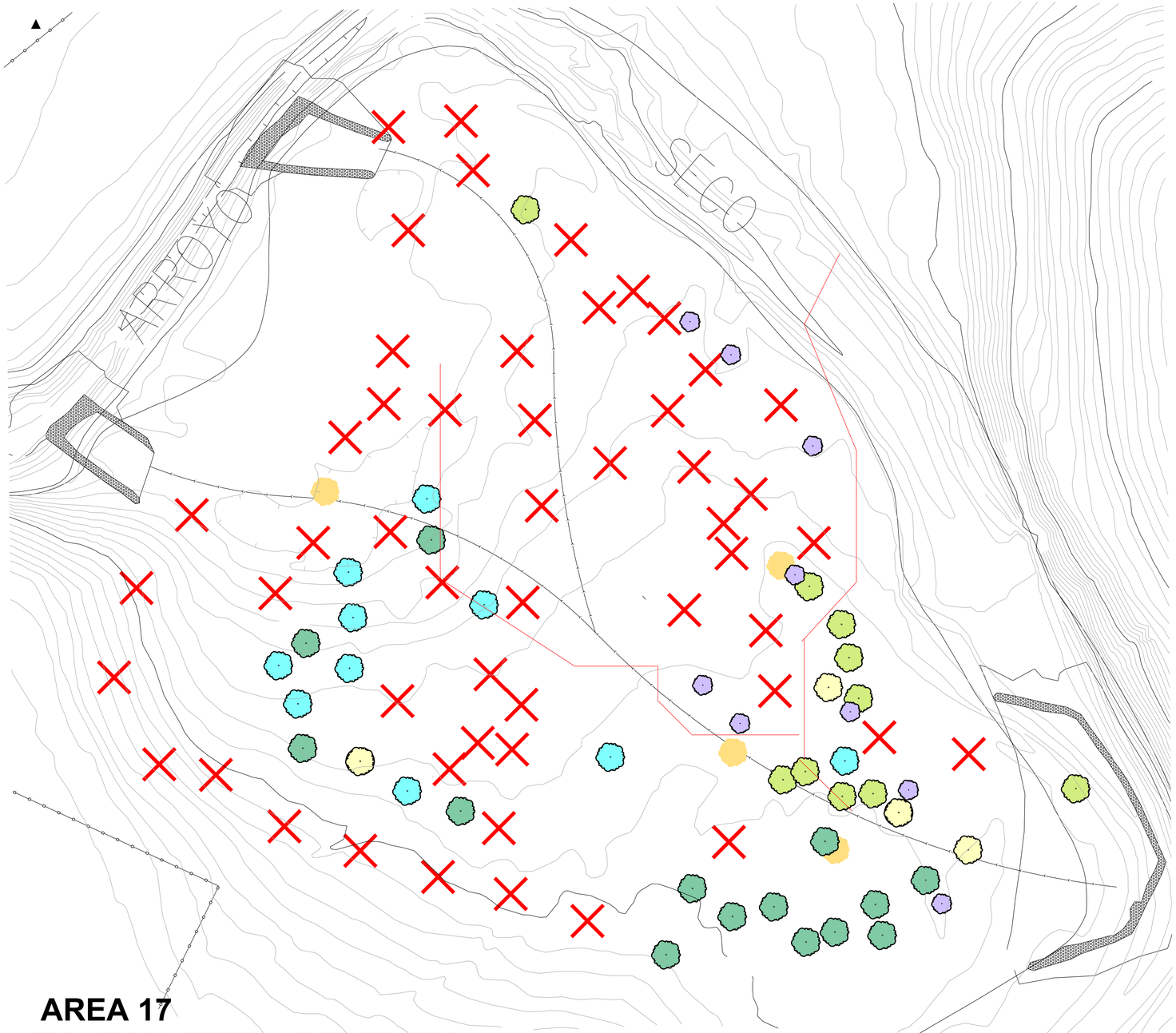


## LEGEND

INDICATES DEAD TREE

ALL DEAD TREES AND STAKES SHALL BE REMOVED AS RECOMMENDED PER PERFORMANCE REPORT PREPARED BY NOMAD ECOLOGY DATED 4/7/22.

### SURVIVING PLANT MATERIAL

| SYMBOL | BOTANICAL NAME | COMMON NAME | QTY |
|---|---|---|---|
| | ACER MACROPHYLLUM | BIG LEAF MAPLE | 4 |
| | PLATANUS RACEMOSA | CALIFORNIA SYCAMORE | 4 |
| | POPULUS FREMONTII | FREMONT COTTONWOOD | 10 |
| | QUERCUS AGRIFOLIA | COAST LIVE OAK | 14 |
| | QUERCUS LOBATA | VALLEY OAK | 10 |
| | SAMBUCUS N. CAERULEA | BLUE ELDERBERRY | 9 |

PLANT SPECIES AND LOCATIONS PER PERFORMANCE REPORT PREPARED BY NOMAD ECOLOGY DATED 4/7/22.
REMOVE TREE STAKES FROM THE SURVIVING PLANT MATERIAL

# AREA 17
# EXISTING TREE INVENTORY

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

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LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT Geoff T. Kilian 2589 Date 7/19 STATE OF CALIFORNIA

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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

AREA 17
EXISTING TREE INVENTORY

CONTRACT NO.(A-E)
DOE ACCT.NO.
DRAWN
CHECKED
SCALE
DATE 5/2022

SUBMITTED | RECOMMENDED | APPROVED

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APPLY A MINIMUM 3" ORGANIC MULCH IN A 6' DIAMETER CIRCLE AROUND
THE NEWLY INSTALLED PLANT MATERIAL, PULL MULCH BACK FOR THE BASE OF TRUNK.
APPLY HYDROSEED PER NOMAD ECOLOGY RECOMMENDATIONS TO ALL DISTURBED AREAS.

AREA 17
PLANTING LEGEND

| SYMBOL | SIZE | BOTANICAL NAME | COMMON NAME | QTY |
|---|---|---|---|---|
| | 15 GAL | POPULUS FREMONTII | FREMONT COTTONWOOD | 10 |
| | 15 GAL | QUERCUS AGRIFOLIA | COAST LIVE OAK | 15 |
| | 15 GAL | QUERCUS LOBATA | VALLEY OAK | 15 |
| | 15 GAL | SAMBUCUS N. CAERULEA | BLUE ELDERBERRY | 10 |

**Table 3. Native Seed Mix**

| Common Name (Scientific Name) | Seeding Rate (lbs. pure live seed /acre) |
|---|---|
| creeping wildrye *(Leymus triticoides)* | 8 |
| California brome (*Bromus sitchensis* var. *carinatus*) | 8 |
| small fescue (*Vulpia microstachys*) | 6 |
| purple needlegrass (*Stipa pulchra*) | 6 |
| common fiddleneck (*Amsinckia intermedia*) | 2 |
| California poppy (*Eschscholzia californica*) | 2 |
| Great Valley gumweed (*Grindelia camporum*) | 2 |
| coyote brush (*Baccharis pilularis* subsp. *consanguinea*) | 2 |
| **Total** | **36** |

APPLY HYDRO SEED PER RECOMMENDATIONS BY NOMAD ECOLOGY REPORT DATED 4/7/2022
PRIOR TO SEEDING, EXISTING WEEDS WILL NEED TO BE REMOVED TO EXPOSE THE SOIL SURFACE AND THE GROUND WILL NEED TO BE SCARIFIED (SURFACE ROUGHENED) TO PROVIDE A SUITABLE SURFACE FOR SEEDING. WEED REMOVAL AND SCARIFICATION CAN BE COMPLETED BY HAND OR WITH A HARROW PULLED BY AN ATV.
ANY SCARIFICATION SHOULD NOT DISTURB THE SOIL SURFACE DEEPER THAN A COUPLE OF INCHES.

N

GRAPHIC SCALE
20 0 10 20 40 80
( IN FEET )
1 inch = 20 ft.

# AREA 17 PLANTING PLAN

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LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT Robert C. Kilian No. 2500 Signature Date RENEWAL 08/31/2023 STATE OF CALIFORNIA

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Sandia National Laboratories
Facilities Management
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AREA 17
PLANTING PLAN

| | |
|---|---|
| CONTRACT NO.(A-E) | |
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| SCALE | |
| DATE | 5/2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-5

# AREA 17
# IRRIGATION PLAN

## LEGEND

EXISTING SPRAY COMPONENTS

EXISTING VALVE

EXISTING IRRIGATION LINE

EXISTING SPRAY HEAD ON PVC RISER

EXISTING SPRAY IRRIGATION TO BE REMOVED AND/OR ABANDONED. REMOVE EXISTING SPRAY IRRIGATION RISERS AND CAP LATERAL LINES.

NEW IRRIGATION SYSTEM

RAIN BIRD 1402 PRESSURE COMPENSATING FULL CIRCLE BUBBLER
INSTALL ONE (1) BUBBLER PER TREE
FLOW .5 GPM / OPERATING PRESSURE 20 – 90 PSI

RAIN BIRD PEB–100 REMOTE CONTROL VALVE
FLOW .25 – 50 GPM / OPERATING PRESSURE 20 –200 PSI

17-3
1"
9
STATION CONTROLLER NUMBER
VALVE SIZE
G.P.M.

SHUT OFF VALVE – LINE SIZE

SCHEDULE 40 LATERAL LINE
(ALL LATERAL LINES ARE 3/4" SIZE UNLESS NOTED OTHERWISE ON PLAN)

EXISTING SCHEDULE 40 PVC MAIN

DESIGN INTENT IS TO PROVIDE NEW BUBBLER IRRIGATION SYSTEMS FOR THE NEWLY PLANTED TREES.
INTENT IS TO UTILIZE THE EXISTING MAINLINE AND EXISTING IRRIGATION CONTROLLER.

LOCATE EXISTING MAINLINE AND VERIFY A MINIMUM EXISTING PRESSURE OF 40 PSI.

INSTALL NEW VALVES AND ROUTE LATERAL LINES TO NEW TREE BUBBLERS.

ABANDON THE EXISTING IRRIGATION VALVE SYSTEMS, REMOVE SPRAY HEADS AND PVC RISERS SHOULD BE REMOVED AND CAPPED.

CONTRACTOR SHOULD USE CAUTION TO MINIMIZE DISTURBANCE TO THE PRESERVE AREA.

N

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

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LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306

REGISTERED LANDSCAPE ARCHITECT
JAMES F. KILIAN
No. 2339
Signature
Date
RENEWAL 08/31/2023
STATE OF CALIFORNIA

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|---|---|---|---|---|---|

Sandia National Laboratories
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AREA 17
IRRIGATION PLAN

| | |
|---|---|
| CONTRACT NO.(A-E) | |
| DOE ACCT. NO. | |
| DRAWN | |
| CHECKED | |
| SCALE | |
| DATE | 5/2022 |

SUBMITTED | RECOMMENDED | APPROVED

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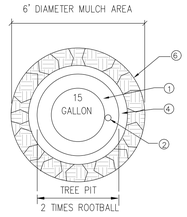
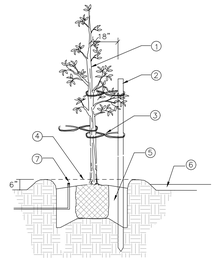


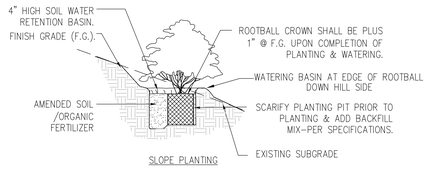

## TOP VIEW



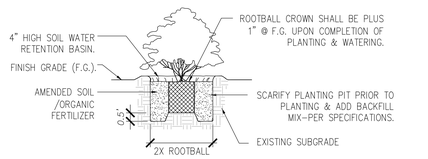

## FRONT VIEW

1. APPROVED TREE, SCARIFY SIDE OF ROOTBALL, SET ON UNDISTURBED SOIL WITH ROOT CROWN 2" ABOVE FINISH GRADE. SLOPE SIDES AWAY TO EDGE OF WATER BASIN.
2. ONE 2" x 8 FT. UNTREATED LODGEPOLE STAKES, POSITION UP WIND, INSTALL OUTSIDE OF ROOTBALL, APR. 18" FROM TRUCK, CUT STAKE 4" ABOVE HIGHEST STRAP.
3. TWO 1" WIDE RUBBER TIES PER STAKE IN FIGURE 8 PATTERN. ATTACH WITH GALV. NAILS
4. PROVIDE 6" HIGH SOIL BERMING ALL AROUND TREE TO CREATE WATER BASIN. KEEP SOIL INSIDE BASIN WEED FREE AND HAND-TILLED.
   24" BOX TREE: PROVIDE A 4 FT. INSIDE DIAMETER WATER BASIN
5. AMENDED SOIL / ORGANIC FERTILIZER -SEE PLANTING NOTE.
6. 3" LAYER BARK MULCH, OUTSIDE OF WATER BASIN.
7. ONE BUBBLER PER TREE. SEE TREE BUBBLER DETAIL ON IRRIGATION PLAN.

## TREE PLANTING & STAKING DETAIL




SLOPE PLANTING



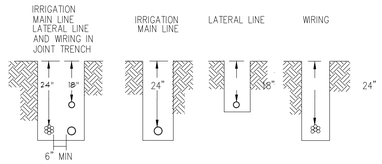

1. PROVIDE 4" HIGH SOIL BERMING ALL AROUND SHRUB TO CREATE WATER BASIN. KEEP SOIL INSIDE BASIN WEED FREE AND HAND-TILLED.
   5-GALLON SHRUB: PROVIDE A 2 FT. INSIDE DIAMETER WATER BASIN
2. AMENDED SOIL SEE PLANTING NOTE.

## SHRUB PLANTING DETAIL

NOTES:

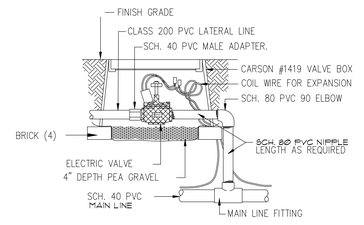
1. THE LANDSCAPE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING IN ORDER TO DETERMINE EXISTING CONDITIONS. ADDITIONAL COMPENSATION RESULTING FROM ALLEGED IGNORANCE OF LOCAL AND/OR EXISTING CONDITIONS AND THEIR EFFECT UPON THE COST OF THE WORK WILL NOT BE APPROVED.
2. AMEND SOIL WITH ORGANIC COMPOST. SOIL SHALL BE MIXED AT A MINIMUM RATE OF 1 PART COMPOST TO 2 PARTS NATIVE SOIL.
3. CONTRACTOR SHALL PROVIDE THE NAME OF THE NURSERY FROM WHERE THE PLANTS ARE BEING PURCHASED FROM, AND, IF REQUIRED AS PART OF THE BID PACKAGE, ARRANGE A TREE INSPECTION AT THE NURSERY WITH THE OWNER'S REPRESENTATIVE. A THREE (3) DAY ADVANCED NOTICE IS REQUIRED TO SET UP THE INSPECTION.
4. DO NOT INSTALL ANY PLANT IN A SWALE OR IN SUCH A MANNER WHICH WILL INTERFERE WITH DRAINAGE.
5. ORGANIC WOOD CHIP MULCH -INSTALL A THREE INCH (3") LAYER OF ORGANIC WOOD CHIP MULCH IN 6' DIAMETER CIRCLE KEEP ALL MULCH 6 INCHES AWAY FROM THE TRUNK OF PLANTS. SUBMIT SAMPLE OF BARK MULCH FOR APPROVAL PRIOR TO DELIVERY TO PROJECT. NO "GORILLA HAIR" OR SHREDDED MULCH ALLOWED. DO NOT INSTALL MULCH ON SLOPES STEEPER THAN 3:1.
6. ONLY ORGANIC FERTILIZERS SHALL BE USED ON THE PROJECT, FERTILIZERS SHALL BE SUBMITTED TO THE SANDIA LABS FOR APPROVAL PRIOR TO USE.

# PLANTING DETAILS



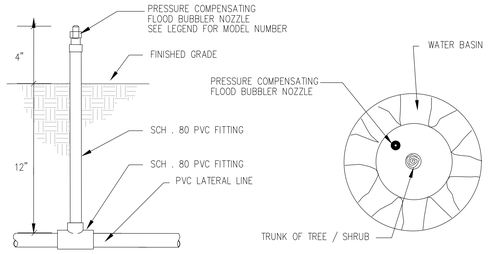

1. LAY IRRIGATION MAIN LINE ON FINE LAYER OF NATIVE SOIL. REMOVE ALL LARGE DIRT CLODS AND ROCKS AND COMPACT TRENCH TO 95 % OF ADJACENT UNDISTURBED SOIL .
2. IRRIGATION LINES TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER' S RECOMMENDATIONS .
3. TAPE AND BUNDLE WIRE EVERY TEN FEET (10'). PROVIDE MINIMUM 6" SIDE CLEARANCE FROM MAINLINE.

## TRENCHING DETAIL



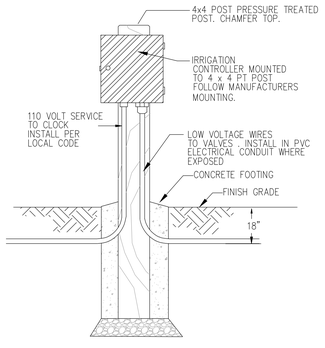

NOTES:
1 BUNDLE AND TAPE WIRE EVERY 10 FEET.
2 PROVIDE 24" EXPANSION LOOP AT EACH WIRE CONNECTION.
3 PROVIDE #3570 SCOTCHLOCK SEAL PACK, OR EQUAL AT ALL SPLICES.
4 PROVIDE A TOTAL OF 4 BRICKS UNDER THE VALVE BOX FOR SUPPORT.

## REMOTE CONTROL VALVE DETAIL




NOTE: INSTALL BUBBLER WITHIN WATER BASIN OF TREE / SHRUB ON THE UP HILL SIDE OF TRUNK

## BUBBLER DETAIL




MOUNT CONTROLLER AND SECURE CONDUIT TO WOOD POST.

## CONTROLLER DETAIL

# IRRIGATION DETAILS


BORRECCO/KILIAN & ASSOCIATES, INC.
LANDSCAPE ARCHITECTS
1241 Pine Street
Martinez, California 94553
Phone: 925/372-5306


| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | DOE APP. |
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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

PHASE B
PLANTING & IRRIGATION DETAILS

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| CONTRACT NO.AT-D | |
| ACCT.NO. | |
| DRAWN | |
| CHECKED | |
| SCALE | |
| DATE | 5/2022 |

SUBMITTED | RECOMMENDED | APPROVED

SHEET L-7


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PROJ. NO. 215791
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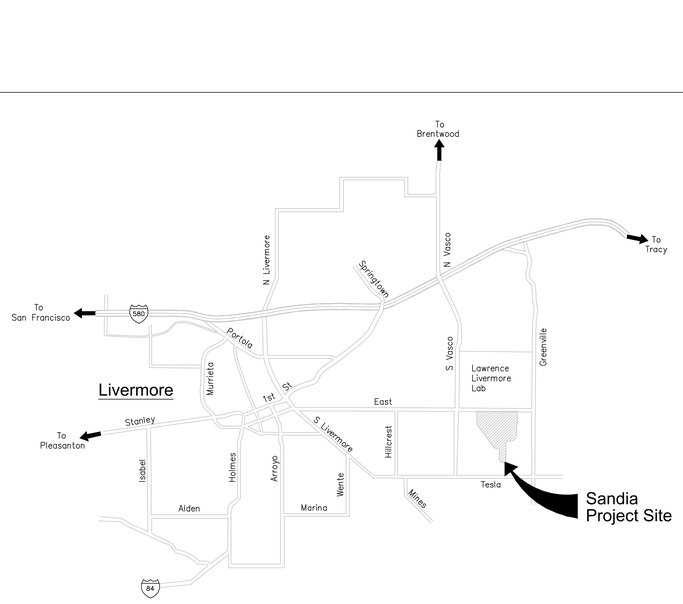
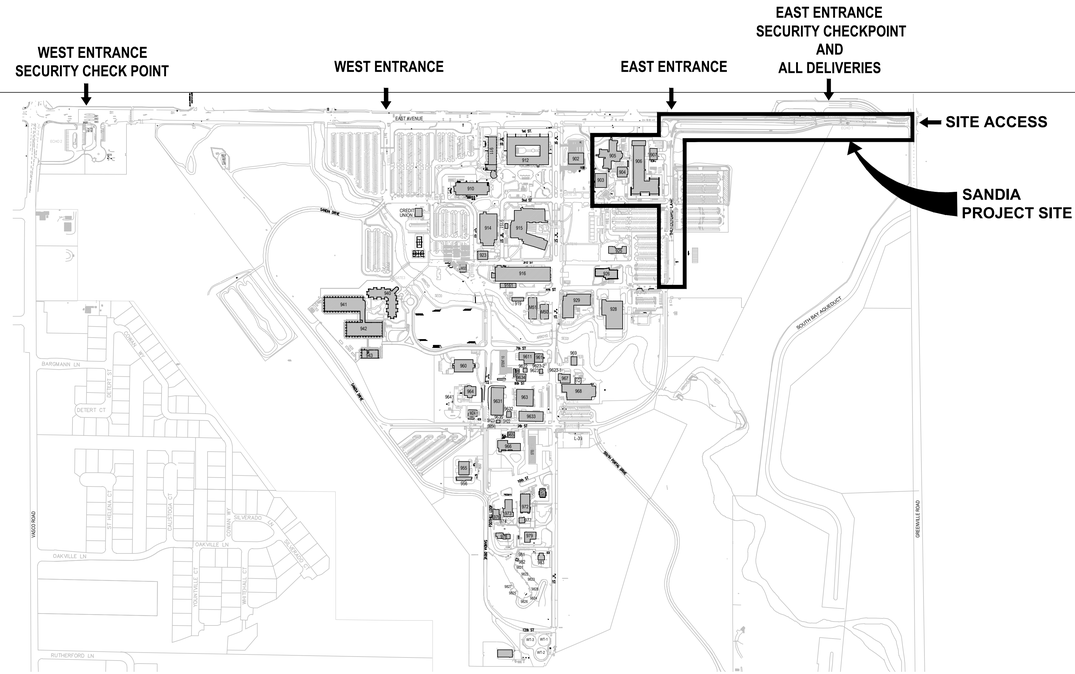
Sandia National Laboratories / California

# GREENVILLE CAMPUS LANDSCAPE DESIGN

## Sandia Project Number 227381




SITE VICINITY MAP




SITE LOCATION PLAN

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GATES +ASSOCIATES
LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
1400 N. MARKET, STE 360, WALNUT CREEK, CA 94596
T 925.734.8174 www.gateslan.com

REGISTERED LANDSCAPE ARCHITECT — CHRIS A. GATES — 9/30/2024, 11/07/2022 — STATE OF CALIFORNIA

## SHEET INDEX


GENERAL

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| G-001 | TITLESHEET |
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LANDSCAPE

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| L-002 | PLANTING SCHEDULE AND LEGEND |
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| LD102 | DEMOLITION PLAN |
| LD103 | DEMOLITION PLAN |
| LD104 | DEMOLITION PLAN |
| LD105 | DEMOLITION PLAN |
| LD106 | DEMOLITION PLAN |
| LH101 | MATERIAL AND FENCING PLAN |
| LH102 | MATERIAL AND FENCING PLAN |
| LH103 | MATERIAL AND FENCING PLAN |
| LH104 | MATERIAL AND FENCING PLAN |
| LH105 | (NOT USED) |
| LP101 | PLANTING PLAN |
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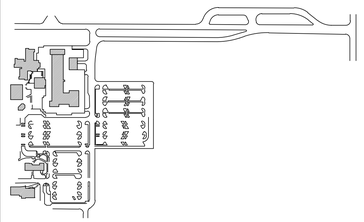
| LS602 | IRRIGATION CALCULATIONS |


KEY MAP



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| CHECKED | KC |
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| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 1 OF 34
SHEET G-001

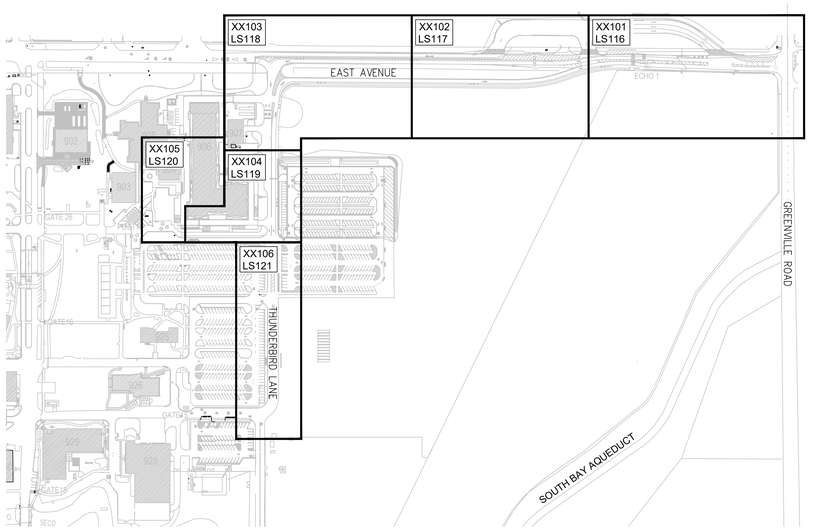
## LAYOUT NOTES

| | | | |
|---|---|---|---|
| A | AMPERE | MIN. | MINIMUM |
| AC | ASPHALT CONCRETE | MED | MEDIUM |
| A.F.F. | ABOVE FINISHED GRADE | (N) | NEW |
| BOW | BACK OF WALK | NIC | NOT IN CONTRACT |
| BS | BOTTOM OF STAIR | NO. | NUMBER |
| BW | BOTTOM OF WALL | NTS | NOT TO SCALE |
| BW | BOTH WAYS | O.C. | ON CENTER |
| C | CONDUIT | OFCI | OWNER FURNISHED, CONTRACTOR INSTALLED |
| CONC. | CONCRETE | PA | PLANTING AREA |
| CP | CONTROL POINT | PCC | PORTLAND CEMENT CONCRETE |
| CTRL | CONTROL | PL | PROPERTY LINE |
| (E), EXIST | EXISTING | PR | PROPOSED |
| E.W. | EACH WAY | PVC | POLY VINYL CHLORIDE |
| EA | EACH | (R) | RELOCATED |
| EL | ELEVATION | R | RADIUS |
| EQ | EQUAL | S | SLOPE |
| ES | EQUAL SPACES | SP | SPACING |
| EX | EXISTING | SD | STORM DRAIN |
| F.O.B. | FACE OF BUILDING | SDCO | STORM DRAIN CLEANOUT |
| (F), FUT | FUTURE | SDMH | STORM DRAIN MANHOLD |
| FC | FACE OF CURB | SL | STREET LIGHT |
| FG | FINISH GRADE | SQ. | SQUARE |
| FH | FIRE HYDRANT | SS | STAINLESS STEEL |
| FL | FLOW LINE | SS | SANITARY SEWER (CIVIL) |
| (G), GRD | GROUND | SSCO | SANITARY SEWER CLEANOUT |
| G | GAS | SSMH | SANITARY SEWER MANHOLE |
| GB | GRADE BREAK | S/W | SIDEWALK |
| GV | GAS VALVE | TEL, T | TELEPHONE |
| HC | HANDICAP FACILITY | TBD | TO BE DETERMINED |
| HDPE | HIGH DENSITY POLYETHYLENE | TS | TOP OF STAIR |
| HT | HEIGHT | TW | TOP OF WALL |
| INV | INVERT | TYP. | TYPICAL |
| IC | IRRIGATION CONTROL | UNO | UNLESS OTHERWISE NOTED |
| IRR | IRRIGATION | W | WATER LINE (CIVIL) |
| JB | JUNCTION BOX | WP | WATERPROOF |
| MFR | MANUFACTURER | W.P.M. | WATERPROOF MEMBRANE |

## LAYOUT NOTES

1. CONTRACTOR SHALL VERIFY ALL UTILITIES, GRADES, EXISTING CONDITIONS AND DIMENSIONS IN THE FIELD PRIOR TO COMMENCING WORK. ALL DISCREPANCIES OR QUESTIONS SHALL BE BROUGHT TO THE ATTENTION OF THE LANDSCAPE ARCHITECT FOR RESOLUTION.
2. ALL WRITTEN DIMENSIONS SUPERCEDE ALL SCALED DISTANCES AND DIMENSIONS. DIMENSIONS SHOWN ARE FROM THE FACE OF THE BUILDING, WALL, BACK OF CURB, EDGE OF WALK, PROPERTY LINE, OR CENTERLINE OF COLUMN UNLESS OTHERWISE NOTED ON THE DRAWINGS.
3. ALL DIMENSIONS AT BUILDING ARE TO FACE OF BUILDING. ALL DIMENSIONS AT ROADWAY ARE TO FACE OF CURB.
4. ALL ANGLES ARE 45 DEGREE, 90 DEGREE, OR 135 DEGREE UNLESS OTHERWISE NOTED.
5. ALL CURVES AND ALL TRANSITIONS BETWEEN CURVES AND STRAIGHT EDGES SHALL BE SMOOTH.
6. ALL RETURN RADII AND CURB DATA ARE TO FACE OF CURB.
7. WHENEVER BOTTOM OF WALL (BW) ELEVATION IS GIVEN, IT IS FINISH PAVEMENT OR GRADE ELEVATION AT FACE OF WALL.
8. BUILDING LAYOUT AND LOCATION, SIDEWALK, CURB AND GUTTER, GRADING AND DRAINAGE IS BASED ON DRAWINGS PREPARED BY THE ARCHITECT AND THE CIVIL ENGINEER.
9. STATIONING HEREON IS ALONG CONSTRUCTION CENTERLINE UNLESS OTHERWISE SHOWN OR INDICATED.
10. ANY EXTRA CONSTRUCTION STAKING NECESSITATED SOLELY BY THE CONTRACTOR'S NEGLIGENCE WILL BE CHARGED TO THE CONTRACTOR ON A TIME AND EXPENSES BASIS AND PAID FOR BY THE CONTRACTOR.
11. SEE IRRIGATION DRAWINGS FOR GENERAL SYSTEM REQUIREMENTS AND FOR LOCATION OF IRRIGATION MAINLINE PIPING. SLEEVES TO ACCOMMODATE IRRIGATION PIPING, SIZED AS NEEDED, SHALL BE IN PLACE UNDER AND THROUGH SLABS AND WALLS, PRIOR TO POURING.
12. PROVIDE CONTINUOUS HEADERS AT THE EDGES OF ALL AC PAVING, SHRUB AREAS, LAWN AREAS, DECOMPOSED GRANITE WHERE IT IS NOT CONSTRAINED BY A CONCRETE PAVING OR MOW BAND.
13. ALL CONCRETE PAVEMENTS SHALL BE DOWELED INTO CURBS, SIDEWALKS, AND BUILDING FOUNDATIONS.
14. REFER TO GEOTECHNICAL REPORT FOR ADDITIONAL INFORMATION, SECTIONS, REINFORCEMENT, AND PREPARATION. IN CASE OF DISCREPANCY THE GEOTECHNICAL REPORT SHALL GOVERN.
15. ALL TYPICAL DETAILS SHALL APPLY UNLESS NOTED OTHERWISE.
16. ANY AND ALL WORK WITHIN CITY RIGHT OF WAY SHALL CONFORM TO ALL CITY STANDARD DETAILS AND SPECIFICATIONS.
17. CONCRETE FOOTINGS INSTALLED FOR ALL SITE FURNISHINGS, SPORTS EQUIPMENT, ETC.. IN DECORATIVE PAVEMENT, ASPHALT PAVING, DECOMPOSED GRANITE, CONCRETE PAVING, AND PLANTERS SHALL BE HELD BELOW GRADE.
18. ALL EXISTING ITEMS TO REMAIN SHALL BE PROTECTED AS REQUIRED. ANY DAMAGED ITEMS SHALL BE FULLY REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE TO THE FULL SATISFACTION OF THE OWNER.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COORDINATION WITH SUBCONTRACTORS AS REQUIRED TO ACCOMPLISH OPERATIONS.
20. ALL QUANTITIES AND PAY ITEMS ARE AND WILL BE BASED ON HORIZONTAL MEASUREMENTS.
21. ALL PATTERNS, LINE TYPES, AND SYMBOLS SHOWN WITHIN THE PLAN SET REFERENCE THE LAYOUT LEGEND AND ARE PART OF THE SCOPE OF WORK. CALLOUTS ARE SHOWN FOR CLARIFICATION OF WORK, BUT DO NOT INDICATE EVERY AND ALL INSTANCES OF SUCH WORK. THE CONTRACTOR SHALL REQUEST CLARIFICATION TO ANY ITEMS (INCLUDING BUT NOT LIMITED TO PAVING, WALLS, FINISHES, COLORS, FENCING, FOUNTAINS, POTS, AND SITE FURNITURE) NOT CLEARLY IDENTIFIED TO BE PART OF THE SCOPE OF WORK PRIOR TO BID.
22. THE CONTRACT DRAWINGS MUST BE ACCOMPANIED BY CONTRACT SPECIFICATIONS. THE CONTRACTOR MUST CONTACT THE LANDSCAPE ARCHITECT AT 925-736-8176 FOR SPECIFICATIONS IF NOT RECEIVED.
23. THE CONTRACTOR IS RESPONSIBLE FOR ALL WORK AND MATERIALS OF THE CONTRACT DOCUMENTS INCLUDING ALL WORK AND MATERIALS PROVIDED BY SUBCONTRACTORS. ALL QUALIFICATIONS OF THE CONTRACT DOCUMENTS INCLUDING ALL SPECIFIC EXCLUSIONS OF ANY WORK, DETAILS, MATERIALS, AND INCIDENTALS SHALL BE CONFIRMED AND ACCEPTED IN WRITING BY THE CONTRACTOR AND OWNER UPON FINALIZATION OF BIDS AND CONTRACT. THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED OF ALL QUALIFICATIONS AND NOTIFICATIONS.

## KEY MAP

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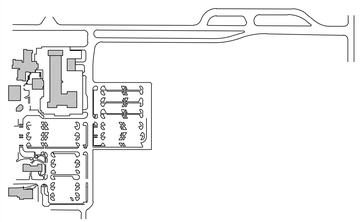
GATES +ASSOCIATES
LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
1660 N. MARKET, STE 360, WALNUT CREEK, CA 94596
T. 925.736.8176 www.gateas.com

REGISTERED LANDSCAPE ARCHITECT CHRISTOPHER A. JOSEPH GATES 8/20/2024 11/07/2022 STATE OF CALIFORNIA

**KEY MAP**



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| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 2 OF 34
SHEET G-002

# PLANTING NOTES

GENERAL

1. ALL WORK SHALL BE PERFORMED BY PERSONS FAMILIAR WITH PLANTING WORK AND UNDER THE SUPERVISION OF A QUALIFIED PLANTING FOREMAN.

2. ALL QUANTITIES AND PLANT COUNTS ARE FOR THE CONVENIENCE OF THE CONTRACTOR. IN CASE OF DISCREPANCIES, THE PLAN SHALL GOVERN.

3. THE LANDSCAPE ARCHITECT RESERVES THE RIGHT TO MAKE SUBSTITUTIONS, ADDITIONS, AND DELETIONS IN THE PLANTING SCHEME AS THEY FEEL NECESSARY WHILE WORK IS IN PROGRESS, UPON APPROVAL BY THE OWNER. SUCH CHANGES ARE TO BE ACCOMPANIED BY EQUITABLE ADJUSTMENTS IN THE CONTRACT PRICE, WHEN NECESSARY.

4. PLANT MATERIAL LOCATIONS SHOWN ARE DIAGRAMMATIC AND MAY BE SUBJECT TO CHANGE IN THE FIELD BY THE LANDSCAPE ARCHITECT. PLANT LOCATIONS ARE TO BE ADJUSTED IN THE FIELD AS NECESSARY TO SCREEN UTILITIES, BUT SHALL NOT BLOCK WINDOWS, BLOCK SIGNS NOR IMPEDE ACCESS.

5. THE DESIGN INTENT OF THE PLANTING PLAN IS TO ESTABLISH AN ATTRACTIVE MATURE LANDSCAPE APPEARANCE. FUTURE PLANT GROWTH WILL NECESSITATE TRIMMING, SHAPING, AND IN SOME CASE REMOVAL OF TREES AND SHRUBS AS AN ON-GOING MAINTENANCE PROCEDURE.

6. ALL PLANTING AREA MUST BE IRRIGATED WITH AUTOMATIC IRRIGATION SYSTEM. IRRIGATION SYSTEM SHALL BE FULLY AUTOMATED AND OPERATIONAL WITH FULL COVERAGE PRIOR TO PLANTING.

7. CONTRACTOR TO REVIEW ALL EXISTING, PROPOSED, & AS BUILT UTILITY PLANS PRIOR TO CONSTRUCTION. CONTRACTOR TO TAKE PRECAUTIONS IN EXCAVATION OF ALL TREE PLANTING PITS. CONTRACTOR TO NOTIFY LANDSCAPE ARCHITECT OF ANY CONFLICTS FOUND DURING CONSTRUCTION.

8. CONTRACTOR MUST REVIEW ALL PLANS PRIOR TO THE BEGINNING OF CONSTRUCTION AND MAINTAIN THE FOLLOWING CLEARANCES FOR ALL TREE PLANTINGS. CONTRACTOR TO TAKE PRECAUTION IN ALL EXCAVATION ACTIVITY. NOTIFY LANDSCAPE ARCHITECT OF ANY CONFLICTS PRIOR TO INSTALLATION.
   FIRE HYDRANTS AND PIVS: 5' MINIMUM
   LIGHT POLES: 10' MINIMUM
   UTILITIES: 5' MINIMUM
   BUILDING ROOF EDGE: 5' MINIMUM

9. CONTRACTOR TO PROVIDE AND ARRANGE FOR PLANT MATERIAL THRU CONTRACT GROW, PLANT BROKERS, OR DIRECT PURCHASE AS REQUIRED FOR THE FULL IMPLEMENTATION OF THE PROJECTS PLANTING PLAN. CONTRACTOR MUST SUBMIT WITHIN 30 DAYS AFTER AWARD OF A BID A DETAILED NURSERY LIST OF SECURED PLANT MATERIAL, CONTRACT GROW PLANT MATERIAL, AND ANY SUBSTITUTION REQUESTS. CONTRACTOR SHALL ARRANGE AND SECURE ALL PLANT MATERIAL WITHIN 30 DAYS OF BID. UPON DELIVERY, PLANT MATERIAL THAT DOES NOT MEET NURSERY STANDARDS, IS ROOTBOUND, OF POOR QUALITY & HEALTH, SUBSTANDARD SIZE, AND/OR IS NOT APPROVED BY THE LANDSCAPE ARCHITECT SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE. MATERIAL WHICH IS NOT SECURED AND IS UNAVAILABLE IN THE SIZE SPECIFIED SHALL BE UP-SIZED, IF AVAILABLE. ALL REPLACEMENT MATERIAL, SUBSTITUTIONS OR UP-SIZED PLANT MATERIAL MUST BE PROVIDED AS REQUIRED FOR THE FULL IMPLEMENTATION OF THE PLANTING PLAN AT NO ADDITIONAL COST TO THE CONTRACT AND OWNER.

10. PROCUREMENT OF PLANT MATERIAL SHALL NOT BE LIMITED TO NORTHERN CALIFORNIA. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRUCKING, INSPECTIONS, AND INCIDENTALS FOR PROVIDING PLANT MATERIAL FROM SOURCES OUT OF STATE AS REQUIRED BY THE PROJECT PLANTING PLAN.

EXISTING PLANT MATERIAL

1. ALL EXISTING PLANT MATERIAL, TREES, OR LAWN TO REMAIN MUST BE PROTECTED AND MAINTAINED IN PLACE BY THE CONTRACTOR.

2. ANY DAMAGED MATERIAL MUST BE FULLY REPLACED TO MATCH EXISTING BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE CONTRACT AND OWNER.

3. CONTRACTOR MUST MAINTAIN ANY EXISTING IRRIGATION SYSTEMS OR PROVIDE TEMPORARY IRRIGATION SYSTEMS AS REQUIRED TO ALL EXISTING PLANTING AREAS TO REMAIN.

SOILS

1. THE CONTRACTOR MAY PROTECT AND STOCKPILE EXISTING SITE SOILS WHICH MAY BE REUSED FOR PLANTING PURPOSES. EXISTING SOILS SHALL BE TESTED PRIOR TO STOCKPILE FOR SOILS SUITABILITY PER THE REQUIREMENTS BELOW.

3. ALL ORGANIC COMPOST SHALL HAVE AN AGRICULTURAL SUITABILITIES TEST FOR COMPATIBILITY TO EXISTING SITE SOILS. TEST RESULTS SHALL BE DATED WITHIN THE LAST 3 MONTHS OF THE SUBMITTAL.

4. ALL EXISTING SITE SOILS SHALL HAVE AN AGRICULTURAL SUITABILITIES TEST BY AN APPROVED SOILS TESTING LAB (WAYPOINT ANALYTICAL OR APPROVED EQUAL) AND ANALYSIS FOR RECOMMENDATIONS ON ORGANIC COMPOST, AMENDMENTS, GRO POWER FERTILIZER AND ANY INCIDENTALS. RECOMMENDATIONS CONTAINED IN THE SOILS ANALYSIS RESULTS ARE TO BE IMPLEMENTED BEFORE PLANTING OCCURS. CONTRACTOR SHALL PROVIDE UP TO 4 COMBINED TESTS AT LOCATIONS SELECTED BY THE LANDSCAPE ARCHITECT. SOIL SAMPLES TO BE TAKEN AND COMBINED FROM A DEPTH OF 6" AND 24". PROVIDE ADDITIONAL TESTING (ONE 6" AND ONE 24" DEPTH TEST PER 25,000 SF FOR AREAS WHICH WERE LIME TREATED). THE ORGANIC COMPOST TEST RESULTS LISTED ABOVE SHALL BE SUBMITTED TO THE SOILS LAB FOR ACCURATE RECOMMENDATIONS OF THE SOIL AMENDMENT REQUIREMENTS. TEST RESULTS SHALL BE TAKEN AFTER ALL GRADING OPERATIONS ARE COMPLETE.

5. ALL LIME TREATED SOILS IN AREAS TO RECEIVE PLANTING SHALL BE FULLY REMOVED AND REPLACED WITH CLEAN APPROVED IMPORT TOP SOIL AT NO COST TO THE OWNER. AN ADDITIONAL 8 SOILS TESTS MAY BE REQUESTED BY THE LANDSCAPE ARCHITECT. ALL TESTING SHALL BE PAID FOR BY THE CONTRACTOR.

6. ALL SOILS IMPORTED ONTO THE SITE FOR ANY PURPOSE SUCH AS GRADING, NON EXPANSIVE FILL, FILL OR FOR ANY GENERAL PURPOSE MUST BE TESTED FOR PLANT SUITABILITY PRIOR TO PLACEMENT. ALL IMPORT SOILS SHALL BE NON-DETRIMENTAL TO PLANT MATERIAL AND SOILS ANALYSIS SUBMITTED TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL. PROVIDE 1 TEST PER 500 CY OF MATERIAL.

7. ALL IMPORT SOILS SHALL BE FREE OF DELETERIOUS MATERIALS, AGGREGATES, AND ROCK. IMPORT SOIL SHALL BE LOAM/ CLAY LOAM WITH A PH BETWEEN 6 AND 7.5. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS

8. FOR BID PURPOSES AMEND ALL SOIL WITH 6 YARDS OMRI COMPOST, 50LBS GYPSUM, 20LBS SOIL SULFUR AND 160LBS OF GRO-POWER PLUS 5-3-1 W/ M PER 1000SF. CONTRACTOR TO SUBMIT ALL DELIVERY TICKETS FOR COMPOST AND FERTILIZERS FOR VERIFICATION.

9. SOIL IS TO BE AMENDED, AT THE RATE INDICATED BY THE SOIL ANALYSIS, TO BRING THE SOIL ORGANIC MATTER CONTENT TO A MINIMUM OF 3.5% BY DRY WEIGHT, AND A MINIMUM OF 2" OF QUALITY RECYCLED COMPOST, ON ALL PLANTING AREAS.

10. ALL PLANTERS IN AREAS WHICH HAVE BEEN COMPACTED, SUCH AS CONSTRUCTION STAGING AREAS AND IN PARKING LOTS, SHALL BE CROSS RIPPED TO THE FOLLOWING DEPTHS: PLANTERS LESS THAN THREE (3) FEET WIDE SHALL HAVE COMPACTION RELIEVED TO A MINIMUM DEPTH OF TWENTY-FOUR (24) INCHES BELOW SUBGRADE. PLANTERS THREE TO TEN (3-10) FEET WIDE MUST HAVE COMPACTION RELIEVED TO A MINIMUM DEPTH OF 18" BELOW SUBGRADE, PLANTERS MORE THAN 10' WIDE SHALL HAVE COMPACTION RELIEVED TO A MINIMUM DEPTH OF 12" BELOW SUBGRADE. AREAS SHALL BE PROTECTED AFTER DECOMPACTION.

11. CONTRACTOR SHALL PERFORM A PERCOLATION TEST AT THE BEGINNING OF CONSTRUCTION AT 1 LOCATION PER ACRE (MAX OF 4) TO DETERMINE THE DRAINAGE CAPACITY OF THE EXISTING SITE SOIL FOR TREE HEALTH. NOTIFY THE LANDSCAPE ARCHITECT IF DRAINAGE IS LESS THAN 2" PER HOUR.

TREES

1. ALL TREES SHALL BE STANDARDS UNLESS SPECIFICALLY NOTED.

2. ALL TREES ARE TO BE STAKED AS SHOWN ON THE TREE STAKING/GUYING DIAGRAMS. BRANCHING HEIGHT OF TREES SHALL BE A 6'-0" MINIMUM ABOVE FINISH GRADE. ALL TREES IN A FORMAL GROUP PLANTING MUST BE MATCHING IN SIZE AND SHAPE. ALL STREET TREES TO BE INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE OWNER. LANDSCAPE ARCHITECT SHALL BE CONSULTED REGARDING ORIENTATION OF TREES PRIOR TO PLANTING AND/OR BACKFILLING.

3. PLANT TREES 3'-0" MINIMUM FROM FACE OF CURB AT PARKING, AND FROM EDGES OF PAVING. ALL TREES WITHIN 5' OF PAVING AREAS AND BUILDINGS MUST HAVE ROOT BARRIERS INSTALLED. SEE ROOT BARRIER DETAIL. DEEP ROOT BARRIER MODEL NO. UB.24.2. (415) 344-1464. INSTALL PER MANUFACTURER'S SPECIFICATIONS. WHERE WATER BARRIERS AND ROOT BARRIERS ARE REQUIRED, USE CENTURY PRODUCTS DUAL PURPOSE WATER/ ROOT BARRIER CR-PE24-20, (714)632-7083, S.C.D. FOR LOCATIONS OF WATER BARRIER.

4. PROVIDE 4" BERM AROUND TREE FOR WATER BASIN. SEE TREE STAKING DETAIL. BERM TO BE REMOVED IN LAWN AREA AFTER INITIAL MAINTENANCE PERIOD. MULCH TREE WELL WITH 3" LAYER OF RECYCLED CHIPPED MULCH. KEEP MULCH AWAY FROM TREE TRUNK. HOLD LAWN AND HYDROSEED 2' CLEAR FROM TRUNKS, TYP.

5. TREES MUST HAVE AN UNCUT LEADER THAT HAS A UNIFORM TAPER FROM BASE TO TIP. TREES MUST MEET AT LEAST NORMAL CALIPER AND HEIGHT FOR CONTAINER SIZE. OVERGROWN OR ROOT BOUND TREES ARE NOT ACCEPTABLE.

# PLANTING NOTES (CONT.)

SHRUBS AND GROUNDCOVERS

1. GROUNDCOVER MUST BE PLANTED AS SHOWN ON THE PLAN, INCLUDING UNDER SHRUBS AND IN TREE WATERING BASINS.

2. SHRUBS AND PERENNIALS MUST HAVE ADEQUATE SETBACK FROM THE ADJACENT SIDEWALK AND EDGES OF PARKING LOT CURBS. NOTIFY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION IF PLANT MATERIAL MAY PROTRUDE INTO THE PATH OF TRAVEL.

3. THE CONTRACTOR IS TO SECURE ALL VINES TO TRELLISES WITH APPROVED FASTENERS, ALLOWING FOR TWO (2) YEARS GROWTH. SUBMIT SAMPLE TO LANDSCAPE ARCHITECT.

ACCESSORIES

1. ALL PLANTING AREAS MUST BE TOP-DRESSED WITH 3" LAYER OF RECYCLED CHIPPED MULCH UNLESS INDICATED OHERWISE ON THE DRAWINGS.. COLOR: DARK BROWN. SUBMIT SAMPLE TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO ORDERING.

2. ALL SLOPES GREATER THAN 2.5:1 MUST BE COVERED WITH EROSION CONTROL NETTING PER THE MANUFACTURER'S SPECIFICATIONS. OVERLAP ALL EDGES A MINIMUM OF 12" AND SECURE AS REQUIRED WITH METAL STAPLES. EROSION CONTROL NETTING TO BE WESTERN EXCELSIOR, EXCEL CS-3 OR APPROVED EQUAL. AVAILABLE FROM REED & GRAHAM 888-381-0800.

3. SEE SPECIFICATIONS FOR ALL FERTILIZER REQUIREMENTS

SUBMITTALS

1. CONTRACTOR MUST SUBMIT ALL TESTS, PRODUCTS, ACCESSORIES, INCIDENTALS, CUT SHEETS OF ALL ITEMS SPECIFIED FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.

2. ALL PLANT MATERIAL MUST BE REVIEWED AND APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO DELIVERY. CONTRACTOR SHALL SUBMIT PHOTOS OF ALL SHRUBS, GROUND COVERS, VINES, AND TREES FOR PRELIMINARY REVIEW AND APPROVAL.

3. ALL SUBMITTALS AND PLANT MATERIAL NOT REVIEWED AND APPROVED IN WRITING BY THE LANDSCAPE ARCHITECT MAY BE SUBJECT TO FULL REMOVAL AND REPLACEMENT WITH APPROVED SOILS, FERTILIZERS, AND PLANT MATERIAL AT NO ADDITIONAL COST TO THE CONTRACT OR OWNER.

4. SUBMITTALS AND SITE MOCKUPS OF ALL WORK SHALL BE REQUIRED PRIOR TO FINAL PLACEMENT INCLUDING BUT NOT LIMITED TO ALL WALLS, PAVEMENTS, COLORS, FINISHES, METAL WORK, FENCING, AND PAINTING FOR REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT. SEE SPECIFICATIONS.

MUNICIPAL REQUIREMENTS

1. ALL PLANT MATERIAL TO BE INSPECTED & APPROVED BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

2. CONTACT THE PROJECT LANDSCAPE ARCHITECT FOR FINAL INSPECTION OF LANDSCAPE AND IRRIGATION. PRIOR TO RELEASE OF BUILDING FOR OCCUPANCY, THE PROJECT LANDSCAPE ARCHITECT WILL SUBMIT A LETTER TO THE CITY CERTIFYING THE PLANTING AND IRRIGATION HAS BEEN INSTALLED IN CONFORMANCE WITH THE APPROVED PLANTING AND IRRIGATION PLANS, SUBJECT TO THE REVIEW AND APPROVAL OF THE CITY LANDSCAPE ARCHITECT. SECURITIES IN LIEU OF INSTALLATION WILL NOT BE ACCEPTED.

3. DURING THE INSTALLATION OF LANDSCAPING AND INSTALLATION AND PRIOR TO THE ISSUANCE OF A BUILDING OCCUPANCY PERMIT, THE LANDSCAPE ARCHITECT MUST INSPECT AND MONITOR THE INSTALLATION OF MATERIALS TO VERIFY CONFORMANCE TO THESE PLANS. ONCE APPROVED, THE LANDSCAPE ARCHITECT SHALL PROVIDE A WRITTEN LETTER TO DEPARTMENT OF PLANNING AND DEVELOPMENT STATING COMPLIANCE WITH THE APPROVED PLANS.

# TREE PROTECTION NOTES

1. PRIOR TO INITIATING ANY CONSTRUCTION ACTIVITY IN THE AREA, INCLUDING GRADING, TEMPORARY PROTECTIVE FENCING SHALL BE INSTALLED AT EACH SITE TREE. FENCING SHALL BE LOCATED AT OR BEYOND THE CANOPY DRIP LINE SO THAT 100% OF THE DRIP LINE WILL BE PROTECTED BY FENCING. TO REDUCE SOIL COMPACTION FROM EQUIPMENT.

2. THE CONTRACTOR IS REQUIRED TO WATER, FERTILIZE AND ATTEND TO OTHER MAINTENANCE NEEDS OF EXISTING TREES AS NEEDED PER ARBORIST'S RECOMMENDATIONS TO MAINTAIN HEALTHY GROWTH THROUGHOUT THE CONSTRUCTION PERIOD. SIX FEET DIAMETER, MINIMUM, BY SIX INCH TALL EARTH BERMS SHALL BE CONSTRUCTED AT THE BASE OF EACH TREE TO FUNCTION AS TEMPORARY WATERING BASINS DURING THE CONSTRUCTION PERIOD. TREES SHALL BE WATERED ACCORDING TO WEATHER AND TREE REQUIREMENTS. APPROVED MULCH OF 1-2 INCH SIZED WOOD CHIPS SHALL BE PLACED AT A DEPTH OF 4 INCHES WHERE NO EXCAVATION IS TO OCCUR IN THE VICINITY OF THE TREES TO BE PROTECTED.

3. THE TREE PROTECTION FENCE SHALL BE 6' HIGH SNOW FENCE WITH IMMOVABLE POSTS. THE FENCING SHALL FORM A CONTINUOUS BARRIER WITHOUT ENTRY POINTS AROUND EACH TREE. ANY ENCROACHMENT INTO THE DRIP LINE FOR FENCING OR CONSTRUCTION PURPOSES SHALL NOT BE PERMITTED.

4. LOW HANGING LIMBS OF SAVED TREES SHALL BE PRUNED PRIOR TO GRADING, OR ANY EQUIPMENT MOBILIZATION ON SITE. THE PURPOSE OF THIS REQUIREMENT IS TO AVOID TEARING LIMBS BY HEAVY EQUIPMENT. ALL LIMBS TO BE PRUNED SHALL BE SUPERVISED BY THE ARBORIST OF RECORD FOR THE JOB.

5. THIS FENCING SHALL SERVE AS A BARRIER TO PREVENT DRIP LINE ENCROACHMENT OF ANY TYPE OF CONSTRUCTION ACTIVITIES AND EQUIPMENT. NO OILS,. GAS, CHEMICALS, LIQUID WASTE, SOLID WASTE CONSTRUCTION MACHINERY OR CONSTRUCTION MATERIALS SHALL BE STORED OR ALLOWED TO STAND FOR ANY PERIOD OF TIME WITHIN THE DRIP LINE OF THE TREE. FURTHER, NO ONE SHALL ENTER THE FENCE PERIMETER FOR ANY REASON EXCEPT FOR THE PURPOSE OF MONITORING THE HEALTH OF THE TREE. ACCIDENTAL DAMAGE TO BARK, ROOT CROWN, OR LIMBS MAY INCREASE POTENTIAL FOR FUTURE DECLINE.

6. CONTRACTORS AND SUBCONTRACTORS SHALL DIRECT ALL EQUIPMENT AND PERSONNEL TO REMAIN OUTSIDE THE FENCED AREA AND AT ALL TIMES UNTIL PROJECT IS COMPLETE, AND SHALL INSTRUCT EMPLOYEES AS TO THE PURPOSE AND IMPORTANCE OF FENCING.

7. A 'TREE PROTECTION ZONE' SIGN SHALL BE POSTED AT EACH TREE INDICATING THE PURPOSE OF THE FENCING.

8. THE ARBORIST OF RECORD FOR THE JOB OR THE CITY ARBORIST SHALL BE RESPONSIBLE FOR INSPECTION AND APPROVAL OF THE FENCING PRIOR TO ANY GRADING OPERATIONS.

9. FENCING MUST REMAIN IN PLACE AND SHALL NOT BE REMOVED UNTIL ALL CONSTRUCTION ACTIVITIES ARE COMPLETED. THIS SHALL INCLUDE GRADING AND COMPACTION ACTIVITIES, INSTALLATION OF UNDERGROUND, ALL CONSTRUCTION ACTIVITIES AND ANY OTHER CONSTRUCTION OR ACTIVITY WHICH IS SCHEDULED PRIOR OR LANDSCAPE INSTALLATION.

10. ROOTS OF SINGLE STANDING TREES OFTEN EXTEND UP TO THREE TIMES THE DISTANCE OF THE ACTUAL DRIP LINE AND FUNCTION PRIMARILY IN THEY UPTAKE OF NUTRIENTS AND WATER. THE DRIP LINE IS ARBITRARILY ESTABLISHED AS THE MINIMUM ROOT AREA GENERALLY REQUIRED TO PRESERVE TREE HEALTH. AS MUCH AREA AROUND THE CIRCUMFERENCE OF THE TREE SHOULD HAVE MINIMUM INTRUSION TO FURTHER INSURE TREE SURVIVAL AND HEALTH.

11. UNAUTHORIZED TREE REMOVAL IS SUBJECT TO IN-KIND REPLACEMENT EQUAL TO THE VALUE OF THE MATURE RESOURCE LOST, AS DETERMINED BY THE CITY.

12. NO MECHANICAL TRENCHING SHALL OCCUR WITHIN THE TREE PROTECTION ZONE. ANY EXCAVATION IF REQUIRED SHALL BE BY HAND, AIR SPADE OR BY VACUUM. CUTTING OF ANY ROOTS OVER 3" DIA SHALL BE REVIEWED BY AN ARBORIST.

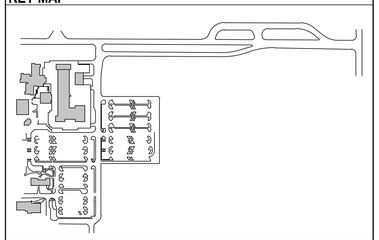
13. SEE TREE PRESERVATION SPECIFICATIONS FOR ADDITIONAL INFORMATION.

14. THE CONTRACTOR SHALL CONTRACT WITH AN ARBORIST AS REQUIRED TO ENSURE PROPER TREE HEALTH IF A PROJECT ARBORIST OR CITY ARBORIST HAS NOT BEEN CONTRACTED.

GATES +ASSOCIATES
LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
1400 N. MARKET, STE 360, WALNUT CREEK, CA 94596
T. 925.734.8174 www.gates.com

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

**KEY MAP**



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PROJ.& W.O.

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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
PLANTING NOTES
BLDG.
FLOOR

| | |
|---|---|
| CONTRACT NO./A-E NO. | XXX |
| ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

A/E FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 3 OF 34
SHEET L-001

# PLANT PALETTE

## TREES

ARA
*ACER RUBRUM 'ARMSTRONG GOLD'*
ARMSTRONG RED MAPLE

ARB
*ARBUTUS X 'MARINA' (LOW BRANCH)*
MARINA STRAWBERRY TREE

ARM
*ARBUTUS X 'MARINA' (STANDARD)*
MARINA STRAWBERRY TREE

ARD
*ARCTOSTAPHYLOS M. 'DR. HURD'*
DR. HURD MAZANITA

CED
*CEDRUS DEODARA 'GLAUCA'*
ATLAS CEDAR

CEO
*CERCIS OCCIDENTALIS*
WESTERN REDBUD

GBP
*GINKGO BILOBA 'PRINCETON SENTRY'*
PRINCETON SENTRY GINKGO

LIN
*LAGERSTROEMIA INDICA 'NATCHEZ'*
NATCHEZ CRAPE MYRTLE

PDM
*PARKINSONIA 'DESERT MUSEUM'*
DESERT MUSEUM PALO VERDE

QUA
*QUERCUS AGRIFOLIA*
COAST LIVE OAK

QUD
*QUERCUS DOUGLASII*
BLUE OAK

QUL
*QUERCUS LOBATA*
VALLEY OAK

ULF
*ULMUS 'FRONTIER'*
FRONTIER HYBRID ELM

## SHRUBS, PERENNIALS & ORNAMENTAL GRASSES

AM
*AGAVE AMERICANA 'MEDIOPICTA ALBA'*
WHITE STRIPED CENTURY PLANT

AV
*AGAVE AMERICANA 'VARIEGATA'*
VARIEGATED CENTURY PLANT

AK
*AGAVE ATTENUATA 'KARA'S STRIPES'*
VARIEGATED FOX TAIL AGAVE

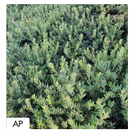
AA
*AGAVE ATTENUATA 'VARIEGATA'*
VARIEGATED FOX TAIL AGAVE

AD
*AGAVE DESMETIANA 'VARIEGATA'*
VARIEGATED SMOOTH AGAVE

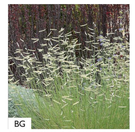
AS
*ALOE STRIATA*
CORAL ALOE

AU
*ARBUTUS UNEDO 'COMPACTA'*
DWARF STRAWBERRY TREE

AH
*ARCTOSTAPHYLOS D. 'HOWARD MCMINN'*
VINE HILL MANZANITA


AP
*ARCTOSTAPHYLOS 'PACIFIC MIST'*
PACIFIC MIST MANZANITA

BA
*BACCHARIS PILULARIS 'TWIN PEAKS'*
DWARF COYOTE BUSH


BG
*BOUTELOUA GRACILIS 'BLONDE AMBITION'*
BLONDE AMBITION BLUE GRAMA

CS
*CALANDRINIA SPECTABILIS*
ROCK PURSLANE

CL
*CALLISTEMON 'LITTLE JOHN'*
BOTTLEBRUSH

CE
*CHONDROPETALUM TECTORUM 'EL CAMPO'*
EL CAMPO SMALL CAPE RUSH

CP
*CISTUS PURPUREUS*
PURPLE-FLOWER ROCK ROSE

DV
*DIANELLA 'VARIEGATA'*
VARIEGATED FLAX LILY

DR
*DIANELLA REVOLUTA 'LITTLE REV'*
LITTLE REV FLAX LILY

DG
*DIETES GRANDIFLORA 'VARIEGATA'*
STRIPED FORTNIGHT LILY

EC
*EPILOBIUM CANUM*
CALIFORNIA FUCHSIA

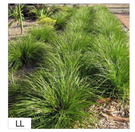
FM
*FESTUCA MAIREI*
ATLAS FESCUE

HB
*HESPERALOE PARVIFLORA 'BRAKELIGHTS'*
BRAKELIGHTS RED YUCCA

HP
*HESPERALOE PARVIFLORA*
RED YUCCA

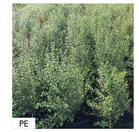
LC
*LEYMUS CONDENSATUS 'CANYON PRINCE'*
CANYON PRINCE GIANT WILD RYE

LT
*LEUCOPHYLLUM TEXANUM*
TEXAS SAGE


LL
*LOMANDRA LONGIFOLIA 'BREEZE'*
DWARF MAT RUSH

MR
*MUHLENBERGIA RIGEN*
DEER GRASS

NP
*NERIUM OLEANDER 'PETITE SALMON'*
PETITE SALMON OLEANDER


PE
*PITTOSPORUM TENNUIFOLIUM 'SILVER SHEEN'*
SILVER SHEEN KOHUHU

PT
*PITTOSPORUM TOBIRA 'VARIEGATA'*
VARIEGATED MOCK ORANGE

SA
*SALVIA CLEVELANDII 'ALLEN CHICKERING'*
CLEVELAND SAGE

SB
*SALVIA X 'BEE'S BLISS'*
BEE 'S BLISS SAGE

SL
*SALVIA LEUCANTHA 'SANTA BARBARA'*
MEXICAN BUSH SAGE

SS
*SENECIO SERPENS*
BLUE CHALKSTICKS

TC
*TEUCRIUM CHAMAEDRYS*
GERMANDER

VD
*VERBENA 'DE LA MINA'*
DE LA MINA VERBENA

# PLANTING SCHEDULE

| TREES | BOTANICAL NAME | COMMON NAME | SIZE | SPACING | QTY | WATER USE |
|---|---|---|---|---|---|---|
| ARA | ACER RUBRUM 'ARMSTRONG GOLD' | ARMSTRONG RED MAPLE | 15 GAL | AS SHOWN | 47 | M |
| ARB | ARBUTUS X 'MARINA' (LOW BRANCH) | MARINA STRAWBERRY | 15 GAL | AS SHOWN | 12 | L |
| ARM | ARBUTUS X 'MARINA' (STANDARD) | MARINA STRAWBERRY | 15 GAL | AS SHOWN | 5 | L |
| ARD | ARCTOSTAPHYLOS M. 'DR. HURD' | DR. HURD MAZANITA | 15 GAL | AS SHOWN | 43 | L |
| CED | CEDRUS DEODARA 'GLAUCA' | ATLAS CEDAR | 15 GAL | AS SHOWN | 7 | L |
| CEO | CERCIS OCCIDENTALIS (STANDARD) | WESTERN REDBUD | 15 GAL | AS SHOWN | 7 | L |
| GBP | GINKGO BILOBA 'PRINCETON SENTRY' | PRINCETON SENTRY GINKGO | 15 GAL | AS SHOWN | 4 | M |
| LIN | LAGERSTROEMIA INDICA 'NATCHEZ' | NATCHEZ CRAPE MYRTLE | 15 GAL | AS SHOWN | 37 | L |
| PDM | PARKINSONIA 'DESERT MUSEUM' | DESERT MUSEUM PALO VERDE | 15 GAL | AS SHOWN | 3 | L |
| PRU | PRUNUS SPP. (TO MATCH EX. SPECIES) | | 15 GAL | AS SHOWN | 3 | M |
| QUA | QUERCUS AGRIFOLIA | COAST LIVE OAK | 15 GAL | AS SHOWN | 15 | L |
| QUD | QUERCUS DOUGLASII | BLUE OAK | 15 GAL | AS SHOWN | 7 | L |
| QUL | QUERCUS LOBATA | VALLEY OAK | 15 GAL | AS SHOWN | 13 | L |
| ULF | ULMUS 'FRONTIER' | FRONTIER HYBRID ELM | 15 GAL | AS SHOWN | 15 | L |

| SHRUBS | BOTANICAL NAME | COMMON NAME | SIZE | SPACING | QTY | WATER USE |
|---|---|---|---|---|---|---|
| AM | AGAVE AMERICANA 'MEDIOPICTA ALBA' | WHITE STRIPED CENTURY PLANT | 5 GAL | 72" O.C. | 16 | L |
| AV | AGAVE AMERICANA 'VARIEGATA' | VARIEGATED CENTURY PLANT | 5 GAL | 96" O.C | 8 | L |
| AK | AGAVE ATTENUATA 'KARA'S STRIPES' | VARIEGATED FOX TAIL AGAVE | 5 GAL | 36" O.C. | 17 | L |
| AA | AGAVE ATTENUATA 'VARIEGATA' | VARIEGATED FOX TAIL AGAVE | 5 GAL | 48" O.C. | 5 | L |
| AD | AGAVE DESMETIANA 'VARIEGATA' | VARIEGATED SMOOTH AGAVE | 5 GAL | 48" O.C. | 212 | L |
| AS | ALOE STRIATA | CORAL ALOE | 1 GAL | 36" O.C. | 44 | L |
| AU | ARBUTUS UNEDO 'COMPACTA' | DWARF STRAWBERRY TREE | 15 GAL | 72" O.C. | 58 | L |
| AH | ARCTOSTAPHYLOS D. 'HOWARD MCMINN' | VINE HILL MANZANITA | 5 GAL | 72" O.C. | 22 | L |
| AP | ARCTOSTAPHYLOS 'PACIFIC MIST' | PACIFIC MIST MANZANITA | 1 GAL | 72" O.C. | 99 | L |
| BA | BACCHARIS PILULARIS 'TWIN PEAKS' | DWARF COYOTE BUSH | 1 GAL | 96" O.C. | 73 | L |
| BG | BOUTELOUA GRACILIS 'BLONDE AMBITION' | BLONDE AMBITION BLUE GRAMA | 1 GAL | 24" O.C. | 134 | L |
| CS | CALANDRINIA SPECTABILIS | ROCK PURSLANE | 1 GAL | 36" O.C. | 450 | L |
| CL | CALLISTEMON 'LITTLE JOHN' | BOTTLEBRUSH | 5 GAL | 36" O.C. | 125 | L |
| CE | CHONDROPETALUM TECTORUM 'EL CAMPO' | EL CAMPO SMALL CAPE RUSH | 5 GAL | 36" O.C. | 79 | L |
| CP | CISTUS PURPUREUS | PURPLE-FLOWER ROCK ROSE | 5 GAL | 48" O.C. | 55 | L |
| DV | DIANELLA 'VARIEGATA' | VARIEGATED FLAX LILY | 1 GAL | 30" O.C. | 77 | L |
| DR | DIANELLA REVOLUTA 'LITTLE REV' | LITTLE REV FLAX LILY | 1 GAL | 18" O.C. | 60 | M |
| DG | DIETES GRANDIFLORA 'VARIEGATA' | STRIPED FORTNIGHT LILY | 5 GAL | 36" O.C. | 128 | L |
| EC | EPILOBIUM CANUM | CALIFORNIA FUCHSIA | 1 GAL | 36" O.C. | 348 | L |
| FM | FESTUCA MAIREI | ATLAS FESCUE | 5 GAL | 36" O.C. | 69 | L |
| HB | HESPERALOE PARVIFLORA 'BRAKELIGHTS' | BRAKELIGHTS RED YUCCA | 5 GAL | 30" O.C. | 542 | L |
| HP | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | 48" O.C. | 15 | L |
| LC | LEYMUS CONDENSATUS 'CANYON PRINCE' | CANYON PRINCE GIANT WILD RYE | 1 GAL | 36" O.C. | 897 | L |
| LT | LEUCOPHYLLUM TEXANUM | TEXAS SAGE | 5 GAL | 48" O.C. | 76 | L |
| LL | LOMANDRA LONGIFOLIA 'BREEZE' | DWARF MAT RUSH | 1 GAL | 36" O.C. | 200 | L |
| MD | MUHLENBERGIA DUBIA | PINE MUHLY | 1 GAL | 36" O.C. | 178 | L |
| MR | MUHLENBERGIA RIGENS | DEER GRASS | 1 GAL | 60" O.C. | 216 | L |
| NP | NERIUM OLEANDER 'PETITE SALMON' | PETITE SALMON OLEANDER | 5 GAL | 48" O.C. | 72 | L |
| PE | PITTOSPORUM TEN 'SILVER SHEEN' | SILVER SHEEN KOHUHU | 5 GAL | 60" O.C. | 10 | M |
| PT | PITTOSPORUM TOBIRA 'VARIEGATA' | VARIEGATED MOCK ORANGE | 5 GAL | 60' O.C. | 76 | L |
| SA | SALVIA CLEVELANDII 'ALLEN CHICKERING' | CLEVELAND SAGE | 5 GAL | 60" O.C. | 133 | L |
| SB | SALVIA X 'BEE'S BLISS' | BEE'S BLISS SAGE | 1 GAL | 72" O.C. | 254 | L |
| SL | SALVIA LEUCANTHA 'SANTA BARBARA' | MEXICAN BUSH SAGE | 5 GAL | 42" O.C. | 576 | L |
| SS | SENECIO SERPENS | BLUE CHALKSTICKS | 1 GAL | 24" O.C. | 825 | L |
| TC | TEUCRIUM CHAMAEDRYS | GERMANDER | 1 GAL | 24" O.C. | 46 | L |
| VD | VERBENA 'DE LA MINA' | DE LA MINA VERBENA | 1 GAL | 36" O.C. | 70 | L |

# PLANTING LEGEND

| | | |
|---|---|---|
| XX / # | TREE NAME / QUANTITY | SEE PLANT LIST FOR ADDT'L. INFO. |
| XX / # | SHRUB NAME / QUANTITY | SEE PLANT LIST FOR ADDT'L INFO. |

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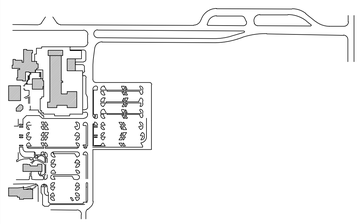
GATES +ASSOCIATES
LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
1600 N. MARKET, STE 360, WALNUT CREEK, CA 94596
T. 925.736.8176 www.gateas.com

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
RENEWAL
STATE OF CALIFORNIA

KEY MAP



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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR LANDSCAPE
BLDG.
FLOOR
PLANTING SCHEDULE AND LEGEND

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| JOB NO. | |
| ACCT.NO. | XXX |
| DRAWN | WJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

A/E FIRM:
SNL PM:
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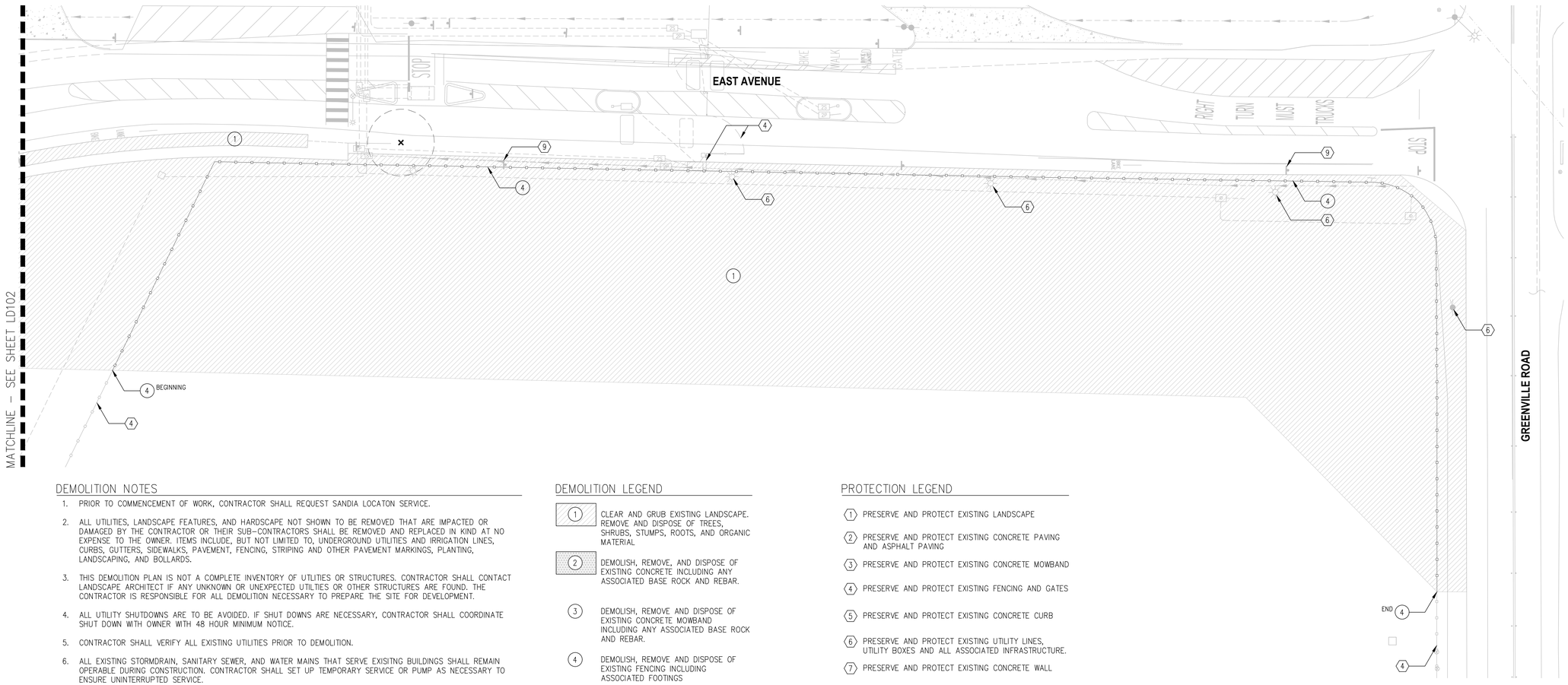
SHEET 4 OF 34
SHEET L-002




## DEMOLITION NOTES

1. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL REQUEST SANDIA LOCATON SERVICE.
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## DEMOLITION LEGEND

- (1) CLEAR AND GRUB EXISTING LANDSCAPE. REMOVE AND DISPOSE OF TREES, SHRUBS, STUMPS, ROOTS, AND ORGANIC MATERIAL
- (2) DEMOLISH, REMOVE, AND DISPOSE OF EXISTING CONCRETE INCLUDING ANY ASSOCIATED BASE ROCK AND REBAR.
- (3) DEMOLISH, REMOVE AND DISPOSE OF EXISTING CONCRETE MOWBAND INCLUDING ANY ASSOCIATED BASE ROCK AND REBAR.
- (4) DEMOLISH, REMOVE AND DISPOSE OF EXISTING FENCING INCLUDING ASSOCIATED FOOTINGS
- (5) SAWCUT EXISTING CONCRETE WITH NEAT, CLEAN EDGES TO RETAIN 6" WIDE CONCRETE CURB. ALL EXISTING REBAR SHALL BE REMOVED OR GRINDED.
- × EXISTING TREE TO BE REMOVE AND DISPOSE OF INCLUDING STUMPS, ROOTS AND ORGANIC MATERIAL
- • PRESERVE AND PROTECT EXISTING TREE TO REMAIN

## PROTECTION LEGEND

- (1) PRESERVE AND PROTECT EXISTING LANDSCAPE
- (2) PRESERVE AND PROTECT EXISTING CONCRETE PAVING AND ASPHALT PAVING
- (3) PRESERVE AND PROTECT EXISTING CONCRETE MOWBAND
- (4) PRESERVE AND PROTECT EXISTING FENCING AND GATES
- (5) PRESERVE AND PROTECT EXISTING CONCRETE CURB
- (6) PRESERVE AND PROTECT EXISTING UTILITY LINES, UTILITY BOXES AND ALL ASSOCIATED INFRASTRUCTURE.
- (7) PRESERVE AND PROTECT EXISTING CONCRETE WALL
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- (10) REMOVE AND STORE EXISITNG COBBLE. COORDINATE WITH LANDSCAPE ARCHITECT TO FACILITATE RELOCATION OF COBBLE.

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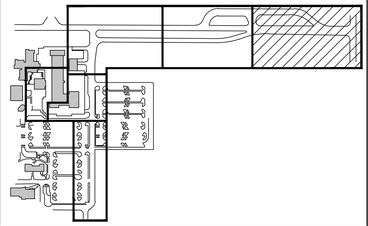
REGISTERED LANDSCAPE ARCHITECT
8/30/2024
11/07/2022
STATE OF CALIFORNIA

**KEY MAP**



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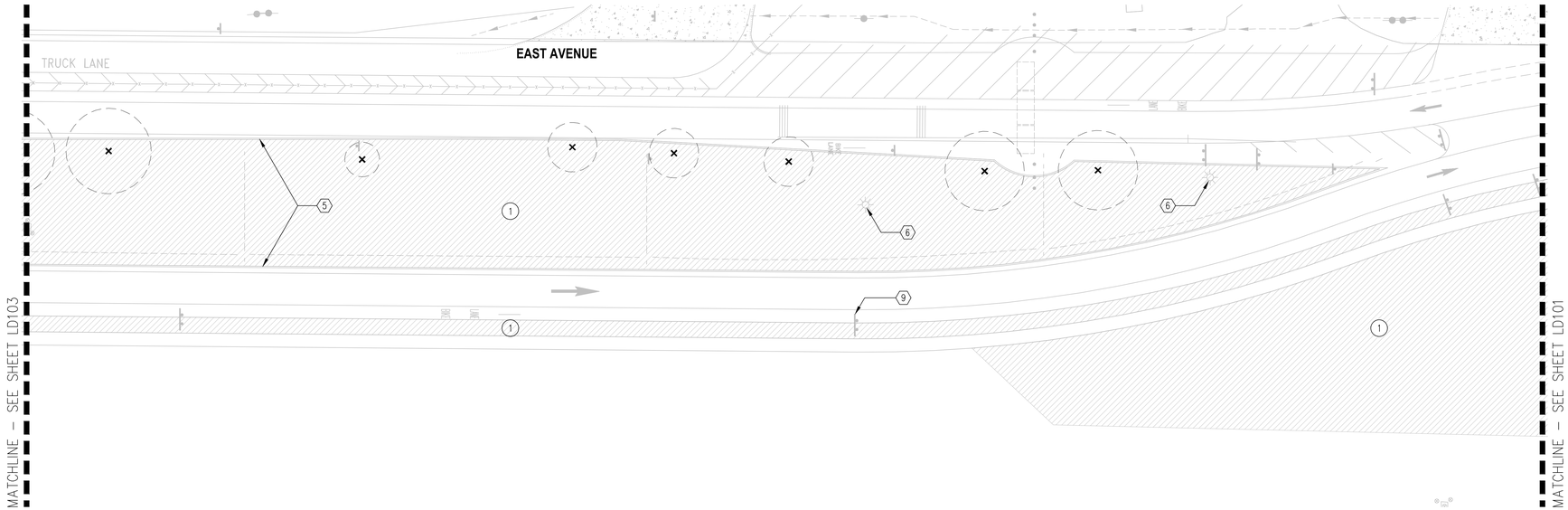
Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
DEMOLITION PLAN
BLDG.
FLOOR

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | WFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 5 OF 34
SHEET LD101

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● PRESERVE AND PROTECT EXISTING TREE TO REMAIN

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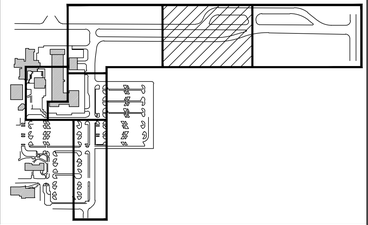
REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

**KEY MAP**



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ORDER NO. XX-XXXX

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
DEMOLITION PLAN
BLDG.
FLOOR

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | WFJC |
| CHECKED | KC |
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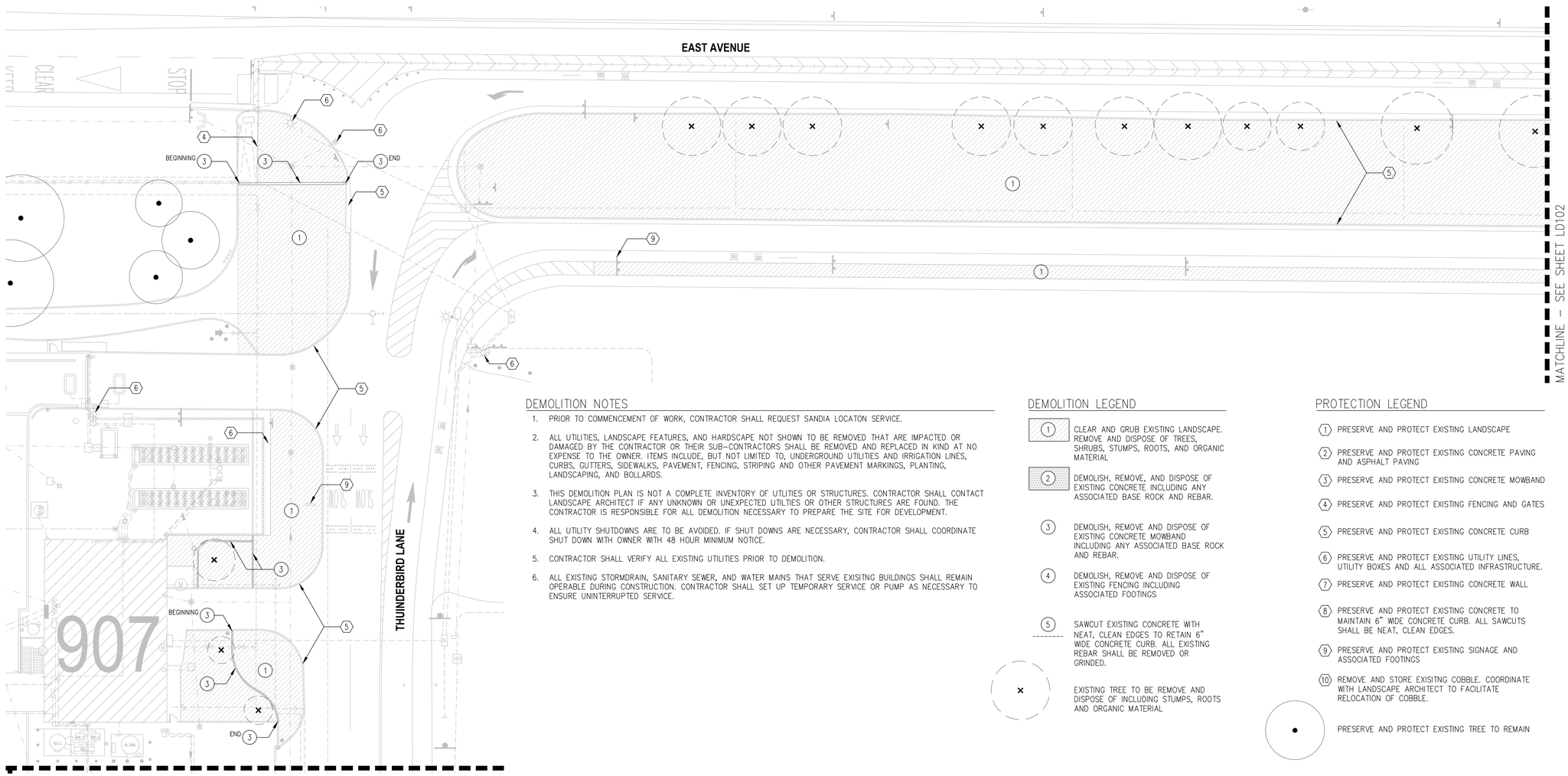
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 6 OF 34
SHEET LD102

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PRESERVE AND PROTECT EXISTING TREE TO REMAIN

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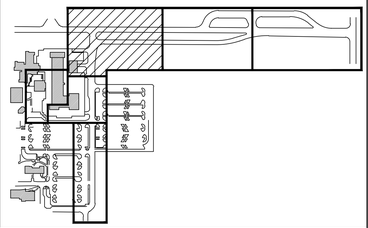
REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



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Facilities Management
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SECTOR | BLDG. | FLOOR

LANDSCAPE
DEMOLITION PLAN

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| TOC ACCT.NO. | XXX |
| DRAWN | MFJC |
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| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 7 OF 34

SHEET LD103

## DEMOLITION NOTES

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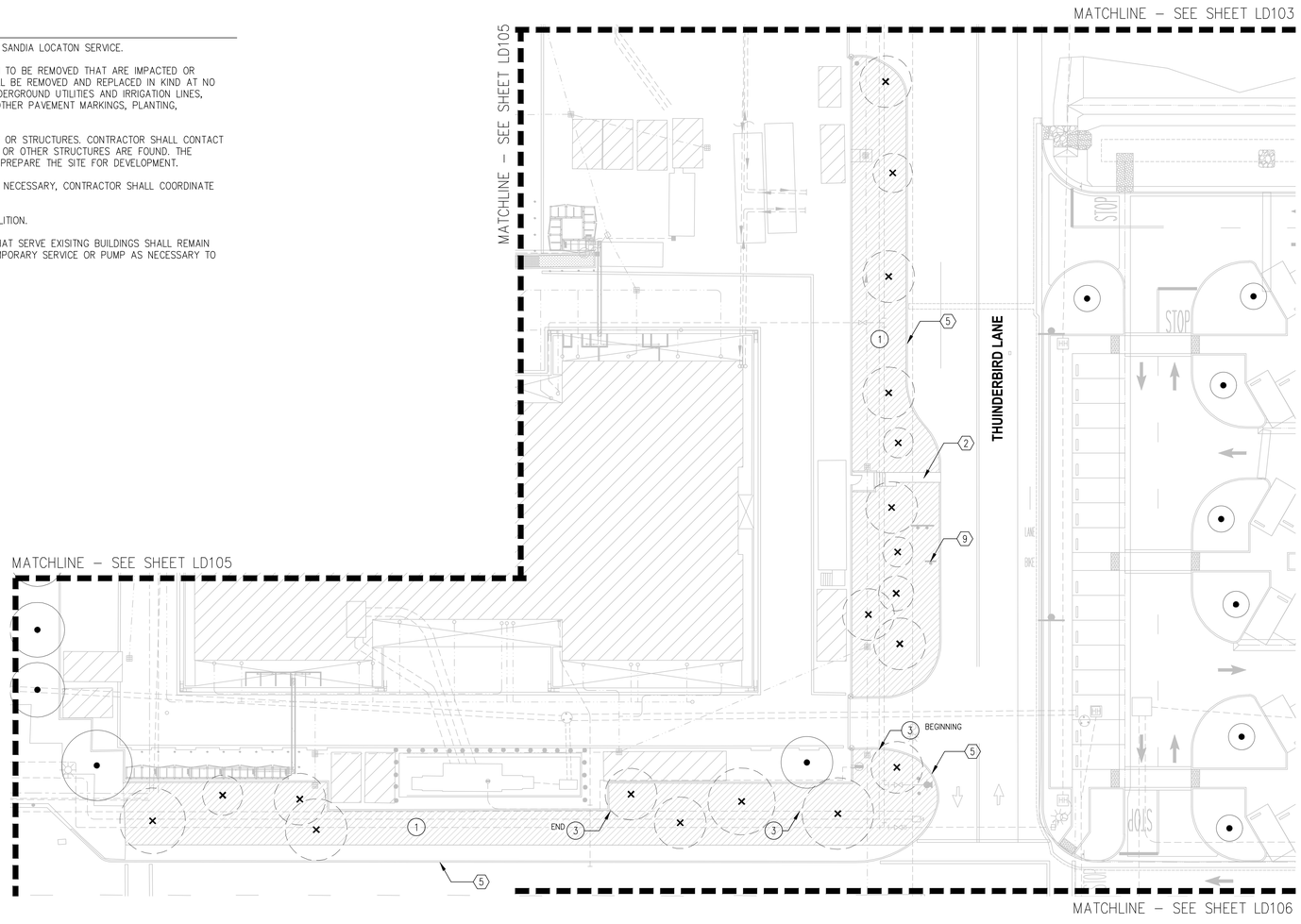



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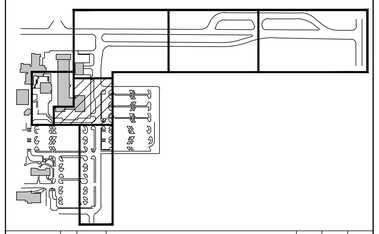
REGISTERED LANDSCAPE ARCHITECT — CHRISTOPHER A. GATES — 8/20/2024 — 11/07/2022 — STATE OF CALIFORNIA

**KEY MAP**



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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
DEMOLITION PLAN
BLDG.
FLOOR

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|---|---|
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | MJAC |
| CHECKED | KC |
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AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 8 OF 34 | SHEET LD104

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SCALE: 1"=20'-0"

CADS DRAWING
FILE NAME: X-XXX.dwg
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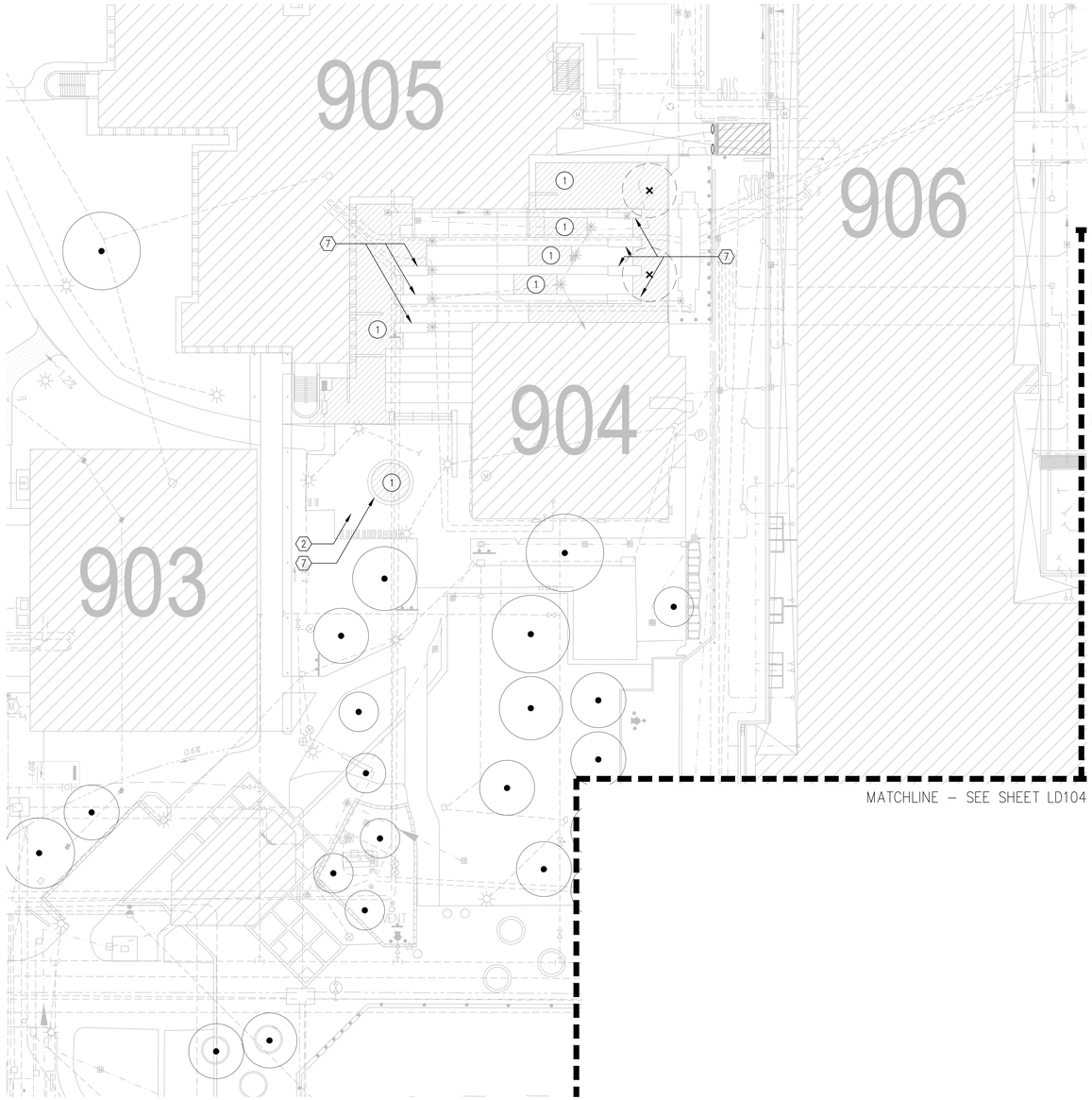
- (1) PRESERVE AND PROTECT EXISTING LANDSCAPE
- (2) PRESERVE AND PROTECT EXISTING CONCRETE PAVING AND ASPHALT PAVING
- (3) PRESERVE AND PROTECT EXISTING CONCRETE MOWBAND
- (4) PRESERVE AND PROTECT EXISTING FENCING AND GATES
- (5) PRESERVE AND PROTECT EXISTING CONCRETE CURB
- (6) PRESERVE AND PROTECT EXISTING UTILITY LINES, UTILITY BOXES AND ALL ASSOCIATED INFRASTRUCTURE.
- (7) PRESERVE AND PROTECT EXISTING CONCRETE WALL
- (8) PRESERVE AND PROTECT EXISTING CONCRETE TO MAINTAIN 6" WIDE CONCRETE CURB. ALL SAWCUTS SHALL BE NEAT, CLEAN EDGES.
- (9) PRESERVE AND PROTECT EXISTING SIGNAGE AND ASSOCIATED FOOTINGS
- (10) REMOVE AND STORE EXISITNG COBBLE. COORDINATE WITH LANDSCAPE ARCHITECT TO FACILITATE RELOCATION OF COBBLE.
- PRESERVE AND PROTECT EXISTING TREE TO REMAIN

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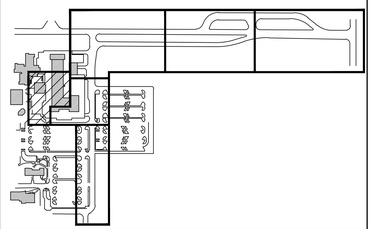
LAND PLANNING · URBAN DESIGN
1660 N. MARKET, STE 360, WALNUT CREEK, CA 94596
T. 925.736.8176 www.gateas.com

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

**KEY MAP**



| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
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| PROJ.& W.O. | NO. | DATE | REVISION | | BY | CHK | APP |

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CADS DRAWING
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0 10' 20' 40'
SCALE: 1"=20'-0"

PROJ. NO. E1234
ORDER NO. XX-XXXX

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
DEMOLITION PLAN
BLDG.
FLOOR

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| SOC ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

A/E FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 9 OF 34
SHEET LD105

## DEMOLITION NOTES

1. PRIOR TO COMMENCEMENT OF WORK, CONTRACTOR SHALL REQUEST SANDIA LOCATON SERVICE.
2. ALL UTILITIES, LANDSCAPE FEATURES, AND HARDSCAPE NOT SHOWN TO BE REMOVED THAT ARE IMPACTED OR DAMAGED BY THE CONTRACTOR OR THEIR SUB-CONTRACTORS SHALL BE REMOVED AND REPLACED IN KIND AT NO EXPENSE TO THE OWNER. ITEMS INCLUDE, BUT NOT LIMITED TO, UNDERGROUND UTILITIES AND IRRIGATION LINES, CURBS, GUTTERS, SIDEWALKS, PAVEMENT, FENCING, STRIPING AND OTHER PAVEMENT MARKINGS, PLANTING, LANDSCAPING, AND BOLLARDS.
3. THIS DEMOLITION PLAN IS NOT A COMPLETE INVENTORY OF UTLITIES OR STRUCTURES. CONTRACTOR SHALL CONTACT LANDSCAPE ARCHITECT IF ANY UNKNOWN OR UNEXPECTED UTILITIES OR OTHER STRUCTURES ARE FOUND. THE CONTRACTOR IS RESPONSIBLE FOR ALL DEMOLITION NECESSARY TO PREPARE THE SITE FOR DEVELOPMENT.
4. ALL UTILITY SHUTDOWNS ARE TO BE AVOIDED. IF SHUT DOWNS ARE NECESSARY, CONTRACTOR SHALL COORDINATE SHUT DOWN WITH OWNER WITH 48 HOUR MINIMUM NOTICE.
5. CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES PRIOR TO DEMOLITION.
6. ALL EXISTING STORMDRAIN, SANITARY SEWER, AND WATER MAINS THAT SERVE EXISITNG BUILDINGS SHALL REMAIN OPERABLE DURING CONSTRUCTION. CONTRACTOR SHALL SET UP TEMPORARY SERVICE OR PUMP AS NECESSARY TO ENSURE UNINTERRUPTED SERVICE.

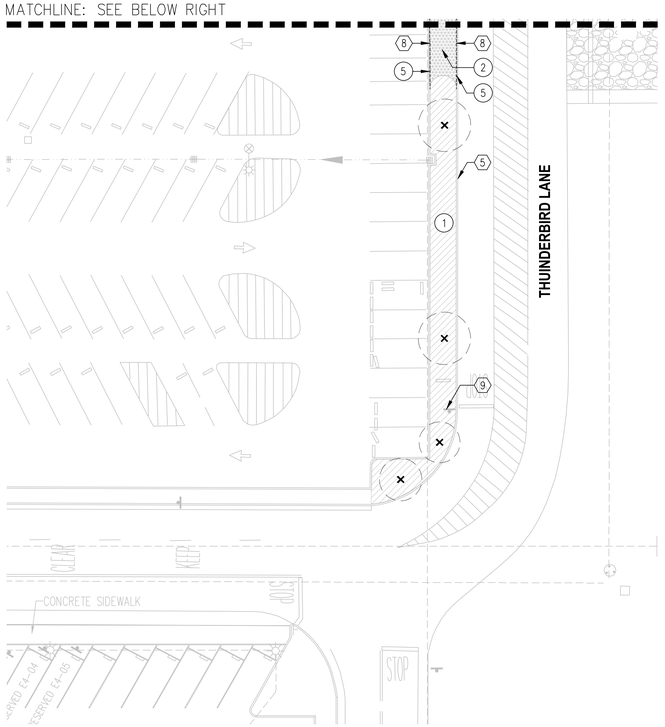
## DEMOLITION LEGEND

- (1) CLEAR AND GRUB EXISTING LANDSCAPE. REMOVE AND DISPOSE OF TREES, SHRUBS, STUMPS, ROOTS, AND ORGANIC MATERIAL
- (2) DEMOLISH, REMOVE, AND DISPOSE OF EXISTING CONCRETE INCLUDING ANY ASSOCIATED BASE ROCK AND REBAR.
- (3) DEMOLISH, REMOVE AND DISPOSE OF EXISTING CONCRETE MOWBAND INCLUDING ANY ASSOCIATED BASE ROCK AND REBAR.
- (4) DEMOLISH, REMOVE AND DISPOSE OF EXISTING FENCING INCLUDING ASSOCIATED FOOTINGS
- (5) SAWCUT EXISTING CONCRETE WITH NEAT, CLEAN EDGES TO RETAIN 6" WIDE CONCRETE CURB. ALL EXISTING REBAR SHALL BE REMOVED OR GRINDED.
- EXISTING TREE TO BE REMOVE AND DISPOSE OF INCLUDING STUMPS, ROOTS AND ORGANIC MATERIAL

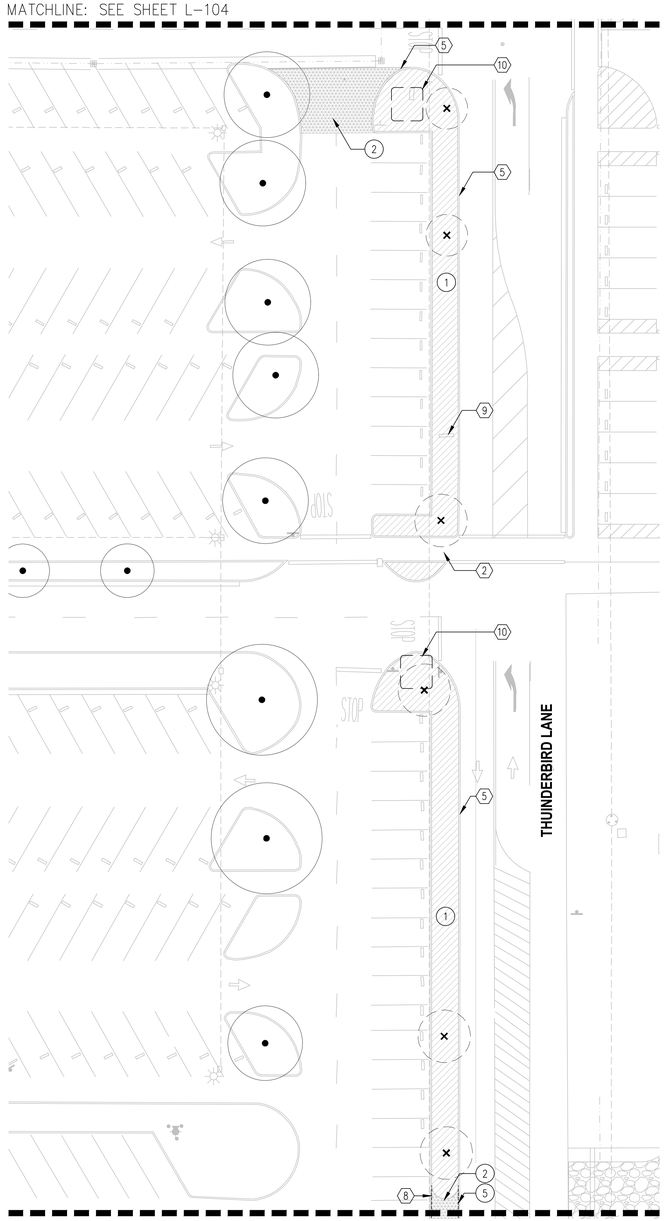
## PROTECTION LEGEND

- (1) PRESERVE AND PROTECT EXISTING LANDSCAPE
- (2) PRESERVE AND PROTECT EXISTING CONCRETE PAVING AND ASPHALT PAVING
- (3) PRESERVE AND PROTECT EXISTING CONCRETE MOWBAND
- (4) PRESERVE AND PROTECT EXISTING FENCING AND GATES
- (5) PRESERVE AND PROTECT EXISTING CONCRETE CURB
- (6) PRESERVE AND PROTECT EXISTING UTILITY LINES, UTILITY BOXES AND ALL ASSOCIATED INFRASTRUCTURE.
- (7) PRESERVE AND PROTECT EXISTING CONCRETE WALL
- (8) PRESERVE AND PROTECT EXISTING CONCRETE TO MAINTAIN 6" WIDE CONCRETE CURB. ALL SAWCUTS SHALL BE NEAT, CLEAN EDGES.
- (9) PRESERVE AND PROTECT EXISTING SIGNAGE AND ASSOCIATED FOOTINGS
- (10) REMOVE AND STORE EXISITNG COBBLE. COORDINATE WITH LANDSCAPE ARCHITECT TO FACILITATE RELOCATION OF COBBLE.
- PRESERVE AND PROTECT EXISTING TREE TO REMAIN

MATCHLINE: SEE BELOW RIGHT




MATCHLINE: SEE SHEET L-104




MATCHLINE: SEE TOP LEFT

0 10' 20' 40'

SCALE: 1"=20'-0"

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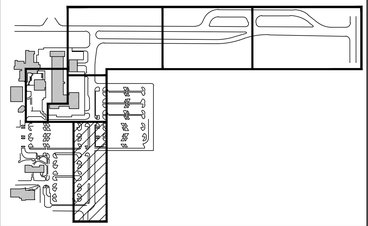
REGISTERED LANDSCAPE ARCHITECT
CHRIS A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|---|
| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR LANDSCAPE

BLDG.

DEMOLITION PLAN

FLOOR

| | |
|---|---|
| CONTRACT NO./A-E | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | WJ,KC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

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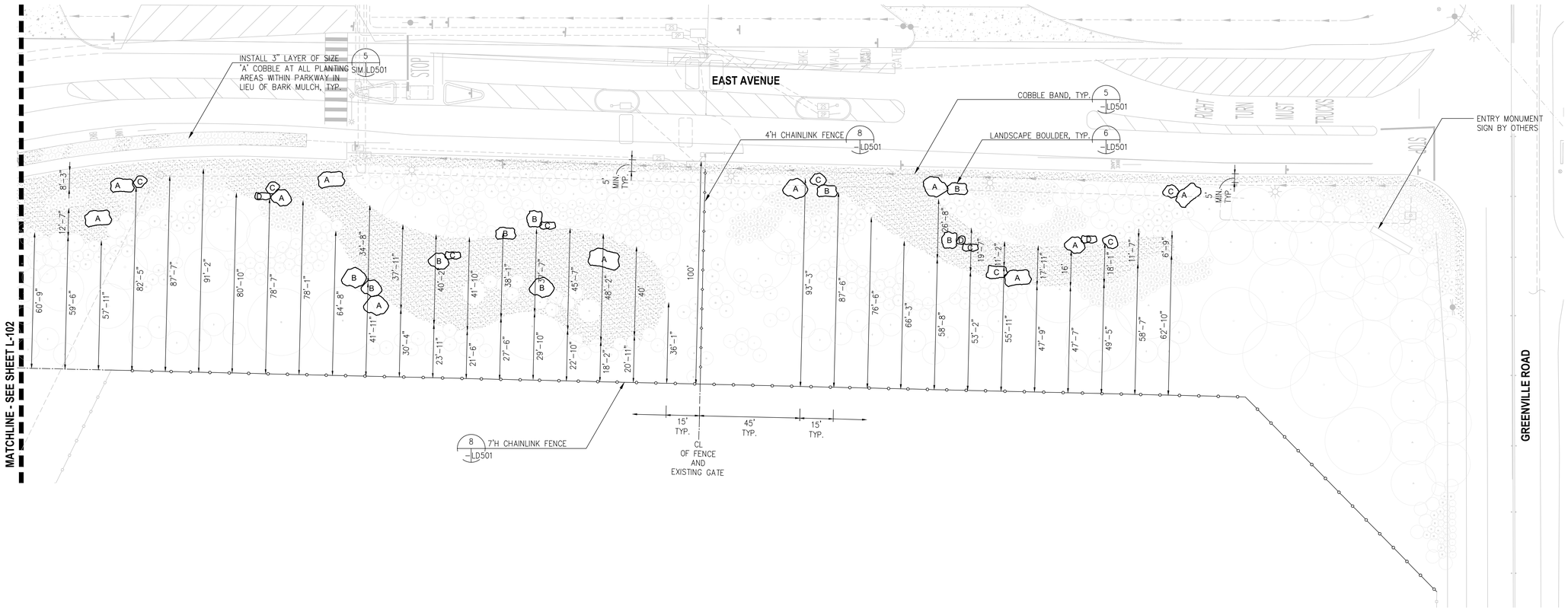
SHEET 10 OF 34

SHEET LD106




MATCHLINE - SEE SHEET L-102

## LAYOUT LEGEND

| | |
|---|---|
| COBBLE BAND | 5 LD501 |
| LANDSCAPE BOULDER | 6 LD501 |
| CONCRETE MOWBAND | 7 LD501 |
| 7'H CHAINLINK FENCE | 8 LD501 |
| 4'H CHAINLINK FENCE | 9 LD501 |

## LANDSCAPE BOULDER SCHEDULE

| BOULDER | SIZE |
|---|---|
| A | 8'–6" TO 10' DIA. |
| B | 6'–6" TO 8' DIA. |
| C | 4'–6" TO 6' DIA. |
| D | 30" TO 4' DIA. |

0 10' 20' 40'

SCALE: 1"=20'-0"

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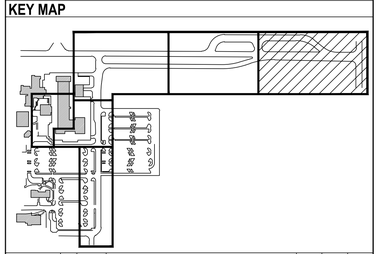
REGISTERED LANDSCAPE ARCHITECT CHRIS A. GATES 8/20/2024 11/07/2022 STATE OF CALIFORNIA

## KEY MAP



| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|---|
| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |

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SECTOR | BLDG. | FLOOR

LANDSCAPE

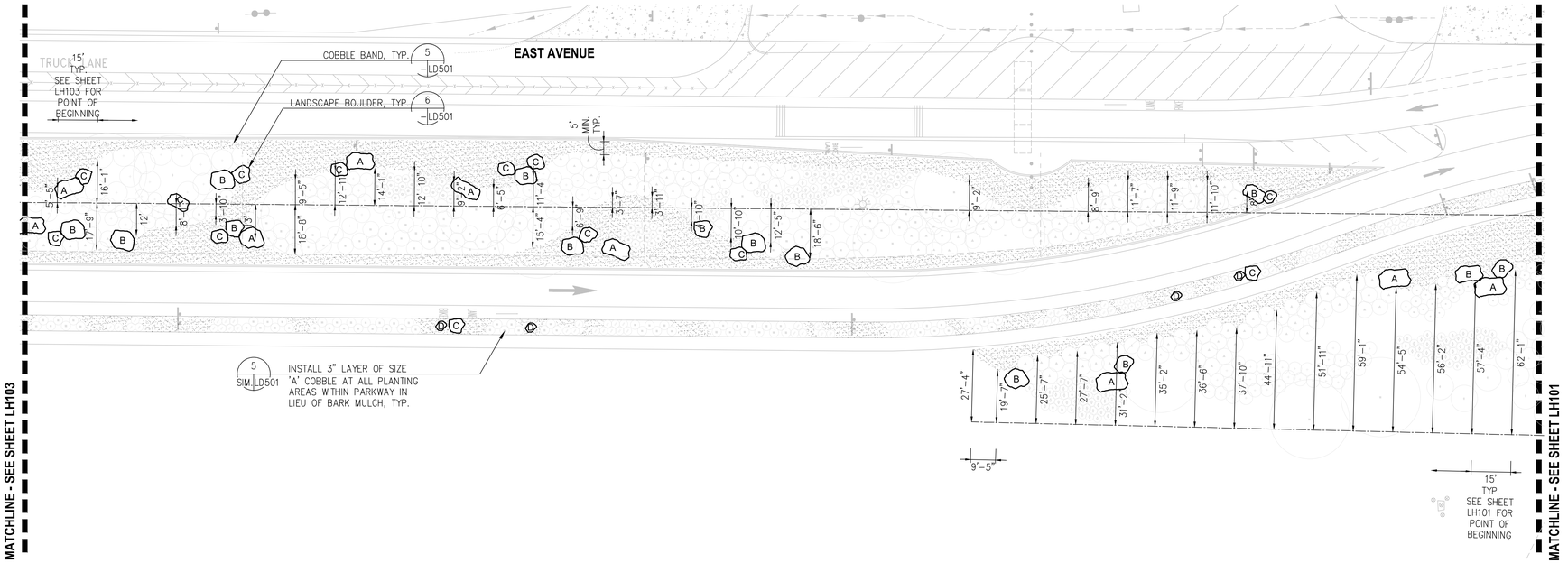
MATERIAL AND FENCING PLAN

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 11 OF 34

SHEET LH101




## LAYOUT LEGEND

- COBBLE BAND — 5 / LD501
- LANDSCAPE BOULDER — 6 / LD501
- CONCRETE MOWBAND — 7 / LD501
- 7'H CHAINLINK FENCE — 8 / LD501
- 4'H CHAINLINK FENCE — 9 / LD501

## LANDSCAPE BOULDER SCHEDULE

| BOULDER | SIZE |
|---|---|
| A | 8'–6" TO 10' DIA. |
| B | 6'–6" TO 8' DIA. |
| C | 4'–6" TO 6' DIA. |
| D | 30" TO 4' DIA. |

0 10' 20' 40'

SCALE: 1"=20'-0"

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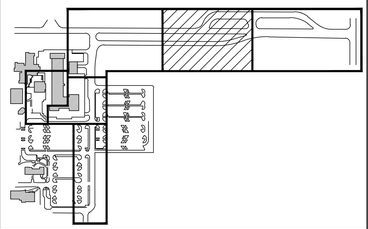
T. 925.736.8176 www.dgates.com

REGISTERED LANDSCAPE ARCHITECT — CHRISTOPHER A. GATES — 8/20/2024 — 11/07/2022 — LA — STATE OF CALIFORNIA

## KEY MAP



| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|---|
| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |

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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR

LANDSCAPE

BLDG.

# MATERIAL AND FENCING PLAN

FLOOR

| | |
|---|---|
| CONTRACT NO.(A-T) | XXX |
| ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

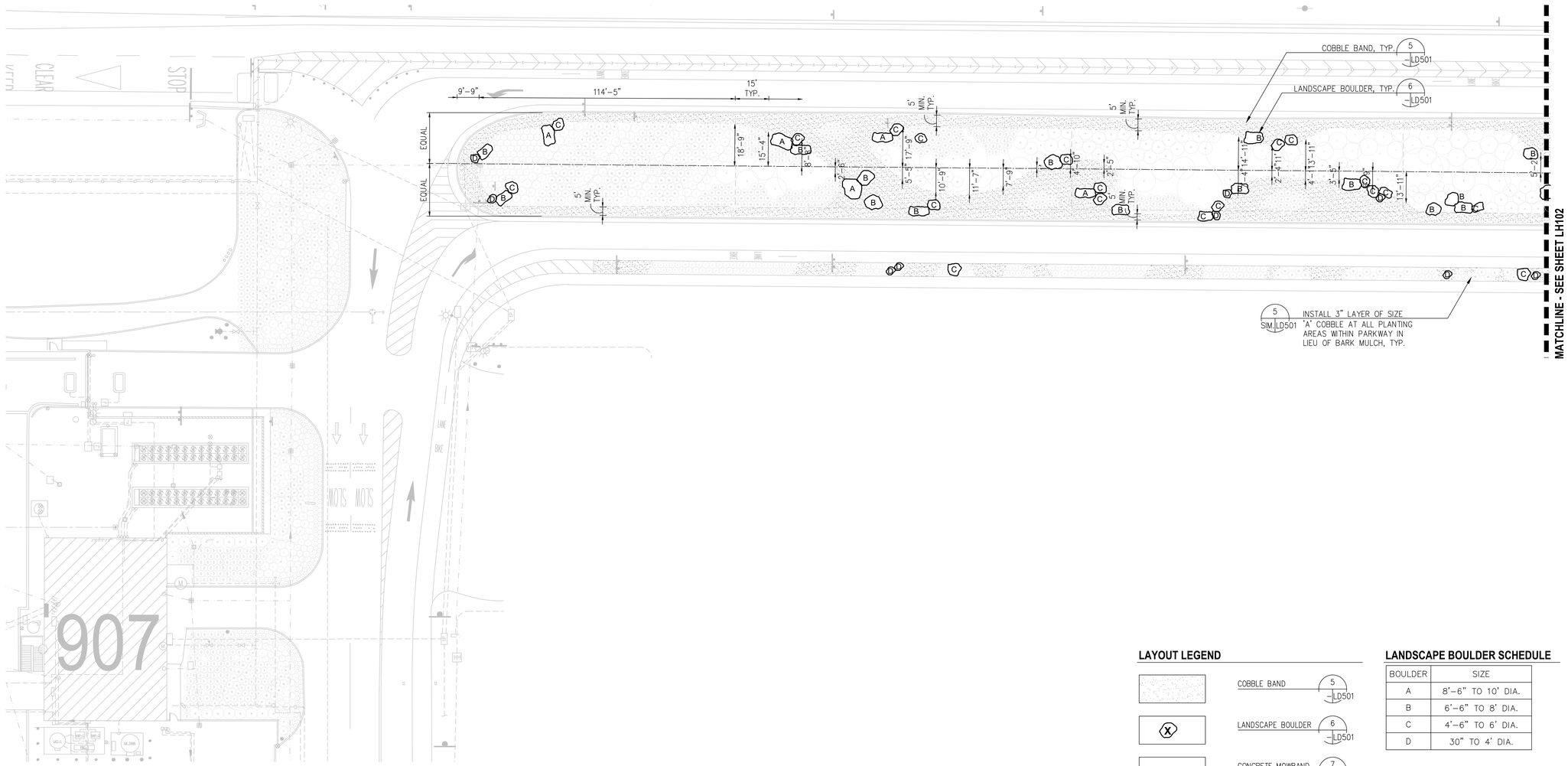
AE FIRM:

SNL PM:

SNL APPROVED BY:

SHEET 12 OF 34

SHEET LH102




## LAYOUT LEGEND

| | | |
|---|---|---|
| | COBBLE BAND | 5 LD501 |
| X | LANDSCAPE BOULDER | 6 LD501 |
| | CONCRETE MOWBAND | 7 LD501 |
| | 7'H CHAINLINK FENCE | 8 LD501 |
| | 4'H CHAINLINK FENCE | 9 LD501 |

## LANDSCAPE BOULDER SCHEDULE

| BOULDER | SIZE |
|---|---|
| A | 8'–6" TO 10' DIA. |
| B | 6'–6" TO 8' DIA. |
| C | 4'–6" TO 6' DIA. |
| D | 30" TO 4' DIA. |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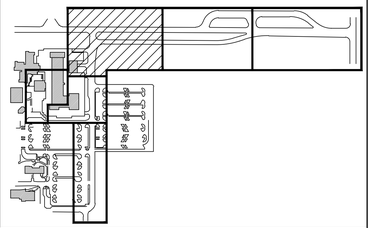
REGISTERED LANDSCAPE ARCHITECT · CARE · No. 6065 · STATE OF CALIFORNIA
8/20/2024
11/07/2022
Date
LA

## KEY MAP



| PROJ.& W.O.NO. | NO. | DATE | REVISION | BY | CHK | APP |
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| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |

0 10' 20' 40'
SCALE: 1"=20'-0"


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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR | BLDG. | FLOOR

LANDSCAPE
MATERIAL AND FENCING PLAN

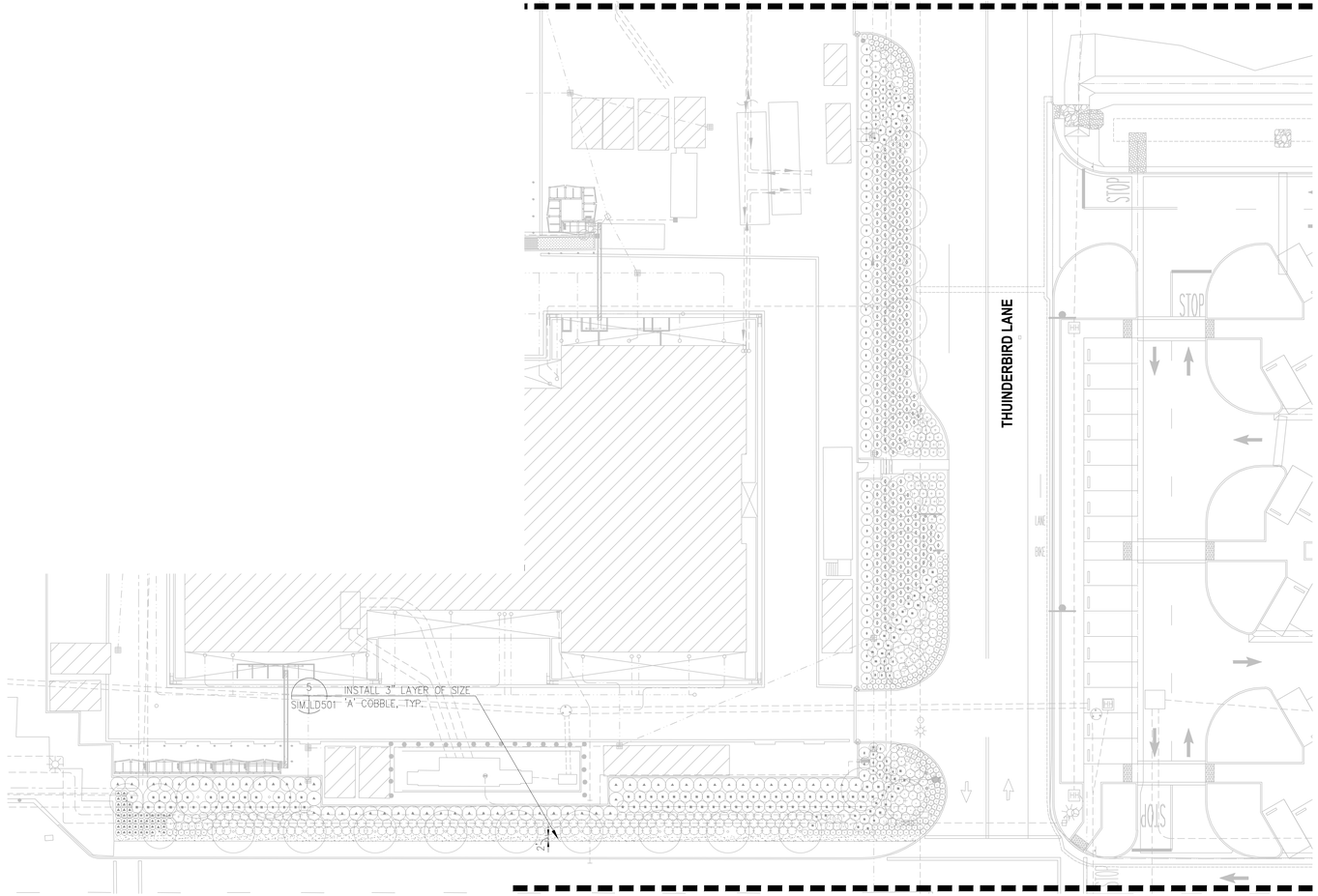
| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 13 OF 34

SHEET LH103

MATCHLINE - SEE SHEET LH103




MATCHLINE - SEE SHEET LH106

## LAYOUT LEGEND

- COBBLE BAND — 5 / LD501
- LANDSCAPE BOULDER — 6 / LD501
- CONCRETE MOWBAND — 7 / LD501
- 7'H CHAINLINK FENCE — 8 / LD501
- 4'H CHAINLINK FENCE — 9 / LD501

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0 10' 20' 40'
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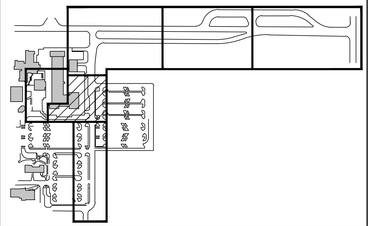
REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
|---|---|---|---|---|---|---|
| PROJ.& W.O. | NO. | DATE | REVISION | | BY | CHK | APP |

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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
BLDG.
FLOOR

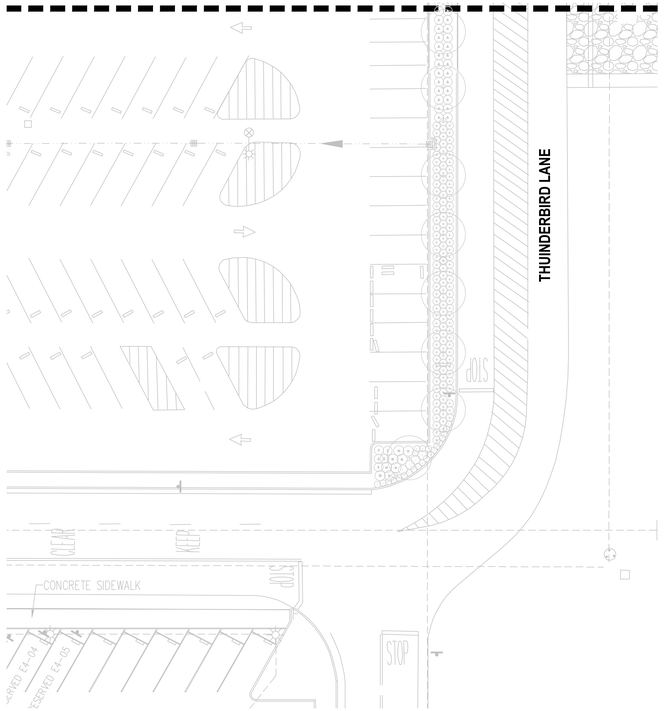
# MATERIAL AND FENCING PLAN

| | |
|---|---|
| CONTRACT NO.(A-S) | XXX |
| SOLT ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

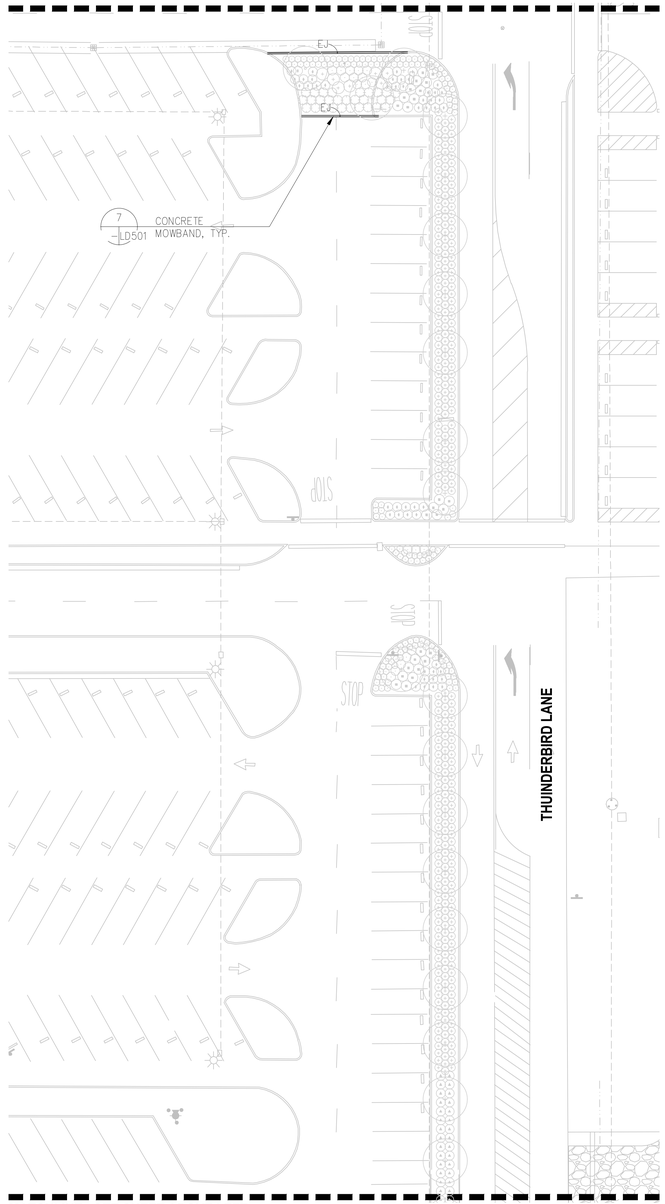
AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 14 OF 34
SHEET LH104

MATCHLINE - SEE BELOW RIGHT




MATCHLINE - SEE SHEET LH104




MATCHLINE - SEE SHEET ABOVE LEFT

## LAYOUT LEGEND

| | | |
|---|---|---|
| COBBLE BAND | 5 | LD501 |
| LANDSCAPE BOULDER | 6 | LD501 |
| CONCRETE MOWBAND | 7 | LD501 |
| 7'H CHAINLINK FENCE | 8 | LD501 |
| 4'H CHAINLINK FENCE | 9 | LD501 |

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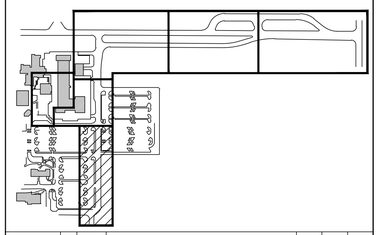
REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/30/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



| PROJ.& W.O.NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|
| XXX | X XX/XX/XX | XXX | XXX | XXX | XXX |

0 10' 20' 40'
SCALE: 1"=20'-0"

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
BLDG.
FLOOR

LANDSCAPE
MATERIAL AND FENCING PLAN

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | W.AC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/01/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 15 OF 34
SHEET LH106

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ORDER NO. XX-XXXX

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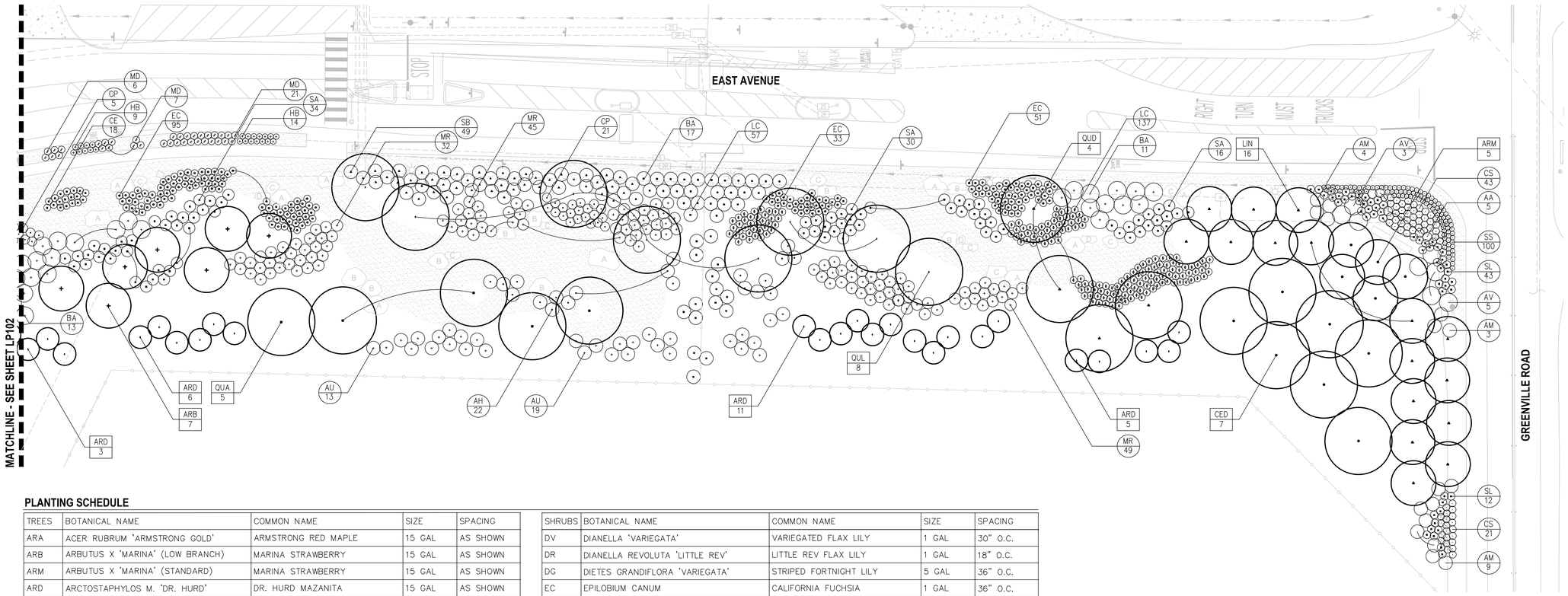


## PLANTING SCHEDULE

| TREES | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
| ARA | ACER RUBRUM 'ARMSTRONG GOLD' | ARMSTRONG RED MAPLE | 15 GAL | AS SHOWN |
| ARB | ARBUTUS X 'MARINA' (LOW BRANCH) | MARINA STRAWBERRY | 15 GAL | AS SHOWN |
| ARM | ARBUTUS X 'MARINA' (STANDARD) | MARINA STRAWBERRY | 15 GAL | AS SHOWN |
| ARD | ARCTOSTAPHYLOS M. 'DR. HURD' | DR. HURD MAZANITA | 15 GAL | AS SHOWN |
| CED | CEDRUS DEODARA 'GLAUCA' | ATLAS CEDAR | 15 GAL | AS SHOWN |
| CEO | CERCIS OCCIDENTALIS (STANDARD) | WESTERN REDBUD | 15 GAL | AS SHOWN |
| GBP | GINKGO BILOBA 'PRINCETON SENTRY' | PRINCETON SENTRY GINKGO | 15 GAL | AS SHOWN |
| LIN | LAGERSTROEMIA INDICA 'NATCHEZ' | NATCHEZ CRAPE MYRTLE | 15 GAL | AS SHOWN |
| PDM | PARKINSONIA 'DESERT MUSEUM' | DESERT MUSEUM PALO VERDE | 15 GAL | AS SHOWN |
| PRU | PRUNUS SPP. (TO MATCH EX. SPECIES) | | 15 GAL | AS SHOWN |
| QUA | QUERCUS AGRIFOLIA | COAST LIVE OAK | 15 GAL | AS SHOWN |
| QUD | QUERCUS DOUGLASII | BLUE OAK | 15 GAL | AS SHOWN |
| QUL | QUERCUS LOBATA | VALLEY OAK | 15 GAL | AS SHOWN |
| ULF | ULMUS 'FRONTIER' | FRONTIER HYBRID ELM | 15 GAL | AS SHOWN |

| SHRUBS | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
| AM | AGAVE AMERICANA 'MEDIOPICTA ALBA' | WHITE STRIPED CENTURY PLANT | 5 GAL | 72" O.C. |
| AV | AGAVE AMERICANA 'VARIEGATA' | VARIEGATED CENTURY PLANT | 5 GAL | 96" O.C |
| AK | AGAVE ATTENUATA 'KARA'S STRIPES' | VARIEGATED FOX TAIL AGAVE | 5 GAL | 36" O.C. |
| AA | AGAVE ATTENUATA 'VARIEGATA' | VARIEGATED FOX TAIL AGAVE | 5 GAL | 48" O.C. |
| AD | AGAVE DESMETIANA 'VARIEGATA' | VARIEGATED SMOOTH AGAVE | 5 GAL | 48" O.C. |
| AS | ALOE STRIATA | CORAL ALOE | 1 GAL | 36" O.C. |
| AU | ARBUTUS UNEDO 'COMPACTA' | DWARF STRAWBERRY TREE | 15 GAL | 72" O.C. |
| AH | ARCTOSTAPHYLOS D. 'HOWARD MCMINN' | VINE HILL MANZANITA | 5 GAL | 72" O.C. |
| AP | ARCTOSTAPHYLOS 'PACIFIC MIST' | PACIFIC MIST MANZANITA | 1 GAL | 72" O.C. |
| BA | BACCHARIS PILULARIS 'TWIN PEAKS' | DWARF COYOTE BUSH | 1 GAL | 96" O.C. |
| BG | BOUTELOUA GRACILIS 'BLONDE AMBITION' | BLONDE AMBITION BLUE GRAMA | 1 GAL | 24" O.C. |
| CS | CALANDRINIA SPECTABILIS | ROCK PURSLANE | 1 GAL | 36" O.C. |
| CL | CALLISTEMON 'LITTLE JOHN' | BOTTLEBRUSH | 5 GAL | 36" O.C. |
| CE | CHONDROPETALUM TECTORUM 'EL CAMPO' | EL CAMPO SMALL CAPE RUSH | 5 GAL | 36" O.C. |
| CP | CISTUS PURPUREUS | PURPLE-FLOWER ROCK ROSE | 5 GAL | 48" O.C. |

| SHRUBS | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
| DV | DIANELLA 'VARIEGATA' | VARIEGATED FLAX LILY | 1 GAL | 30" O.C. |
| DR | DIANELLA REVOLUTA 'LITTLE REV' | LITTLE REV FLAX LILY | 1 GAL | 18" O.C. |
| DG | DIETES GRANDIFLORA 'VARIEGATA' | STRIPED FORTNIGHT LILY | 5 GAL | 36" O.C. |
| EC | EPILOBIUM CANUM | CALIFORNIA FUCHSIA | 1 GAL | 36" O.C. |
| FM | FESTUCA MAIREI | ATLAS FESCUE | 5 GAL | 36" O.C. |
| HB | HESPERALOE PARVIFLORA 'BRAKELIGHTS' | BRAKELIGHTS RED YUCCA | 5 GAL | 30" O.C. |
| HP | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | 48" O.C. |
| LC | LEYMUS CONDENSATUS 'CANYON PRINCE' | CANYON PRINCE GIANT WILD RYE | 1 GAL | 36" O.C. |
| LT | LEUCOPHYLLUM TEXANUM | TEXAS SAGE | 5 GAL | 48" O.C. |
| LL | LOMANDRA LONGIFOLIA 'BREEZE' | DWARF MAT RUSH | 1 GAL | 36" O.C. |
| MD | MUHLENBERGIA DUBIA | PINE MUHLY | 1 GAL | 36" O.C. |
| MR | MUHLENBERGIA RIGENS | DEER GRASS | 1 GAL | 60" O.C. |
| NP | NERIUM OLEANDER 'PETITE SALMON' | PETITE SALMON OLEANDER | 5 GAL | 48" O.C. |
| PE | PITTOSPORUM TEN 'SILVER SHEEN' | SILVER SHEEN KOHUHU | 5 GAL | 60" O.C. |
| PT | PITTOSPORUM TOBIRA 'VARIEGATA' | VARIEGATED MOCK ORANGE | 5 GAL | 60' O.C. |
| SA | SALVIA CLEVELANDII 'ALLEN CHICKERING' | CLEVELAND SAGE | 5 GAL | 60" O.C. |
| SB | SALVIA X 'BEE'S BLISS' | BEE'S BLISS SAGE | 1 GAL | 72" O.C. |
| SL | SALVIA LEUCANTHA 'SANTA BARBARA' | MEXICAN BUSH SAGE | 5 GAL | 42" O.C. |
| SS | SENECIO SERPENS | BLUE CHALKSTICKS | 1 GAL | 24" O.C. |
| TC | TEUCRIUM CHAMAEDRYS | GERMANDER | 1 GAL | 24" O.C. |
| VD | VERBENA 'DE LA MINA' | DE LA MINA VERBENA | 1 GAL | 36" O.C. |

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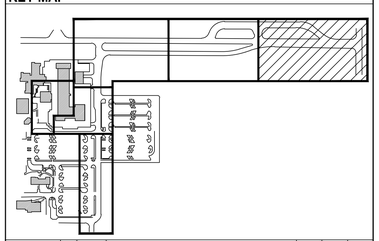
LAND PLANNING · URBAN DESIGN
1660 N. MAIN ST. STE 260, WALNUT CREEK, CA 94596
T 925.736.8176 www.dgates.com

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

**KEY MAP**



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CADS DRAWING
FILE NAME: X-XXX.dwg

0 10' 20' 40'
SCALE: 1"=20'-0"

PROJ. NO. E1234
ORDER NO. XX-XXXX

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
PLANTING PLAN
FLOOR

BLDG.
CONTRACT NO.(A-E)
COST ACCT.NO.
DRAWN
CHECKED
SCALE
DATE

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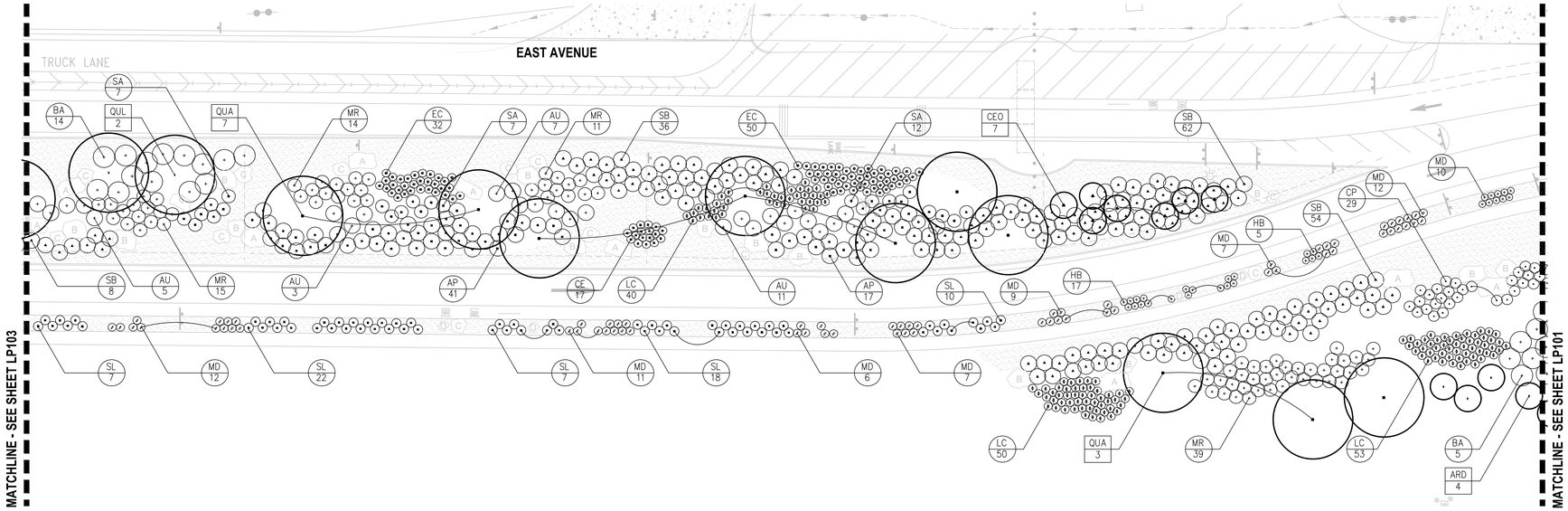
SHEET 16 OF 34
SHEET LP101




## PLANTING SCHEDULE

| TREES | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
| ARA | ACER RUBRUM 'ARMSTRONG GOLD' | ARMSTRONG RED MAPLE | 15 GAL | AS SHOWN |
| ARB | ARBUTUS X 'MARINA' (LOW BRANCH) | MARINA STRAWBERRY | 15 GAL | AS SHOWN |
| ARM | ARBUTUS X 'MARINA' (STANDARD) | MARINA STRAWBERRY | 15 GAL | AS SHOWN |
| ARD | ARCTOSTAPHYLOS M. 'DR. HURD' | DR. HURD MAZANITA | 15 GAL | AS SHOWN |
| CED | CEDRUS DEODARA 'GLAUCA' | ATLAS CEDAR | 15 GAL | AS SHOWN |
| CEO | CERCIS OCCIDENTALIS (STANDARD) | WESTERN REDBUD | 15 GAL | AS SHOWN |
| GBP | GINKGO BILOBA 'PRINCETON SENTRY' | PRINCETON SENTRY GINKGO | 15 GAL | AS SHOWN |
| LIN | LAGERSTROEMIA INDICA 'NATCHEZ' | NATCHEZ CRAPE MYRTLE | 15 GAL | AS SHOWN |
| PDM | PARKINSONIA 'DESERT MUSEUM' | DESERT MUSEUM PALO VERDE | 15 GAL | AS SHOWN |
| PRU | PRUNUS SPP. (TO MATCH EX. SPECIES) | | 15 GAL | AS SHOWN |
| QUA | QUERCUS AGRIFOLIA | COAST LIVE OAK | 15 GAL | AS SHOWN |
| QUD | QUERCUS DOUGLASII | BLUE OAK | 15 GAL | AS SHOWN |
| QUL | QUERCUS LOBATA | VALLEY OAK | 15 GAL | AS SHOWN |
| ULF | ULMUS 'FRONTIER' | FRONTIER HYBRID ELM | 15 GAL | AS SHOWN |

| SHRUBS | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
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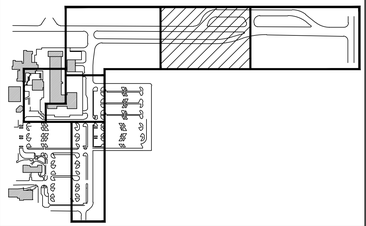
T 925.736.8176 www.dgates.com

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
No. 2500
8/30/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



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ORDER NO. XX-XXXX

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
PLANTING PLAN
BLDG.
FLOOR

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| CONTRACT NO.(A-E) | XXX |
| PROJECT NO. ACCT.NO. | XXX |
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SNL APPROVED BY:

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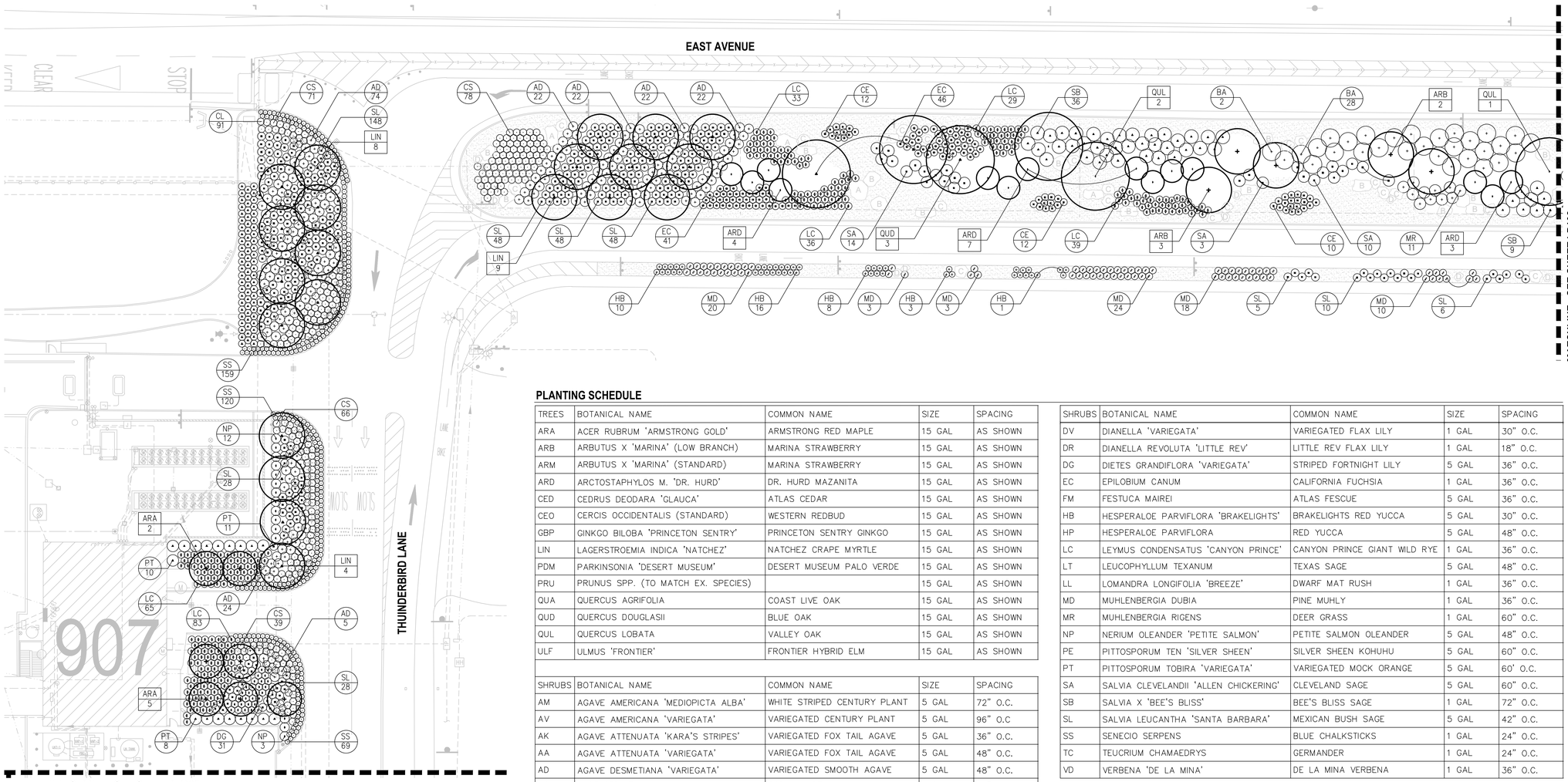


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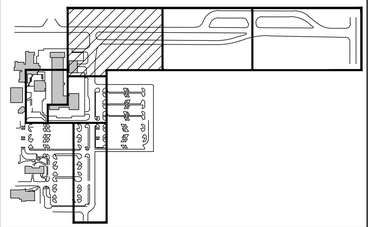
T. 925.736.8176 www.gateslaa.com

REGISTERED LANDSCAPE ARCHITECT — CHRIS A. GATES — 8/20/2024, 11/07/2022 — No. 5466 — STATE OF CALIFORNIA

KEY MAP



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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
PLANTING PLAN
FLOOR

BLDG.

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|---|---|
| CONTRACT NO.(A-E) | XXX |
| REQ. ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 18 OF 34 | SHEET LP103

0 10' 20' 40'
SCALE: 1"=20'-0"

CADS DRAWING
FILE NAME: X-XXX.dwg
PROJ. NO. E1234
ORDER NO. XX-XXXX

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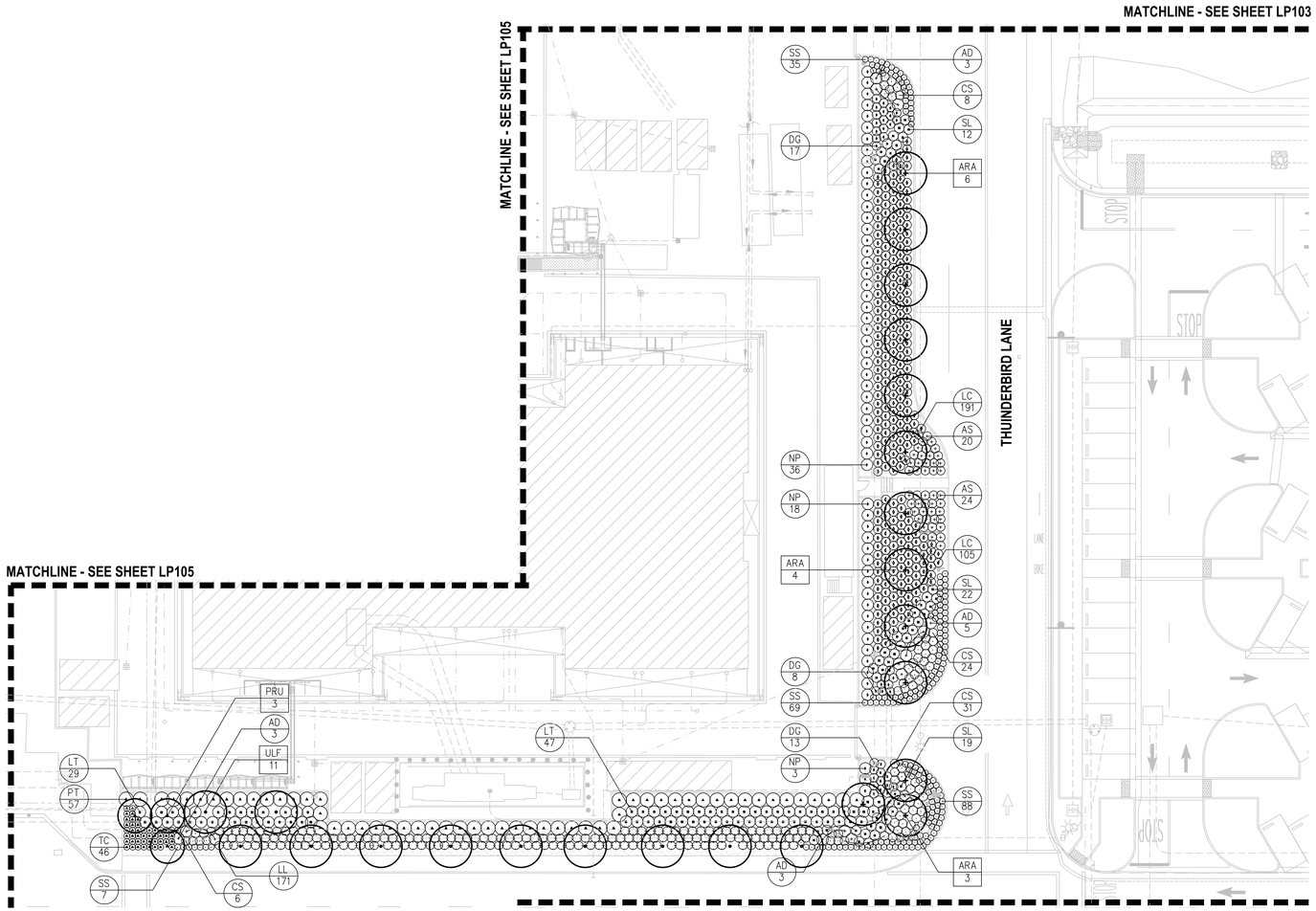
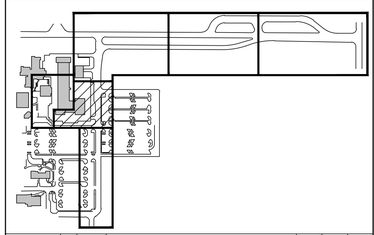
| AH | ARCTOSTAPHYLOS D. 'HOWARD MCMINN' | VINE HILL MANZANITA | 5 GAL | 72" O.C. |
| AP | ARCTOSTAPHYLOS 'PACIFIC MIST' | PACIFIC MIST MANZANITA | 1 GAL | 72" O.C. |
| BA | BACCHARIS PILULARIS 'TWIN PEAKS' | DWARF COYOTE BUSH | 1 GAL | 96" O.C. |
| BG | BOUTELOUA GRACILIS 'BLONDE AMBITION' | BLONDE AMBITION BLUE GRAMA | 1 GAL | 24" O.C. |
| CS | CALANDRINIA SPECTABILIS | ROCK PURSLANE | 1 GAL | 36" O.C. |
| CL | CALLISTEMON 'LITTLE JOHN' | BOTTLEBRUSH | 5 GAL | 36" O.C. |
| CE | CHONDROPETALUM TECTORUM 'EL CAMPO' | EL CAMPO SMALL CAPE RUSH | 5 GAL | 36" O.C. |
| CP | CISTUS PURPUREUS | PURPLE-FLOWER ROCK ROSE | 5 GAL | 48" O.C. |
| DV | DIANELLA 'VARIEGATA' | VARIEGATED FLAX LILY | 1 GAL | 30" O.C. |
| DR | DIANELLA REVOLUTA 'LITTLE REV' | LITTLE REV FLAX LILY | 1 GAL | 18" O.C. |
| DG | DIETES GRANDIFLORA 'VARIEGATA' | STRIPED FORTNIGHT LILY | 5 GAL | 36" O.C. |
| EC | EPILOBIUM CANUM | CALIFORNIA FUCHSIA | 1 GAL | 36" O.C. |
| FM | FESTUCA MAIREI | ATLAS FESCUE | 5 GAL | 36" O.C. |
| HB | HESPERALOE PARVIFLORA 'BRAKELIGHTS' | BRAKELIGHTS RED YUCCA | 5 GAL | 30" O.C. |
| HP | HESPERALOE PARVIFLORA | RED YUCCA | 5 GAL | 48" O.C. |
| LC | LEYMUS CONDENSATUS 'CANYON PRINCE' | CANYON PRINCE GIANT WILD RYE | 1 GAL | 36" O.C. |
| LT | LEUCOPHYLLUM TEXANUM | TEXAS SAGE | 5 GAL | 48" O.C. |
| LL | LOMANDRA LONGIFOLIA 'BREEZE' | DWARF MAT RUSH | 1 GAL | 36" O.C. |
| MD | MUHLENBERGIA DUBIA | PINE MUHLY | 1 GAL | 36" O.C. |
| MR | MUHLENBERGIA RIGENS | DEER GRASS | 1 GAL | 60" O.C. |
| NP | NERIUM OLEANDER 'PETITE SALMON' | PETITE SALMON OLEANDER | 5 GAL | 48" O.C. |
| PE | PITTOSPORUM TEN 'SILVER SHEEN' | SILVER SHEEN KOHUHU | 5 GAL | 60" O.C. |
| PT | PITTOSPORUM TOBIRA 'VARIEGATA' | VARIEGATED MOCK ORANGE | 5 GAL | 60' O.C. |
| SA | SALVIA CLEVELANDII 'ALLEN CHICKERING' | CLEVELAND SAGE | 5 GAL | 60" O.C. |
| SB | SALVIA X 'BEE'S BLISS' | BEE'S BLISS SAGE | 1 GAL | 72" O.C. |
| SL | SALVIA LEUCANTHA 'SANTA BARBARA' | MEXICAN BUSH SAGE | 5 GAL | 42" O.C. |
| SS | SENECIO SERPENS | BLUE CHALKSTICKS | 1 GAL | 24" O.C. |
| TC | TEUCRIUM CHAMAEDRYS | GERMANDER | 1 GAL | 24" O.C. |
| VD | VERBENA 'DE LA MINA' | DE LA MINA VERBENA | 1 GAL | 36" O.C. |



KEY MAP

| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
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| PROJ.& W.O. | NO. | DATE | REVISION | | BY | CHK | APP |

0 10' 20' 40'

SCALE: 1"=20'-0"

CADS DRAWING

FILE NAME: X-XXX.dwg

PROJ. NO. E1234

ORDER NO. XX-XXXX

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T. 925.736.8176 www.gateas.com

REGISTERED LANDSCAPE ARCHITECT CHRISTOPHER A. JOSE 8/20/2024 11/07/2022 STATE OF CALIFORNIA

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

| | |
|---|---|
| SECTOR | LANDSCAPE |
| BLDG. | |
| FLOOR | |
| CONTRACT NO.(A-E) | XXX |
| DOE ACCT.NO. | XXX |
| DRAWN | WFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

PLANTING PLAN

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 19 OF 34

SHEET LP104

## PLANTING SCHEDULE

| TREES | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
| ARA | ACER RUBRUM 'ARMSTRONG GOLD' | ARMSTRONG RED MAPLE | 15 GAL | AS SHOWN |
| ARB | ARBUTUS X 'MARINA' (LOW BRANCH) | MARINA STRAWBERRY | 15 GAL | AS SHOWN |
| ARM | ARBUTUS X 'MARINA' (STANDARD) | MARINA STRAWBERRY | 15 GAL | AS SHOWN |
| ARD | ARCTOSTAPHYLOS M. 'DR. HURD' | DR. HURD MAZANITA | 15 GAL | AS SHOWN |
| CED | CEDRUS DEODARA 'GLAUCA' | ATLAS CEDAR | 15 GAL | AS SHOWN |
| CEO | CERCIS OCCIDENTALIS (STANDARD) | WESTERN REDBUD | 15 GAL | AS SHOWN |
| GBP | GINKGO BILOBA 'PRINCETON SENTRY' | PRINCETON SENTRY GINKGO | 15 GAL | AS SHOWN |
| LIN | LAGERSTROEMIA INDICA 'NATCHEZ' | NATCHEZ CRAPE MYRTLE | 15 GAL | AS SHOWN |
| PDM | PARKINSONIA 'DESERT MUSEUM' | DESERT MUSEUM PALO VERDE | 15 GAL | AS SHOWN |
| PRU | PRUNUS SPP. (TO MATCH EX. SPECIES) | | 15 GAL | AS SHOWN |
| QUA | QUERCUS AGRIFOLIA | COAST LIVE OAK | 15 GAL | AS SHOWN |
| QUD | QUERCUS DOUGLASII | BLUE OAK | 15 GAL | AS SHOWN |
| QUL | QUERCUS LOBATA | VALLEY OAK | 15 GAL | AS SHOWN |
| ULF | ULMUS 'FRONTIER' | FRONTIER HYBRID ELM | 15 GAL | AS SHOWN |

| SHRUBS | BOTANICAL NAME | COMMON NAME | SIZE | SPACING |
|---|---|---|---|---|
| AM | AGAVE AMERICANA 'MEDIOPICTA ALBA' | WHITE STRIPED CENTURY PLANT | 5 GAL | 72" O.C. |
| AV | AGAVE AMERICANA 'VARIEGATA' | VARIEGATED CENTURY PLANT | 5 GAL | 96" O.C |
| AK | AGAVE ATTENUATA 'KARA'S STRIPES' | VARIEGATED FOX TAIL AGAVE | 5 GAL | 36" O.C. |
| AA | AGAVE ATTENUATA 'VARIEGATA' | VARIEGATED FOX TAIL AGAVE | 5 GAL | 48" O.C. |
| AD | AGAVE DESMETIANA 'VARIEGATA' | VARIEGATED SMOOTH AGAVE | 5 GAL | 48" O.C. |
| AS | ALOE STRIATA | CORAL ALOE | 1 GAL | 36" O.C. |
| AU | ARBUTUS UNEDO 'COMPACTA' | DWARF STRAWBERRY TREE | 15 GAL | 72" O.C. |
| AH | ARCTOSTAPHYLOS D. 'HOWARD MCMINN' | VINE HILL MANZANITA | 5 GAL | 72" O.C. |
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| BA | BACCHARIS PILULARIS 'TWIN PEAKS' | DWARF COYOTE BUSH | 1 GAL | 96" O.C. |
| BG | BOUTELOUA GRACILIS 'BLONDE AMBITION' | BLONDE AMBITION BLUE GRAMA | 1 GAL | 24" O.C. |
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| NP | NERIUM OLEANDER 'PETITE SALMON' | PETITE SALMON OLEANDER | 5 GAL | 48" O.C. |
| PE | PITTOSPORUM TEN 'SILVER SHEEN' | SILVER SHEEN KOHUHU | 5 GAL | 60" O.C. |
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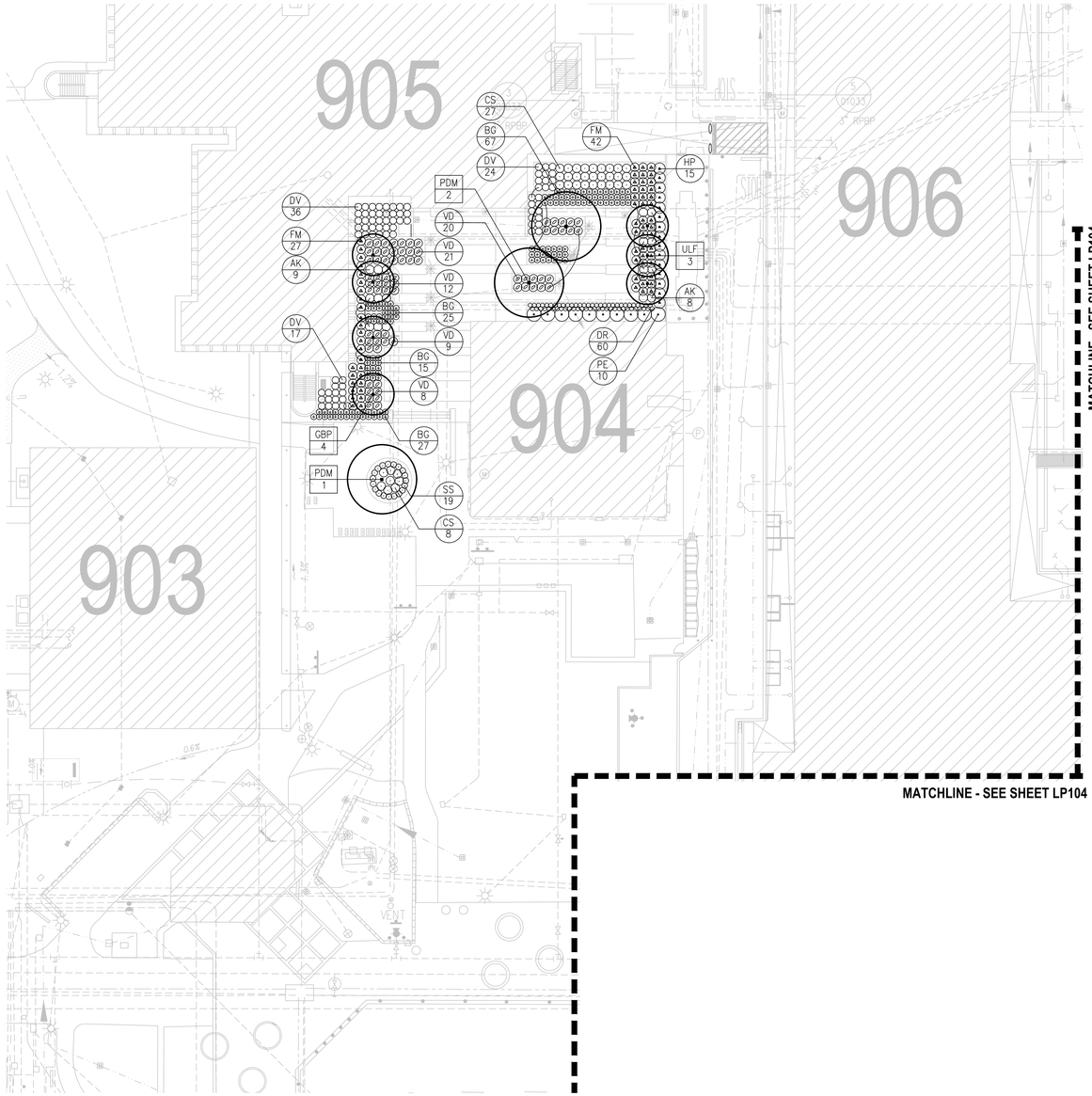


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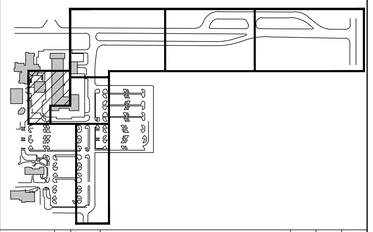
REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

**KEY MAP**



| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
|---|---|---|---|---|---|---|
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |

0 10' 20' 40'
SCALE: 1"=20'-0"

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CADS DRAWING
FILE NAME: X-XXX.dwg

PROJ. NO. E1234
ORDER NO. XX-XXXX

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

| | | | |
|---|---|---|---|
| SECTOR | LANDSCAPE | BLDG. | |
| | PLANTING PLAN | FLOOR | |

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| TOC ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM: | SNL PM: | SNL APPROVED BY:



SHEET LP105

## PLANTING SCHEDULE

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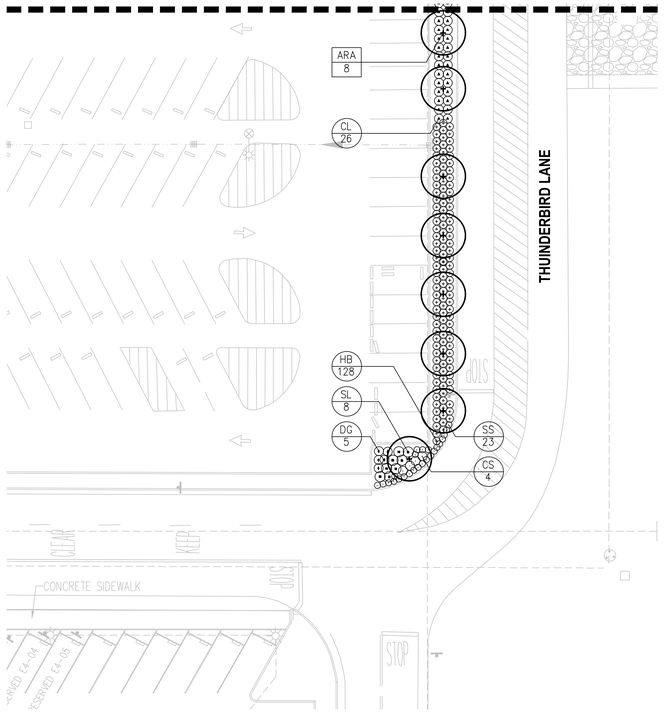
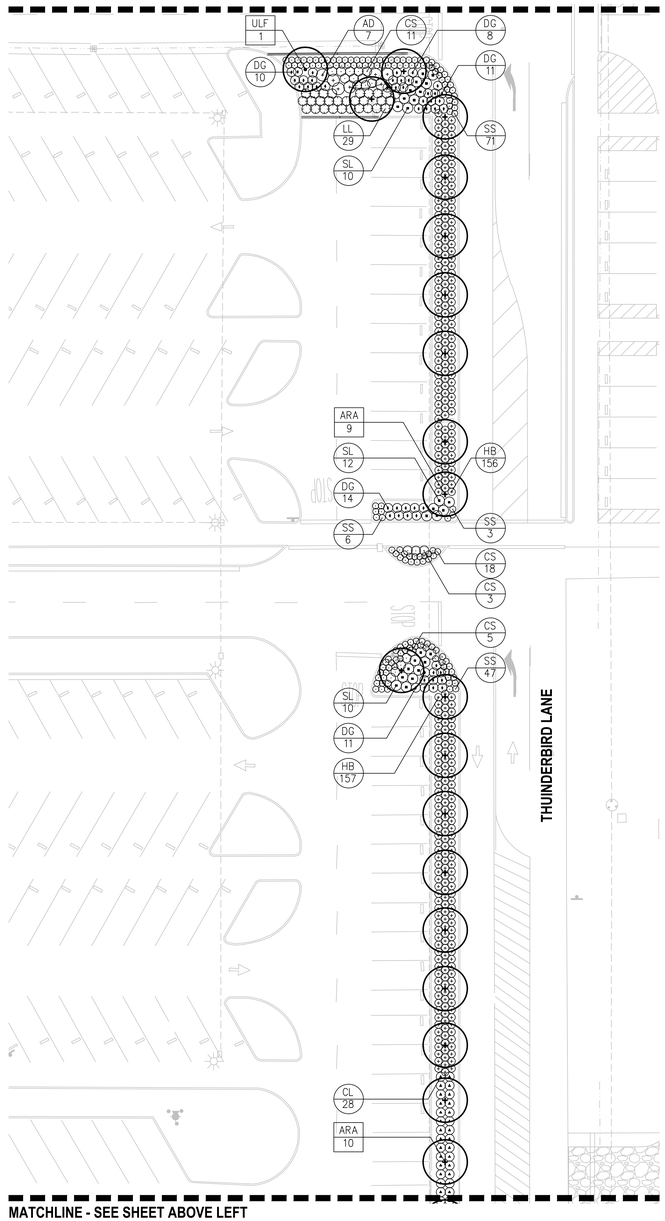
MATCHLINE - SEE BELOW RIGHT




MATCHLINE - SEE SHEET LH104




MATCHLINE - SEE SHEET ABOVE LEFT

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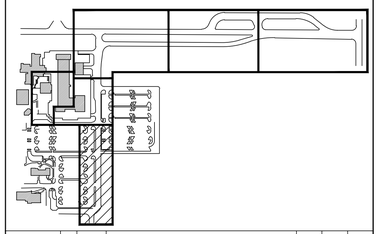
REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
|---|---|---|---|---|---|---|
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |

0 10' 20' 40'
SCALE: 1"=20'-0"

CADS DRAWING
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PROJ. NO. E1234
ORDER NO. XX-XXXX

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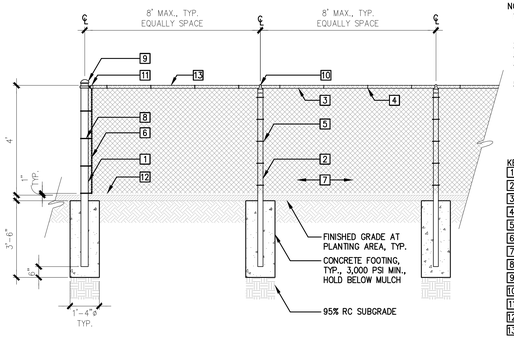
Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR: LANDSCAPE
BLDG.:
FLOOR:
PLANTING PLAN

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
| REQ. ACCT.NO. | XXX |
| DRAWN | MFJC |
| CHECKED | RC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

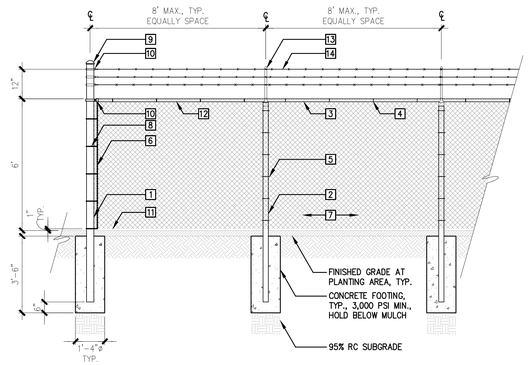
SHEET 21 OF 34
SHEET LP106




NOTES:
1. ALL FENCING MATERIAL INCLUDING BUT LIMITED TO POSTS, RAILS, CAPS AND FABRIC SHALL BE HOT-DIPPED GALVANIZED PER SPECS.
2. ALL FENCING HARDWARE FINISH SHALL MATCH FENCE.
3. CAP ALL ENDS.
4. COMPRESSION TYPE GALV. METAL FITTING. SIZED TO MATCH RAIL, END POSTS, AND LINE POSTS DIMENSIONS.
5. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS AND SUBMIT SHOP DRAWINGS FOR REVIEW AND APPROVAL PRIOR TO FABRICATION.

KEY:
1. END POST, 3-1/2" O.D.
2. LINE POST, 2-7/8" O.D.
3. TOP RAIL, 1-5/8" O.D.
4. TIE WIRES, 9 GA @ 24" O.C. @ RAILS
5. TIE WIRES, 9 GA @ 12" O.C. @ LINE POSTS
6. TENSION BAR @ ALL END POSTS AND CORNER POSTS
7. CHAINLINK FENCE FABRIC, 9 GA 2" MESH
8. TENSION BAND @ 15" O.C.
9. BALL POST CAP. SEE NOTE #2
10. LINE POST WITH LOOP CAP. SEE NOTE #2
11. BRACE BAND WITH RAIL END OR ENDS. SEE NOTE #2
12. BOTTOM SELVAGE KNUCKLE
13. TOP SELVAGE TWIST

## 9 4'H CHAIN LINK FENCE
SCALE: 3/8" = 1'-0"

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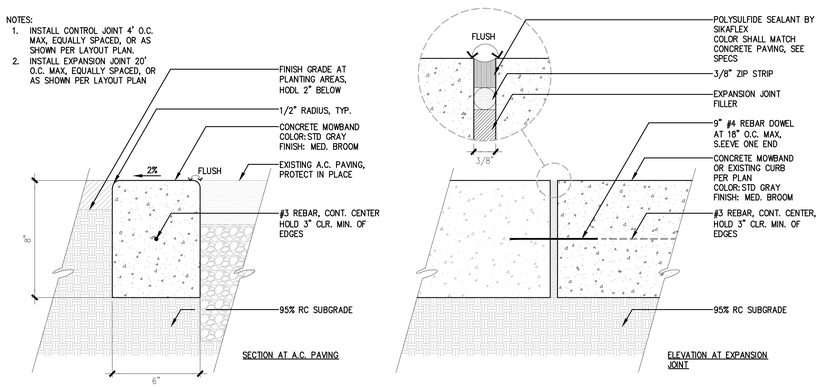
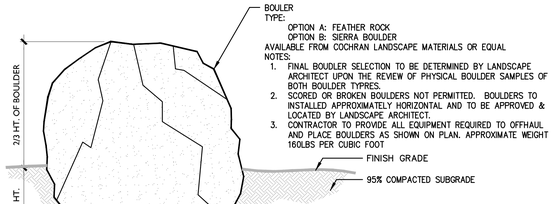
6. TENSION BAR @ ALL END POSTS AND CORNER POSTS
7. CHAINLINK FENCE FABRIC, 9 GA 2" MESH
8. TENSION BAND @ 15" O.C.
9. BALL POST CAP. SEE NOTE #2
10. BRACE BAND WITH RAIL END OR ENDS. SEE NOTE #2
11. BOTTOM SELVAGE KNUCKLE
12. TOP SELVAGE TWIST
13. 45° B/W ARM
14. (3) STRANDS BARBED WIRE, 2 STRAND LINE WIRE W/ 4 PT BARBS

## 8 7'H CHAIN LINK FENCE
SCALE: 3/8" = 1'-0"



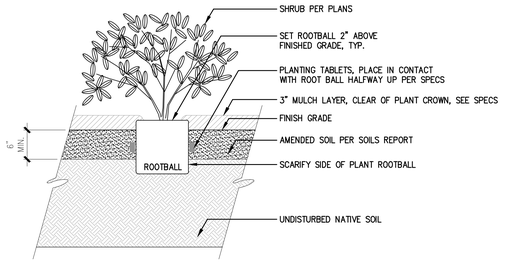

## 7 CONCRETE MOWBAND
SCALE: 3" = 1'-0"



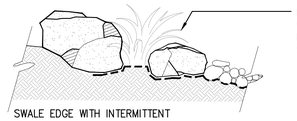

AVAILABLE FROM COCHRAN LANDSCAPE MATERIALS OR EQUAL

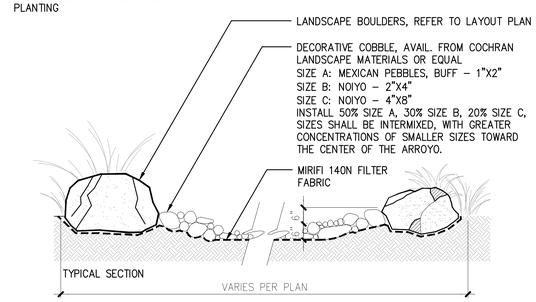
NOTES:
1. FINAL BOULDER SELECTION TO BE DETERMINED BY LANDSCAPE ARCHITECT UPON THE REVIEW OF PHYSICAL BOULDER SAMPLES OF BOTH BOULDER TYPRES.
2. SCORED OR BROKEN BOULDERS NOT PERMITTED. BOULDERS TO INSTALLED APPROXIMATELY HORIZONTAL AND TO BE APPROVED & LOCATED BY LANDSCAPE ARCHITECT.
3. CONTRACTOR TO PROVIDE ALL EQUIPMENT REQUIRED TO OFFHAUL AND PLACE BOULDERS AS SHOWN ON PLAN. APPROXIMATE WEIGHT 160LBS PER CUBIC FOOT

## 6 LANDSCAPE BOULDERS
SCALE: 1/2" = 1'-0"

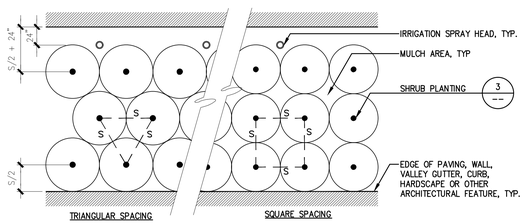



## 3 SHRUB PLANTING
SCALE: 1" = 1'-0"



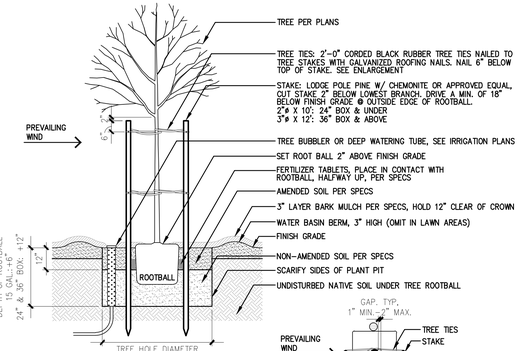

## 5 COBBLE BAND
SCALE: 1" = 1'-0"



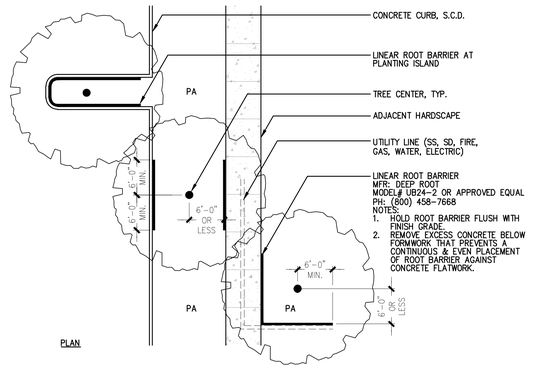

NOTES:
1. S = PLANT SPACING DISTANCE ON CENTER. SEE PLANT QUANTITY CHART FOR USE AS A GUIDE FOR SHRUBS AND GROUNDCOVERS WHEN PLANTS ARE SPACED EQUIDISTANT FROM EACH OTHER.
2. AT ALL SHRUB AND GROUNDCOVER LOCATIONS WHERE SPRAY IRRIGATION IS USED, HOLD PLANTING 24" CLEAR OF CURB LINE IN CONJUNCTION WITH IRRIGATION PER AB 1881.

| PLANT QUANTITY CHART | |
|---|---|
| SPACING | # OF PLANTS/S.F. |
| 12" o.c. | 1.15 |
| 18" o.c. | .512 |
| 24" o.c. | .290 |
| 30" o.c. | .185 |
| 36" o.c. | .128 |
| 42" o.c. | .087 |
| 48" o.c. | .063 |

## 4 SHRUB SPACING
SCALE: 1" = 1'-0"




## 2 TREE PLANTING
SCALE: 3/8" = 1'-0"




## 1 LINEAR ROOT BARRIER
SCALE: 1" = 10'-0"

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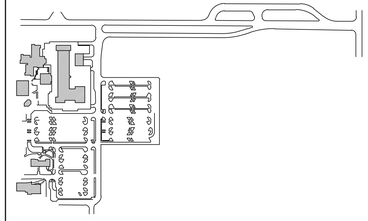
CHRISTOPHER A. GATES
8/30/2024
11/07/2022
RENEWAL
STATE OF CALIFORNIA

KEY MAP



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SECTOR
LANDSCAPE
CONSTRUCTION DETAILS
BLDG.
FLOOR

| | |
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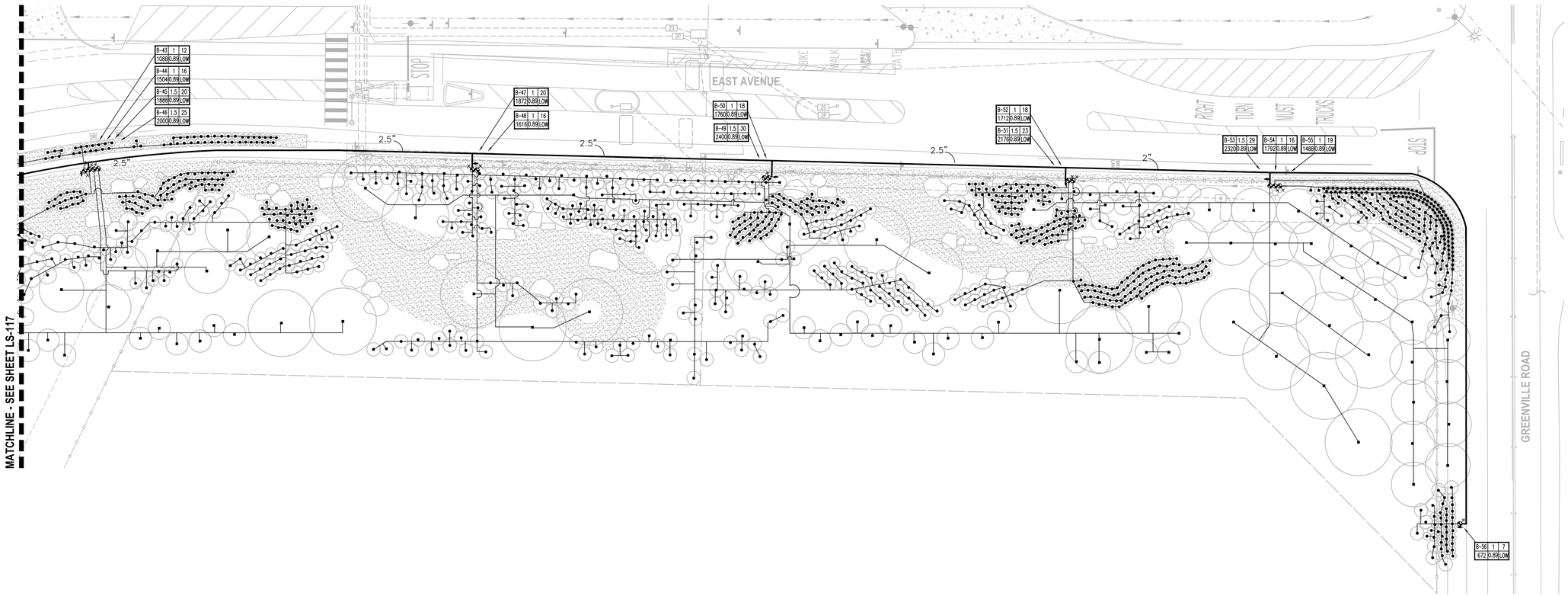
| ACCT.NO. | XXX |
| DRAWN | MF/JC |
| CHECKED | KC |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 22 OF 34
SHEET LP501




## NOTES:

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|---|---|---|
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| 1.25" | 13–20 GPM | 71–117 |
| 1.5" | 21–26 GPM | 118–150 |


*Irrigation Consultant:*
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8/20/2024
11/07/2022
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KEY MAP

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SECTOR
BLDG.
FLOOR

LANDSCAPE
IRRIGATION PLAN

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| CONTRACT NO.(A-E) | XXX |
| ACCT.NO. | XXX |
| DRAWN | JB,DM |
| CHECKED | DM |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
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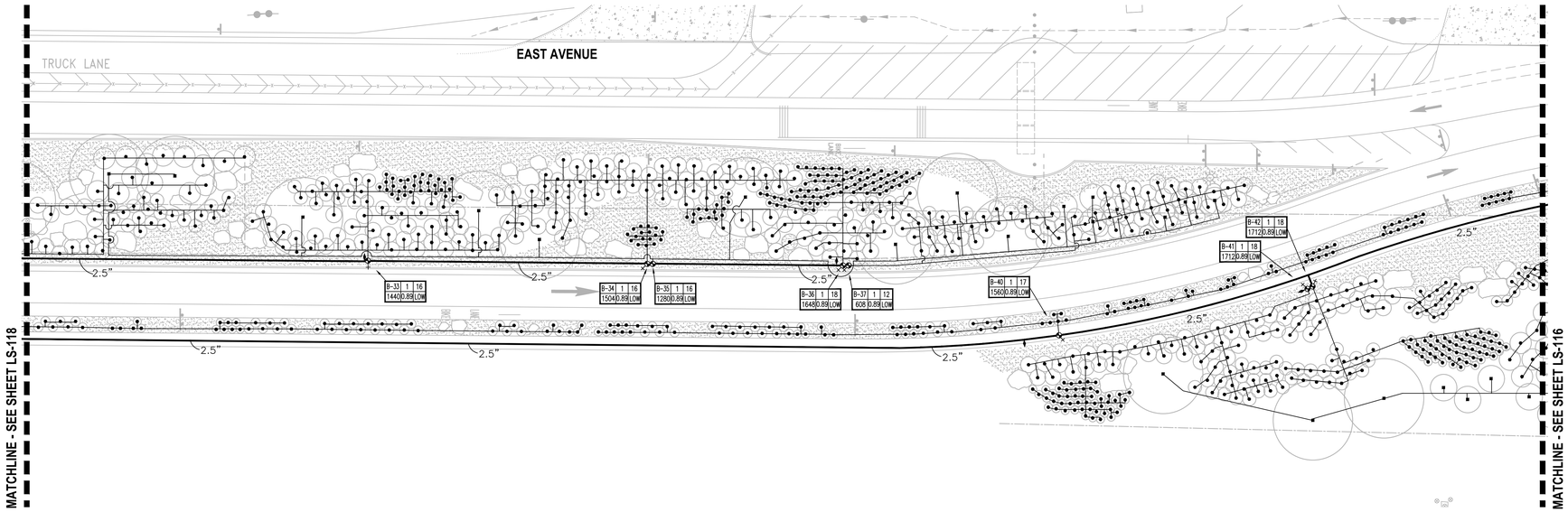
SHEET 23 OF 34
SHEET LS-116

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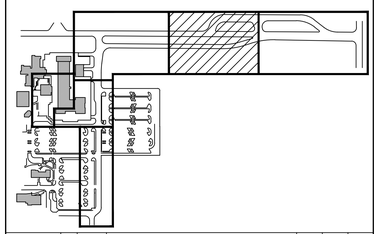
REGISTERED LANDSCAPE ARCHITECT
CARL A. GATES
8/30/2024
11/07/2022
LA
STATE OF CALIFORNIA

KEY MAP



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BLDG.
FLOOR

| | |
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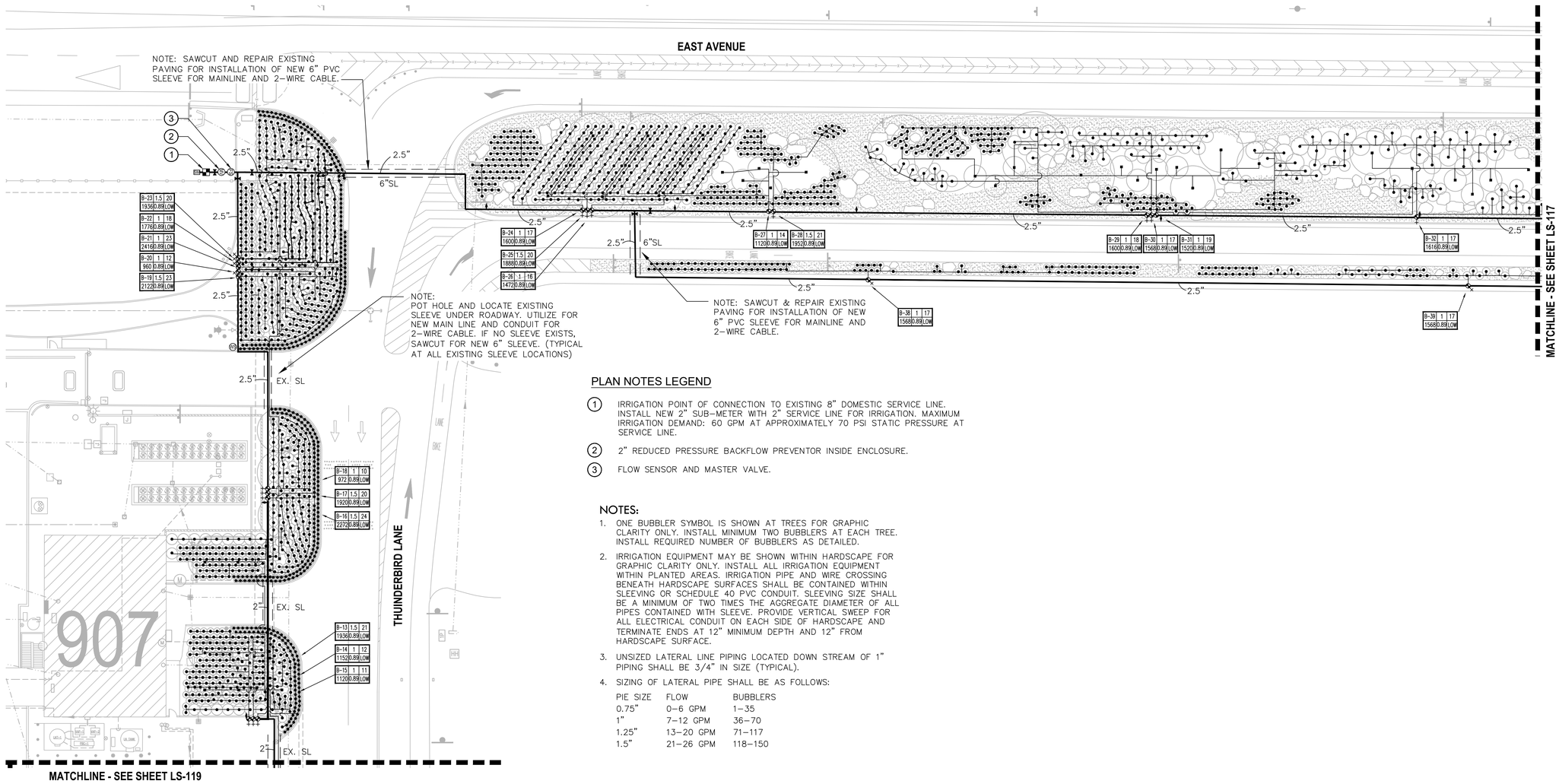
SHEET LS-117




## PLAN NOTES LEGEND

1. IRRIGATION POINT OF CONNECTION TO EXISTING 8" DOMESTIC SERVICE LINE. INSTALL NEW 2" SUB-METER WITH 2" SERVICE LINE FOR IRRIGATION. MAXIMUM IRRIGATION DEMAND: 60 GPM AT APPROXIMATELY 70 PSI STATIC PRESSURE AT SERVICE LINE.
2. 2" REDUCED PRESSURE BACKFLOW PREVENTOR INSIDE ENCLOSURE.
3. FLOW SENSOR AND MASTER VALVE.

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8/20/2024
11/07/2022

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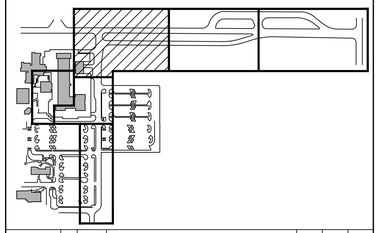

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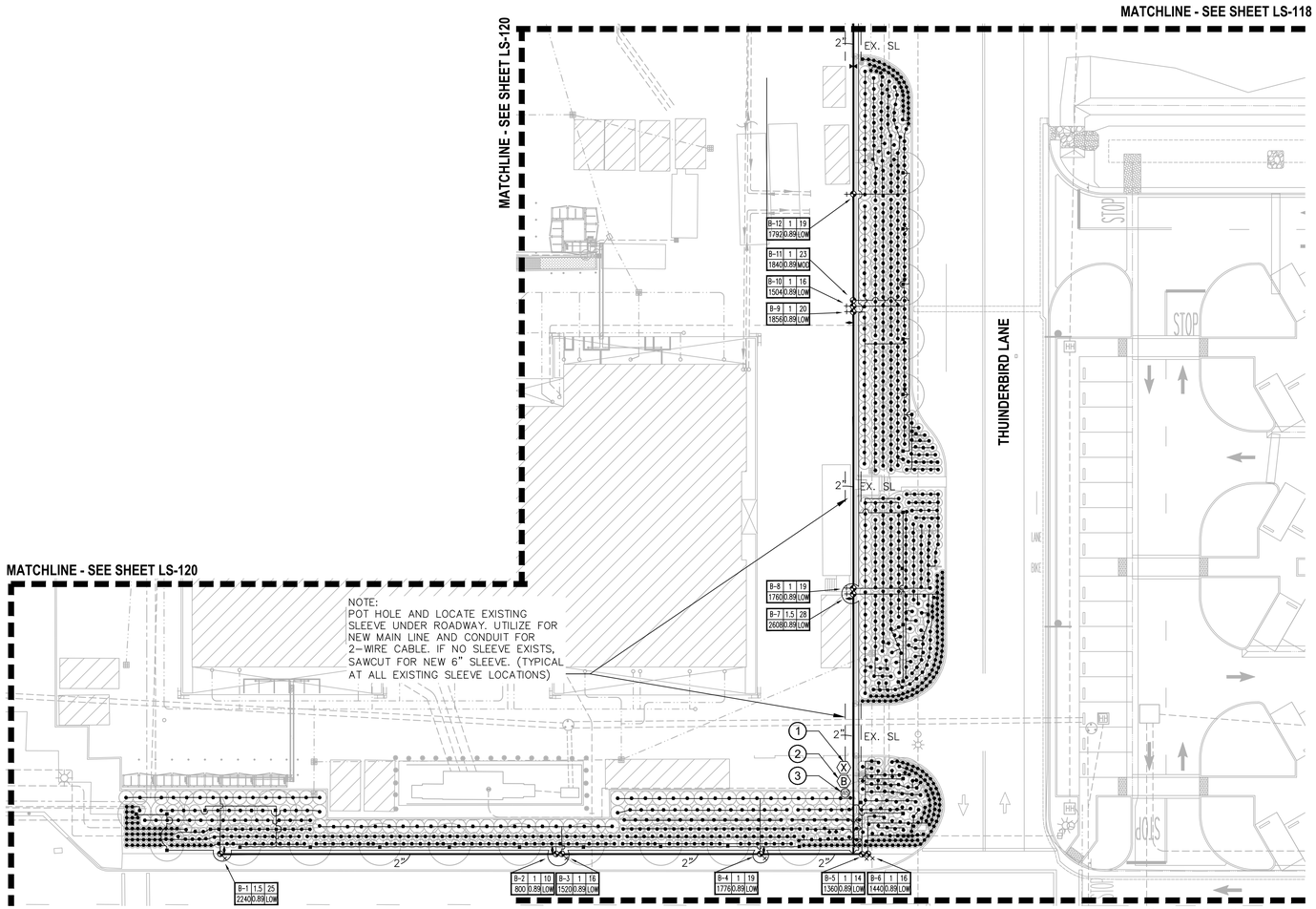
| DATE | 11/07/22 |

SECTOR: LANDSCAPE
BLDG.
FLOOR
IRRIGATION PLAN

A/E FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 25 OF 34 | SHEET LS-118




## PLAN NOTES LEGEND

(1) EXISTING WALL MOUNT IRRIGATION CONTROLLER TO BE REMOVED. EXISTING 120 VAC ELECTRICAL SERVICE TO REMAIN AND SHALL BE RE-USED FOR NEW CONTROLLER.

(2) IRRIGATION CONTROLLER "C" WALL MOUNT AT THIS LOCATION AS DETAILED AND AS DIRECTED BY LANDSCAPE ARCHITECT. CONNECT TO EXISTING 120 VOLT A.C. ELECTRICAL SERVICE INSTALLED AT THIS LOCATION.

(3) HUNTER WIRELESS WEATHER SENSOR AND RAIN SENSOR. MOUNT TO TOP OF WALL PER MANUFACTURERS INSTRUCTIONS. INSTALL SENSOR OPEN TO THE SKY. COORDINATE AND CONFIRM EXACT LOCATION WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

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REGISTERED LANDSCAPE ARCHITECT
CHRIS A. GATES
8/30/2024
11/07/2022
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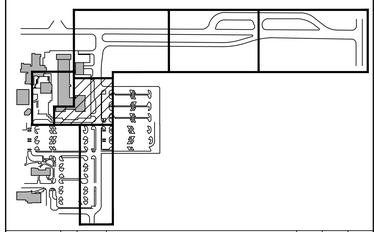
KEY MAP



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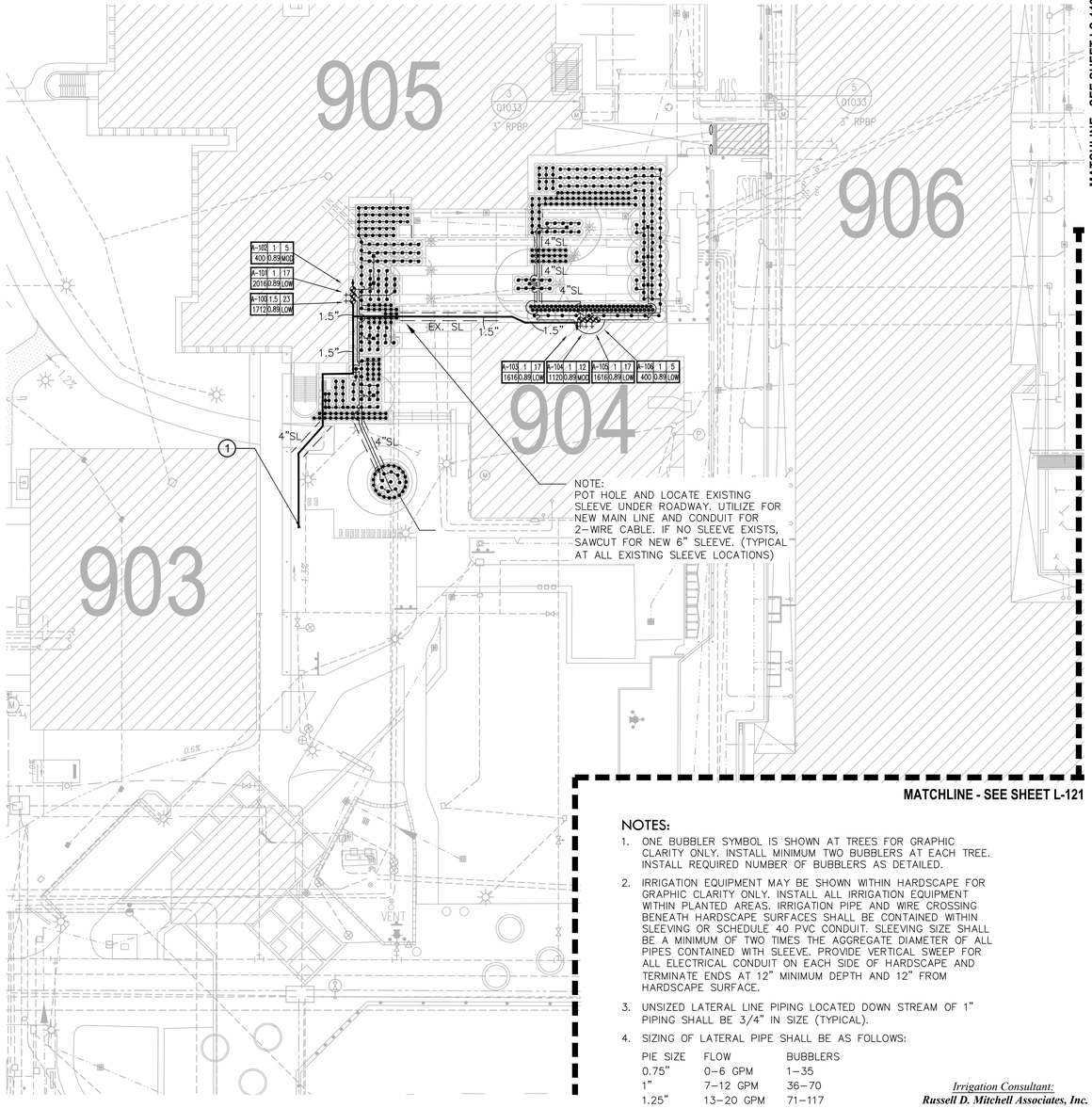
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

SECTOR
LANDSCAPE
IRRIGATION PLAN
BLDG.
FLOOR

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 26 OF 34
SHEET LS-119




## PLAN NOTES LEGEND

(1) IRRIGATION POINT OF CONNECTION TO EXISTING 1.5" MAINLINE AND 2-WIRE CABLE FROM CONTROLLER STUBBED OUT TO THIS LOCATION FROM PREVIOUS PHASE OF CONSTRUCTION. MAXIMUM IRRIGATION DEMAND: 20 GPM AT APPROXIMATELY 50 PSI STATIC PRESSURE AT MAINLINE.

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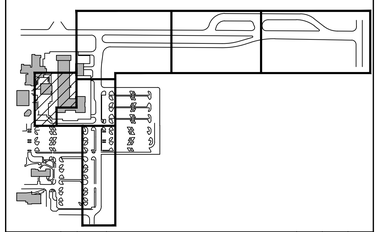
1420 N. MAIN ST. STE 260, WALNUT CREEK, CA 94596
T. 925.736.8176 www.gateso.com

REGISTERED LANDSCAPE ARCHITECT
CHRISTOPHER A. GATES
8/20/2024
11/07/2022
STATE OF CALIFORNIA

KEY MAP



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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR: LANDSCAPE
BLDG.:
FLOOR:
IRRIGATION PLAN

| | |
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| CONTRACT NO./A-E | XXX |
| SOC ACCT.NO. | XXX |
| DRAWN | JB,DM |
| CHECKED | DM |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
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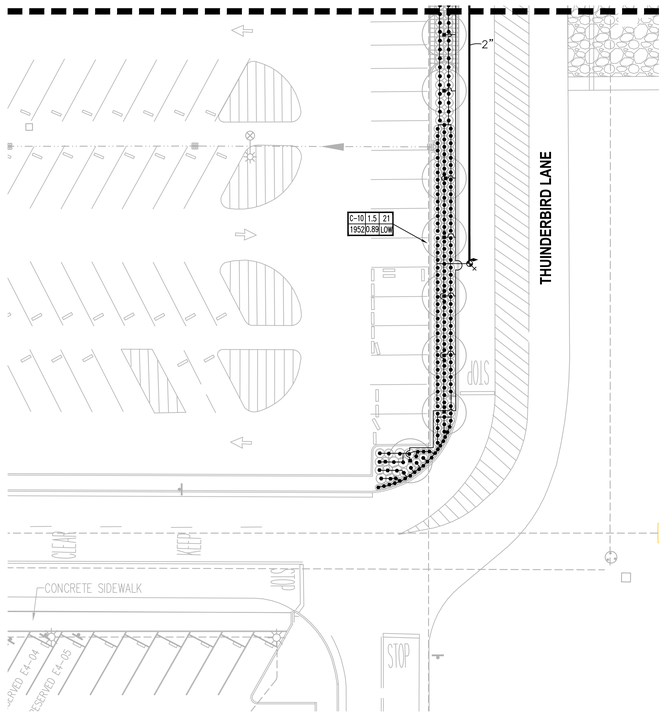
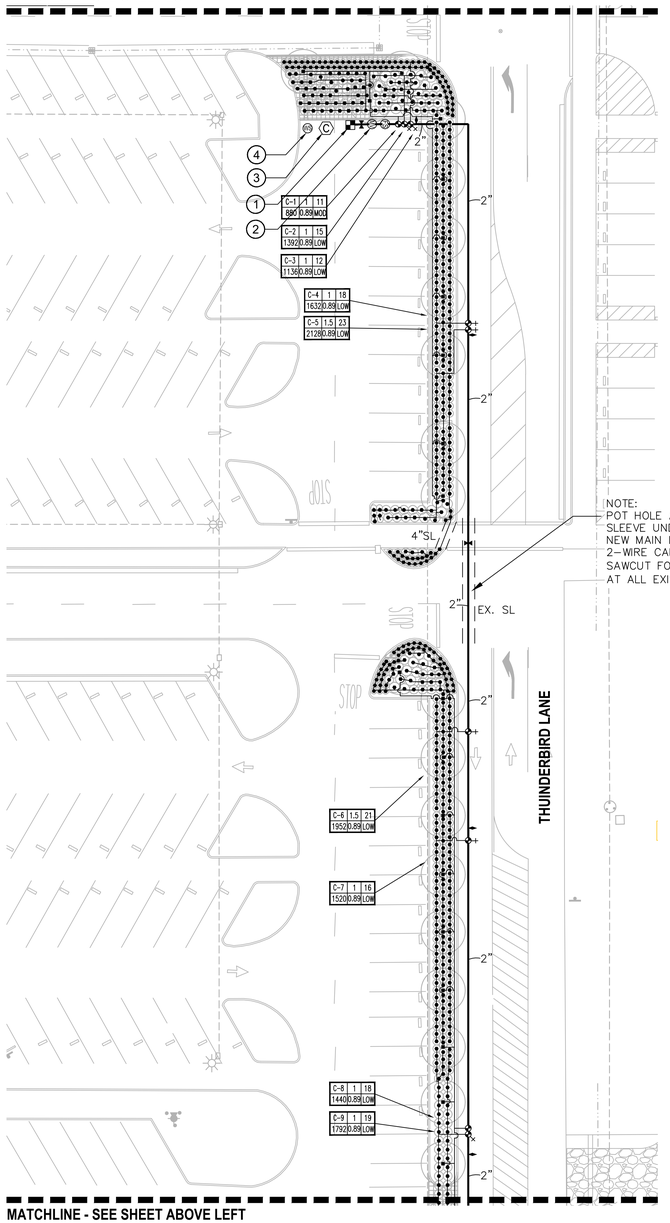
SHEET 27 OF 34
SHEET LS-120

MATCHLINE - SEE BELOW RIGHT




MATCHLINE - SEE SHEET LS-119




MATCHLINE - SEE SHEET ABOVE LEFT

## PLAN NOTES LEGEND

1. IRRIGATION POINT OF CONNECTION TO EXISTING 82" BACKFLOW PREVENTOR FOR IRRIGATION. MAXIMUM IRRIGATION DEMAND: 60 GPM AT APPROXIMATELY 60 PSI STATIC PRESSURE AT DOWNSTREAM SIDE OF BACKFLOW PREVENTOR.
2. INSTALL NEW FLOW SENSOR AND MASTER VALVE.
3. IRRIGATION CONTROLLER "C". MOUNT ON PEDESTAL AT THIS LOCATION AS DETAILED AND AS DIRECTED BY ARCHITECT. CONNECT TO 120 VOLT A.C. ELECTRICAL SERVICE INSTALLED AT THIS LOCATION UNDER ELECTRICAL CONTRACT. IRRIGATION CONTRACTOR SHALL COORDINATE LOCATION OF ELECTRICAL SERVICE PRIOR TO CONSTRUCTION.
4. HUNTER WIRELESS WEATHER SENSOR AND RAIN SENSOR. MOUNT AS DETAILED. INSTALL SENSOR OPEN TO THE SKY. COORDINATE AND CONFIRM EXACT LOCATION WITH LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.

## NOTES:

1. ONE BUBBLER SYMBOL IS SHOWN AT TREES FOR GRAPHIC CLARITY ONLY. INSTALL MINIMUM TWO BUBBLERS AT EACH TREE. INSTALL REQUIRED NUMBER OF BUBBLERS AS DETAILED.
2. IRRIGATION EQUIPMENT MAY BE SHOWN WITHIN HARDSCAPE FOR GRAPHIC CLARITY ONLY. INSTALL ALL IRRIGATION EQUIPMENT WITHIN PLANTED AREAS. IRRIGATION PIPE AND WIRE CROSSING BENEATH HARDSCAPE SURFACES SHALL BE CONTAINED WITHIN SLEEVING OR SCHEDULE 40 PVC CONDUIT. SLEEVING SIZE SHALL BE A MINIMUM OF TWO TIMES THE AGGREGATE DIAMETER OF ALL PIPES CONTAINED WITH SLEEVE. PROVIDE VERTICAL SWEEP FOR ALL ELECTRICAL CONDUIT ON EACH SIDE OF HARDSCAPE AND TERMINATE ENDS AT 12" MINIMUM DEPTH AND 12" FROM HARDSCAPE SURFACE.
3. UNSIZED LATERAL LINE PIPING LOCATED DOWN STREAM OF 1" PIPING SHALL BE 3/4" IN SIZE (TYPICAL).
4. SIZING OF LATERAL PIPE SHALL BE AS FOLLOWS:

| PIE SIZE | FLOW | BUBBLERS |
|---|---|---|
| 0.75" | 0-6 GPM | 1-35 |
| 1" | 7-12 GPM | 36-70 |
| 1.25" | 13-20 GPM | 71-117 |
| 1.5" | 21-26 GPM | 118-150 |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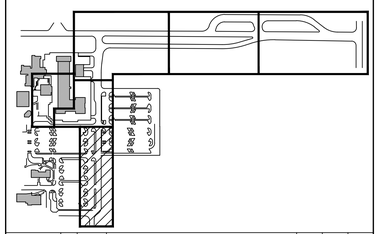

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0 10' 20' 40'
SCALE: 1"=20'-0"


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| SECTOR | LANDSCAPE | BLDG. |
| | IRRIGATION PLAN | FLOOR |

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| CONTRACT NO.(A-E) | XXX |
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SHEET LS-121

## IRRIGATION NOTES

1. THESE IRRIGATION DRAWINGS ARE DIAGRAMMATIC AND INDICATIVE OF THE WORK TO BE INSTALLED. ALL PIPING, VALVES, AND OTHER IRRIGATION COMPONENTS MAY BE SHOWN WITHIN PAVED AREAS FOR GRAPHIC CLARITY ONLY AND ARE TO BE INSTALLED WITHIN PLANTING AREAS. DUE TO THE SCALE OF THE DRAWINGS, IT IS NOT POSSIBLE TO INDICATE ALL OFFSETS, FITTINGS, SLEEVES, CONDUIT, AND OTHER ITEMS WHICH MAY BE REQUIRED. INVESTIGATE THE STRUCTURAL AND FINISHED CONDITION AFFECTING THE CONTRACT WORK INCLUDING OBSTRUCTIONS, GRADE DIFFERENCES OR AREA DIMENSIONAL DIFFERENCES. IN THE EVENT OF FIELD DISCREPANCY WITH CONTRACT DOCUMENTS, PLAN THE INSTALLATION WORK ACCORDINGLY BY NOTIFICATION AND APPROVAL OF THE OWNER'S AUTHORIZED REPRESENTATIVE AND ACCORDING TO THE CONTRACT SPECIFICATIONS. NOTIFY AND COORDINATE IRRIGATION CONTRACT WORK WITH APPLICABLE CONTRACTORS FOR THE LOCATION AND INSTALLATION OF PIPE, CONDUIT OR SLEEVES THROUGH OR UNDER WALLS, ROADWAYS, PAVING AND STRUCTURES BEFORE CONSTRUCTION. IN THE EVENT THESE NOTIFICATIONS ARE NOT PERFORMED, THE CONTRACTOR ASSUMES FULL RESPONSIBILITY FOR REQUIRED REVISIONS.

2. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE CODES, STANDARDS, AND REGULATIONS. ALL WORK AND MATERIALS SHALL BE IN FULL ACCORDANCE WITH THE LATEST RULES AND REGULATIONS OF THE NATIONAL ELECTRIC CODE; THE UNIFORM PLUMBING CODE, PUBLISHED BY THE WESTERN PLUMBING OFFICIALS ASSOCIATION; AND OTHER STATE OR LOCAL LAWS OR REGULATIONS. NOTHING IN THESE DRAWINGS IS TO BE CONSTRUED TO PERMIT WORK NOT CONFORMING TO THESE CODES OR REGULATIONS. THE CONTRACTOR SHALL FURNISH WITHOUT ANY EXTRA CHARGE, ANY ADDITIONAL MATERIAL AND LABOR WHEN REQUIRED BY THE COMPLIANCE WITH THESE CODES AND REGULATIONS.

3. THE CONTRACTOR SHALL COORDINATE INSTALLATION OF IRRIGATION SYSTEM WITH LAYOUT AND INSTALLATION OF THE PLANT MATERIALS TO INSURE THAT THERE WILL BE COMPLETE AND UNIFORM IRRIGATION COVERAGE OF PLANTING IN ACCORDANCE WITH THESE DRAWINGS, AND CONTRACT DOCUMENTS. THE IRRIGATION LAYOUT SHALL BE CHECKED BY THE CONTRACTOR AND OWNER'S AUTHORIZED REPRESENTATIVE PRIOR TO CONSTRUCTION TO DETERMINE IF ANY CHANGES, DELETIONS, OR ADDITIONS ARE REQUIRED. IRRIGATION SYSTEM SHALL BE INSTALLED AND TESTED PRIOR TO INSTALLATION OF PLANT MATERIAL.

4. THE INTENT OF THIS IRRIGATION SYSTEM IS TO PROVIDE THE MINIMUM AMOUNT OF WATER REQUIRED TO SUSTAIN GOOD PLANT HEALTH.

5. IT IS THE RESPONSIBILITY OF THE MAINTENANCE CONTRACTOR AND/OR OWNER TO PROGRAM THE IRRIGATION CONTROLLER(S) TO PROVIDE THE MINIMUM AMOUNT OF WATER NEEDED TO SUSTAIN GOOD PLANT HEALTH. THIS INCLUDES MAKING ADJUSTMENTS TO THE PROGRAM FOR SEASONAL WEATHER CHANGES, PLANT MATERIAL, WATER REQUIREMENTS, MOUNDS, SLOPES, SUN, SHADE AND WIND EXPOSURE.

6. IT IS THE RESPONSIBILITY OF A LICENSED ELECTRICAL CONTRACTOR TO PROVIDE 120 VOLT A.C. (2.5 AMP DEMAND PER CONTROLLER) ELECTRICAL SERVICE TO THE CONTROLLER LOCATION(S). IT IS THE RESPONSIBILITY OF THE IRRIGATION CONTRACTOR TO COORDINATE THE ELECTRICAL SERVICE STUB-OUT TO THE CONTROLLER(S). PROVIDE PROPER GROUNDING PER CONTROLLER MANUFACTURER'S INSTRUCTIONS AND IN ACCORDANCE WITH LOCAL CODES.

7. PROVIDE EACH CONTROLLER WITH ITS OWN GROUND ROD. SEPARATE THE GROUND RODS BY A MINIMUM OF EIGHT FEET. THE GROUND ROD SHALL BE AN EIGHT FOOT LONG BY 5/8" DIAMETER U.L. APPROVED COPPER CLAD ROD. INSTALL NO MORE THAN 6" OF THE GROUND ROD ABOVE FINISH GRADE. CONNECT #6 GAUGE WIRE WITH A U.L. APPROVED GROUND ROD CLAMP TO ROD AND BACK TO GROUND SCREW AT BASE OF CONTROLLER WITH APPROPRIATE CONNECTOR. MAKE THIS WIRE AS SHORT AS POSSIBLE, AVOIDING KINKS OR BENDING.

8. INSTALL NEW BATTERIES IN THE IRRIGATION CONTROLLER(S) TO RETAIN PROGRAM IN MEMORY DURING TEMPORARY POWER FAILURES. USE QUANTITY, TYPE AND SIZE REQUIRED AS PER CONTROLLER MANUFACTURER'S INSTRUCTIONS.

9. SCHEDULE A MEETING WHICH INCLUDES REPRESENTATIVES OF THE IRRIGATION CONTROLLER MANUFACTURER, THE MAINTENANCE CONTRACTOR, THE OWNER AND THE IRRIGATION CONTRACTOR AT THE SITE FOR INSTRUCTION ON THE PROPER PROGRAMMING AND OPERATION OF THE IRRIGATION CONTROLLER.

10. INSTALL 3" DETECTABLE TAPE ABOVE ALL PRESSURIZED MAIN LINES AS DETAILED. USE CHRISTY MODEL #TA-DT-3-BIRR FOR POTABLE IRRIGATION SYSTEMS IRRIGATION WATER SYSTEMS.

11. INSTALL 2-WIRE CABLE WITHIN 1.25" CONDUIT WITH LONG SWEEPS IN AND OUT OF EACH VALVE BOX. SEAL ALL CONDUIT OPENINGS WITH WATERPROOF FOAM.

12. INSTALL A 14"X19" GREY ELECTRICAL PULL BOX EVERY 200' AND AT EVERY CHANGE IN DIRECTION. ONLY SPLICE TWO WIRE CABLE AT THREE WAY WIRE CONNECTIONS.

13. DECODER GROUNDING SHALL BE PROVIDED EVERY 500 FEET OR EVERY 8 DECODERS, WHICHEVER IS SMALLER, AT THE CONTROLLER AND AT THE LAST DECODER OR AT THE END OF THE 2 WIRE PATH., (ANY SPUR OVER 50 FEET AND AT THE ENDS OF COMMUNICATION WIRE PATHS) [BASELINE]. GROUND WITH A 5/8" X 8' COPPER CLAD GROUNDING ROD. #6 COPPER WIRE TO SURGE DEVICE/DECODER. INCLUDE A SURGE ARRESTOR AT EACH GROUNDING LOCATION. A SPLIT BOLT CONNECTION TO BE USED TO CONNECT THE SURGE DEVICE TO THE GROUND WIRE WITH A DBR/Y-6 WATERPROOF CONNECTOR.

14. SPLICING OF JACKETED 2-WIRE IS PERMITTED IN VALVE BOXES ONLY. LEAVE A 24" LONG COIL OF WIRE AT EACH SPLICE AND A 24" LONG EXPANSION LOOP IN ALL PULL BOXES.

15. INSTALL BLACK PLASTIC VALVE BOXES WITH BOLT DOWN, NON HINGED COVER MARKED "IRRIGATION CONTROL VALVE". BOX BODY SHALL HAVE KNOCK OUTS. ACCEPTABLE VALVE BOX MANUFACTURER'S INCLUDE NDS, CARSON OR APPROVED EQUAL.

16. INSTALL REMOTE CONTROL VALVE BOXES 12" FROM WALK, CURB, BUILDING OR LANDSCAPE FEATURE. AT MULTIPLE VALVE BOX GROUPS, INSTALL EACH BOX AN EQUAL DISTANCE FROM THE WALK, CURB, BUILDING OR LANDSCAPE FEATURE AND PROVIDE 12" BETWEEN BOX TOPS. ALIGN THE SHORT SIDE OF RECTANGULAR VALVE BOXES PARALLEL TO WALK, CURB, BUILDING OR LANDSCAPE FEATURE.

17. VALVE LOCATIONS SHOWN ARE DIAGRAMMATIC. INSTALL IN GROUND COVER/SHRUB AREAS (AVOID LAWN AREAS WHERE POSSIBLE).

18. THE CONTRACTOR SHALL LABEL CONTROL LINE WIRE AT EACH REMOTE CONTROL VALVE WITH A 2 1/4" X 2 3/4" POLYURETHANE I.D. TAG, INDICATING IDENTIFICATION NUMBER OF VALVE (CONTROLLER AND STATION NUMBER). ATTACH LABEL TO CONTROL WIRE. THE CONTRACTOR SHALL PERMANENTLY STAMP ALL VALVE BOX LIDS WITH APPROPRIATE IDENTIFICATION AS NOTED IN CONSTRUCTION DETAILS.

19. FLUSH AND ADJUST IRRIGATION OUTLETS AND NOZZLES FOR OPTIMUM PERFORMANCE AND TO PREVENT OVER SPRAY ONTO WALKS, ROADWAYS, AND/OR BUILDINGS. SELECT THE BEST DEGREE OF THE ARC AND RADIUS TO FIT THE EXISTING SITE CONDITIONS AND THROTTLE THE FLOW CONTROL AT EACH VALVE TO OBTAIN THE OPTIMUM OPERATING PRESSURE FOR EACH CONTROL ZONE.

20. LOCATE BUBBLERS ON UPHILL SIDE OF PLANT OR TREE.

21. INSTALL A HUNTER HCV SERIES, KBI CV SERIES, OR APPROVED EQUAL SPRING LOADED CHECK VALVE IN SPRINKLER RISER ASSEMBLIES WHERE LOW OUTLET DRAINAGE WILL CAUSE EROSION AND/OR EXCESS WATER.

22. WHERE IT IS NECESSARY TO EXCAVATE ADJACENT TO EXISTING TREES, USE CAUTION TO AVOID INJURY TO TREES AND TREE ROOTS. EXCAVATE BY HAND IN AREAS WHERE TWO (2) INCH AND LARGER ROOTS OCCUR. BACK FILL TRENCHES ADJACENT TO TREE WITHIN TWENTY-FOUR (24) HOURS. WHERE THIS IS NOT POSSIBLE, SHADE THE SIDE OF THE TRENCH ADJACENT TO THE TREE WITH WET BURLAP OR CANVAS.

23. NOTIFY LOCAL JURISDICTIONS FOR INSPECTION AND TESTING OF INSTALLED BACKFLOW PREVENTION DEVICE.

24. THE IRRIGATION SYSTEM DESIGN IS BASED ON THE MINIMUM OPERATING PRESSURE SHOWN ON THE IRRIGATION DRAWINGS. VERIFY WATER PRESSURE PRIOR TO CONSTRUCTION. REPORT ANY DIFFERENCE BETWEEN THE WATER PRESSURE INDICATED ON THE DRAWINGS AND THE ACTUAL PRESSURE READING AT THE IRRIGATION POINT OF CONNECTION TO THE OWNER'S AUTHORIZED REPRESENTATIVE.

25. IRRIGATION DEMAND: REFER TO PLANS.

26. THE EXISTING MAIN LINE SHOWN ON THE DRAWINGS IS DIAGRAMMATIC. VERIFY AND LOCATE EXISTING MAIN LINE IN FIELD. REPORT TO ARCHITECT IN WRITING ANY DEVIATION OF EXISTING MAIN LINE LOCATION FROM THAT SHOWN ON THE DRAWINGS.

27. AT POINTS OF CONNECTION BETWEEN EXISTING SOLVENT WELD MAIN LINE AND A NEW MAIN LINE BRANCH, USE THE FOLLOWING PROCEDURE:

28. PIPE SIZING SHOWN ON THE DRAWINGS IS TYPICAL. AS CHANGES IN LAYOUT OCCUR DURING STAKING AND CONSTRUCTION THE SIZE MAY NEED TO BE ADJUSTED ACCORDINGLY.

29. PIPE THREAD SEALANT COMPOUND SHALL BE RECTOR SEAL #5.

30. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR MINOR CHANGES IN THE IRRIGATION LAYOUT DUE TO OBSTRUCTIONS NOT SHOWN ON THE IRRIGATION DRAWINGS SUCH AS LIGHTS, FIRE HYDRANTS, SIGNS, ELECTRICAL ENCLOSURES, ETC.

31. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR CHANGES IN THE IRRIGATION LAYOUT AND VALVE ZONING DUE TO VARIATIONS IN THE EXISTING SITE CONDITIONS SUCH AS EXPOSURE FROM BUILDINGS, TRELLISES, TREES, ETC., AS WELL AS SLOPE AND SOIL CONDITIONS. THE CONTRACTOR SHALL NOTIFY THE LANDSCAPE ARCHITECT AND IRRIGATION CONSULTANT OF THE PROPOSED CHANGES PRIOR TO INSTALLATION FOR APPROVAL.

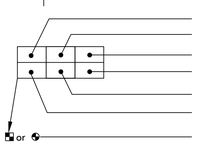
32. THE LANDSCAPE CONTRACTOR IS RESPONSIBLE FOR ADJUSTING THE IRRIGATION SYSTEM DESIGN IF THE PLANTING DESIGN CHANGES FROM THE ORIGINAL PLAN AND NEEDS TO ADAPT TO THE NEW PLANTING DESIGN. THE LANDSCAPE CONTRACTOR NEEDS TO NOTIFY THE LANDSCAPE ARCHITECT AND IRRIGATION CONSULTANT OF PROPOSED CHANGES PRIOR TO INSTALLATION FOR APPROVAL.

33. WHEN WORK OF THIS SECTION HAS BEEN COMPLETED AND SUCH OTHER TIMES AS MAY BE DIRECTED, REMOVE ALL TRASH, DEBRIS, SURPLUS MATERIALS AND EQUIPMENT FROM SITE.

34. CONTRACTOR SHALL BE RESPONSIBLE FOR SUPPLEMENTAL HAND WATERING OF ALL PLANT MATERIAL WITHIN DRIPLINE AREAS UNTIL THE PLANTS ARE SUFFICIENTLY ESTABLISHED.

## IRRIGATION LEGEND

| SYMBOL | MODEL NUMBER | DESCRIPTION | NOZZLE GPM | OPERATING PSI | OPERATING RADIUS (FEET) |
|---|---|---|---|---|---|
| ● | PCT-10 | RAIN BIRD BUBBLER (SHRUB) | 0.17 | 30 | TRICKLE |
| ■ | 1401 SERIES | RAIN BIRD BUBBLER (TREE) MIN. 2 PER TREE. REFER TO BUBBLER DETAIL FOR QUANTITY OF BUBBLERS PER TREE SIZE. | 0.25 | 30 | TRICKLE |
| MV | IBV-200 | HUNTER MASTER VALVE-2" (NORMALLY CLOSED) | | | |
| FS | FSI-T15-001 | CST 1.5" FLOW METER (2-108 GPM) | | | |
| C | A2C-75-225D-PED-SS/ A2C-D75/A2C-LTE /ICD-HP/ROAM-XL KIT | HUNTER ACC2 (75-225) STATION 2-WIRE CONTROLLER IN A STAINLESS STEEL PEDESTAL ENCLOSURE; INCLUDES 75 STATION EXPANSION MODULE, CELLULAR COMMUNICATION, FLOW SCHEDULING AND MONITORING TECHNOLOGY, AND BUILT-IN SOLAR SYNC LOGIC. WITH WIRELESS PROGRAMMER COMPATIBLE. INCLUDE HUNTER HAND HELD TRANSMITTER AND RECEIVER SITE REMOTE KIT. | | | |
| B | A2C-75-225D-SS/ A2C-D75/A2C-LTE /ICD-HP/ROAM-XL KIT | HUNTER ACC2 (75-225) STATION 2-WIRE CONTROLLER IN A STAINLESS STEEL WALL MOUNT ENCLOSURE; INCLUDES 75 STATION EXPANSION MODULE, CELLULAR COMMUNICATION, FLOW SCHEDULING AND MONITORING TECHNOLOGY, AND BUILT-IN SOLAR SYNC LOGIC. WITH WIRELESS PROGRAMMER COMPATIBLE. INCLUDE HUNTER HAND HELD TRANSMITTER AND RECEIVER SITE REMOTE KIT. | | | |
| WS | WSS-SEN | HUNTER WIRELESS SOLAR SYNC SENSOR AND RECIEVER | | | |
| — | ICD-100 | HUNTER SINGLE STATION DECODER (1 PER VALVE) | | | |
| — | ICD-200 | HUNTER TWO STATION DECODER (USE WHEN MORE THAN 1 OR MORE VALVE IS CLUSTERED TOGETHER) | | | |
| — | ICD-400 | HUNTER 4 STATION DECODER (USE WHEN 4 OR MORE VALVE IS CLUSTERED TOGETHER) | | | |
| — | DUAL-S | HUNTER SURGE ARRESTOR (1 EVERY 1000 FEET ALONG MAIN) REFER TO DETAILS FOR INSTALLATION INSTRUCTIONS. | | | |
| — | ICD-SEN | HUNTER SENSOR DECODER WITH SURGE SUPPRESSION. | | | |
| — | NOT SHOWN ON PLANS | ROUTE TWO WIRE CABLE TO ALL REMOTE CONTROL VALVES. SIZE #14AWG WIRE WITH A JACKETED 2-CONDUCTOR. PREFERRED WIRE MAKE AND MODEL IS PAIGE ELECTRIC WIRE P7072D. ALL SPLICING SHALL BE MADE WITH 3-M DBR/Y-6 WATERPROOF SPLICE KITS OR APPROVED EQUAL. INSTALL 2 WIRE CABLE WITHIN 1.25" SCH 40 ELECTRICAL CONDUIT. PULL BOXES SHALL BE LOCATED EVERY 200' NO SPLICES ARE ALLOWED BETWEEN VALVES. REFER TO DETAIL FOR INSTALLATION INSTRUCTIONS. | | | |
| | PEB SERIES | RAIN BIRD REMOTE CONTROL VALVE | | | |
| | XCZ-100-PRB-LC<br>XCZ-150-LCS | RAIN BIRD REMOTE CONTROL VALVE DRIP ZONE KIT (3-19 GPM)<br>RAIN BIRD REMOTE CONTROL VALVE DRIP ZONE KIT (20-25 GPM) | | | |
| | 44-LRC | RAIN BIRD 1" TWO-PIECE QUICK COUPLING VALVE (YELLOW LOCKING RUBBER COVER) | | | |
| | T113-K SERIES | NIBCO BRASS GATE VALVE (LINE SIZE)-2.5" AND SMALLER | | | |
| | 975XL2SEU-2"/SBBC-30AL /PBB-30 | WILKINS REDUCED PRESSURE BACKFLOW ASSEMBLY WITH VIT STRONGBOX ALUMINUM ENCLOSURE AND FREEZE BLANKET. | | | |
| SM | M120-150LNSX-HL | BADGER RECORDALL 1.5" FLANGED | | | |
| | REFER TO PLANS | EXISTING CONTROLLER TO BE REMOVED | | | |




CONTROLLER AND STATION NUMBER
REMOTE CONTROL VALVE SIZE (IN INCHES)
FLOW (GPM)
WATER USE CLASSIFICATION OF ZONE
APPLICATION RATE (IN/HR) or DRIPLINE SPACING
AREA (SQ. FT.)
ASSOCIATED REMOTE CONTROL VALVE

MAIN LINE: 2 1/2" AND SMALLER: 1120-SCHEDULE 40 PVC PLASTIC PIPE WITH SCHEDULE 40 PVC SOLVENT WELD FITTINGS. 18" COVER.

LATERAL LINE: 3/4" AND LARGER: 1120-SCHEDULE 40 PVC PLASTIC PIPE WITH SCHEDULE 40 PVC SOLVENT WELD FITTINGS. 12" COVER.

SLEEVING: SCHEDULE 40 PVC PLASTIC PIPE. COVER TO BE AS INDICATED IN SPECIFICATIONS OR AS INDICATED ABOVE FOR PIPE DEPTH OF COVER.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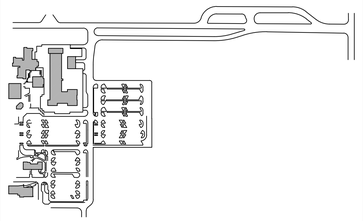
REGISTERED LANDSCAPE ARCHITECT — CHRISTOPHER A. GATES — 8/20/2024 — 31/07/2022 — STATE OF CALIFORNIA

KEY MAP



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Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR LANDSCAPE BLDG. FLOOR

IRRIGATION NOTES AND LEGEND

| | |
|---|---|
| CONTRACT NO.(A-E) | XXX |
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| DRAWN | JB,ZW |
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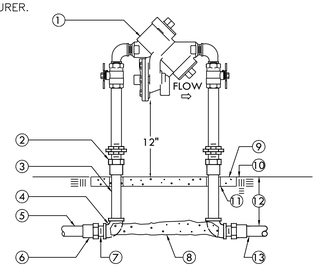
| DATE | 11/07/22 |

A/E FIRM: | SNL PM: | SNL APPROVED BY:

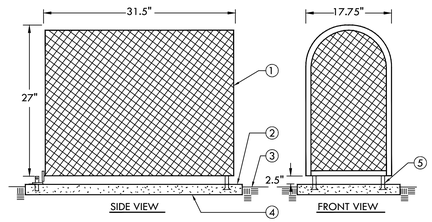
SHEET 29 OF 34 | SHEET LS-122

NOTES:
1. INSTALL A FREEZE PREVENTATIVE BLANKET AROUND BACKFLOW ASSEMBLY. BLANKET SHALL BE GREEN AND MANUFACTURED BY STRONGBOX.
2. DO NOT SOLDER CONNECT FITTINGS WHILE THREADED INTO BACKFLOW ASSEMBLY. DAMAGE MAY OCCUR.
3. NIPPLES AND FITTINGS TO BE SAME IPT SIZE AS BACKFLOW ASSEMBLY.
4. PROVIDE A STRONG BOX SBBC-30SS OR ACCEPTED EQUAL 32"x 30"x 18" BACKFLOW PREVENTER ENCLOSURE TO COMPLETELY ENCLOSE DEVICE. INSTALL ENCLOSURE TO CONCRETE BASE AS DIRECTED BY MANUFACTURER.




① REDUCED PRESSURE BACKFLOW ASSEMBLY
② WROUGHT COPPER MALE ADAPTER-2 TOTAL (SOLDER X THREAD CONNECTION)
③ COPPER TYPE "K" PIPE (LENGTH AS REQUIRED)
④ WROUGHT COPPER 90° ELBOW-2 TOTAL (SOLDER X THREAD CONNECTION)
⑤ PVC MAIN LINE TO POINT OF CONNECTION
⑥ BUSH AS NECESSARY FOR SIZE TRANSITION
⑦ SCHEDULE 40 PVC MALE ADAPTER-2 TOTAL
⑧ CONCRETE SUPPORT BLOCK
⑨ CONCRETE PAD-SEE ENCLOSURE DETAIL
⑩ FINISH GRADE
⑪ PVC SLEEVE BOTH SIDES
⑫ REFER TO IRRIGATION LEGEND
⑬ PVC MAIN LINE TO IRRIGATION SYSTEM

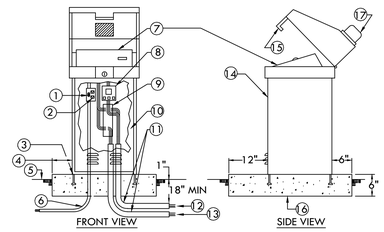
## 1 REDUCED PRESSURE BACKFLOW ASSEMBLY
SCALE: NONE




① STAINLESS STEEL ENCLOSURE
② SET PAD 1/2" ABOVE FINISH GRADE
③ FINISH GRADE
④ 6" THICK CLASS "B" CONCRETE PAD FOR ENCLOSURE SUPPORT TO EXTEND 6" BEYOND ENCLOSURE ON ALL SIDES. CONCRETE TO HAVE MEDIUM BROOM FINISH.
⑤ MOUNTING BRACKETS (STANDARD WITH ENCLOSURE) TO BE SET INTO CONCRETE PAD. PROVIDE LOCKING TAB TO ACCEPT PADLOCK PER MANUFACTURE'S INSTRUCTION.

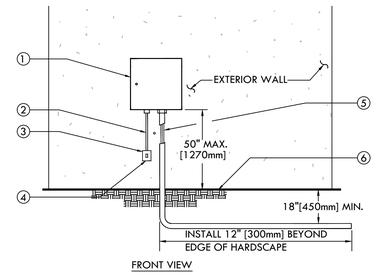
## 2 BACKFLOW PREVENTOR ENCLOSURE
SCALE: NONE

NOTES:
1. PROVIDE (CONTRACTOR) #10 BARE COPPER GROUND WIRE AND 5/8" DIA. COPPER CLAD GROUNDING ROD(S) AS DIRECTED BY MANUFACTURER.
2. UNIT IS TO BE ASSEMBLED, WIRED, AND TESTED BY A MANUFACTURER TRAINED VENDOR.
3. INSTALL (CONTRACTOR) ENCLOSURE TO CONCRETE PAD AS DIRECTED BY ENCLOSURE MANUFACTURER.
4. INSTALL SLAB LEVEL.
5. PROVIDE SLOPE TO TOP OF SLAB SURFACE FOR DRAINAGE.
6. PROVIDE FINISH AND COLOR TO CONCRETE ACCORDING TO SECTION 02520, PORTLAND CEMENT CONCRETE PAVING.

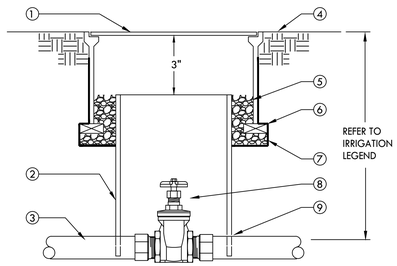



① ON/OFF SWITCH FOR SATELLITE CONTROLLER
② GFCI PROTECTED 120 VAC 15AMP RECEPTACLES
③ MOUNT ASSEMBLY (CONTRACTOR) TO MOUNTING STUDS INCLUDED WITH ENCLOSURE
④ 6" TYP. BOTH SIDES
⑤ FINISH GRADE
⑥ INSTALL (CONTRACTOR) RIGID STEEL CONDUIT FOR 120 VAC SERVICE
⑦ SATELLITE CONTROLLER MOUNTED ON PANEL OF ENCLOSURE
⑧ FLOW MONITOR
⑨ TERMINAL STRIP WITH PLACARDS FOR STATION IDENTIFICATION
⑩ REMOVABLE FRONT PANEL
⑪ INSTALL (CONTRACTOR) SCHEDULE 40 GREY PVC ELECTRICAL CONDUITS(2) WITH SWEEP ELL FOR LOW VOLTAGE WIRE, SIZE AS REQUIRED AND EXTEND 12" BEYOND CONCRETE SLAB.
⑫ LOW VOLTAGE WIRE
⑬ COMMUNICATION WIRE
⑭ STAINLESS STEEL ENCLOSURE
⑮ FLIP TOP LID
⑯ INSTALL (CONTRACTOR) CONCRETE SLAB
⑰ RADIO ANTENNA (WHERE SPECIFIED)

## 3 CONTROLLER PEDESTAL MOUNT / WALL MOUNT
SCALE: NONE

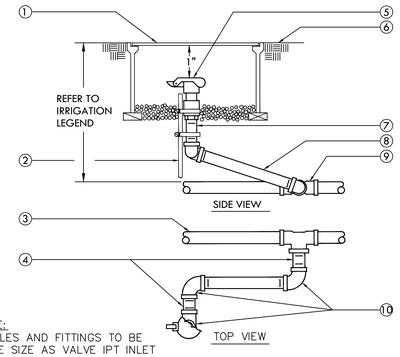



① IRRIGATION CONTROLLER.
② 120 VOLT SERVICE IN RIGID STEEL CONDUIT.
③ 120 VOLT LOCKABLE WEATHERPROOF ON/OFF SWITCH PROVIDED UNDER IRRIGATION CONTRACT.
④ EXISTING 120 VOLT SERVICE TO CONTROLLER LOCATION PROVIDED BY CONTRACTOR.
⑤ LOW VOLTAGE WIRE IN SCHEDULE 40 PVC CONDUIT. PAINT CONDUIT ABOVE GRADE TO MATCH BUILDING SURFACE COLOR.
⑥ FINISH GRADE OR HARDSCAPE.




① 10" ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID.
② 8" CLASS 160 OR SCHEDULE 40 PVC PIPE (NOTCH TO FIT OVER MAIN LINE PIPE).
③ PVC MAIN LINE.
④ FINISH GRADE.
⑤ PEA GRAVEL OR 3/4" DRAIN ROCK – 4" DEEP (NO SOIL IN VALVE BOX).
⑥ BRICK-2 TOTAL.
⑦ 19 GAUGE 1/2" SQUARE WIRE MESH. WRAP UP SIDES OF BOX.
⑧ GATE VALVE WITH X-TOP HANDLE.
⑨ MALE ADAPTER. REFER TO LEGEND FOR FITTING TYPE.

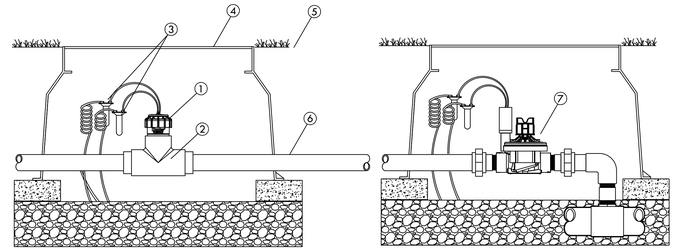
## 4 GATE VALVE-S 1/2" AND SMALLER
SCALE: NONE




NOTE:
NIPPLES AND FITTINGS TO BE SAME SIZE AS VALVE IPT INLET THREAD SIZE

① ROUND PLASTIC VALVE BOX WITH BOLT DOWN LID. TOP DIMENSION: 10".
② 1 1/4" x 1 1/4" x 3/16" ANGLE IRON 30" LONG W/2 STAINLESS STEEL STRAPS (ONE AROUND QCV)
③ PVC MAIN LINE
④ 3" LONG SCHEDULE 80 PVC THREADED NIPPLE
⑤ QUICK COUPLING VALVE
⑥ FINISH GRADE
⑦ SCHEDULE 80 PVC THREADED NIPPLE
⑧ 10" LONG SHCEDULE 80 PVC THREADED NIPPLE
⑨ UPC APPROVED SCHEDULE 40 PVC TEE OR ELBOW
⑩ SCHEDULE 80 PVC THREADED 90° ELL

## 5 QUICK COUPLING VALVE
SCALE: NONE



*NOTE* INLET PIPE LENGTH OF SENSOR MUST BE MIN. 10X PIPE DIA. STRAIGHT, CLEAN RUN OF PIPE, NO FITTINGS OR TURNS. OUTLET PIPE LENGTH OF SENSOR MUST BE MIN. 5X PIPE DIA. OF STRAIGTH CLEAN RUN OF PIPE, NO FITTINGS OR TURNS.

① MODEL: FLOW CLICK
② MODEL FCT-208
③ MIN. 18/2 WIRE TO ACC POWER MODULE. MAXIMUM WIRE DISTANCE RUN OF 1,000'
④ STANDARD VALVE BOX
⑤ FINISH GRADE
⑥ MAIN LINE PIPE
⑦ MASTER VALVE

## 6 HUNTER FLOW SENSOR & MASTER VALVE INSTALLATION
SCALE: NONE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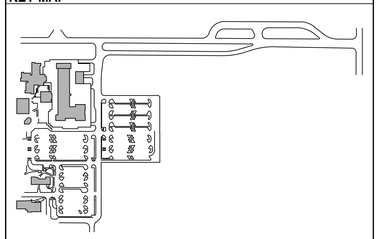
REGISTERED LANDSCAPE ARCHITECT — CHRISTOPHER A. GATES — 8/20/2024, 11/07/2022 — STATE OF CALIFORNIA

KEY MAP



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SECTOR: LANDSCAPE
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FLOOR:

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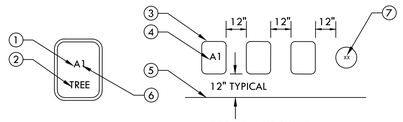
| CONTRACT NO.(A-E) | XXX |
| JOB / ACCT.NO. | XXX |
| DRAWN | JELZW |
| CHECKED | CM |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM:
SNL PM:
SNL APPROVED BY:

SHEET 30 OF 34
SHEET LS-501




TOP VIEW OF BOXES

VALVE IDENTIFICATION

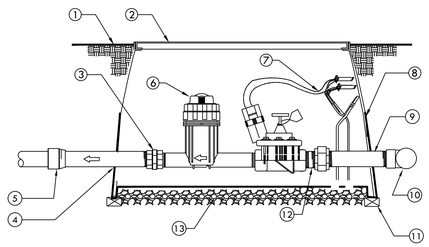
1. CONTROLLER ID.
2. ALL TREE VALVES TO HAVE TREE BRANDED INTO LID.
3. RECTANGULAR VALVE BOX.
4. HEAT BRAND VALVE TYPE PER TABLE OR CONTROLLER ID AND STATION NUMBER INTO LID.
5. EDGE OF LAWN, WALK, FENCE, CURB, ETC.
6. STATION NUMBER.
7. ROUND VALVE BOX FOR QCV AND GATE VALVE. HEAT BRAND VALVE TYPE INTO INTO LID PER TABLE.

| ITEMS TO BRAND: | BRAND CODE |
|---|---|
| GATE VALVE | GV |
| PRESSURE REDUCER | PRV |
| MASTER VALVE | MV |
| FLOW SENSOR | FS |
| HYDROMETER | HM |
| MAIN LINE AIR RELIEF | ARV |
| REMOTE CONTROL VALVE | A___ |
| QUICK COUPLER | QC |
| SPLICE BOX | SB |
| PULL BOX | PB |
| LIGHTNING ARRESTOR | LA |
| GROUND ROD | GR |

INSTRUCTIONS:

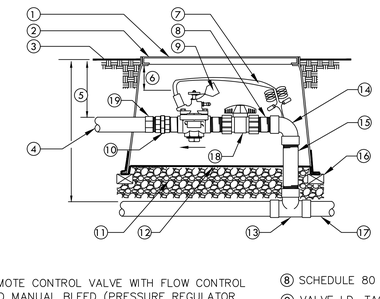
1. CENTER VALVE BOX OVER REMOTE CONTROL VALVE TO FACILITATE SERVICING VALVE.
2. SET BOXES 1" ABOVE FINISH GRADE OR MULCH COVER IN GROUND COVER/SHRUB AREA AND FLUSH WITH FINISH GRADE IN TURF AREA.
3. SET RCV AND VALVE BOX ASSEMBLY IN GROUND COVER/SHRUB AREA WHERE POSSIBLE. INSTALL IN LAWN ONLY IF GROUND COVER DOES NOT EXIST ADJACENT TO LAWN.
4. SET BOXES PARALLEL TO EACH OTHER AND PERPENDICULAR TO EDGE OF LAWN, WALK, FENCE, CURB, ETC.
5. AVOID HEAVILY COMPACTING SOIL AROUND VALVE BOXES TO PREVENT COLLAPSE AND DEFORMATION OF VALVE BOX SIDES.
6. INSTALL EXTENSION BY VALVE BOX MANUFACTURER AS REQUIRED TO COMPLETELY ENCLOSE ASSEMBLY FOR EASY ACCESS.

## 7 VALVE BOX INSTALLATION
SCALE: NONE



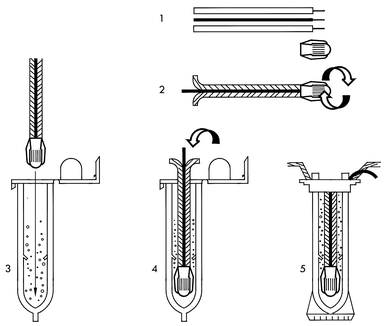

1. FINISH GRADE.
2. RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID. ONE VALVE PER BOX– NO EXCEPTIONS. INSTALL BOX AS SHOWN IN BOX INSTALLATION DETAIL.
3. SCHEDULE 80 PVC THREADED UNION–2 TOTAL.
4. SCHEDULE 80 PVC TOE NIPPLE (12" LENGTH) MATCH VALVE SIZE
5. SCH 40 PVC REDUCER. UPSIZE AS REQUIRED PER LATERAL PIPE SIZING ON THE PLANS
6. REMOTE CONTROL VALVE DRIP ZONE KIT. (SHALL INCLUDE VALVE, FILTER AND A 40 PSI PRESSURE REDUCING VALVE)
7. VALVE CONTROL WIRE– PROVIDE 3M–DBY–6 SEAL PACKS AT ALL SPLICES AND 24" OF EXCESS CABLE.
8. 18 GAUGE 1/2" SQUARE STAINLESS STEEL WIRE MESH. WRAP UP SIDES OF THE BOX. ANCHOR TO BOX WITH S.S. SCREWS AND WASHER AS REQUIRED.
9. SCH 80 NIPPLES (MIN 6"–MAX.12" LONG).–MATCH VALVE SIZE
10. SCH 80 PVC 90° OR TEE FROM VALVE MANIFOLD. REDUCE TO VALVE SIZE AT THIS FITTING.
11. BRICK–ONE ON EACH CORNER
12. SCH 80 NIPPLE (3" LONG).–MATCH VALVE SIZE
13. PEA GRAVEL OR 3/4" DRAIN ROCK– 4" DEEP BELOW VALVE (NO SOIL IN VALVE BOX).

## 8 REMOTE CONTROL VALVE (DRIPZONE)
SCALE: NONE




1. REMOTE CONTROL VALVE WITH FLOW CONTROL AND MANUAL BLEED (PRESSURE REGULATOR WHERE SHOWN ON PLANS).
2. USE A NDS PRO SERIES 14" X 19" RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID FOR 1" VALVES. FOR 1.5" AND LARGER VALVES INSTALL BALL VALVE WITHIN A SEPARATE 10" ROUND BOX OR ONE BALL VALVE PER MANIFOLD OF VALVES. GATE VALVE SIZE SHALL BE SAME AS LARGEST VALVE WITHIN MANIFOLD. ONE VALVE PER BOX– NO EXCEPTIONS. INSTALL BOX AS SHOWN IN BOX INSTALLATION DETAIL.
3. FINISH GRADE.
4. PVC LATERAL LINE.
5. REFER TO IRRIGATION SPECS.
6. 3" [75mm] MIN, 6" [150mm] MAX.
7. VALVE CONTROL WIRE– PROVIDE SEAL PACKS AT ALL SPLICES AND 3' [1m] OF EXCESS UF WIRE IN A 1" [25mm] DIAMETER COIL.
8. SCHEDULE 80 PVC NIPPLE (3 TOTAL).
9. VALVE I.D. TAG (CONTROLLER AND STATION NUMBER).
10. SCHEDULE 80 PVC THREADED UNION.
11. PEA GRAVEL OR 3/4" DRAIN ROCK– 4" [100mm] DEEP BELOW VALVE (NO SOIL IN VALVE BOX).
12. 19 GAUGE 1/2" [12mm] SQUARE WIRE MESH.
13. SCHEDULE 40 OR 80 PVC TEE. REFER TO LEGEND FOR TYPE.
14. SCHEDULE 80 PVC 90° ELBOW (TxT).
15. SCHEDULE 80 PVC NIPPLE– LENGTH AS REQUIRED.
16. BRICK–1 EACH CORNER.
17. PVC MAIN LINE.
18. SCHEDULE 80 PVC UNION BALL VALVE (ONE PER VALVE).
19. SCHEDULE 40 MALE ADAPTER

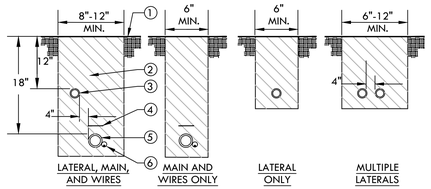
## 9 REMOTE CONTROL VALVE
SCALE: NONE




INSTRUCTIONS:

1. STRIP WIRES APPROXIMATELY 1/2" (12.7 MM) TO EXPOSE WIRE.
2. TWIST CONNECTOR AROUND WIRES CLOCKWISE UNTIL HAND TIGHT, DO NOT OVERTIGHTEN.
3. INSERT WIRE ASSEMBLY INTO PLASTIC TUBE UNTIL WIRE CONNECTOR SNAPS PAST LIP IN BOTTOM OF TUBE.
4. PLACE WIRES WHICH EXIT TUBE IN WIRE EXIT HOLES AND CLOSE CAP UNTIL IT SNAPS.
5. INSPECT FINAL SPLICE ASSEMBLY TO BE SECURE AND FINISHED.

## 10 WEATHERPROOF SPLICE ASSEMBLY
SCALE: NONE




NOTES:

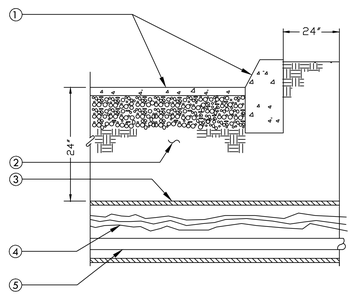
1. ALL MAIN SUPPLY LINES AND LATERAL LINES SHALL BE PLACED IN SLEEVES UNDER PAVED SURFACES. INSTALL LOW VOLTAGE WIRES WITHIN A SEPARATE CONDUIT UNDER PAVED SURFACES. DO NOT TAPE WIRES WITHIN CONDUIT.
2. REUSE SALVAGED EXCAVATED FILL AND COMPACT TO ORIGINAL DENSITY IN LANDSCAPE AREAS. ALL OTHER AREAS SHALL BE AT 95% COMPACTION. BACKFILL MATERIAL SHALL BE THE EARTH EXCAVATED FROM THE TRENCHES, FREE FROM ROCKS (ANYTHING LARGER THAN 2"), CONCRETE CHUNKS, AND OTHER FOREIGN OR COARSE MATERIALS.
3. WHEN 12" POP–UP SPRINKLER HEADS ARE USED, INCREASE THE DEPTH OF LATERAL TO 18" AT THE SPRINKLER LOCATION ONLY.

1. FINISH GRADE.
2. CLEAN BACKFILL MATERIAL.
3. LATERAL LINE.
4. 3" DETECTABLE WARNING TAPE OVER MAIN LINE. INSTALL 3" ABOVE MAIN LINE. USE CHRISTY MODEL #TA–DT–3–BIRR FOR POTABLE IRRIGATION SYSTEMS OR #TA–DT–3–PRW FOR RECYCLED IRRIGATION WATER SYSTEMS
5. MAIN LINE.
6. TWO WIRE CABLE IN CONDUIT

## 11 TRENCHING
SCALE: NONE

NOTES:

1. SLEEVE IS TO EXTEND 24" BEYOND CURB OR SIDEWALK PAVING




1. PAVING AND CURBING–SEE CIVIL DRAWING
2. COMPACTED SUBGRADE
3. IRRIGATION SLEEVE
4. IRRIGATION CONTROL WIRING
5. IRRIGATION LINE

## 12 SLEEVING INSTALLATION
SCALE: NONE

*Irrigation Consultant:*
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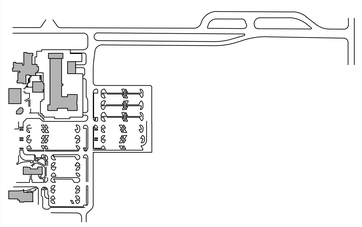
KEY MAP



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| ACCT.NO. | XXX |
| DRAWN | JELW |
| CHECKED | CM |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

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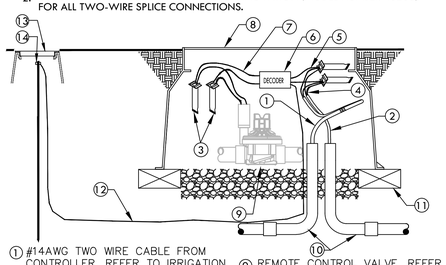
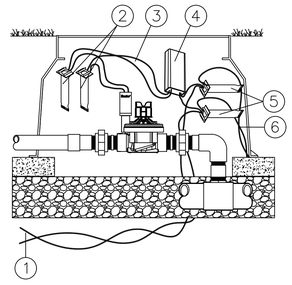
SHEET 31 OF 34 | SHEET LS-502

NOTE:
1. ALL DECODERS SHALL HAVE A VALVE NUMBER ADDRESSED AT CONTROLLER PRIOR TO INSTALLATION.
2. USE U.F. SAFETY CABLE STRIPPER BY KING INNOVATION (MODEL NUMBER 46200) FOR ALL TWO-WIRE SPLICE CONNECTIONS.




① #14AWG TWO WIRE CABLE FROM CONTROLLER. REFER TO IRRIGATION NOTES FOR MODEL NUMBER OF WIRE. ALLOW A 24" SLACK PER DECODER. USE ELECTRICAL TAPE TO HOLD SLACK CABLES TOGETHER.
② TWO WIRE CABLE TO NEXT DECODER
③ 3M DBR/Y-6 OR APPROVED EQUAL WATERPROOF SPLICE KIT (4 TOTAL)
④ A MAXIMUM OF 4" OF WIRE SHALL BE STRIPPED FROM TWO WIRE CABLE WHEN SPLICING AT DECODERS.
⑤ CONNECT CORRECT DECODER WIRES TO TWO WIRE CABLES.
⑥ DECODER
⑦ CONNECT CORRECT DECODER WIRES TO VALVE SOLENOID WIRES
⑧ VALVE BOX. REFER TO REMOTE CONTROL VALVE DETAIL FOR INSTALLATION INSTRUCTIONS.
⑨ REMOTE CONTROL VALVE. REFER TO REMOTE CONTROL VALVE DETAIL FOR INSTALLATION INSTRUCTIONS.
⑩ 1.25" CONDUIT FOR 2 WIRE CABLE WITH LONG SWEEPS IN AND OUT OF EACH VALVE BOX. SEAL ALL CONDUIT OPENINGS WITH WATERPROFF FOAM.
⑪ BRICK-ONE ON EACH CORNER
⑫ #6 BARE COPPER GROUND WIRE. SPLICE INTO GROUND WIRE AT DECODER. ONLY REQUIRED AT EVERY 10TH DECODER AND AT THE ENDS OF THE LINE.
⑬ 8' LONG COPPER GROUND ROD. LOCATE A MINIMUM OF 8' AWAY FROM DECODER AND TWO WIRE CABLE. LOCATE IN 10" ROUND BOX.
⑭ CADWELD CONNECTIONS

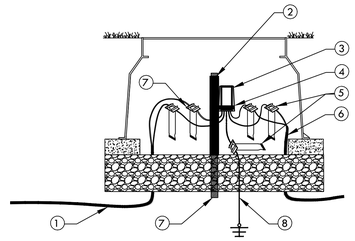
## 13 DECODER WIRING IN CONDUIT
SCALE: NONE



NOTE: All DUAL 1 DECODERS SHALL HAVE THE FOLLOWING ADDRESS AND CORRESPONDING COLOR ADDRESS 1 = Black

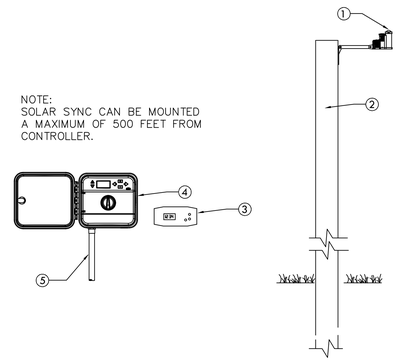
① JACKETED ID WIRE PATH TO NEXT DECODER
② DBY (2)
③ TWO BLACK WIRES TO VALVE SOLENOID
④ MODEL IDUAL-1 DECODER
⑤ DBR/Y-6 (2)
⑥ JACKETED ID WIRE PATH FROM CONTROLLER. ALLOW 5 ft/1.5M SLACK PER DECODER.

## 14 HUNTER DUAL DECODER INSTALLATION
SCALE: NONE



① JACKETED ID WIRE PATH TO NEXT DECODER
② PVC PIPE-1" SCHEDULE 40
③ MODEL DUAL-S SURGE PROTECTOR MODULE
④ ELECTRICAL CABLE TIE-12"
⑤ DBR/Y-6 (2)
⑥ JACKETED ID WIRE PATH FROM CONTROLLER. ALLOW 5 ft/1.5M SLACK PER SURGE DEVICE, 1/2 ON EITHER SIDE
⑦ PVC PIPE-.75" SCHEDULE 40
⑧ TO EARTH GROUND 8FT/2.5M FROM DUAL-S AT RIGHT ANGLE TO THE 2-WIRE PATH

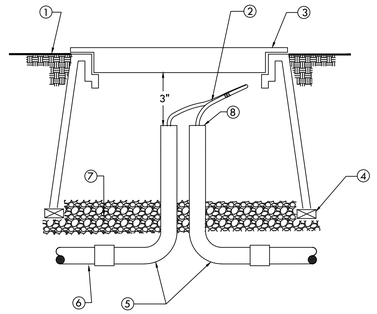
## 15 HUNTER DUAL-S SURGE DEVICE
SCALE: NONE



NOTE:
SOLAR SYNC CAN BE MOUNTED A MAXIMUM OF 500 FEET FROM CONTROLLER.

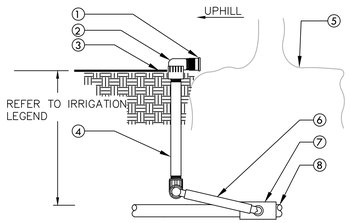
① MODEL: SOLAR SYNC SENSOR-WIRELESS
② SUITABLE POST, POLE, OR GUTTER MOUNT. MOUNT IN LOCATION WHERE SENSOR CAN RECEIVE FULL SUN, IS OPEN TO RAINFALL AND OUT OF SPRINKLER SPRAY PATTERN
③ MODEL SOLAR SYNC MODULE MOUNTED INSIDE OF HUNTER PCC CONTROLLER
④ HUNTER CONTROLLER
⑤ POWER SOURCE

## 16 HUNTER SOLAR SYNC-WIRELESS
SCALE: NONE

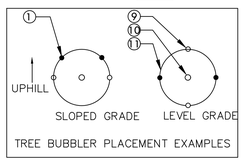



① FINISH GRADE
② 24" LOOP OF TWO WIRE CABLE.
③ GREY RECTANGULAR PLASTIC VALVE BOX WITH BOLT DOWN LID. HEAT BRAND "PB" INTO LID.
④ BRICK-ONE ON EACH CORNER
⑤ SCHEDULE 40 PVC SWEEP ELLS
⑥ SCHEDULE 40 U.L. LISTED PVC CONDUIT
⑦ PEA GRAVEL OR 3/4" [20mm] DRAIN ROCK - 4" [102mm] DEEP BELOW VALVE (NO SOIL IN VALVE BOX).
⑧ SEAL ALL CONDUIT OPENINGS WITH WATERPROOF FOAM.

## 17 IRRIGATION TWO WIRE PULL BOX
SCALE: NONE




NOTE:
SUGGESTED QUANTITY OF BUBBLERS PER TREES AND SHRUBS SIZE:
- SHRUBS = 1 BUBBLER
- 15 GAL OR 24" BOX = 2 BUBBLERS
- 36 GAL OR 48" BOX = 4 BUBBLERS
- 60 GAL OR 72" BOX = 6 BUBBLERS




① BUBBLER (TO BE INSTALLED ON TOP OF ROOTBALL).
② 1/2" MARLEX 90°
③ FINISH GRADE.
④ 1/2" x 8" SCH 80 NIPPLE
⑤ SHRUB OR TREE ROOTBALL.
⑥ SCHEDULE 40 PVC PRE-FABRICATED SWING JOINT WITH SCH 40 PVC STREET ELLS AS REQUIRED TO TRANSITION INTO NIPPLE
⑦ PVC TEE (SST), ELBOW (ST) OR FEMALE ADAPTER.
⑧ PVC LATERAL LINE.
⑨ TREE STAKES.
⑩ TREE
⑪ EDGE OF ROOTBALL (TYPICAL).

## 18 TREE AND SHRUB BUBBLER
SCALE: NONE


*Irrigation Consultant:*
***Russell D. Mitchell Associates, Inc.***
2760 Camino Diablo
Walnut Creek, CA 94597
tel 925.939.3985 ♦ fax 925.932.5671
www.rmairrigation.com



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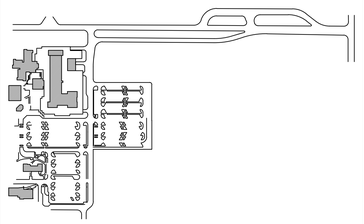
FILE NAME: X-XXX.dwg
PROJ. NO. E1234
ORDER NO. XX-XXXX


GATES +ASSOCIATES
LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
1485 N. MAIN ST. STE 260, WALNUT CREEK, CA 94596
T 925.734.8176 www.gates.com


REGISTERED LANDSCAPE ARCHITECT — CHRISTOPHER A. GATES — 8/20/2024 — 11/07/2022 — STATE OF CALIFORNIA

KEY MAP



| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
|---|---|---|---|---|---|---|
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR: LANDSCAPE
IRRIGATION DETAILS
BLDG.
FLOOR

| | |
|---|---|
| CONTRACT NO.(A-T) | XXX |
| WORK AUTH. NO. | XXX |
| DRAWN | JBLEW |
| CHECKED | CM |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |
| SNL APPROVED BY: | |

AE FIRM:
SNL PM:

SHEET 32 OF 34
SHEET LS-503

## WATER USE ESTIMATION & IRRIGATION SCHEDULE - CONTROLLER C

| | |
|---|---|
| WATER TYPE | POTABLE |
| CITY | Livermore |
| ETO | 47.2 |
| DATE | 10/31/2022 |

*Nearest City to project with published ET data*

REGULAR LANDSCAPE AREAS

| STATION/HYDROZONE | GPM | AREA (sq.ft) (HA) | WATER USE TYPE (LW=LOW, MW=MOD, HW=HIGH) | PLANT TYPE | IRRIGATION TYPE | PLANT FACTOR (PF) | IRRIGATION EFFICIENCY (IE) | PRECIP. RATE/ APPLICATION RATE (IN/HR) | ETAF (PF/IE) | CYCLES PER DAY | DAYS PER WEEK | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC | ETWU (GALLONS PER YEAR) | PERCENTAGE OF LANDSCAPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | MONTHLY ETO | | | | | | | | | | | | | |
| | | | | | | | | | | | | 1.2 | 1.5 | 2.9 | 4.4 | 5.9 | 6.6 | 7.4 | 6.4 | 5.3 | 3.2 | 1.5 | 0.9 | | |
| | | | | | | | | | | | | TOTAL RUN TIME IN MINUTES PER DAY | | | | | | | | | | | | | |
| C-1 | 11 | 880 | MW | TREE MW | BUBBLER (TREE) 0.5 GPM | 0.5 | 0.81 | 0.85 | 0.6 | 2 | 3 | 0.0 | 0.0 | 10.0 | 15.0 | 20.0 | 22.0 | 25.0 | 21.0 | 18.0 | 11.0 | 5.0 | 0.0 | 15,896 | 6% |
| C-2 | 15 | 1392 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 15,087 | 9% |
| C-3 | 12 | 1136 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 12,313 | 7% |
| C-4 | 18 | 1632 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,688 | 10% |
| C-5 | 23 | 2128 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 23,064 | 13% |
| C-6 | 21 | 1952 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 21,157 | 12% |
| C-7 | 16 | 1520 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,475 | 10% |
| C-8 | 18 | 1440 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 15,607 | 9% |
| C-9 | 19 | 1792 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,423 | 11% |
| C-10 | 21 | 1952 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 21,157 | 12% |
| | TOTAL | 15,824 | | | | | | | | | | | | | | | | | | | | | TOTAL | 177,867 | 100% |

SPECIAL LANDSCAPE AREAS

| HYDROZONE # | HYDROZONE NAME | AREA (sq.ft) (HA) | Percentage of Landscape |
|---|---|---|---|
| | | | |
| | | | 0% |

| | | |
|---|---|---|
| MAWA | GALLONS/YR | 208,383 |
| | ACRE FEET/YR | 0.64 |
| | HCF/YR | 278.59 |
| ETWU | GALLONS/YR | 177,867 |
| | ACRE FEET/YR | 0.55 |
| | HCF/YR | 237.79 |

| SITE IRRIGATION EFFICIENCY | SITE PLANT FACT0R | MAWA COMPLIANT |
|---|---|---|
| 81.0% | 0.31 | YES |

| ETAF Calculations | |
|---|---|
| REGULAR LANDSCAPE AREAS | |
| TOTAL ETAF x AREA | 6,078 |
| TOTAL AREA | 15,824 |
| AVG. ETAF | 38.41% |

*THE IRRIGATION VALVE SCHEDULE SHOWN ABOVE IS INTENDED TO BE USED AS A GUIDELINE ONLY AND INDICATES THE APPROXIMATE RUN TIMES IN MINUTES FOR EACH VALVE BASED ON ESTIMATED WEEKLY WATER REQUIREMENTS FOR ESTABLISHED PLANT MATERIAL. THE TIMES SHOWN ARE APPROXIMATE AND HAVE BEEN DEVELOPED FROM LOCAL AND CURRENT AVERAGES FOR EVAPOTRANSPIRATION, AND REFLECTTHE WATER REQUIREMENTS OF THE PLANT MATERIAL BASED ON PLANT TYPE AND THE APPROXIMATE PRECIPITATION OR APPLICATION RATES OF THE IRRIGATION SYSTEM TYPE. ACTUAL RUN TIMES MAY BE DIFFERENT DEPENDING ON A VARIETY OF FACTORS INCLUDING TOPOGRAPHY, SOIL STRUCTURE, SUN AND WIND EXPOSURE, WEATHER, ACTUAL PLANT WATER REQUIREMENTS, OVERALL PRECIPITATION RATE OF ZONE, ETC.*

**MAWA FORMULA**

MAXIMUM APPLIED WATER ALLOWANCE (MAWA) GALLONS PER YEAR

MAWA = (ETo)(0.62)[(LA x 0.45) + (0.55 x SLA)]

ETo = REFERENCE EVAPOTRANSPIRATION

0.45= ET ADJUSTMENT FACTOR

LA=LANDSCAPED AREA (SQUARE FEET)
0.62 = CONVERSION FACTOR (GALLONS/SQ.FT/YR)

**ETWU FORMULA**

ESTIMATED TOTAL WATER USE (ETWU) GALLONS PER YEAR

ETWU= ((ETO)(.62)(ETAF x LA))

ETo = REFERENCE EVAPOTRANSPIRATION

PF = PLANT FACTOR FOR HYDROZONES

HA = HYDROZONE AREA (SQ.FT)
0.62 = CONVERSION FACTOR (GALLONS/SQ.FT/YR)

IE = IRRIGATION EFFICIENCY (0.81)-BUBBLER/DRIP

IE = IRRIGATION EFFICIENCY (0.75)-ROTORS/SPRAY

## WATER USE ESTIMATION & IRRIGATION SCHEDULE - CONTROLLER A

| | |
|---|---|
| WATER TYPE | POTABLE |
| CITY | Livermore |
| ETO | 47.2 |
| DATE | 10/31/2022 |

*Nearest City to project with published ET data*

REGULAR LANDSCAPE AREAS

| STATION/HYDROZONE | GPM | AREA (sq.ft) (HA) | WATER USE TYPE (LW=LOW, MW=MOD, HW=HIGH) | PLANT TYPE | IRRIGATION TYPE | PLANT FACTOR (PF) | IRRIGATION EFFICIENCY (IE) | PRECIP. RATE/ APPLICATION RATE (IN/HR) | ETAF (PF/IE) | CYCLES PER DAY | DAYS PER WEEK | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC | ETWU (GALLONS PER YEAR) | PERCENTAGE OF LANDSCAPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | MONTHLY ETO | | | | | | | | | | | | | |
| | | | | | | | | | | | | 1.2 | 1.5 | 2.9 | 4.4 | 5.9 | 6.6 | 7.4 | 6.4 | 5.3 | 3.2 | 1.5 | 0.9 | | |
| | | | | | | | | | | | | TOTAL RUN TIME IN MINUTES PER DAY | | | | | | | | | | | | | |
| A-100 | 23 | 1712 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 18,556 | 19% |
| A-101 | 15 | 2016 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 21,850 | 23% |
| A-102 | 5 | 400 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 4,335 | 5% |
| A-103 | 17 | 1616 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,515 | 18% |
| A-104 | 12 | 1120 | MW | SHRUB GC MW | BUBBLER (SHRUB) | 0.5 | 0.81 | 1.91 | 0.6 | 2 | 3 | 0.0 | 0.0 | 5.0 | 7.0 | 9.0 | 10.0 | 11.0 | 10.0 | 8.0 | 5.0 | 3.0 | 0.0 | 20,232 | 13% |
| A-105 | 17 | 1616 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,515 | 18% |
| A-106 | 5 | 400 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 4,335 | 5% |
| | TOTAL | 8,880 | | | | | | | | | | | | | | | | | | | | | TOTAL | 104,339 | 100% |

SPECIAL LANDSCAPE AREAS

| HYDROZONE # | HYDROZONE NAME | AREA (sq.ft) (HA) | Percentage of Landscape |
|---|---|---|---|
| | | | |
| | | | 0% |

| | | |
|---|---|---|
| MAWA | GALLONS/YR | 116,939 |
| | ACRE FEET/YR | 0.36 |
| | HCF/YR | 156.34 |
| ETWU | GALLONS/YR | 104,339 |
| | ACRE FEET/YR | 0.32 |
| | HCF/YR | 139.49 |

| SITE IRRIGATION EFFICIENCY | SITE PLANT FACT0R | MAWA COMPLIANT |
|---|---|---|
| 81.0% | 0.33 | YES |

| ETAF Calculations | |
|---|---|
| REGULAR LANDSCAPE AREAS | |
| TOTAL ETAF x AREA | 3,565 |
| TOTAL AREA | 8,880 |
| AVG. ETAF | 40.15% |

*THE IRRIGATION VALVE SCHEDULE SHOWN ABOVE IS INTENDED TO BE USED AS A GUIDELINE ONLY AND INDICATES THE APPROXIMATE RUN TIMES IN MINUTES FOR EACH VALVE BASED ON ESTIMATED WEEKLY WATER REQUIREMENTS FOR ESTABLISHED PLANT MATERIAL. THE TIMES SHOWN ARE APPROXIMATE AND HAVE BEEN DEVELOPED FROM LOCAL AND CURRENT AVERAGES FOR EVAPOTRANSPIRATION, AND REFLECTTHE WATER REQUIREMENTS OF THE PLANT MATERIAL BASED ON PLANT TYPE AND THE APPROXIMATE PRECIPITATION OR APPLICATION RATES OF THE IRRIGATION SYSTEM TYPE. ACTUAL RUN TIMES MAY BE DIFFERENT DEPENDING ON A VARIETY OF FACTORS INCLUDING TOPOGRAPHY, SOIL STRUCTURE, SUN AND WIND EXPOSURE, WEATHER, ACTUAL PLANT WATER REQUIREMENTS, OVERALL PRECIPITATION RATE OF ZONE, ETC.*

**MAWA FORMULA**

MAXIMUM APPLIED WATER ALLOWANCE (MAWA) GALLONS PER YEAR

MAWA = (ETo)(0.62)[(LA x 0.45) + (0.55 x SLA)]

ETo = REFERENCE EVAPOTRANSPIRATION

0.45= ET ADJUSTMENT FACTOR

LA=LANDSCAPED AREA (SQUARE FEET)
0.62 = CONVERSION FACTOR (GALLONS/SQ.FT/YR)

**ETWU FORMULA**

ESTIMATED TOTAL WATER USE (ETWU) GALLONS PER YEAR

ETWU= ((ETO)(.62)(ETAF x LA))

ETo = REFERENCE EVAPOTRANSPIRATION

PF = PLANT FACTOR FOR HYDROZONES

HA = HYDROZONE AREA (SQ.FT)
0.62 = CONVERSION FACTOR (GALLONS/SQ.FT/YR)

IE = IRRIGATION EFFICIENCY (0.81)-BUBBLER/DRIP

IE = IRRIGATION EFFICIENCY (0.75)-ROTORS/SPRAY

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CADS DRAWING
FILE NAME: X-XXX.dwg

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LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
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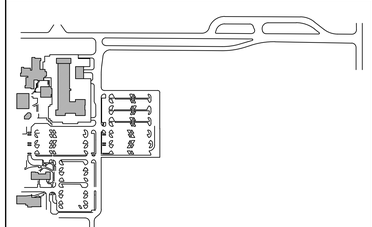
REGISTERED LANDSCAPE ARCHITECT · CHRISTOPHER A. JOSE · 8/20/2024 · 11/07/2022 · No. 6362 · STATE OF CALIFORNIA

KEY MAP



| XXX | X | XX/XX/XX | XXX | XXX | XXX | XXX |
|---|---|---|---|---|---|---|
| PROJ.& W.O. | NO. | DATE | REVISION | | BY | CHK | APP |

*Irrigation Consultant:*
***Russell D. Mitchell Associates, Inc.***
2760 Camino Diablo
Walnut Creek, CA 94597
tel 925.939.3985 ♦ fax 925.932.5671
www.rmairrigation.com

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
LANDSCAPE
IRRIGATION CALCULATIONS
FLOOR

| | |
|---|---|
| BLDG. | |
| CONTRACT NO.(A-E) | XXX |
| SNL ACCT. NO. | XXX |
| DRAWN | JBLDW |
| CHECKED | CM |
| SCALE | AS SHOWN |
| DATE | 11/07/22 |

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 33 OF 34

SHEET LS-601

# WATER USE ESTIMATION & IRRIGATION SCHEDULE - CONTROLLER B

| | |
|---|---|
| WATER TYPE | POTABLE |
| CITY | Livermore |
| ETO | 47.2 |
| DATE | 10/31/2022 |

*Nearest City to project with published ET data*

REGULAR LANDSCAPE AREAS

| STATION/HYDROZONE | GPM | AREA (sq.ft) (HA) | WATER USE TYPE (LW=LOW, MW=MOD, HW=HIGH) | PLANT TYPE | IRRIGATION TYPE | PLANT FACTOR (PF) | IRRIGATION EFFICIENCY (IE) | PRECIP. RATE/ APPLICATION RATE (IN/HR) | ETAF (PF/IE) | CYCLES PER DAY | DAYS PER WEEK | JAN | FEB | MAR | APR | MAY | JUNE | JULY | AUG | SEP | OCT | NOV | DEC | ETWU (GALLONS PER YEAR) | PERCENTAGE OF LANDSCAPE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | MONTHLY ETO | | | | | | | | | | | | | |
| | | | | | | | | | | | | 1.2 | 1.5 | 2.9 | 4.4 | 5.9 | 6.6 | 7.4 | 6.4 | 5.3 | 3.2 | 1.5 | 0.9 | | |
| | | | | | | | | | | | | TOTAL RUN TIME IN MINUTES PER DAY | | | | | | | | | | | | | |
| B-1 | 10 | 800 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 8,671 | 1% |
| B-2 | 16 | 1520 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,475 | 2% |
| B-3 | 19 | 1776 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,249 | 2% |
| B-4 | 14 | 1360 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 14,740 | 1% |
| B-5 | 14 | 1360 | MW | SHRUB GC LW | BUBBLER (SHRUB) | 0.5 | 0.81 | 1.91 | 0.6 | 2 | 2 | 0.0 | 0.0 | 7.0 | 10.0 | 13.0 | 15.0 | 17.0 | 15.0 | 12.0 | 8.0 | 4.0 | 0.0 | 24,567 | 1% |
| B-6 | 16 | 1440 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 15,607 | 2% |
| B-7 | 28 | 2608 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 28,267 | 3% |
| B-8 | 19 | 1760 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,076 | 2% |
| B-9 | 20 | 1856 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,116 | 2% |
| B-10 | 16 | 1504 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,301 | 2% |
| B-11 | 23 | 1840 | MW | TREE MW | BUBBLER (TREE) 0.5 GPM | 0.5 | 0.81 | 0.85 | 0.6 | 2 | 3 | 0.0 | 0.0 | 10.0 | 15.0 | 20.0 | 22.0 | 25.0 | 21.0 | 18.0 | 11.0 | 5.0 | 0.0 | 33,238 | 2% |
| B-12 | 19 | 1792 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,423 | 2% |
| B-13 | 21 | 1936 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,983 | 2% |
| B-14 | 12 | 1152 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 12,486 | 1% |
| B-15 | 11 | 1120 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 12,139 | 1% |
| B-16 | 24 | 2272 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 24,625 | 2% |
| B-17 | 20 | 1920 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,810 | 2% |
| B-18 | 10 | 972 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 10,535 | 1% |
| B-19 | 23 | 2122 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 22,999 | 2% |
| B-20 | 12 | 960 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 10,405 | 1% |
| B-21 | 23 | 2416 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 26,186 | 3% |
| B-22 | 18 | 1776 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,249 | 2% |
| B-23 | 20 | 1936 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,983 | 2% |
| B-24 | 17 | 1600 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,342 | 2% |
| B-25 | 20 | 1888 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,463 | 2% |
| B-26 | 16 | 1472 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 15,954 | 2% |
| B-27 | 14 | 1120 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 12,139 | 1% |
| B-28 | 21 | 1952 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 21,157 | 2% |
| B-29 | 19 | 1600 | MW | SHRUB GC LW | BUBBLER (SHRUB) | 0.5 | 0.81 | 1.91 | 0.6 | 2 | 2 | 0.0 | 0.0 | 7.0 | 10.0 | 13.0 | 15.0 | 17.0 | 15.0 | 12.0 | 8.0 | 4.0 | 0.0 | 28,903 | 2% |
| B-30 | 17 | 1568 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,995 | 2% |
| B-31 | 19 | 1520 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 16,475 | 2% |
| B-32 | 17 | 1616 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,515 | 2% |
| B-33 | 16 | 1440 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 15,607 | 2% |
| B-34 | 16 | 1504 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,301 | 2% |
| B-35 | 16 | 1280 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 13,873 | 1% |
| B-36 | 18 | 1648 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,862 | 2% |
| B-37 | 12 | 608 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 6,590 | 1% |
| B-38 | 17 | 1569 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,006 | 2% |
| B-39 | 17 | 1568 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,995 | 2% |
| B-40 | 17 | 1560 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,908 | 2% |
| B-41 | 18 | 1712 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 18,556 | 2% |
| B-42 | 18 | 1712 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 18,556 | 2% |
| B-43 | 12 | 1088 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 11,792 | 1% |
| B-44 | 16 | 1504 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,301 | 2% |
| B-45 | 20 | 1888 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,463 | 2% |
| B-46 | 25 | 2000 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 21,677 | 2% |
| B-47 | 20 | 1872 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 20,290 | 2% |
| B-48 | 16 | 1616 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 17,515 | 2% |
| B-49 | 30 | 2400 | LW | TREE LW | BUBBLER (TREE) 0.5 GPM | 0.3 | 0.81 | 0.85 | 0.4 | 2 | 2 | 0.0 | 0.0 | 9.0 | 13.0 | 18.0 | 20.0 | 22.0 | 19.0 | 16.0 | 10.0 | 5.0 | 0.0 | 26,012 | 3% |
| B-50 | 18 | 1760 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,076 | 2% |
| B-51 | 23 | 2176 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 23,585 | 2% |
| B-52 | 18 | 1712 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 18,556 | 2% |
| B-53 | 19 | 2320 | MW | SHRUB GC LW | BUBBLER (SHRUB) | 0.5 | 0.81 | 1.91 | 0.6 | 2 | 2 | 0.0 | 0.0 | 7.0 | 10.0 | 13.0 | 15.0 | 17.0 | 15.0 | 12.0 | 8.0 | 4.0 | 0.0 | 41,909 | 3% |
| B-54 | 16 | 1792 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 19,423 | 2% |
| B-55 | 19 | 1488 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 16,128 | 2% |
| B-56 | 7 | 672 | LW | SHRUB GC LW | BUBBLER (SHRUB) | 0.3 | 0.81 | 1.91 | 0.4 | 2 | 2 | 0.0 | 0.0 | 4.0 | 6.0 | 8.0 | 9.0 | 10.0 | 9.0 | 7.0 | 5.0 | 2.0 | 0.0 | 7,283 | 1% |
| | TOTAL | 91,423 | | | | | | | | | | | | | | | | | | | | | TOTAL | 1,042,337 | 100% |

SPECIAL LANDSCAPE AREAS

| HYDROZONE # | HYDROZONE NAME | AREA (sq.ft) (HA) | Percentage of Landscape |
|---|---|---|---|
| | | | |
| | | | 0% |

| | | |
|---|---|---|
| MAWA | GALLONS/YR | 1,203,931 |
| | ACRE FEET/YR | 3.69 |
| | HCF/YR | 1,609.53 |

| | | |
|---|---|---|
| ETWU | GALLONS/YR | 1,042,337 |
| | ACRE FEET/YR | 3.20 |
| | HCF/YR | 1,393.50 |

| SITE IRRIGATION EFFICIENCY | SITE PLANT FACTOR | MAWA COMPLIANT |
|---|---|---|
| 81.0% | 0.32 | YES |

| ETAF Calculations | |
|---|---|
| REGULAR LANDSCAPE AREAS | |
| TOTAL ETAF x AREA | 35,618 |
| TOTAL AREA | 91,423 |
| AVG. ETAF | 38.96% |

***THE IRRIGATION VALVE SCHEDULE SHOWN ABOVE IS INTENDED TO BE USED AS A GUIDELINE ONLY AND INDICATES THE APPROXIMATE RUN TIMES IN MINUTES FOR EACH VALVE BASED ON ESTIMATED WEEKLY WATER REQUIREMENTS FOR ESTABLISHED PLANT MATERIAL. THE TIMES SHOWN ARE APPROXIMATE AND HAVE BEEN DEVELOPED FROM LOCAL AND CURRENT AVERAGES FOR EVAPOTRANSPIRATION, AND REFLECTTHE WATER REQUIREMENTS OF THE PLANT MATERIAL BASED ON PLANT TYPE AND THE APPROXIMATE PRECIPITATION OR APPLICATION RATES OF THE IRRIGATION SYSTEM TYPE. ACTUAL RUN TIMES MAY BE DIFFERENT DEPENDING ON A VARIETY OF FACTORS INCLUDING TOPOGRAPHY, SOIL STRUCTURE, SUN AND WIND EXPOSURE, WEATHER, ACTUAL PLANT WATER REQUIREMENTS, OVERALL PRECIPITATION RATE OF ZONE, ETC.***

| MAWA FORMULA |
|---|
| MAXIMUM APPLIED WATER ALLOWANCE (MAWA) GALLONS PER YEAR |
| MAWA = (ETo)(0.62)[(LA x 0.45) + (0.55 x SLA)] |

ETo = REFERENCE EVAPOTRANSPIRATION

0.45= ET ADJUSTMENT FACTOR

LA=LANDSCAPED AREA (SQUARE FEET)
0.62 = CONVERSION FACTOR (GALLONS/SQ.FT/YR)

| ETWU FORMULA |
|---|
| ESTIMATED TOTAL WATER USE (ETWU) GALLONS PER YEAR |
| ETWU= ((ETO)(.62)(ETAF x LA)) |

ETo = REFERENCE EVAPOTRANSPIRATION

PF = PLANT FACTOR FOR HYDROZONES

HA = HYDROZONE AREA (SQ.FT)
0.62 = CONVERSION FACTOR (GALLONS/SQ.FT/YR)

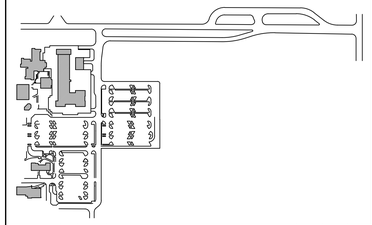
IE = IRRIGATION EFFICIENCY (0.81)-BUBBLER/DRIP

IE = IRRIGATION EFFICIENCY (0.75)-ROTORS/SPRAY


GATES +ASSOCIATES
LANDSCAPE ARCHITECTURE
LAND PLANNING · URBAN DESIGN
1455 N. MAIN ST. STE 260, WALNUT CREEK, CA 94596
T 925.736.8176 www.gates.com


REGISTERED LANDSCAPE ARCHITECT · CHRIS GATES · 6/30/2024 · 11/07/2022 · STATE OF CALIFORNIA

KEY MAP



| XXX | X | XX/XX/XX | REVISION | XXX | XXX | XXX |
|---|---|---|---|---|---|---|
| PROJ.& W.O. | NO. | DATE | | BY | CHK | APP |


*Irrigation Consultant:*
***Russell D. Mitchell Associates, Inc.***
2760 Camino Diablo
Walnut Creek, CA 94597
tel 925.939.3985 ◆ fax 925.932.5671
www.rmairrigation.com


Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

| | | | |
|---|---|---|---|
| SECTOR | LANDSCAPE | BLDG. | |
| | IRRIGATION CALCULATIONS | FLOOR | |
| CONTRACT NO./A-E | XXX | | |
| DOE ACCT.NO. | XXX | | |
| DRAWN | JELZM | | |
| CHECKED | CM | | |
| SCALE | AS SHOWN | | |
| DATE | 11/07/22 | | |

AE FIRM: | SNL PM: | SNL APPROVED BY:

SHEET 34 OF 34 | SHEET LS-602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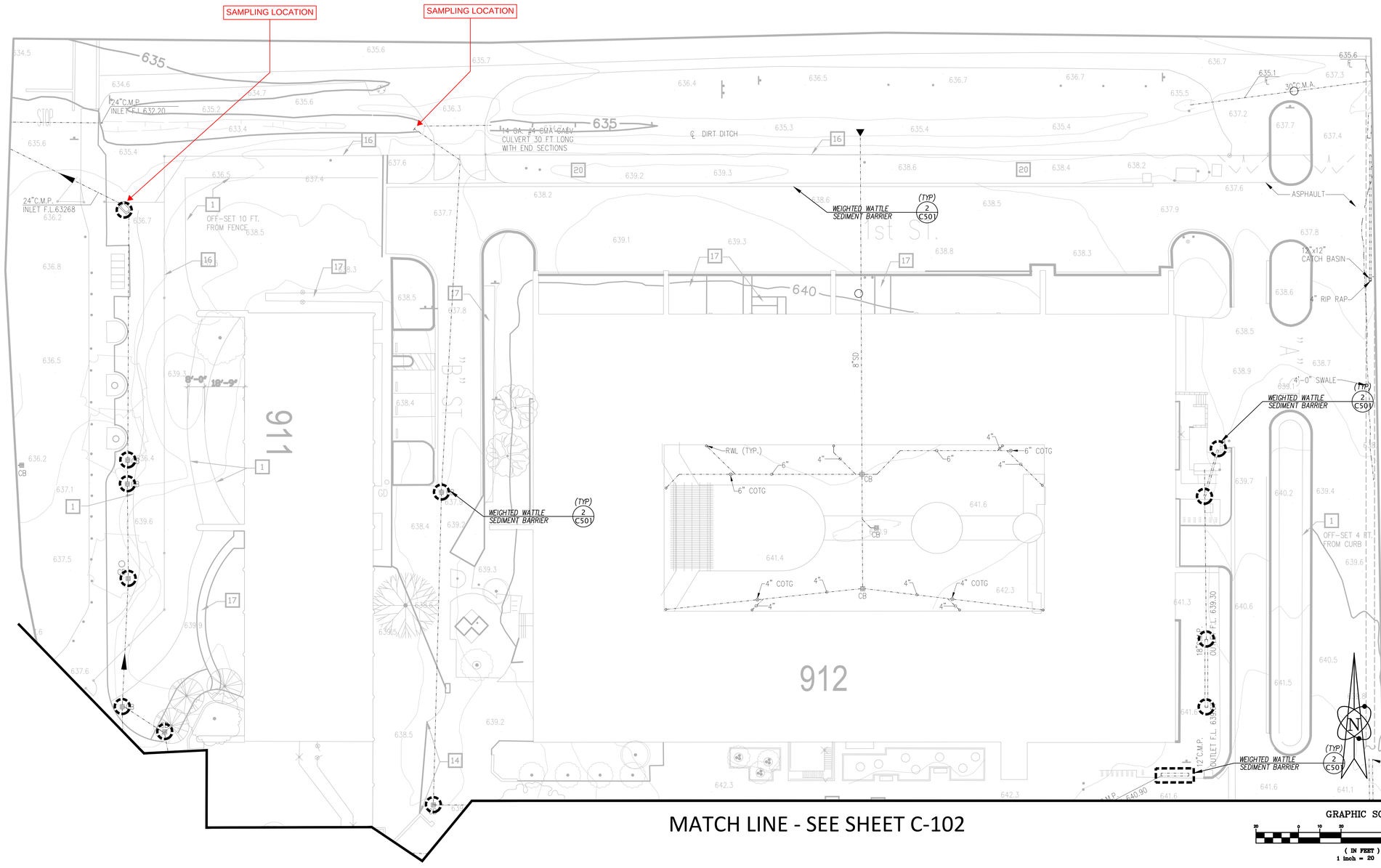
CADS DRAWING
FILE NAME: X-XXX.dwg
PROJ. NO. E1234
ORDER NO. XX-XXXX

# FIGURE 3

# EROSION CONTROL PLAN




MATCH LINE - SEE SHEET C-102

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE / SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 — C-101, C-102, C-103, C-104, C-501
FOR NATIVE TERRAIN
STRAW WATTLE (FIBER ROLL)

2 — C-101, C-102, C-103, C-104, C-501
FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT)
WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

HYDROSEEDING (ALL DISTURBED AREAS). SEE LANDSCAPING NOTES FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.
   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12" MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
4. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE SANDIA DESIGNATED REPRESENTATIVE (SDR).
5. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE SDR.
6. ALL PAVED AREAS SHALL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO AS TO MINIMIZE SEDIMENT-LADEN RUN-OFF TO ANY CREEK OR STORM DRAINAGE SYSTEM.
7. ALL EROSION CONTROL FACILITIES MUST BE INSPECTED AND REPAIRED AS NEEDED OR DIRECTED BY THE SDR.
8. BORROW AREAS AND TEMPORARY STOCKPILES SHALL BE PROTECTED WITH APPROPRIATE EROSION CONTROL MEASURES TO THE SATISFACTION OF THE SDR.
9. ALL CUT AND FILL SLOPES ARE TO BE PROTECTED TO PREVENT OVERBANK FLOW AS REQUIRED BY THE SDR.
10. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO ANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF THE SDR.
11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

| | | | | | |
|---|---|---|---|---|---|
| | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH | |
| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | APP. |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE A

# EROSION CONTROL PLAN

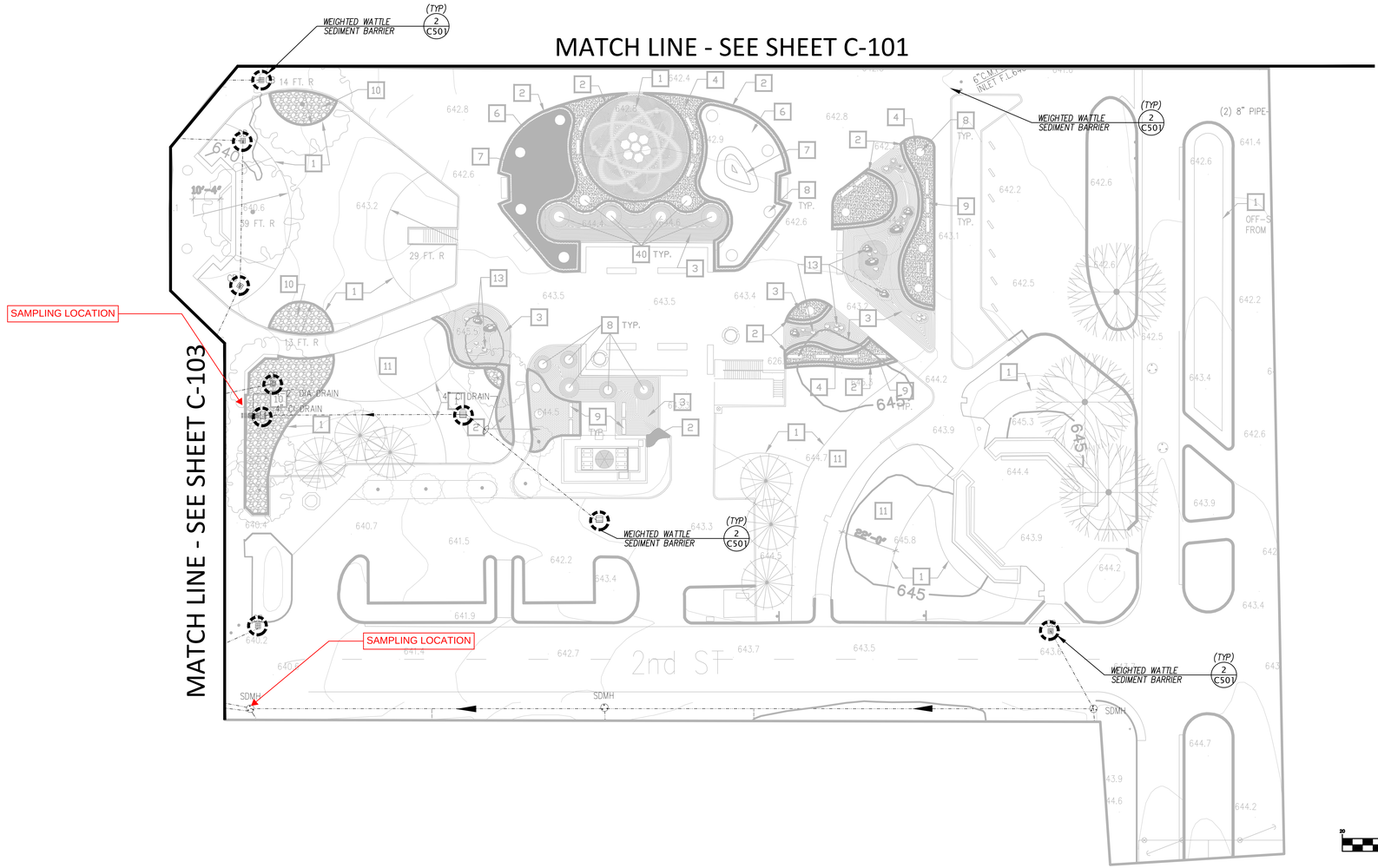
| | |
|---|---|
| DRAWN | |
| CHECKED | |
| DESIGN | SA |
| PROJECT MGR | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:
SHEET C-101

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

Z:\2017\A17546-61\DWG\CIVIL\Civil Erosion Control-2.dwg 8-01-22 04:24:22 PM choyes




## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| 100 / 100.00 | 100 / 100.00 | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| | | CONTOUR LINE |
| | | SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 C-101 C-102 C-103 C-104 C-501 — FOR NATIVE TERRAIN: STRAW WATTLE (FIBER ROLL)

2 C-101 C-102 C-103 C-104 C-501 — FOR PAVEMENT AREAS: GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

HYDROSEEDING (ALL DISTURBED AREAS). SEE LANDSCAPING NOTES FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12" MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
4. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE SANDIA DESIGNATED REPRESENTATIVE (SDR).
5. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE SDR.
6. ALL PAVED AREAS SHALL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO AS TO MINIMIZE SEDIMENT-LADEN RUN-OFF TO ANY CREEK OR STORM DRAINAGE SYSTEM.
7. ALL EROSION CONTROL FACILITIES MUST BE INSPECTED AND REPAIRED AS NEEDED OR DIRECTED BY THE SDR.
8. BORROW AREAS AND TEMPORARY STOCKPILES SHALL BE PROTECTED WITH APPROPRIATE EROSION CONTROL MEASURES TO THE SATISFACTION OF THE SDR.
9. ALL CUT AND FILL SLOPES ARE TO BE PROTECTED TO PREVENT OVERBANK FLOW AS REQUIRED BY THE SDR.
10. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO ANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF THE SDR.
11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

| | | | | | |
|---|---|---|---|---|---|
| | | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH |
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. APP. |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico, Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE A
**EROSION CONTROL PLAN**

| | |
|---|---|
| DRAWN | |
| DESIGN | |
| CHK | SA |
| APPR | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT | SNL PM: | SNL APPROVED BY:

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

SHEET C-102

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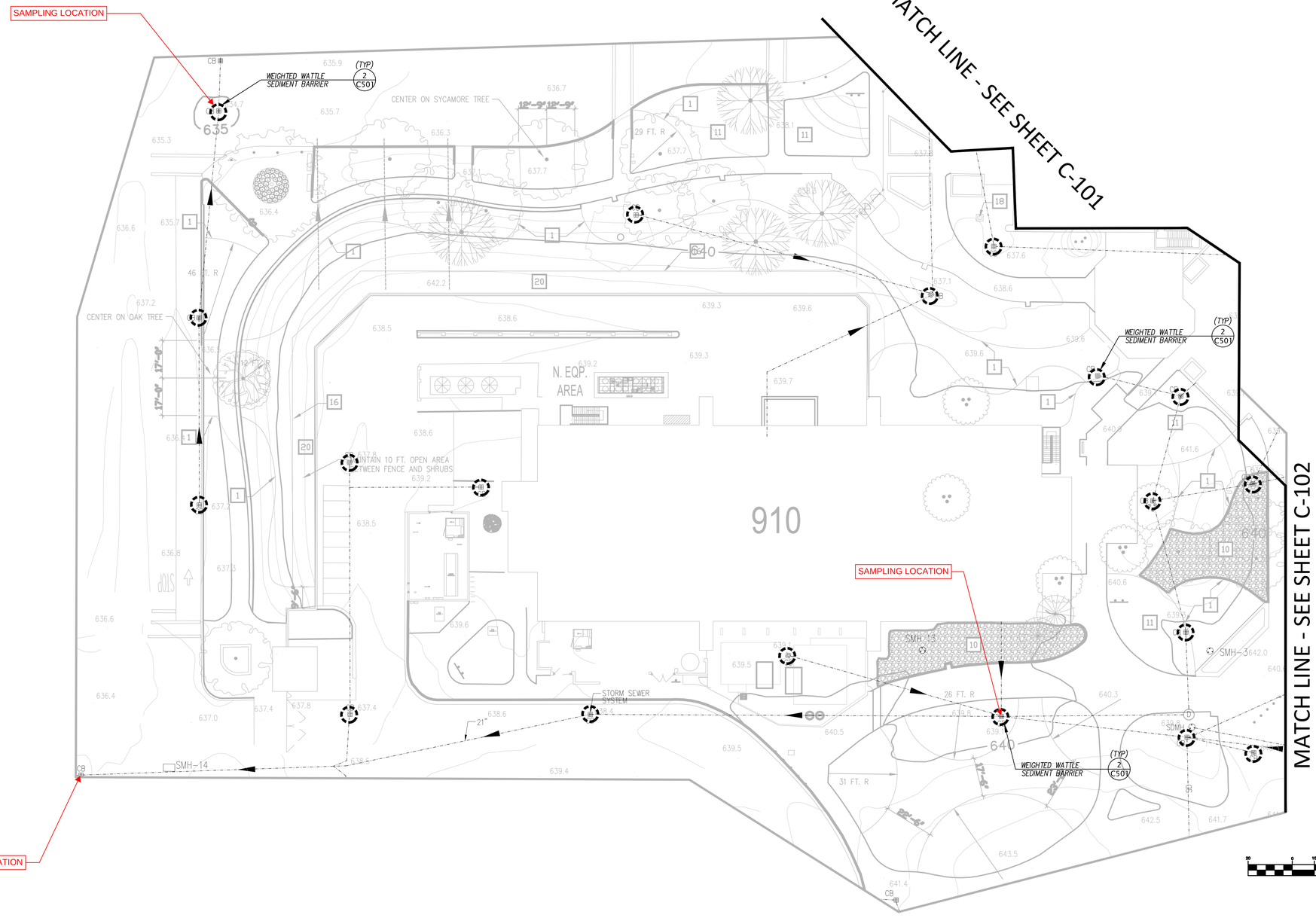


## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE / SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 / C-101 C-102 C-103 C-104 C-501 — FOR NATIVE TERRAIN: STRAW WATTLE (FIBER ROLL)

2 / C-101 C-102 C-103 C-104 C-501 — FOR PAVEMENT AREAS: GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

HYDROSEEDING (ALL DISTURBED AREAS). SEE LANDSCAPING NOTES FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12' MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
4. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE SANDIA DESIGNATED REPRESENTATIVE (SDR).
5. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE SDR.
6. ALL PAVED AREAS SHALL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO AS TO MINIMIZE SEDIMENT-LADEN RUN-OFF TO ANY CREEK OR STORM DRAINAGE SYSTEM.
7. ALL EROSION CONTROL FACILITIES MUST BE INSPECTED AND REPAIRED AS NEEDED OR DIRECTED BY THE SDR.
8. BORROW AREAS AND TEMPORARY STOCKPILES SHALL BE PROTECTED WITH APPROPRIATE EROSION CONTROL MEASURES TO THE SATISFACTION OF THE SDR.
9. ALL CUT AND FILL SLOPES ARE TO BE PROTECTED TO PREVENT OVERBANK FLOW AS REQUIRED BY THE SDR.
10. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO ANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF THE SDR.
11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

| | | | | | |
|---|---|---|---|---|---|
| | | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH |
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. APP. |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE A
**EROSION CONTROL PLAN**

| | |
|---|---|
| DESIGN | |
| DRAWN | SA |
| CHECKED | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:

SHEET C-103

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN
PROJ. NO. 215791
ORDER NO.

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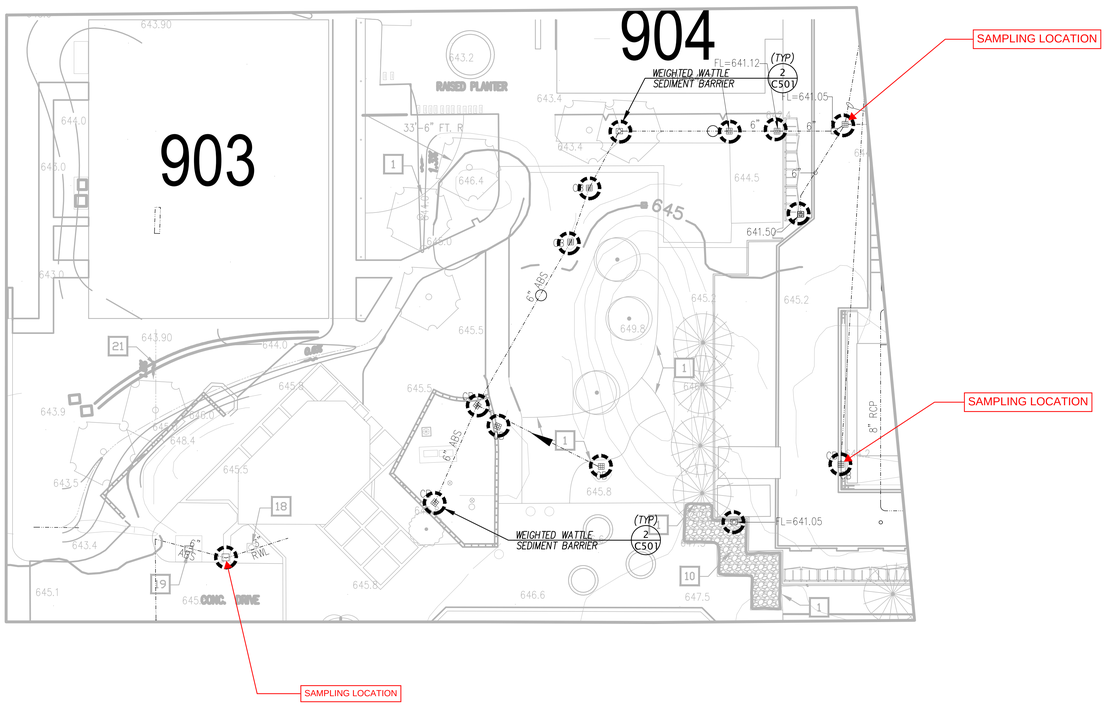


## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE |
| | | SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 — C-101, C-102, C-103, C-104 — C-501

FOR NATIVE TERRAIN
STRAW WATTLE (FIBER ROLL)

2 — C-101, C-102, C-103, C-104 — C-501

FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT)
WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

HYDROSEEDING (ALL DISTURBED AREAS). SEE LANDSCAPING NOTES FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12" MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
4. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE SANDIA DESIGNATED REPRESENTATIVE (SDR).
5. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE SDR.
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9. ALL CUT AND FILL SLOPES ARE TO BE PROTECTED TO PREVENT OVERBANK FLOW AS REQUIRED BY THE SDR.
10. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO ANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF THE SDR.
11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

N

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

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| | | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH |
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. APP. |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE A
**EROSION CONTROL PLAN**

| | |
|---|---|
| DESIGN | |
| DRAWN | SA |
| CHECK | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:

SHEET C-104

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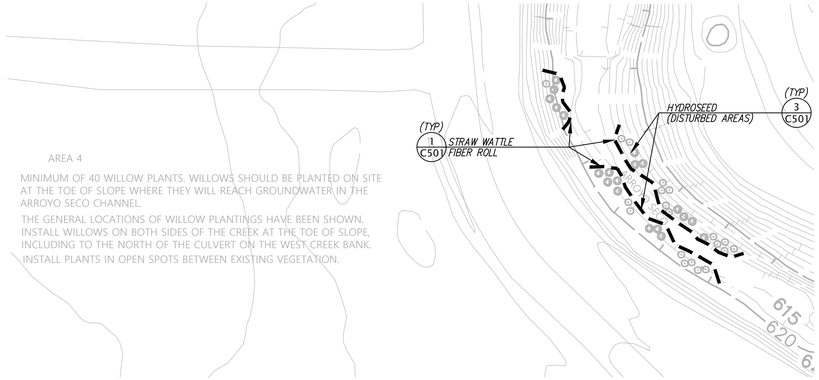


# AREA 4
# EROSION CONTROL PLAN

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE / SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

FOR NATIVE TERRAIN
1 C-101 C-102 C-103 C-104 C-501
STRAW WATTLE (FIBER ROLL)

FOR PAVEMENT AREAS
2 C-101 C-102 C-103 C-104 C-501
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

HYDROSEEDING (ALL DISTURBED AREAS). SEE 3 C-101 C-501 FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.
   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12' MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
4. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE SANDIA DESIGNATED REPRESENTATIVE (SDR).
5. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE SDR.
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10. THIS PLAN MAY NOT COVER ALL THE SITUATIONS THAT ARISE DURING CONSTRUCTION DUE TO ANTICIPATED FIELD CONDITIONS. VARIATIONS MAY BE MADE TO THE PLAN IN THE FIELD SUBJECT TO THE APPROVAL OF THE SDR.
11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | APP. |
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| | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE B

**AREA 4 EROSION CONTROL PLAN**

| | |
|---|---|
| DESIGNED | |
| DRAWN | SA |
| CHECKED | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

SHEET C-101

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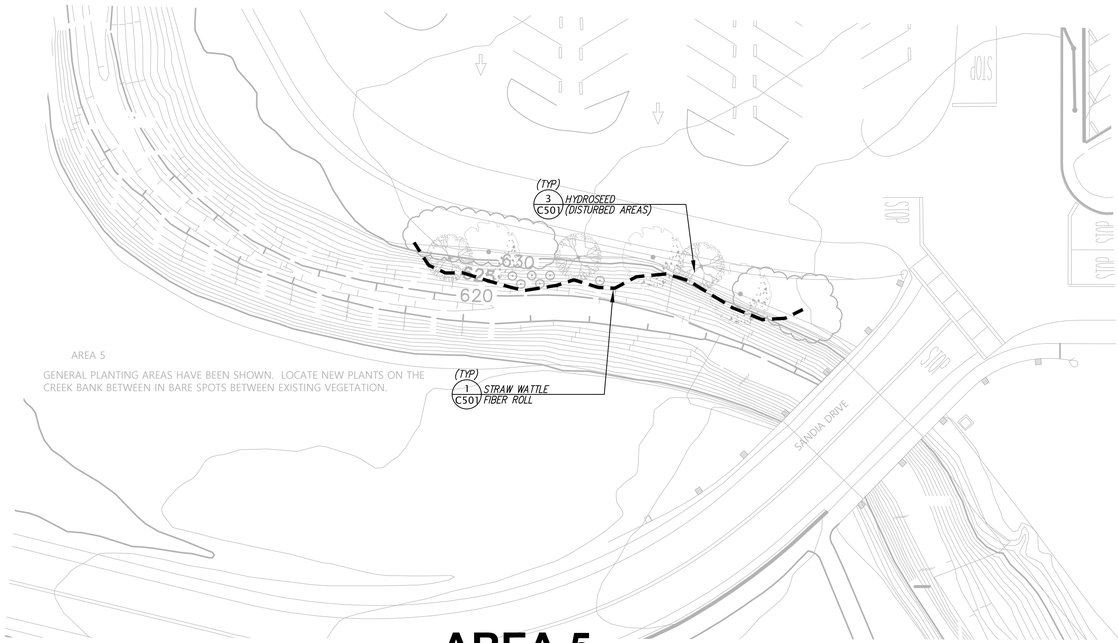


# AREA 5
# EROSION CONTROL PLAN

GRAPHIC SCALE

30 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| 100 / 100.00 | 100 / +100.00 | ASPHALT BERM<br>BLOCK/RETAINING WALL<br>CONCRETE CURB<br>CONTOUR LINE<br>SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 C-101 C-102 C-103 C-104 C-501 — FOR NATIVE TERRAIN: STRAW WATTLE (FIBER ROLL)

2 C-101 C-102 C-103 C-104 C-501 — FOR PAVEMENT AREAS: GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

HYDROSEEDING (ALL DISTURBED AREAS). SEE 3 C-101 C-501 FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12" MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
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11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | APP. |
|---|---|---|---|---|---|---|
| | | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico, Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE B

**AREA 5 EROSION CONTROL PLAN**

| | |
|---|---|
| DRAWN: | |
| DESIGN: | SA |
| CHECKED: | CH |
| SCALE: | AS INDICATED |
| DATE: | 07/15/22 |

AE FIRM: KIER+WRIGHT | SNL PM: | SNL APPROVED BY:

SHEET C-102

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

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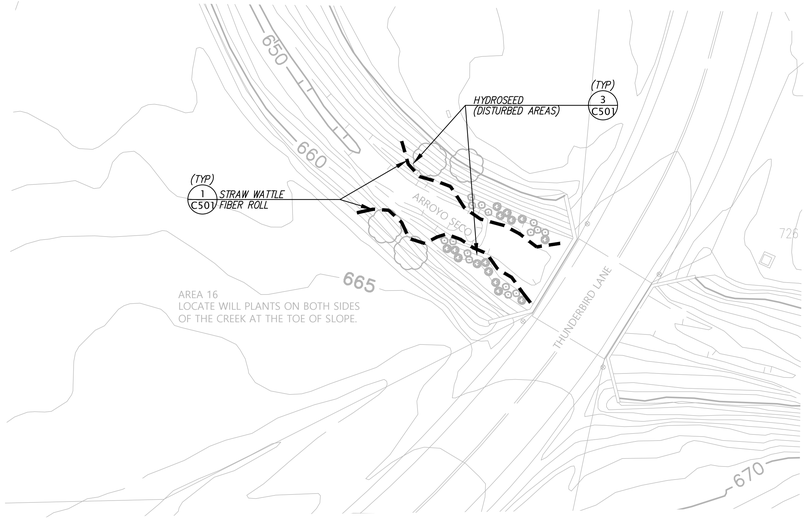


# AREA 16
# EROSION CONTROL PLAN

GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE |
| | | SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

FOR NATIVE TERRAIN
STRAW WATTLE (FIBER ROLL)
1 C-101 C-501 C-102 C-103 C-104

FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION
2 C-101 C-501 C-102 C-103 C-104

HYDROSEEDING (ALL DISTURBED AREAS).
SEE 3 C-101 C-501 FOR SEED

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

   NAME: TO BE DETEMINED
   ADDRESS:
   TELEPHONE:
3. IF REQUIRED BY SANDIA, THE CONTRACTOR SHALL PLACE 3"-6" COARSE AGGREGATE AS A GRAVEL ROADWAY (12" MIN. THICK FOR THE FULL WIDTH AND 50 FEET LONG) AT EACH D/W ENTRANCE TO SITE.
4. ANY MUD THAT IS TRACKED ONTO PUBLIC STREETS SHALL BE REMOVED THAT SAME DAY AND AS REQUIRED BY THE SANDIA DESIGNATED REPRESENTATIVE (SDR).
5. ALL EROSION CONTROL MEASURES SHALL BE MAINTAINED UNTIL DISTURBED AREAS ARE STABILIZED AND CHANGES TO THIS EROSION AND SEDIMENT CONTROL PLAN SHALL BE MADE TO MEET FIELD CONDITIONS ONLY WITH THE APPROVAL OF OR AT THE DIRECTION OF THE SDR.
6. ALL PAVED AREAS SHALL BE KEPT CLEAR OF EARTH MATERIAL AND DEBRIS. THE SITE SHALL BE MAINTAINED SO AS TO MINIMIZE SEDIMENT-LADEN RUN-OFF TO ANY CREEK OR STORM DRAINAGE SYSTEM.
7. ALL EROSION CONTROL FACILITIES MUST BE INSPECTED AND REPAIRED AS NEEDED OR DIRECTED BY THE SDR.
8. BORROW AREAS AND TEMPORARY STOCKPILES SHALL BE PROTECTED WITH APPROPRIATE EROSION CONTROL MEASURES TO THE SATISFACTION OF THE SDR.
9. ALL CUT AND FILL SLOPES ARE TO BE PROTECTED TO PREVENT OVERBANK FLOW AS REQUIRED BY THE SDR.
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11. ANY DISTURBED OR CLEARED AREAS SHALL BE STABILIZED IF NOT ACTIVELY WORKED ON WITHIN 14 DAYS.

## KEY NOTES

1. INSTALL PERIMETER STRAW WATTLES PER DETAIL 1 ON SHEET C-501.
2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

| PROJ.& W.O. NO. | DATE | REVISION | BY | CK. | APP. |
|---|---|---|---|---|---|
| | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH | |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE B
AREA 16 EROSION CONTROL PLAN

| | |
|---|---|
| DESIGNED | |
| DRAWN | SA |
| CHECKED | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:

SHEET C-103

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

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GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

# AREA 17
# EROSION CONTROL PLAN

## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / +100.00 | CONTOUR LINE / SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |
| | | FOR NATIVE TERRAIN: STRAW WATTLE (FIBER ROLL) — 1 / C-101 C-102 C-103 C-104 C-501 |
| | | FOR PAVEMENT AREAS: GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION — 2 / C-101 C-102 C-103 C-104 C-501 |
| | | HYDROSEEDING (ALL DISTURBED AREAS). SEE 3 / C-101 FOR SEED C-501 |

## EROSION & SEDIMENT CONTROL MEASURES

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   TELEPHONE:
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## KEY NOTES

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2. SEE DETAIL 2 ON SHEET C-501 FOR FILL OPTIONS AT LOCATIONS WITHIN CREEK.
3. TEMPORARY STOCKPILE SHALL BE PROTECTED FROM EROSION CONTROL.

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH | |
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | APP. |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PHASE B
AREA 17 EROSION CONTROL PLAN

| | |
|---|---|
| DESIGN | |
| DRAWN | SA |
| CHECK | CH |
| SCALE | AS INDICATED |
| DATE | 07/15/22 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:

SHEET C-104

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

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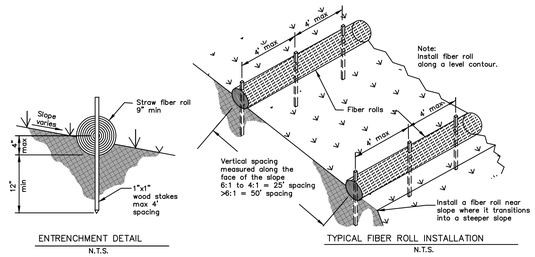


1
C-101 C-501
C-102
C-103
C-104

STRAW WATTLE

NOT TO SCALE

**Table 3. Native Seed Mix**

| Common Name (Scientific Name) | Seeding Rate (lbs. pure live seed /acre) |
|---|---|
| creeping wildrye *(Leymus triticoides)* | 8 |
| California brome (*Bromus sitchensis* var. *carinatus*) | 8 |
| small fescue (*Vulpia microstachya*) | 6 |
| purple needlegrass (*Stipa pulchra*) | 6 |
| common fiddleneck (*Amsinckia intermedia*) | 2 |
| California poppy (*Eschscholzia californica*) | 2 |
| Great Valley gumweed (*Grindelia camporum*) | 2 |
| coyote brush (*Baccharis pilularis* subsp. *consanguinea*) | 2 |
| **Total** | **36** |

3
C-101 C-501
C-102
C-103
C-104

HYDROSEED MIX

NOT TO SCALE

Gator Guard
Environmental Products Inc. ™

## Street & Drain Sediment Control Installation & Maintenance

### Weighted Wattle

1. Take to desired location, remove the bands and unfold. **DO NOT DRAG**.
2. Push the weighted inserts fully into the outer sock.
3. Soft Geotextile should be centered on the bottom – reposition inserts to get weighted side down if necessary.
4. Connect by pushing the closed end of one Wattle fully into the open end of the next. Handling straps may be tied together for a more secure connection.

### Weighted Gutter Wattle

1. Place Gutter Wattle Diagonally across gutter and press into place with your feet.

### Weighted Drain Wattle

1. Install per photos **below**. Press sandbags with feet – tight to curb. **DO NOT DRAG**
2. Inspect weekly for correct placement
3. REUSE or dispose of wattle properly if damaged, deteriorated or no longer needed.

**Most Effective Install**



**Stops Dirt & Covers Curb Cutout**



**Covers Curb Cutout**

### Curb Cutout Protector

1. Remove storm drain grate and place it on the sidewalk. Clean the framework.
2. Place Drain Inlet Bag in the opening and hold with your feet
3. Center the Curb Cutout Protector against the curb with apron either under or over the DI Bag and hold the ends with your feet too.
4. Install the grate on top of the DI bag and curb cutout protector apron. Pull the apron ends tight while holding up the back of the grate, then push down on the grate until flush.

### MAINTENANCE

1. Inspect, clean out deposited sediment after each storm event (best to sweep when dry).
2. REUSE or dispose of properly if damaged, deteriorated or no longer needed.

www.gatorguard.com 1-877-428-6763

April 2020

Gator Guard
Environmental Products Inc. ™

## Street & Drain Sediment Control SPECIFICATIONS

**12-ft Weighted Wattle**

**3-ft Gutter Wattle**

**8-ft Drain Wattle**

**33-in Curb Cutout**

| | WEIGHTED WATTLE | GUTTER WATTLE | DRAIN WATTLE | CURB CUTOUT PROTECTOR |
|---|---|---|---|---|
| Part No. | EWW612 | WGW436 | WDW608 | CCP433 |
| Height | 6-inch | 4-inch | 6-inch | 4-inch |
| Length | 12-ft (+ sleeve) | 36-inch | 8-feet | 33-inch effective |
| Connection Sleeve | 20-inch | none | none | none |
| Weight | 50-pounds | 30-pounds | 50-pounds | 0.75-pounds |
| Pallet Weight | 740-lb (14 ea.) | 1240-lb (40 ea.) | 1290-lb (25 ea.) | 120-lb (108 ea.) |
| Full Pallet - Inches | 48x42x38 | 42x42x34 | 48x48x38 | 48x48x65 (108ea) |
| Single Bundle In. | 48x18x6 | 37x10x4 | 48x12x6 | 45x15x15 (9 ea) |
| | | | | |
| **Outer Construction** | | | | |
| - Main Fabric | 6-oz Woven Monofilament Polypropylene | | | |
| - Bottom-nonwoven | Polypropylene | none | Polypropylene | none |
| - Straps | 1-inch 900-lb UV Polypropylene Webbing | | | none |
| - Poly Strapping | none | none | Polypropylene | none |
| | | | | |
| **Inner Construction** | | | | |
| - Weight Material | Clean Coarse Sand | | | none |
| - Inner Sand Bag | 6-mil Polyethylene | | | none |
| - Sand Bag Cover | 6-oz Woven Monofilament Polypropylene | | | none |
| - Foam for Height | 2"x4"x45" | none | 6" x 45" roll | 33"x4"x4" shaped |
| | | | | |
| **Woven Fabric** | | | | |
| - Type | High Quality Woven Monofilament Silt Fence | | | |
| - Weight | 6 oz./sq. yd. | | | |
| - Tensile Strength | 375 x 250 lbs. | | | |
| - Puncture | 120 lbs. | | | |
| - Water Flow | 100-gpm/sf clean water, <10-gpm/sf dirty water | | | |
| - UV % Strength | 90% after 500 hrs. | | | |
| | | | | |
| Thread | UV Resistant Polyester | | | |
| | | | | |
| Functional Life | 5 years expected (excludes major damage) | | | |

Date: April 2020 – The above properties are typical averages. All test methods are ASTM or Industry Standards.

www.gatorguard.com 1-877-428-6763

April 2020

2
C-101 C-501
C-102
C-103
C-104

GATOR GUARD WEIGHTED WATTLES

NOT TO SCALE

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 08/01/2022 | LANDSCAPE IMPROVEMENTS | SA | CH | |
| PROJ.& W.O. | NO. | DATE | REVISION | BY | CK. | APP. |

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SITE IMPROVEMENTS
PAHSE A & B

**DETAILS**

DESIGN: SA
DRAWN: SA
CHECK: DS
SCALE: AS INDICATED
DATE: 07/15/22

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:

SHEET C-501

CADS DRAWING
FILE NAME: EROSION CONTROL PLAN

PROJ. NO. 215791
ORDER NO.

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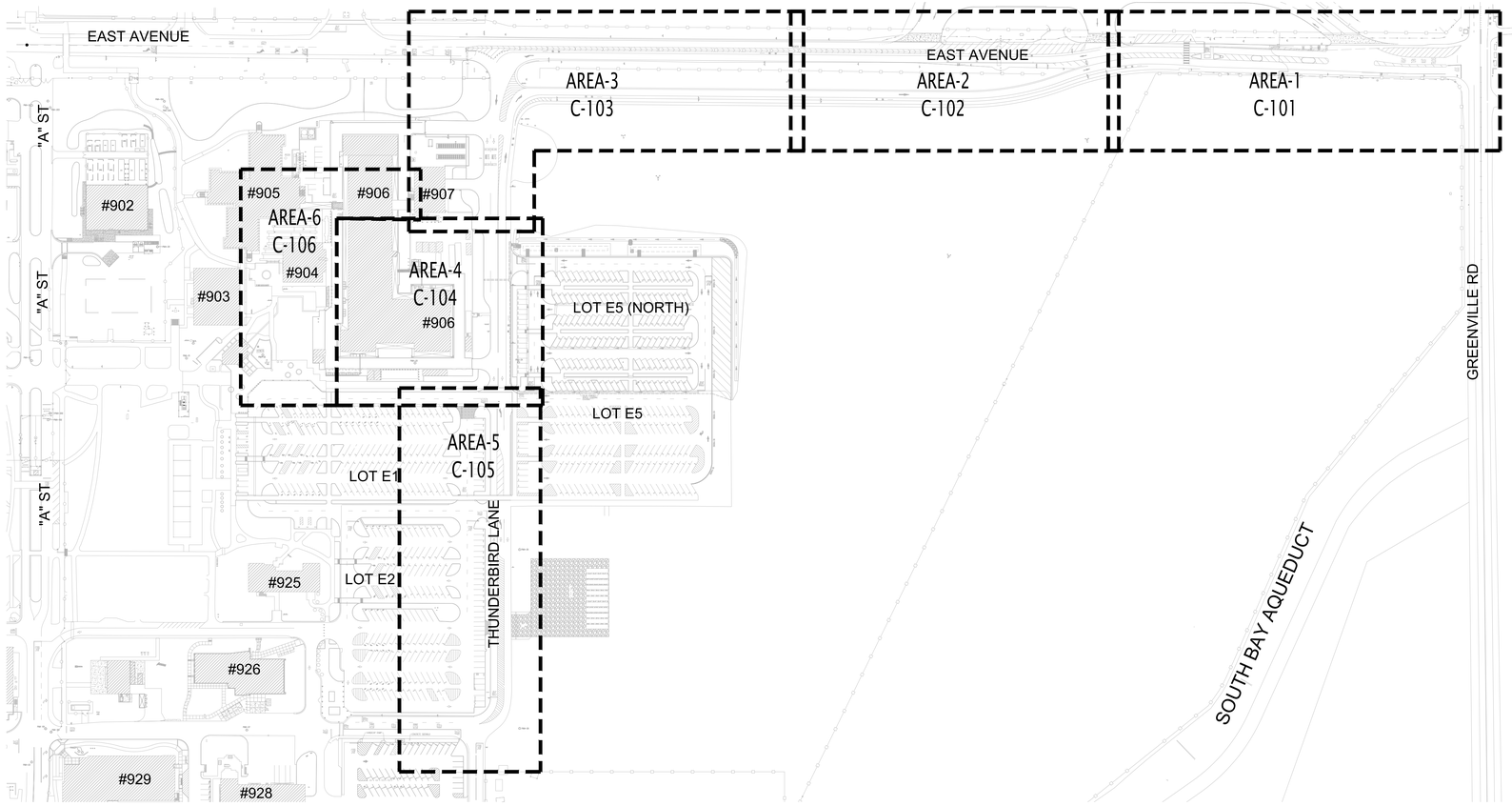


GRAPHIC SCALE

200 0 100 200 400 800

( IN FEET )
1 inch = 100 ft.

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CADS DRAWING
FILE NAME: C-100.dwg

PROJ. NO.
ORDER NO.

| PROJ.& W.O. NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico, Livermore, California; Tonopah, Nevada

SECTOR
SITE IMPROVEMENTS
OVERALL KEY PLAN
BLDG.
FLOOR:N\A

| | |
|---|---|
| CONTRACT NO.(A-E) | XX |
| DOE ACCT.NO. | |
| DRAWN | SA |
| CHECKED | CM |
| SCALE | |
| DATE | MARCH, 2023 |

| A-E FIRM: | SNL PM: | SNL APPROVED BY: |
|---|---|---|
| KIER+WRIGHT | SHEET C-100 | |

Z:\2017\A17546-67\DWG\CIVIL\TITLE I\A17546-67 - CIVIL EROSION CONTROL.dwg 3-16-23 01:42:28 PM salvarez

MATCH LINE - SEE SHEET C-102

EAST AVE.

STOP

(TYP) 1 C501 WEIGHTED WATTLE SEDIMENT BARRIER

RIGHT TURN MUST TRUCKS

STOP

GREENVILLE RD

SHH-43

GRAPHIC SCALE

30 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

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CADS DRAWING
FILE NAME: C-101.dwg

PROJ. NO.
ORDER NO.

## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE / SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 C-101 C-501 C-102 C-103 C-104 C-105 C-106 — FOR PAVEMENT AREAS GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

## EROSION & SEDIMENT CONTROL MEASURES

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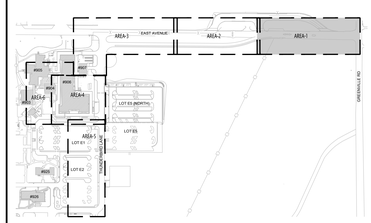
## KEYMAP




| PROJ.& W.O. | NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|---|

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR: 65 — SITE IMPROVEMENTS — BLDG.

EROSION CONTROL PLAN - AREA 1

FLOOR: N\A

| | |
|---|---|
| CONTRACT NO.(A-E) | XX |
| ACCT.NO. | |
| DRAWN | SA |
| CHECKED | CH |
| SCALE | |
| DATE | MARCH, 2023 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:
SHEET C-101

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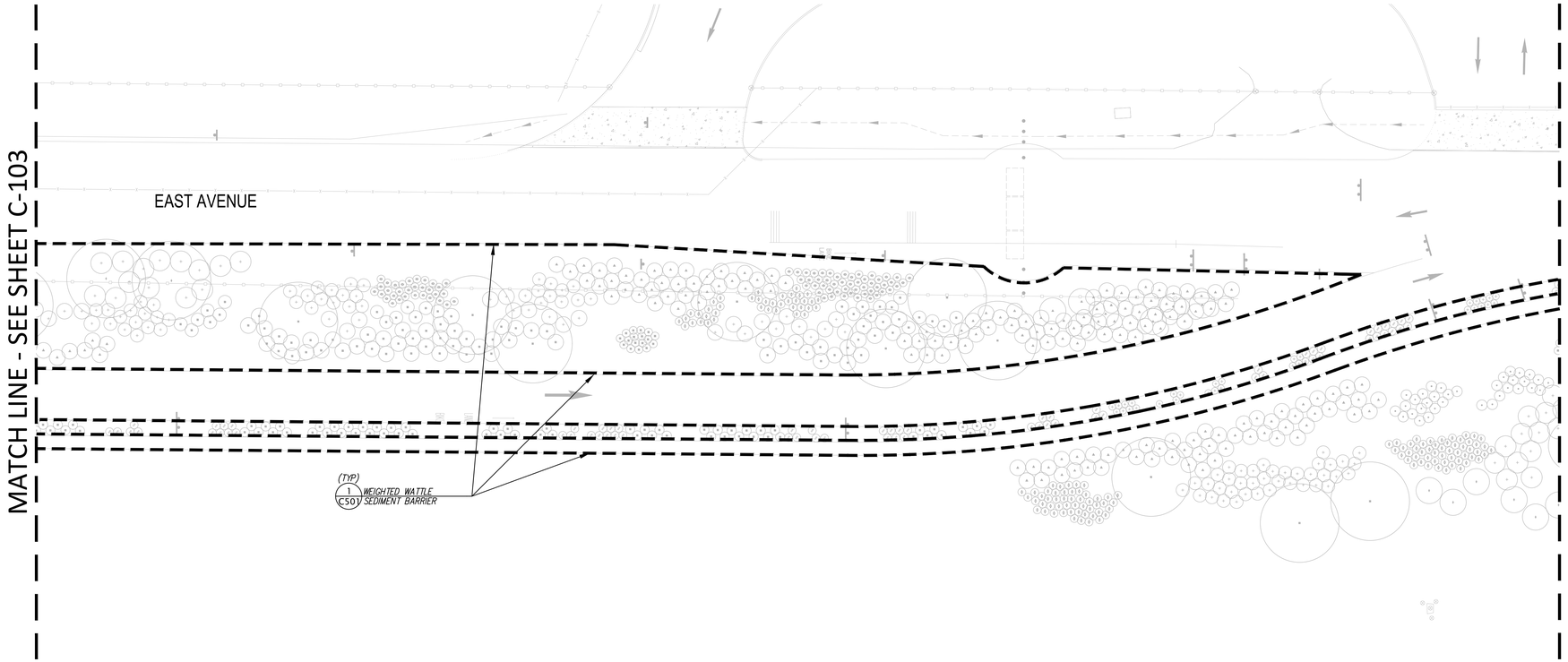


## LEGEND

PROPOSED / EXISTING

- ASPHALT BERM
- BLOCK/RETAINING WALL
- CONCRETE CURB
- CONTOUR LINE
- SPOT ELEVATION
- TRAFFIC SIGN
- TREE
- UTILITY BOX
- PHOTO MONUMENTS
- CONCRETE
- EASEMENT
- FLOW LINE
- GRADE BREAK
- RIDGE
- SWALE

1 C-101 C-501 C-102 C-103 C-104 C-105 C-106

FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC
(OR APPROVED EQUAL PRODUCT)
WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

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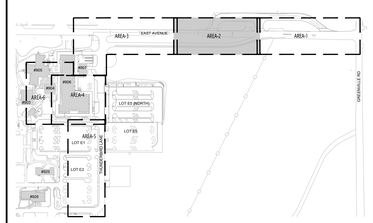


GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

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CADS DRAWING
FILE NAME: C-102.dwg

PROJ. NO.
ORDER NO.

| PROJ.& W.O. NO. | DATE | REVISION | BY | CHK | APP |
|---|---|---|---|---|---|

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR: 65 SITE IMPROVEMENTS BLDG.

EROSION CONTROL PLAN - AREA 2

FLOOR: N\A

| | |
|---|---|
| CONTRACT NO./A-E-D | XX |
| SOL ACCT.NO. | |
| DRAWN | JA |
| CHECKED | DN |
| SCALE | |
| DATE | MARCH, 2023 |

AE FIRM: KIER+WRIGHT
SNL PM:
SNL APPROVED BY:
SHEET C-102

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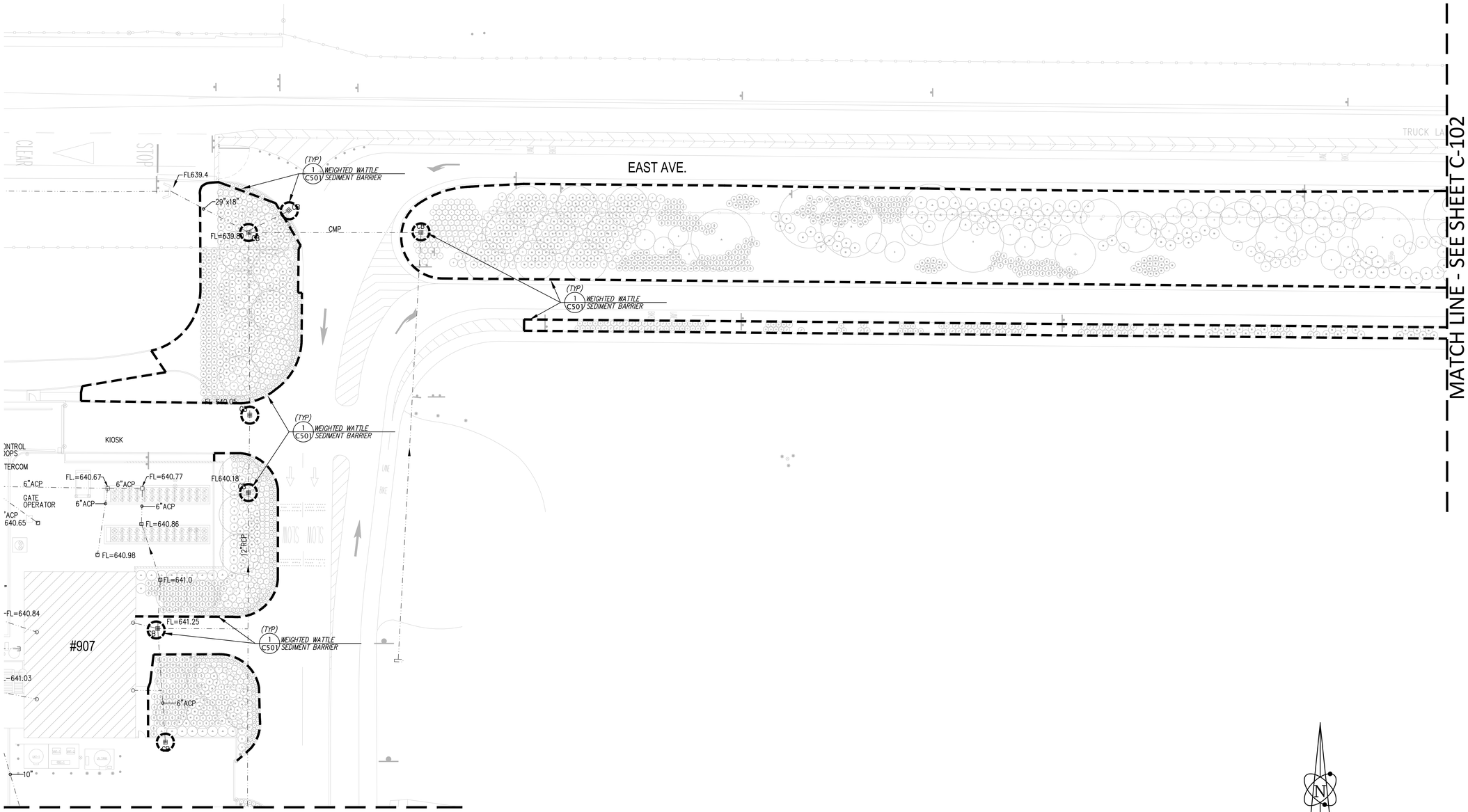


## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 / 100.00 | 100 / 100.00 | CONTOUR LINE / SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
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| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

1 C-101 C-102 C-103 C-104 C-105 C-106 C-501 — FOR PAVEMENT AREAS GATOR GUARD ENVIRONMENTAL PRODUCTS, INC (OR APPROVED EQUAL PRODUCT) WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

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2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

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   ADDRESS:
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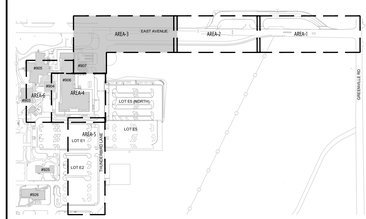
## KEYMAP




GRAPHIC SCALE

20 0 10 20 40 80

( IN FEET )
1 inch = 20 ft.

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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR:65 — SITE IMPROVEMENTS — BLDG.:

EROSION CONTROL PLAN - AREA 3

FLOOR:N\A

| | |
|---|---|
| CONTRACT SOW-ID | XX |
| DOE ACCT.NO. | |
| DRAWN | SA |
| CHECKED | CH |
| SCALE | |
| DATE | MARCH, 2023 |

AE FIRM: — SNL PM: — SNL APPROVED BY:

KIER+WRIGHT — SHEET C-103

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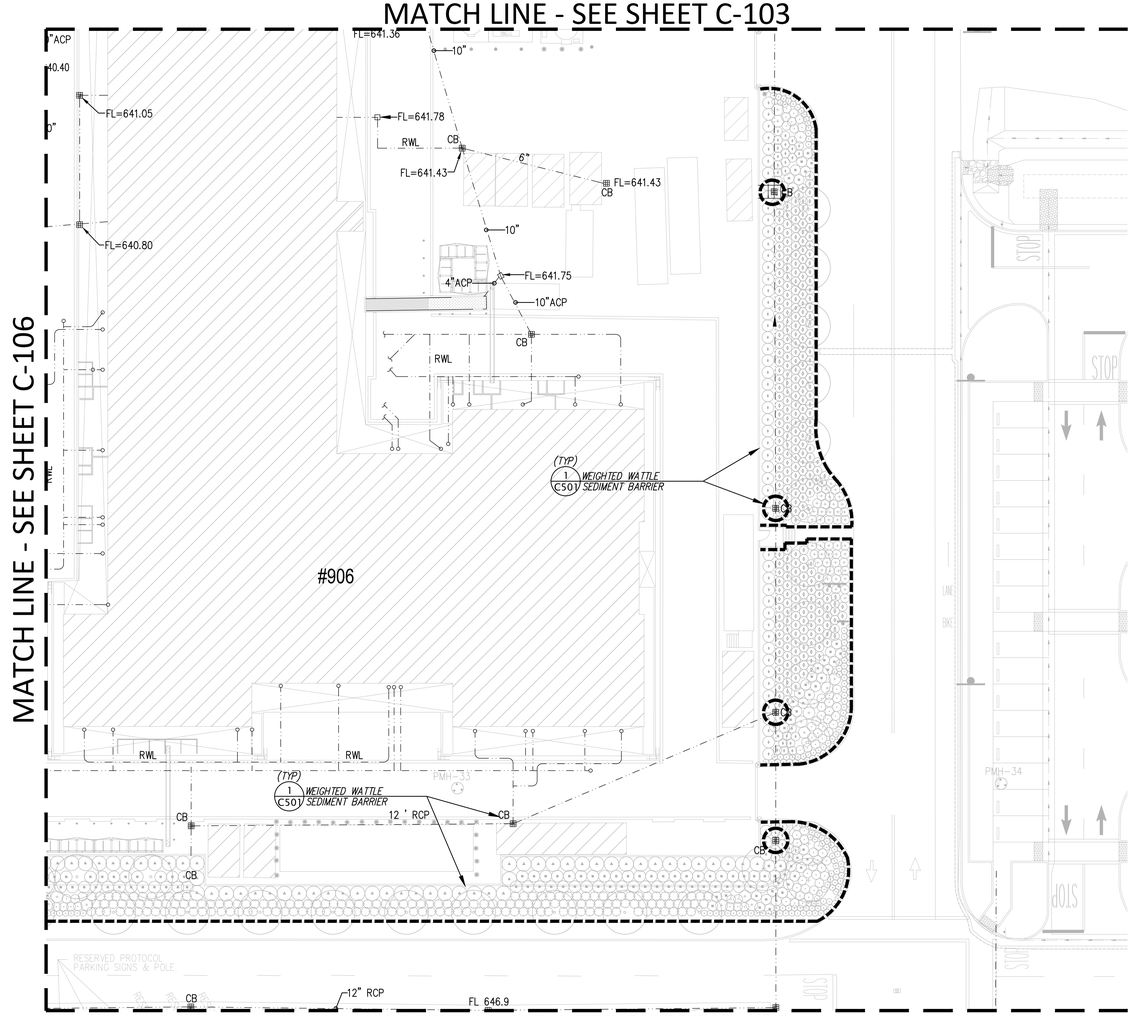


## LEGEND

| PROPOSED | EXISTING | |
|---|---|---|
| | | ASPHALT BERM |
| | | BLOCK/RETAINING WALL |
| | | CONCRETE CURB |
| 100 | 100 | CONTOUR LINE |
| +100.00 | +100.00 | SPOT ELEVATION |
| | | TRAFFIC SIGN |
| | | TREE |
| | | UTILITY BOX |
| | | PHOTO MONUMENTS |
| C | C | CONCRETE |
| ESMT | ESMT | EASEMENT |
| FL | FL | FLOW LINE |
| GB | GB | GRADE BREAK |
| R | R | RIDGE |
| SWL | SWL | SWALE |

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C-101 C-501
C-102
C-103
C-104
C-105
C-106

FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC
(OR APPROVED EQUAL PRODUCT)
WEIGHTED WATTLES, GUTTER AND INLET
PROTECTION

## EROSION & SEDIMENT CONTROL MEASURES

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE EFFECTIVE FOR THE DURATION OF CONSTRUCTION.
2. PERSON RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION PLAN.

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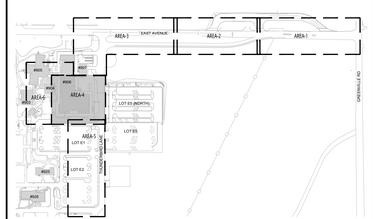

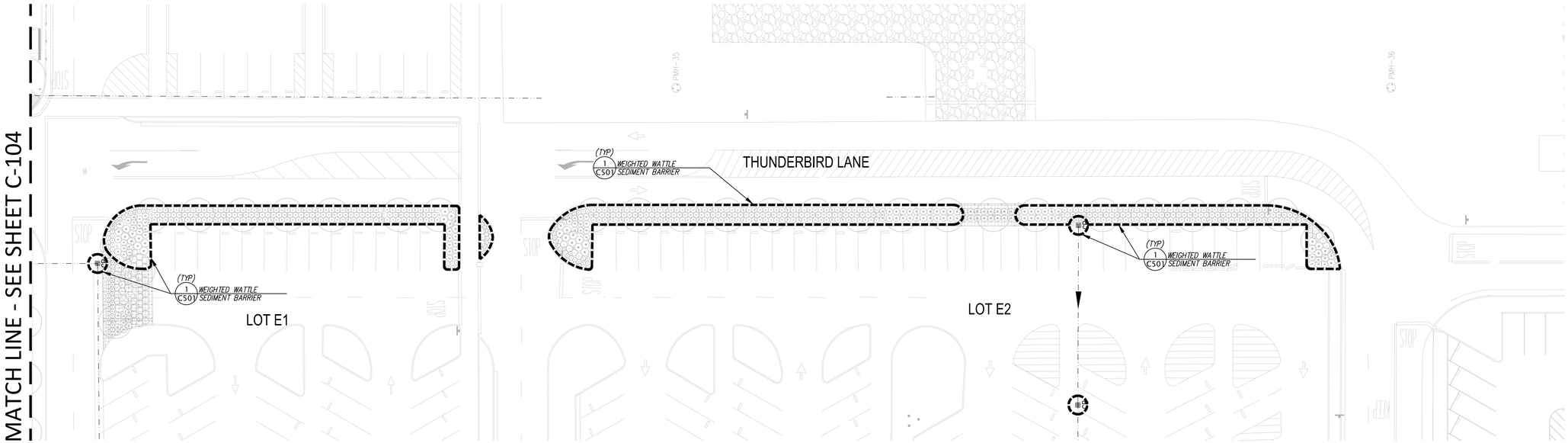


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| R | R | RIDGE |
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1 C-101 C-501 C-102 C-103 C-104 C-105 C-106

FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC
(OR APPROVED EQUAL PRODUCT)
WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

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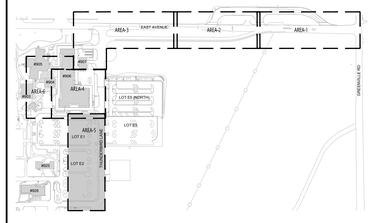


GRAPHIC SCALE

20 0 10 20 40 80

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|---|---|---|---|---|---|

Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR:65 SITE IMPROVEMENTS BLDG.

EROSION CONTROL PLAN - AREA 5

FLOOR:N\A

| | |
|---|---|
| CONTRACT NO.(A-E) | XX |
| DOE ACCT.NO. | |
| DRAWN | GA |
| CHECKED | DN |
| SCALE | |
| DATE | MARCH, 2023 |

| A/E FIRM: | SNL PM: | SNL APPROVED BY: |
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| KIER+WRIGHT | SHEET C-105 | |

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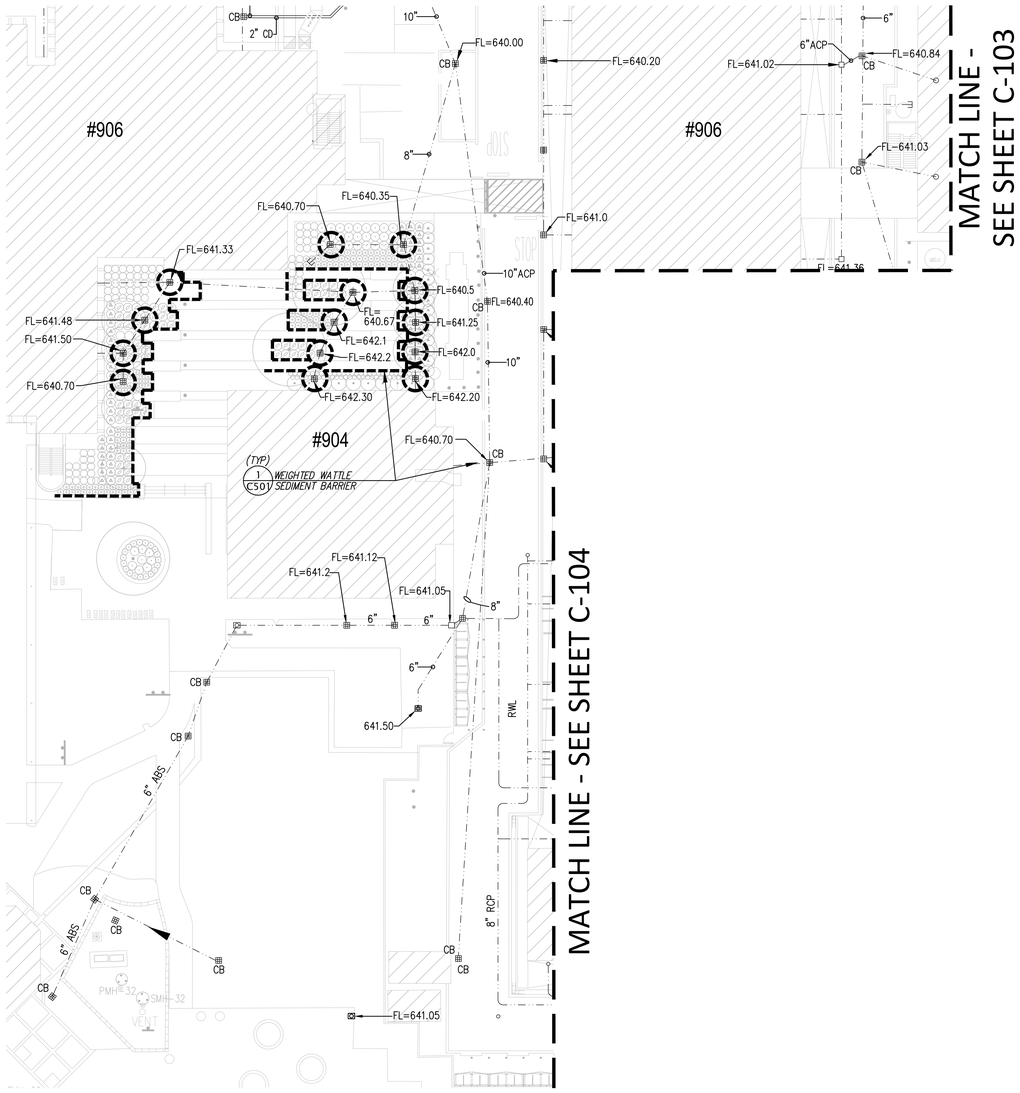


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|---|---|---|
| | | ASPHALT BERM |
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| | | CONCRETE CURB |
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| +100.00 | +100.00 | SPOT ELEVATION |
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| | | TREE |
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C-102
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C-104
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C-106

FOR PAVEMENT AREAS
GATOR GUARD ENVIRONMENTAL PRODUCTS, INC
(OR APPROVED EQUAL PRODUCT)
WEIGHTED WATTLES, GUTTER AND INLET PROTECTION

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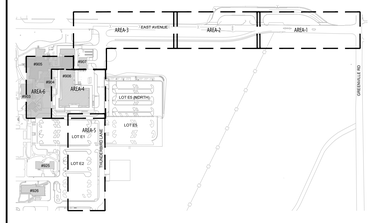

Gator Guard
Environmental Products Inc. ™

# Street & Drain Sediment Control Installation & Maintenance

## Weighted Wattle

1. Take to desired location, remove the bands and unfold. **DO NOT DRAG**.
2. Push the weighted inserts fully into the outer sock.
3. Soft Geotextile should be centered on the bottom – reposition inserts to get weighted side down if necessary.
4. Connect by pushing the closed end of one Wattle fully into the open end of the next. Handling straps may be tied together for a more secure connection.

## Weighted Gutter Wattle

1. Place Gutter Wattle Diagonally across gutter and press into place with your feet.

## Weighted Drain Wattle

1. Install per photos **below**. Press sandbags with feet – tight to curb. **DO NOT DRAG**
2. Inspect weekly for correct placement
3. REUSE or dispose of wattle properly if damaged, deteriorated or no longer needed.

**Most Effective Install**

**Stops Dirt & Covers Curb Cutout**

**Covers Curb Cutout**

## Curb Cutout Protector

1. Remove storm drain grate and place it on the sidewalk. Clean the framework.
2. Place Drain Inlet Bag in the opening and hold with your feet
3. Center the Curb Cutout Protector against the curb with apron either under or over the DI Bag and hold the ends with your feet too.
4. Install the grate on top of the DI bag and curb cutout protector apron. Pull the apron ends tight while holding up the back of the grate, then push down on the grate until flush.

## MAINTENANCE

1. Inspect, clean out deposited sediment after each storm event (best to sweep when dry).
2. REUSE or dispose of properly if damaged, deteriorated or no longer needed.

www.gatorguard.com 1-877-428-6763

April 2020

Gator Guard
Environmental Products Inc. ™

# Street & Drain Sediment Control SPECIFICATIONS

**12-ft Weighted Wattle**

**3-ft Gutter Wattle**

**8-ft Drain Wattle**

**33-in Curb Cutout**

| | WEIGHTED WATTLE | GUTTER WATTLE | DRAIN WATTLE | CURB CUTOUT PROTECTOR |
|---|---|---|---|---|
| Part No. | EWW612 | WGW436 | WDW608 | CCP433 |
| Height | 6-inch | 4-inch | 6-inch | 4-inch |
| Length | 12-ft (+ sleeve) | 36-inch | 8-feet | 33-inch effective |
| Connection Sleeve | 20-inch | none | none | none |
| Weight | 50-pounds | 30-pounds | 50-pounds | 0.75-pounds |
| Pallet Weight | 740-lb (14 ea.) | 1240-lb (40 ea.) | 1290-lb (25 ea.) | 120-lb (108 ea.) |
| Full Pallet - Inches | 48x42x38 | 42x42x34 | 48x48x38 | 48x48x65 (108ea) |
| Single Bundle In. | 48x18x6 | 37x10x4 | 48x12x6 | 45x15x15 (9 ea) |
| | | | | |
| **Outer Construction** | | | | |
| - Main Fabric | 6-oz Woven Monofilament Polypropylene | | | |
| - Bottom-nonwoven | Polypropylene | none | Polypropylene | none |
| - Straps | 1-inch 900-lb UV Polypropylene Webbing | | | none |
| - Poly Strapping | none | none | Polypropylene | none |
| | | | | |
| **Inner Construction** | | | | |
| - Weight Material | Clean Coarse Sand | | | none |
| - Inner Sand Bag | 6-mil Polyethylene | | | none |
| - Sand Bag Cover | 6-oz Woven Monofilament Polypropylene | | | none |
| - Foam for Height | 2"x4"x45" | none | 6" x 45" roll | 33"x4"x4" shaped |
| | | | | |
| **Woven Fabric** | | | | |
| - Type | High Quality Woven Monofilament Silt Fence | | | |
| - Weight | 6 oz./sq. yd. | | | |
| - Tensile Strength | 375 x 250 lbs. | | | |
| - Puncture | 120 lbs. | | | |
| - Water Flow | 100-gpm/sf clean water, <10-gpm/sf dirty water | | | |
| - UV % Strength | 90% after 500 hrs. | | | |
| | | | | |
| Thread | UV Resistant Polyester | | | |
| | | | | |
| Functional Life | 5 years expected (excludes major damage) | | | |

Date: April 2020 – The above properties are typical averages. All test methods are ASTM or Industry Standards.

www.gatorguard.com 1-877-428-6763

April 2020

1 C-101 C-102 C-103 C-104 C-105 C-106 C-501

GATOR GUARD WEIGHTED WATTLES

NOT TO SCALE

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Sandia National Laboratories
Facilities Management
Albuquerque, New Mexico; Livermore, California; Tonopah, Nevada

SECTOR
SITE IMPROVEMENTS
DETAILS
BLDG.
FLOOR: N\A

| | |
|---|---|
| CONTRACT NO. / W.O. ACCT.NO. | XX |
| DRAWN | SA |
| CHECKED | SH |
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| DATE | MARCH, 2023 |

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| KIER+WRIGHT | SHEET C-501 | |

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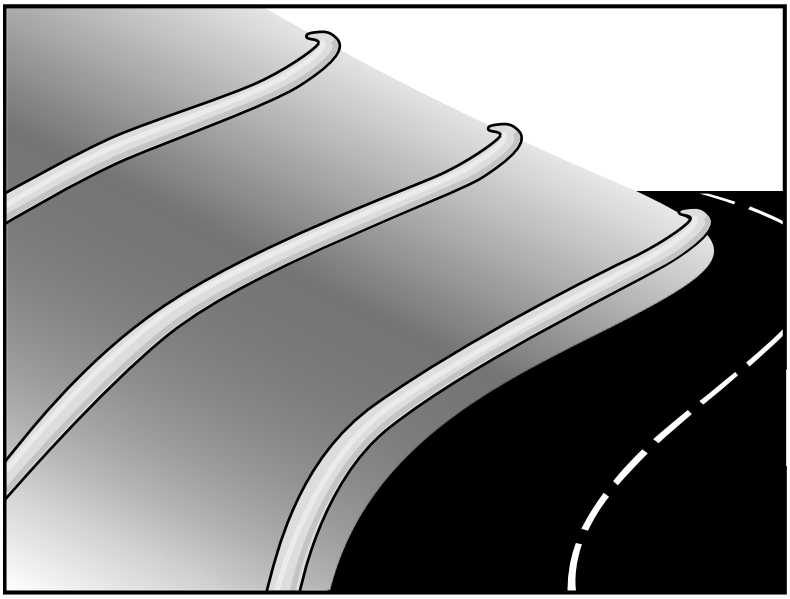
# ATTACHMENT 1

# BMP HANDBOOK FACT SHEETS

# Fiber Rolls SE-5



## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Description and Purpose

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

## Suitable Applications

Fiber rolls may be suitable:

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

## Targeted Constituents

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

## Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

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- At operational storm drains as a form of inlet protection.
- Around temporary stockpiles.

## Limitations

- Fiber rolls should be used in conjunction with erosion control, such as hydroseed, RECPs, etc.
- Only biodegradable fiber rolls containing no plastic can remain on a site applying for a Notice of Termination due to plastic pollution and wildlife concerns (State Water Board, 2016). Fiber rolls containing plastic that are used on a site must be disposed of for final stabilization.
- Fiber rolls are not effective unless trenched in and staked. If not properly staked and trenched in, fiber rolls will not work as intended and could be transported by high flows.
- Not intended for use in high flow situations (i.e., for concentrated flows).
- Difficult to move once saturated.
- Fiber rolls have a limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.
- Rolls typically function for 12-24 months, depending upon local conditions and roll material.

## Implementation

### *Fiber Roll Materials*

- Fiber rolls should be prefabricated.
- Fiber rolls may come manufactured containing polyacrylamide (PAM), a flocculating agent within the roll. Fiber rolls impregnated with PAM provide additional sediment removal capabilities and should be used in areas with fine, clayey or silty soils to provide additional sediment removal capabilities. Monitoring may be required for these installations.
- Fiber rolls are made from weed-free rice straw, flax, curled wood fiber, or coir bound into a tight tubular roll by netting or natural fiber (see *Limitations* above regarding plastic netting).
- Typical fiber rolls vary in diameter from 6 in. to 20 in. Larger diameter rolls are available as well. The larger the roll, the higher the sediment retention capacity.
- Typical fiber rolls lengths are 4, 10, 20 and 25 ft., although other lengths are likely available.

### *Installation*

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.

  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).

  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).

- Prepare the slope before beginning installation.

- Dig small trenches across the slope on the contour. The trench depth should be ¼ to 1/3 of the thickness of the roll, and the width should equal the roll diameter, in order to provide area to backfill the trench.

- It is critical that rolls are installed perpendicular to water movement, and parallel to the slope contour.

- Start building trenches and installing rolls from the bottom of the slope and work up.

- It is recommended that pilot holes be driven through the fiber roll. Use a straight bar to drive holes through the roll and into the soil for the wooden stakes.

- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.

- Stake fiber rolls into the trench.

  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.

  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.

- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

- See typical fiber roll installation details at the end of this fact sheet.

***Removal***

- Fiber rolls can be left in place or removed depending on the type of fiber roll and application (temporary vs. permanent installation). Fiber rolls encased with plastic netting or containing any plastic material will need to be removed from the site for final stabilization. Fiber rolls used in a permanent application are to be encased with a non-plastic material and are left in place. Removal of a fiber roll used in a permanent application can result in greater disturbance; therefore, during the BMP planning phase, the areas where fiber rolls will be used on final slopes, only fiber rolls wrapped in non-plastic material should be selected.

- Temporary installations should only be removed when up gradient areas are stabilized per General Permit requirements, and/or pollutant sources no longer present a hazard. But they should also be removed before vegetation becomes too mature so that the removal process does not disturb more soil and vegetation than is necessary.

### Costs

Material costs for straw fiber rolls range from $26 - $38 per 25-ft. roll[1] and curled wood fiber rolls range from $30 - $40 per roll[2].

Material costs for PAM impregnated fiber rolls range between $9.00-$12.00 per linear foot, based upon vendor research[1] .

### Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-third the designated sediment storage depth.
- If fiber rolls are used for erosion control, such as in a check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.
- Repair any rills or gullies promptly.

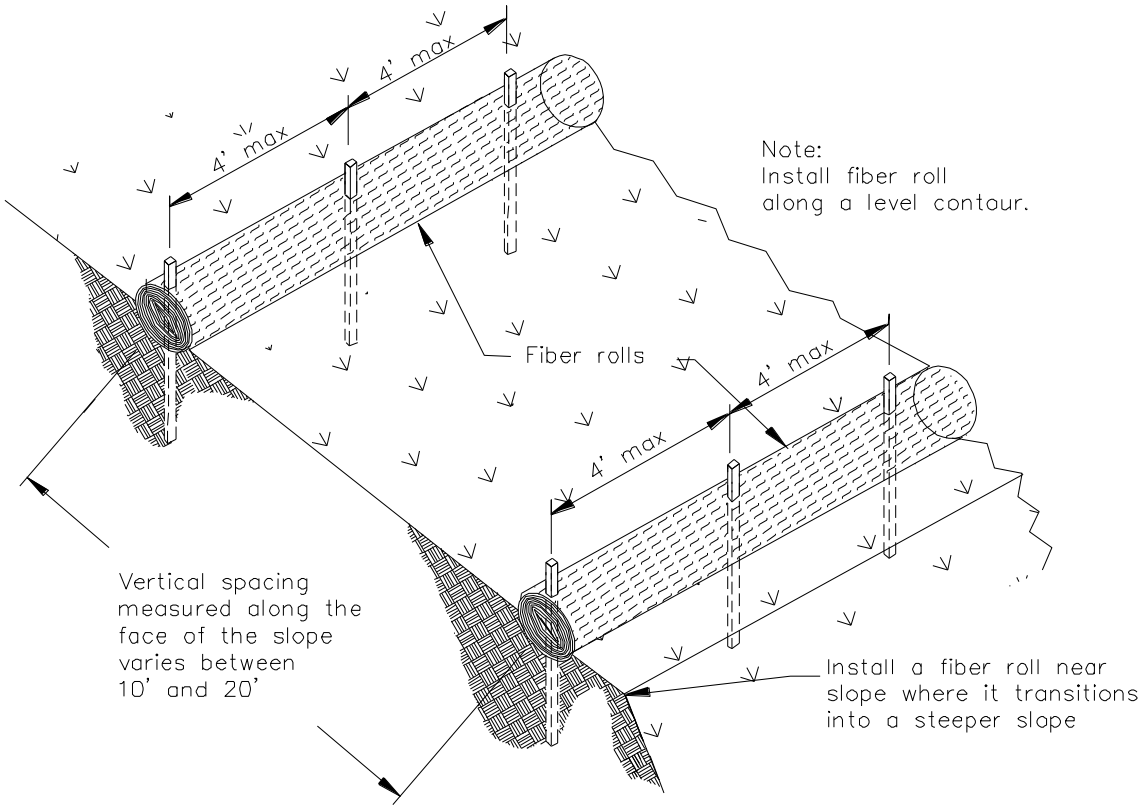
### References

General Construction – Frequently Asked Questions, Storm Water Program website, State Water Resources Control Board, 2009 updated in 2016. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_const_faq.shtml.

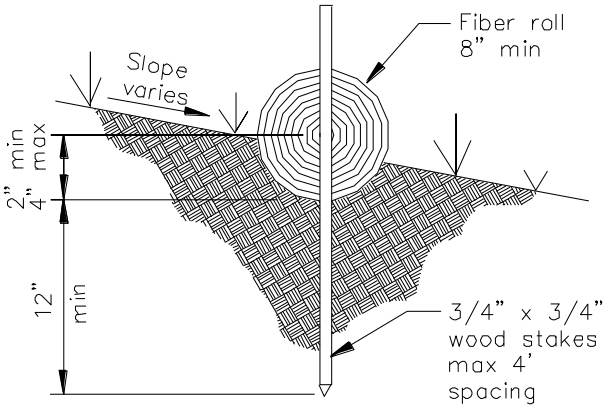
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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

[1] Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.
[2] Costs estimated based on vendor query by Tetra Tech, Inc. 2016.

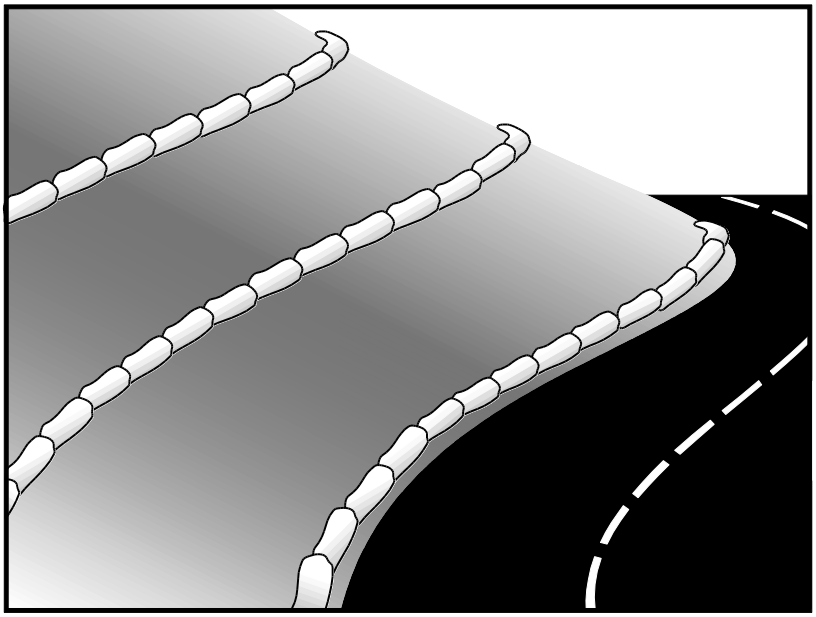



TYPICAL FIBER ROLL INSTALLATION
N.T.S.




ENTRENCHMENT DETAIL
N.T.S.

# Gravel Bag Berm SE-6



## Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

## Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As a linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

### Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

### Targeted Constituents

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

### Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-12 Temporary Silt Dike

SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As chevrons (small check dams) across mildly sloped construction roads. For use check dam use in channels, see SE-4, Check Dams.

## Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the berm, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Durability of gravel bags is somewhat limited, and bags may need to be replaced when installation is required for longer than 6 months.
- Easily damaged by construction equipment.
- When used to detain concentrated flows, maintenance requirements increase.

## Implementation

### *General*

A gravel bag berm consists of a row of open graded gravel-filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers but are more porous. Generally, gravel bag berms should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

### *Design and Layout*

- Locate gravel bag berms on level contours.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Gravel bags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

Slope inclination 2:1 (H:V) or greater: Gravel bags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, gravel bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the gravel bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction
  - Top width = 12 in. minimum for one- or two-layer construction
  - Side slopes = 2:1 (H:V) or flatter
- In Construction Traffic Areas:
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction.
  - Top width = 12 in. minimum for one- or two-layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- Butt ends of bags tightly.
- On multiple row, or multiple layer construction, overlap butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

***Materials***

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd$^2$, Mullen burst strength exceeding 300 lb/in$^2$ in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.

- ***Fill Material:*** Fill material should be 0.5 to 1 in. Crushed rock, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

### Costs

Material costs for gravel bags are average and are dependent upon material availability. $3.20-$3.80 per filled gravel bag is standard based upon vendor research (Adjusted for inflation, 2016 dollars, by Tetra Tech, Inc.).

### Inspection and Maintenance

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

- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.

- Reshape or replace gravel bags as needed.

- Repair washouts or other damage as needed.

- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.

- Remove gravel bag berms when no longer needed and recycle gravel fill whenever possible and properly dispose of bag material. Remove sediment accumulation and clean, re-grade, and stabilize the area.

### References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

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

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

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

# Street Sweeping and Vacuuming SE-7

## Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

## Targeted Constituents

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

## Potential Alternatives

None

## Description and Purpose

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

## Suitable Applications

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

## Limitations

- Sweeping and vacuuming may not be effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).
- Sweeping may be less effective for fine particle soils (i.e., clay).

## Implementation

- Controlling the number of points where vehicles can leave the site will allow sweeping and vacuuming efforts to be focused and perhaps save money.
- Inspect potential sediment tracking locations daily.

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- Visible sediment tracking should be swept or vacuumed on a daily basis.
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- If not mixed with debris or trash, consider incorporating the removed sediment back into the project

### Costs

Rental rates for self-propelled sweepers vary depending on hopper size and duration of rental. Expect rental rates from $ 650/day to $2,500/day[1], plus operator costs. Hourly production rates vary with the amount of area to be swept and amount of sediment. Match the hopper size to the area and expect sediment load to minimize time spent dumping.

### Inspection and Maintenance

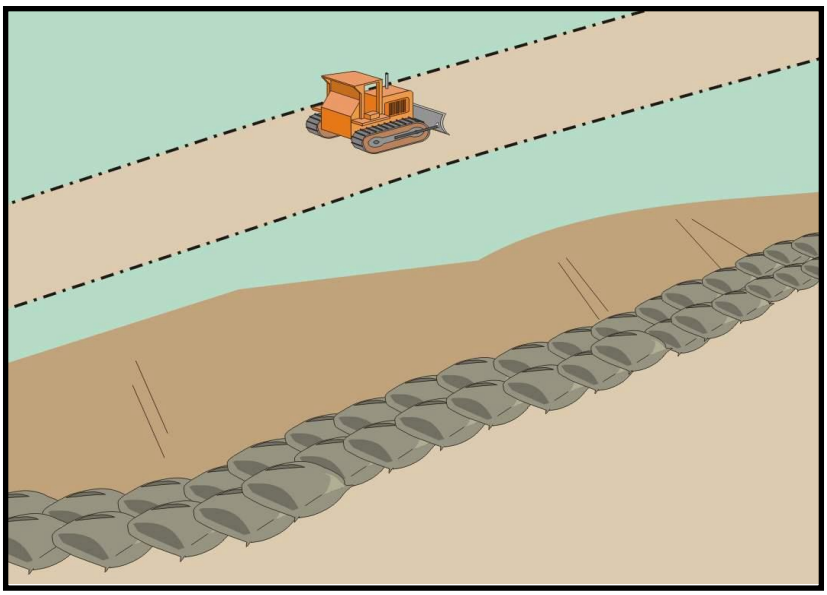
- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- When actively in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

### References

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

[1] Based on contractor query conducted by Tetra Tech, Inc. November 2016.

# Sandbag Barrier SE-8



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

**Legend:**
☑ **Primary Category**
☒ **Secondary Category**

## Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

## Suitable Applications

Sandbag barriers may be a suitable control measure for the applications described below. It is important to consider that sand bags are less porous than gravel bags and ponding or flooding can occur behind the barrier. Also, sand is easily transported by runoff if bags are damaged or ruptured. The SWPPP Preparer should select the location of a sandbag barrier with respect to the potential for flooding, damage, and the ability to maintain the BMP.

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes.
  - As sediment traps at culvert/pipe outlets.
  - Below other small cleared areas.
  - Along the perimeter of a site.
  - Down slope of exposed soil areas.
  - Around temporary stockpiles and spoil areas.
  - Parallel to a roadway to keep sediment off paved areas.
  - Along streams and channels.

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

**Potential Alternatives**

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-12 Manufactured Linear Sediment Controls

SE-14 Biofilter Bags

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- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.
  - At the top of slopes to divert runoff away from disturbed slopes.
  - As check dams across mildly sloped construction roads.

## Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited, and bags will need to be replaced when there are signs of damage or wear.
- Burlap should not be used for sandbags.

## Implementation

### *General*

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

### *Design and Layout*

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

  - Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction
  - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more-layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

***Materials***

- ***Sandbag Material:*** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd$^2$, Mullen burst strength exceeding 300 lb/in$^2$ in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- ***Sandbag Size:*** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal and may vary based on locally available materials.

- ***Fill Material:*** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) or similar permeable material free from clay and deleterious material, such as recycled concrete or asphalt.

### Costs

Empty sandbags cost $0.25 - $0.75. Average cost of fill material is $8 per $yd^3$. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at $1.50 - $2.00 per bag. These costs are based upon vendor research.

### Inspection and Maintenance

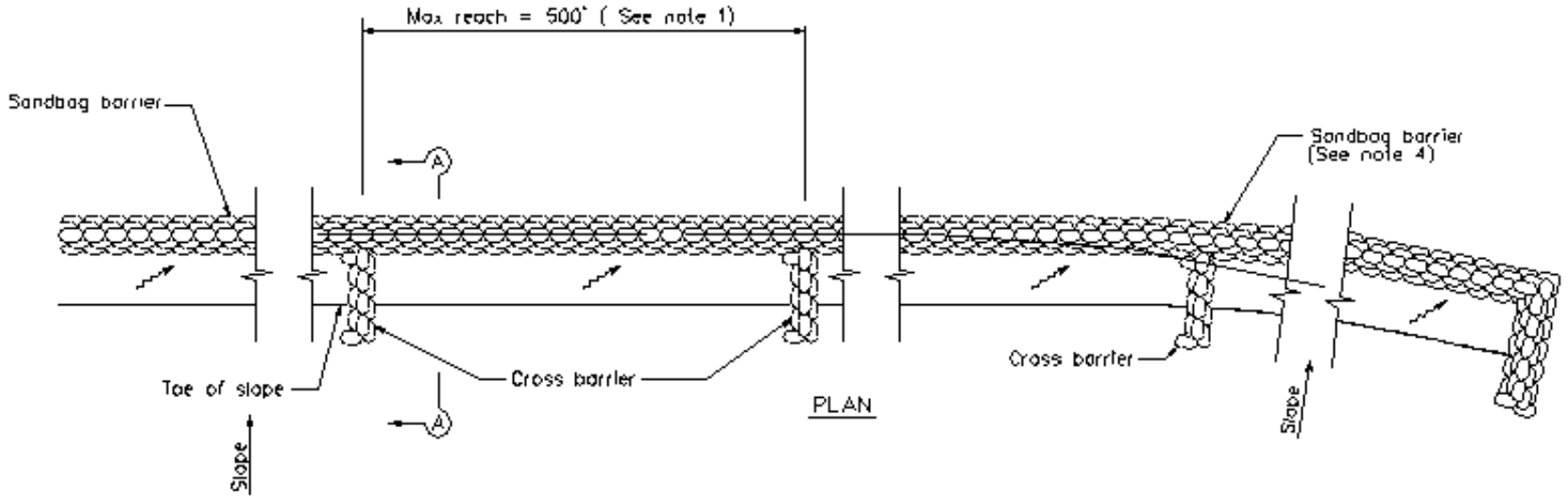
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

### References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

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

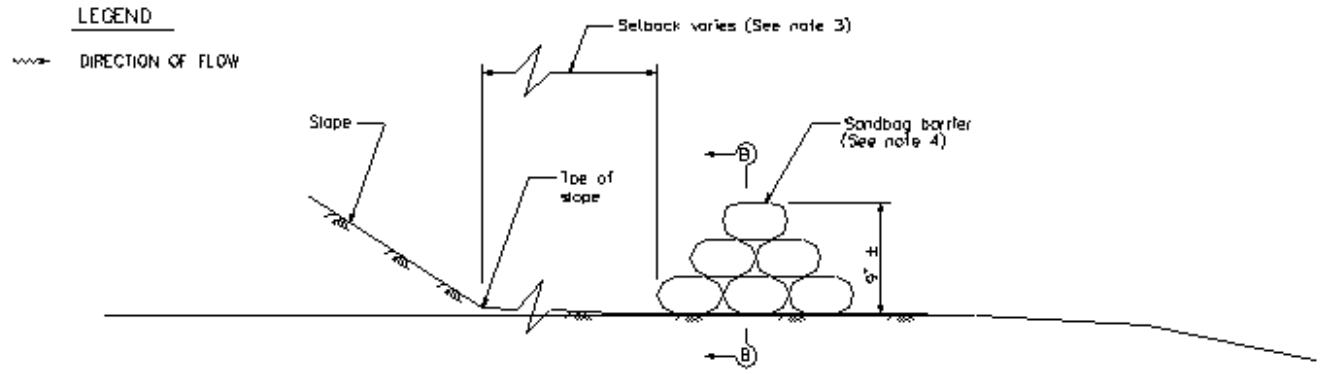
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



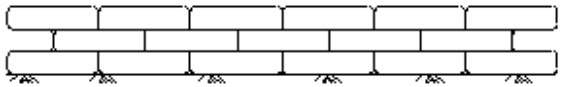

SANDBAG BARRIER

NOTES

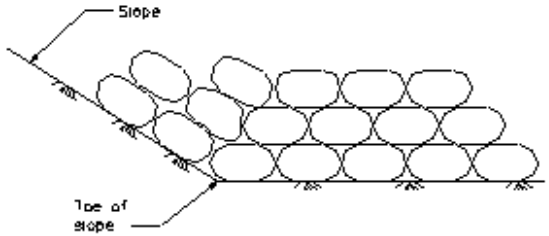
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. Place sandbags tightly
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.



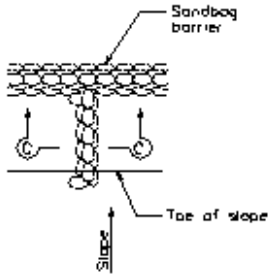

SECTION A–A



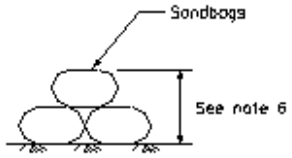
SECTION B–B




END DETAIL

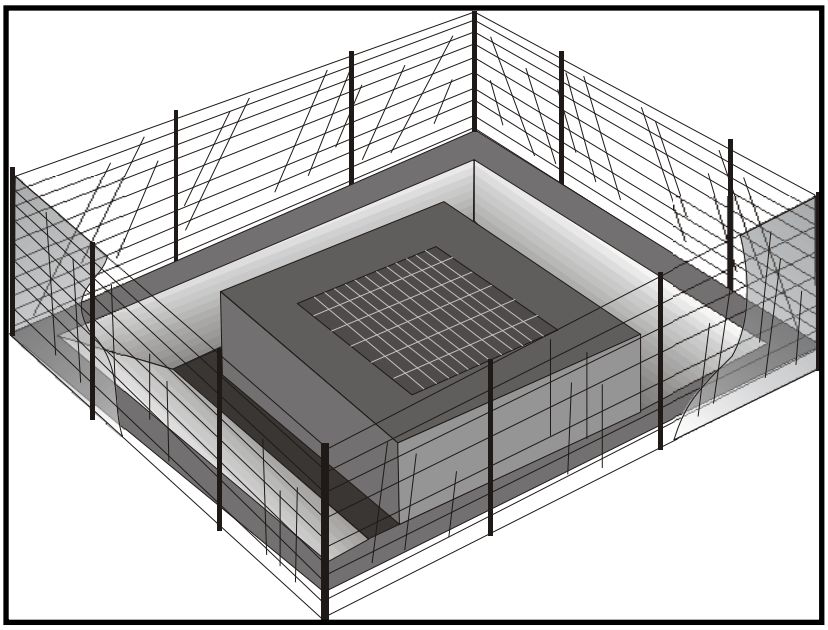



CROSS BARRIER DETAIL




SECTION C–C

# Storm Drain Inlet Protection SE-10



## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

| | |
|---|---|
| Sediment | ☑ |
| Nutrients | |
| Trash | ☒ |
| Metals | |
| Bacteria | |
| Oil and Grease | |
| Organics | |

## Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-14 Biofilter Bags

SE-13 Compost Socks and Berms

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## Description and Purpose

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

## Suitable Applications

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

## Limitations

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

other onsite sediment trapping techniques in conjunction with inlet protection.

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

## Implementation

### *General*

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

### *Design and Layout*

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

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

- Silt Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.

- Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).

- Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.

- Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.

- Temporary Geotextile Storm drain Inserts: Different products provide different features. Refer to manufacturer details for targeted pollutants and additional features.

- Biofilter Bag Barrier: Used to create a small retention area upstream of inlets and can be located on pavement or soil. Biofilter bags slowly filter runoff allowing sediment to settle out. Appropriate for flows under 0.5 cfs.

- Compost Socks: Allow filtered run-off to pass through the compost while retaining sediment and potentially other pollutants (SE-13). Appropriate for flows under 1.0 cfs.

- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.

- Provide area around the inlet for water to pond without flooding structures and property.

- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.

- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

***Installation***

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

  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.

  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes should be at least 48 in.

  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.

  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.

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

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

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

  1. Construct on gently sloping street.

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

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

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

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

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

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

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

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

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

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

    1. Construct in a gently sloping area.
    2. Biofilter bags should be placed around inlets to intercept runoff flows.
    3. All bag joints should overlap by 6 in.
    4. Leave room upstream for water to pond and for sediment to settle out.
    5. Stake bags to the ground as described in the following detail. Stakes may be omitted if bags are placed on a paved surface.

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

### Costs

- Average annual cost for installation and maintenance of DI Type 1-4 and 6 (one-year useful life) is $200 per inlet.
- Temporary geotextile inserts are proprietary, and cost varies by region. These inserts can often be reused and may have greater than 1 year of use if maintained and kept undamaged. Average cost per insert ranges from $50-75 plus installation, but costs can exceed $100. This cost does not include maintenance.
- See SE-13 for Compost Sock cost information.

### Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Silt Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes. At a minimum, remove the sediment behind the fabric fence when accumulation reaches one-third the height of the fence or barrier height.
- Gravel Filters. If the gravel becomes clogged with sediment, it should be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

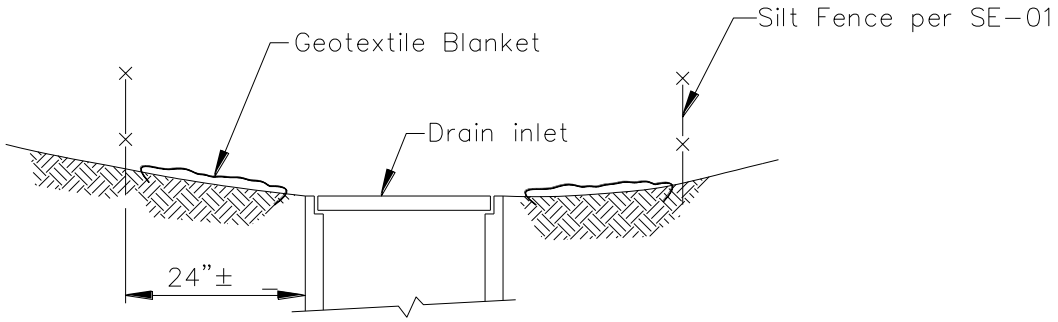
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Inspect and maintain temporary geotextile insert devices according to manufacturer's specifications.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

### References

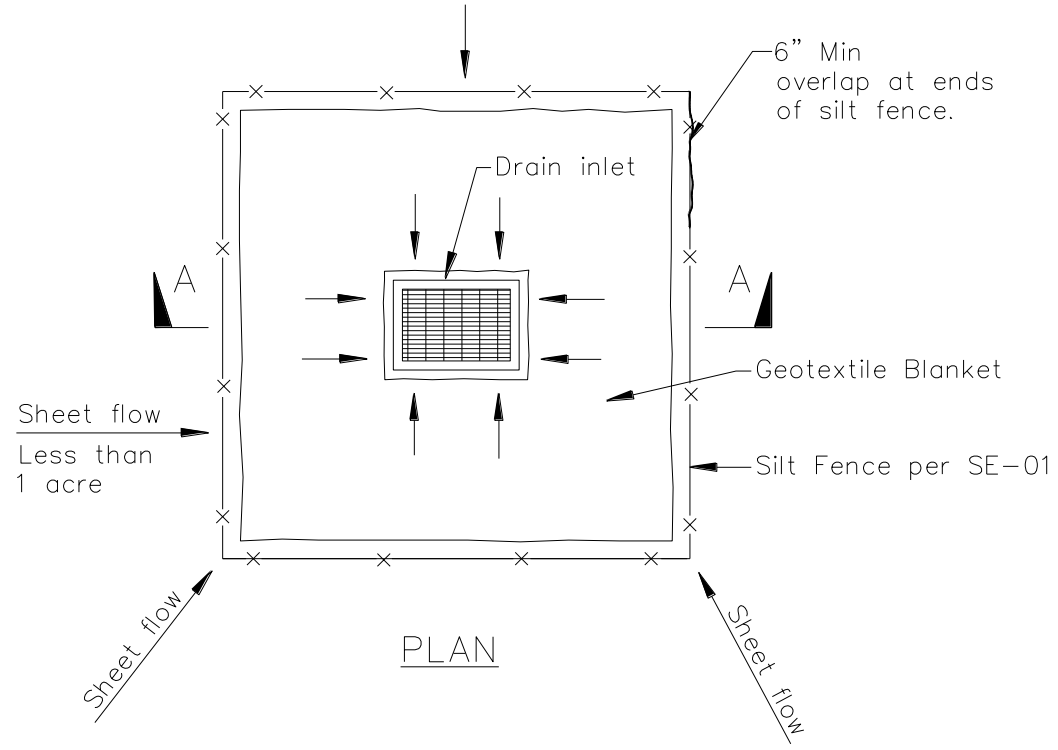
Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

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

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




SECTION A–A

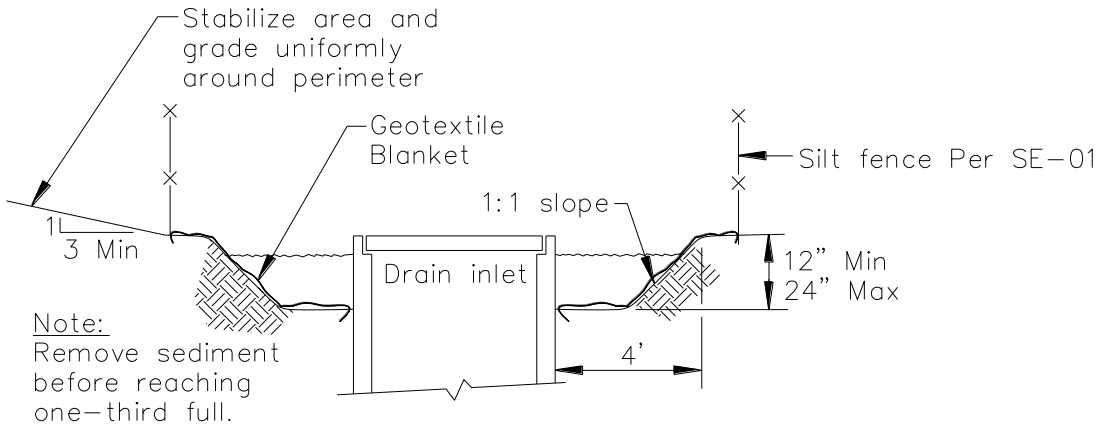



PLAN

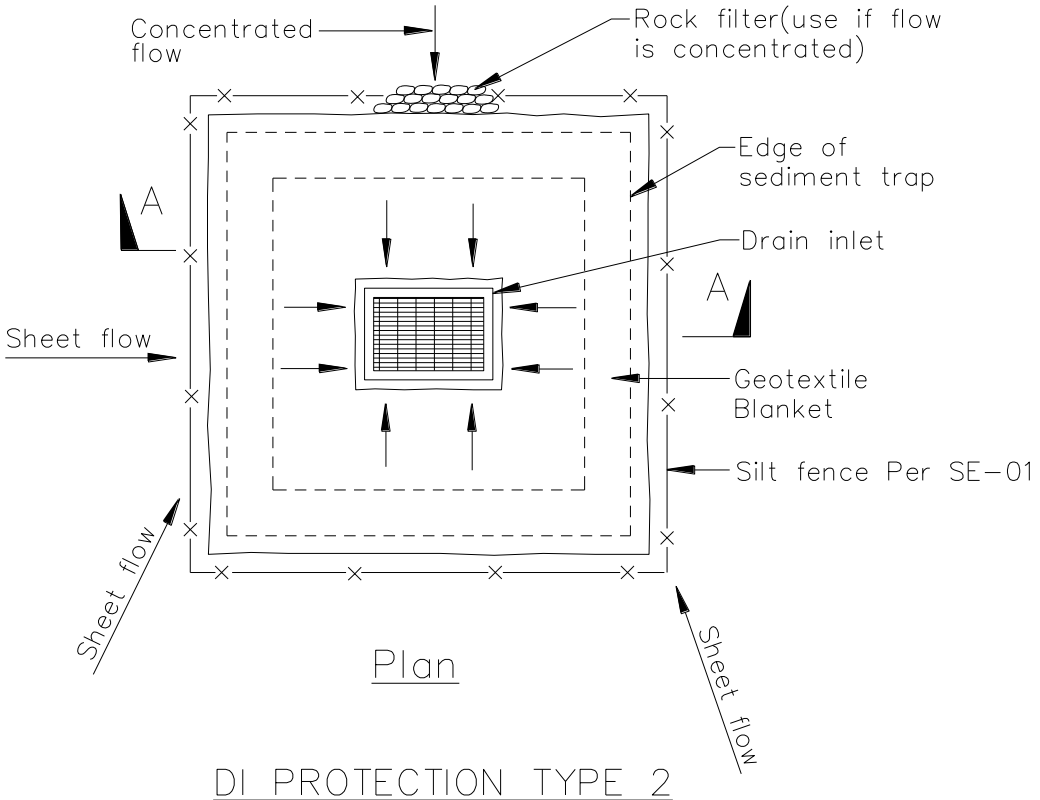
DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

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



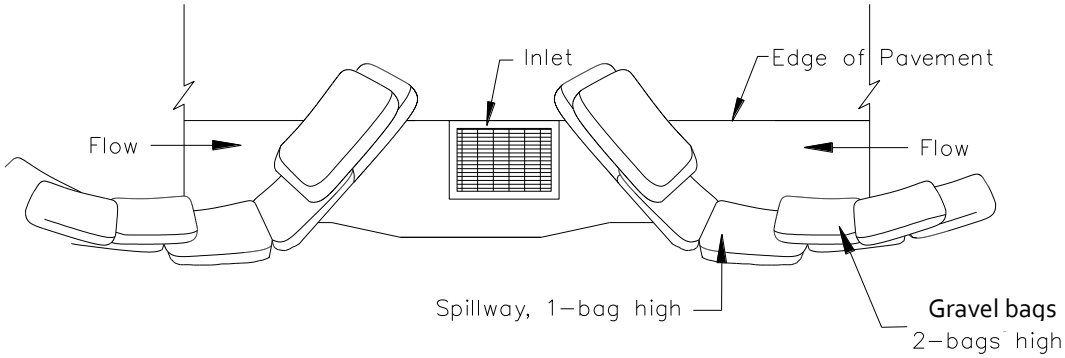

Section A–A



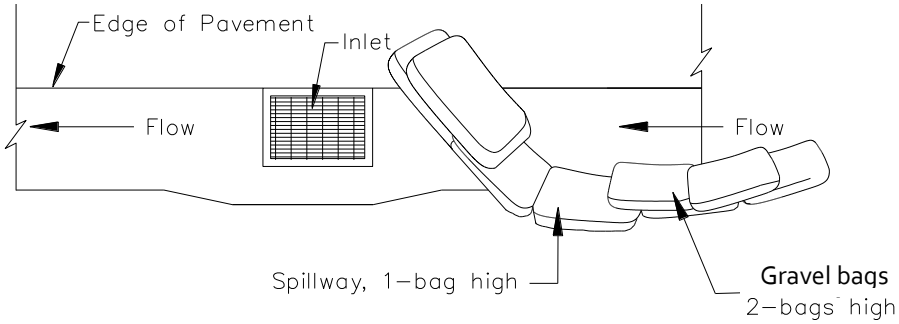

Plan

DI PROTECTION TYPE 2
NOT TO SCALE

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




TYPICAL PROTECTION FOR INLET ON SUMP

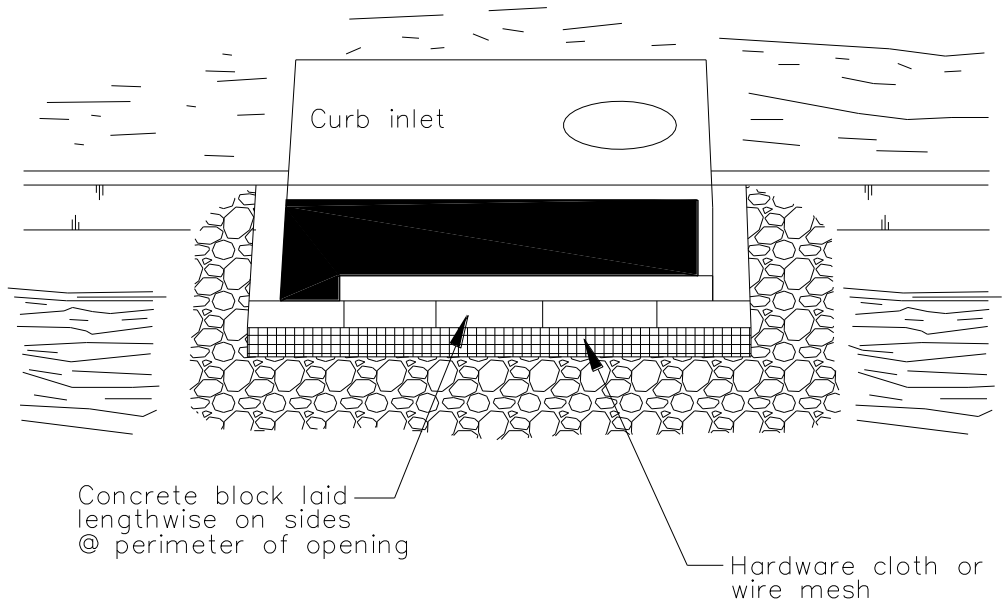


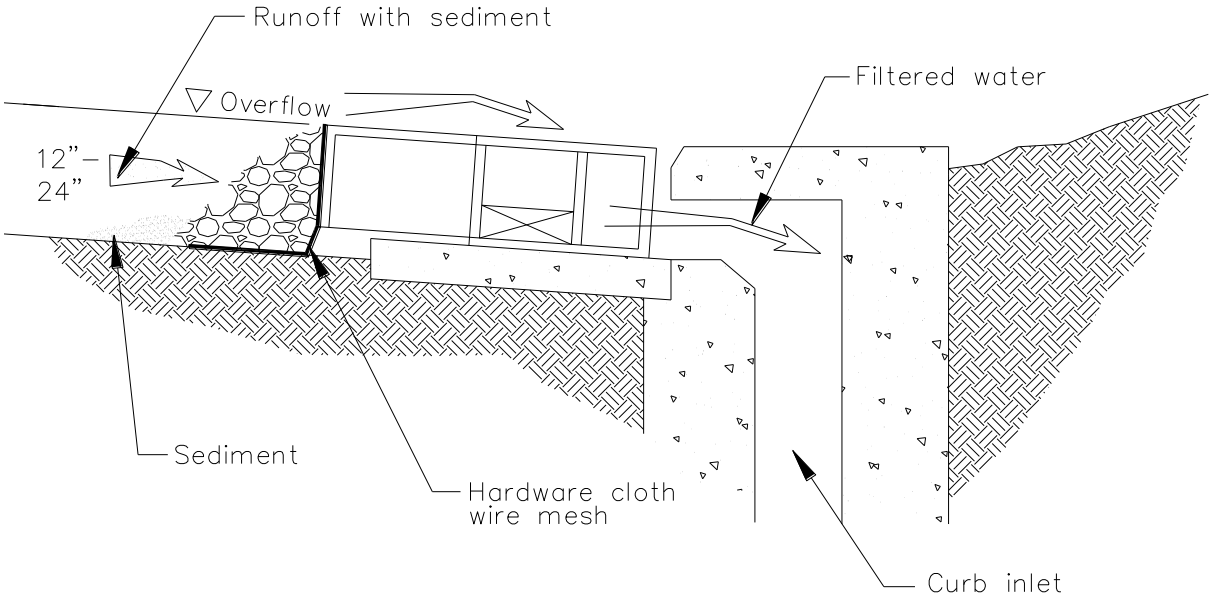

TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

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

DI PROTECTION TYPE 3
NOT TO SCALE

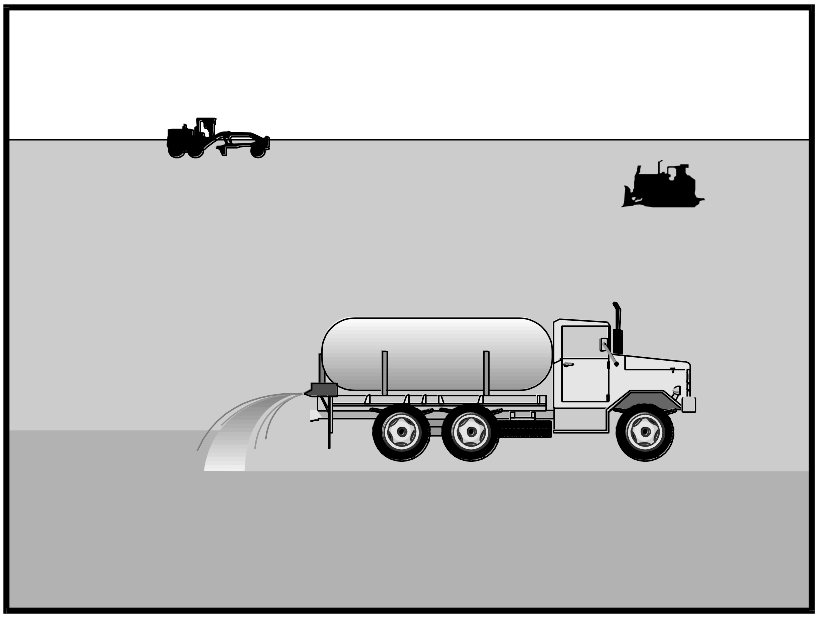



DI PROTECTION – TYPE 4

NOT TO SCALE

# Wind Erosion Control WE-1



## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

EC-5 Soil Binders

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## Description and Purpose

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

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

## Suitable Applications

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

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

## Limitations

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

## Implementation

### *Dust Control Practices*

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

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

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

Additional preventive measures include:

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

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

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

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

### Costs

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

### Inspection and Maintenance

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

### References

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

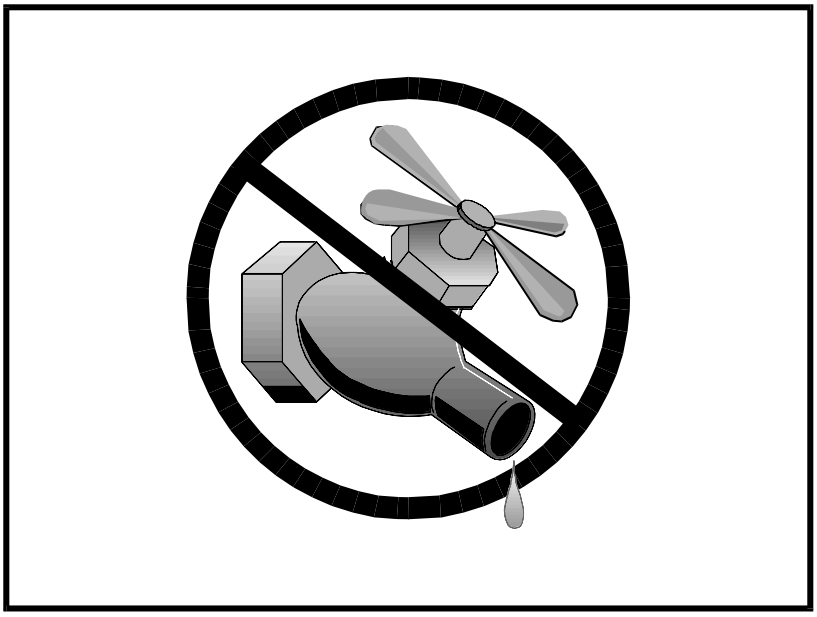
California Air Pollution Control Laws, California Air Resources Board, updated annually.

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

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

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

# Water Conservation Practices NS-1



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

**Legend:**
☑ **Primary Objective**
☒ **Secondary Objective**

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

**Potential Alternatives**

None

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## Description and Purpose

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

## Suitable Applications

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

## Limitations

- None identified.

## Implementation

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

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

### Costs

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

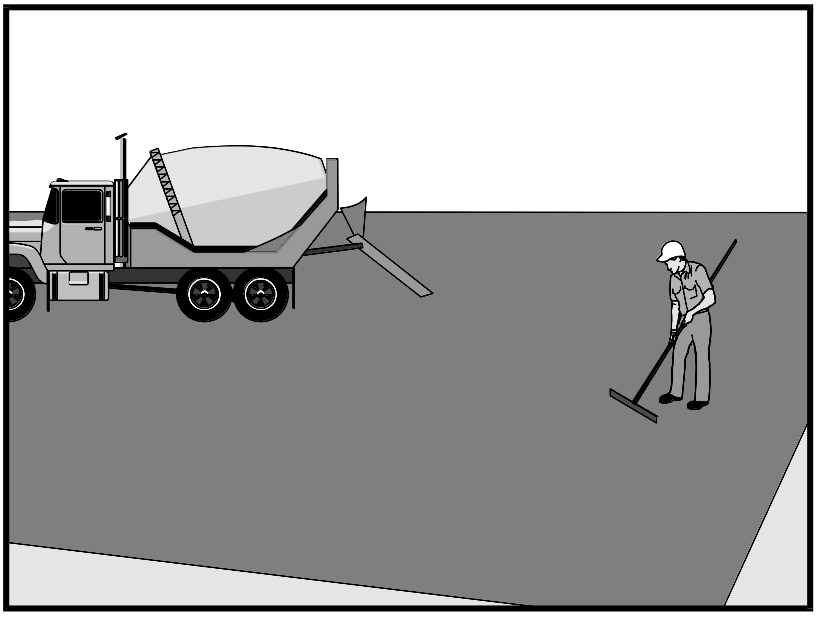
### Inspection and Maintenance

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

### References

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

# Paving and Grinding Operations NS-3



## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

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

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

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

## Suitable Applications

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

## Limitations

- Paving opportunities may be limited during wet weather.

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

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## Implementation

### *General*

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

### *Saw Cutting, Grinding, and Pavement Removal*

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

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

***Asphaltic Concrete Paving***

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

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

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

***Portland Cement Concrete Paving***

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

***Sealing Operations***

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

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

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

***Paving Equipment***

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

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

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

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

***Thermoplastic Striping***

- Thermoplastic striper and pre-heater equipment shutoff valves should be inspected to ensure that they are working properly to prevent leaking thermoplastic from entering drain inlets, the stormwater drainage system, or watercourses.
- Pre-heaters should be filled carefully to prevent splashing or spilling of hot thermoplastic. Leave six inches of space at the top of the pre-heater container when filling thermoplastic to allow room for material to move.
- Do not pre-heat, transfer, or load thermoplastic near drain inlets or watercourses.
- Clean truck beds daily of loose debris and melted thermoplastic. When possible, recycle thermoplastic material.

***Raised/Recessed Pavement Marker Application and Removal***

- Do not transfer or load bituminous material near drain inlets, the stormwater drainage system, or watercourses.
- Melting tanks should be loaded with care and not filled to beyond six inches from the top to leave room for splashing.
- When servicing or filling melting tanks, ensure all pressure is released before removing lids to avoid spills.
- On large-scale projects, use mechanical or manual methods to collect excess bituminous material from the roadway after removal of markers.

## Costs

- All of the above are low cost measures.

## Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of paving and grinding operations.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sample stormwater runoff required by the General Permit.
- Keep ample supplies of drip pans or absorbent materials onsite.
- Inspect and maintain machinery regularly to minimize leaks and drips.

## References

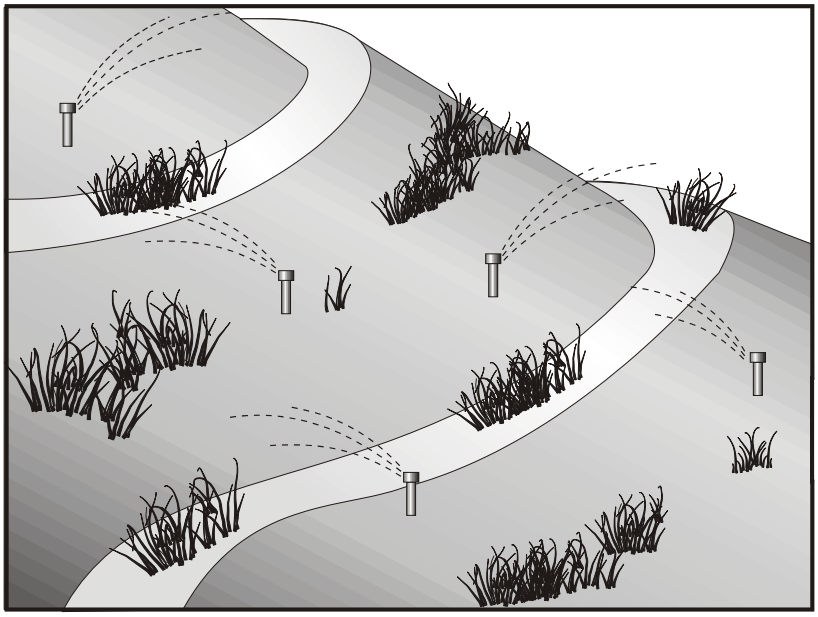
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

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

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

# Potable Water/Irrigation NS-7



## Description and Purpose

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing.

## Suitable Applications

Implement this BMP whenever potable water or irrigation water discharges occur at or enter a construction site.

## Limitations

None identified.

## Implementation

- Direct water from offsite sources around or through a construction site, where feasible, in a way that minimizes contact with the construction site.
- Discharges from water line flushing should be reused for landscaping purposes where feasible.
- Shut off the water source to broken lines, sprinklers, or valves as soon as possible to prevent excess water flow.
- Protect downstream stormwater drainage systems and watercourses from water pumped or bailed from trenches excavated to repair water lines.

### Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

### Targeted Constituents

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

### Potential Alternatives

None

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- Inspect irrigated areas within the construction limits for excess watering. Adjust watering times and schedules to ensure that the appropriate amount of water is being used and to minimize runoff. Consider factors such as soil structure, grade, time of year, and type of plant material in determining the proper amounts of water for a specific area.

## Costs

Cost to manage potable water and irrigation are low and generally considered to be a normal part of related activities.

## Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Repair broken water lines as soon as possible.
- Inspect irrigated areas regularly for signs of erosion and/or discharge.

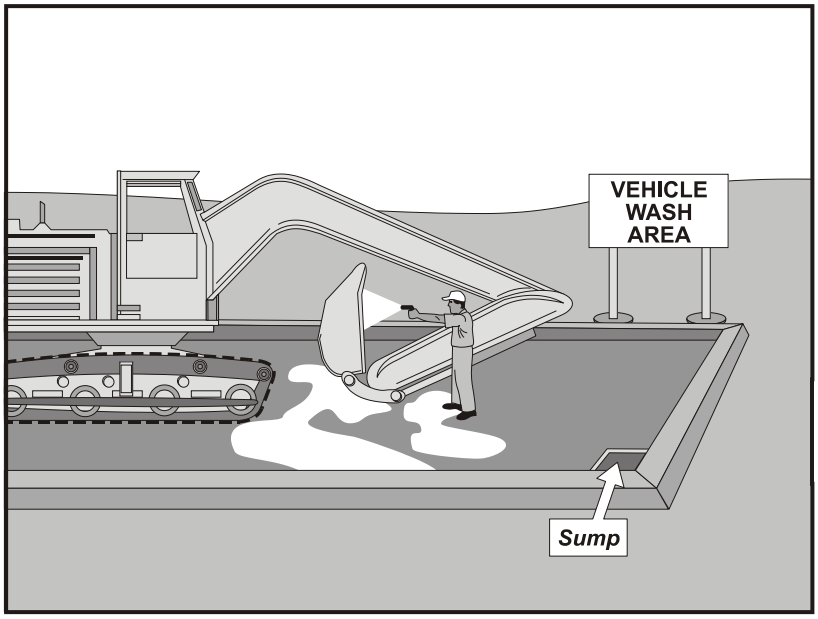
## References

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

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

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

# Vehicle and Equipment Cleaning NS-8




## Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

## Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

## Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TC-1, Stabilized Construction Entrance/Exit.

## Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

## Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

### Inspection and Maintenance

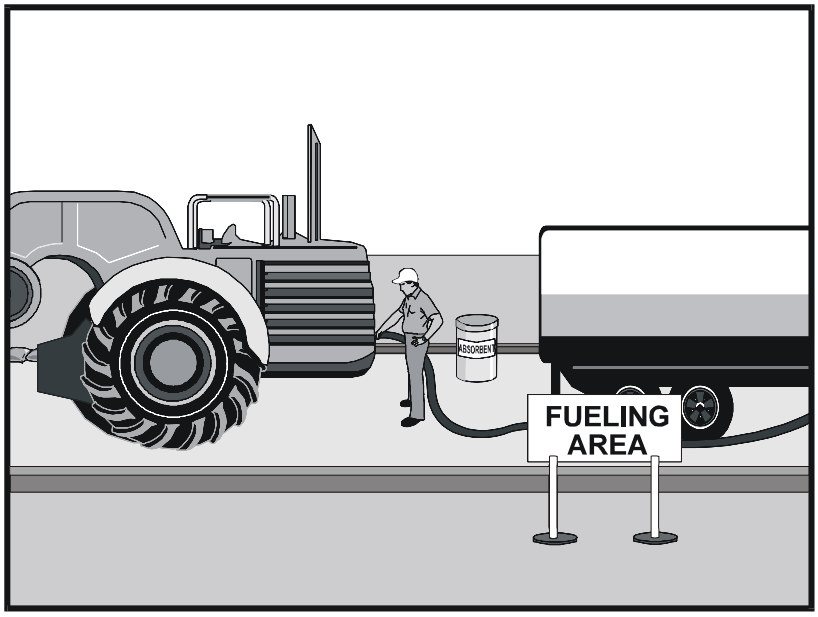
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

### References

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

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

# Vehicle and Equipment Fueling NS-9




## Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

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

## Suitable Applications

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

## Limitations

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

## Implementation

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

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- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

### Costs

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

### Inspection and Maintenance

- Inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately, or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.

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

### References

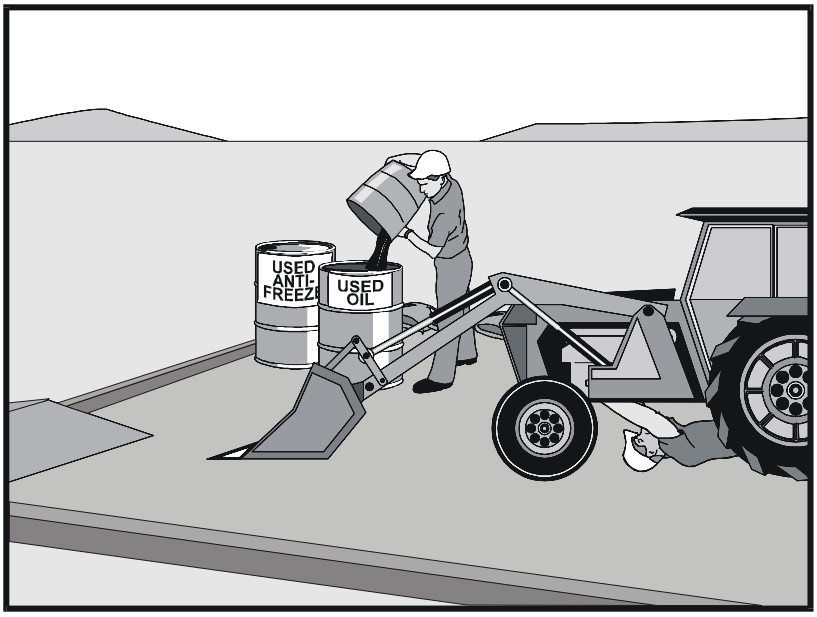
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

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

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

# Vehicle & Equipment Maintenance NS-10




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

**Legend:**
☑ **Primary Objective**
☒ **Secondary Objective**

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

**Potential Alternatives**

None

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## Description and Purpose

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

## Suitable Applications

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

## Limitations

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

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

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

### Implementation

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

- Repair leaks of fluids and oil immediately.

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

### *Safer Alternative Products*

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

### *Waste Reduction*

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

### *Recycling and Disposal*

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

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

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

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

## Costs

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

### Inspection and Maintenance

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

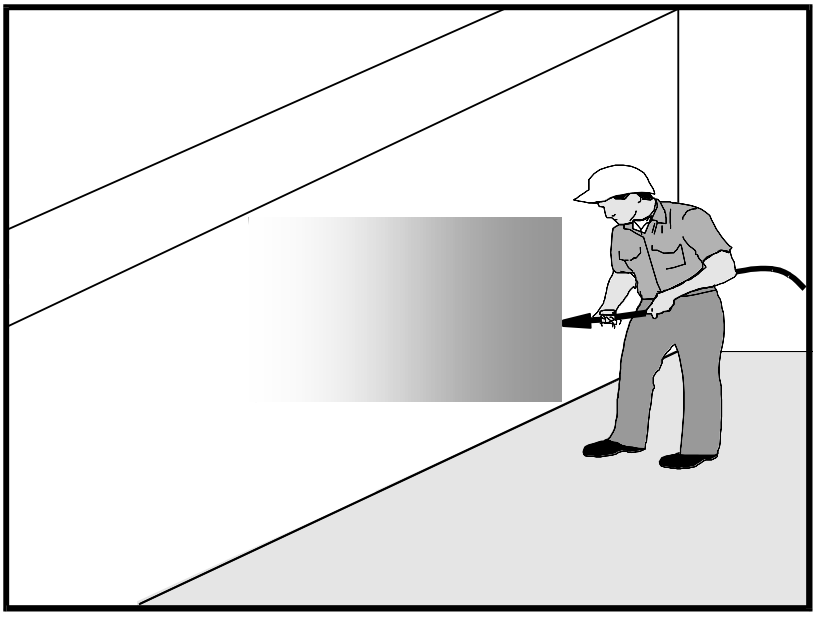
### References

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

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

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

# Concrete Curing NS-12



| Categories | | |
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| WM | Waste Management and Materials Pollution Control | ☑ |

**Legend:**
☑ **Primary Category**
☒ **Secondary Category**

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

**Potential Alternatives**

None

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## Description and Purpose

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

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

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

## Suitable Applications

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

## Limitations

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

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## Implementation

### *Chemical Curing*

- Avoid over spray of curing compounds.
- Minimize the drift by applying the curing compound close to the concrete surface. Apply an amount of compound that covers the surface but does not allow any runoff of the compound.
- Use proper storage and handling techniques for concrete curing compounds. Refer to WM-1, Material Delivery and Storage.
- Protect drain inlets prior to the application of curing compounds.
- Refer to WM-4, Spill Prevention and Control.

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

- Direct cure water away from inlets and watercourses to collection areas for evaporation or other means of removal in accordance with all applicable permits. See WM-8 Concrete Waste Management.
- Collect cure water at the top of slopes and transport to a concrete waste management area in a non-erosive manner. See EC-9 Earth Dikes and Drainage Swales, EC-10, Velocity Dissipation Devices, and EC-11, Slope Drains.
- Utilize wet blankets or a similar method that maintains moisture while minimizing the use and possible discharge of water.

### *Education*

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

## Costs

All of the above measures are generally low cost.

## Inspection and Maintenance

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

- Ensure that employees and subcontractors implement appropriate measures for storage, handling, and use of curing compounds.
- Inspect cure containers and spraying equipment for leaks.

### References

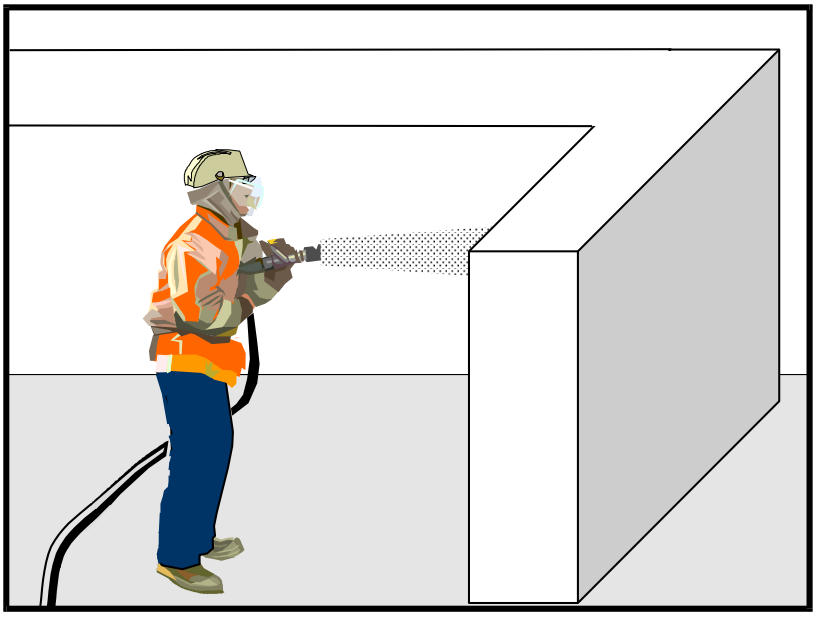
Blue Print for a Clean Bay-Construction-Related Industries: Best Management Practices for Stormwater Pollution Prevention; Santa Clara Valley Non-Point Source Pollution Control Program, 1992.

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

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

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

# Concrete Finishing NS-13



## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

None

## Description and Purpose

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

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

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

## Suitable Applications

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

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## Limitations

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

## Implementation

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

### *Education*

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

## Costs

These measures are generally of low cost.

## Inspection and Maintenance

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

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

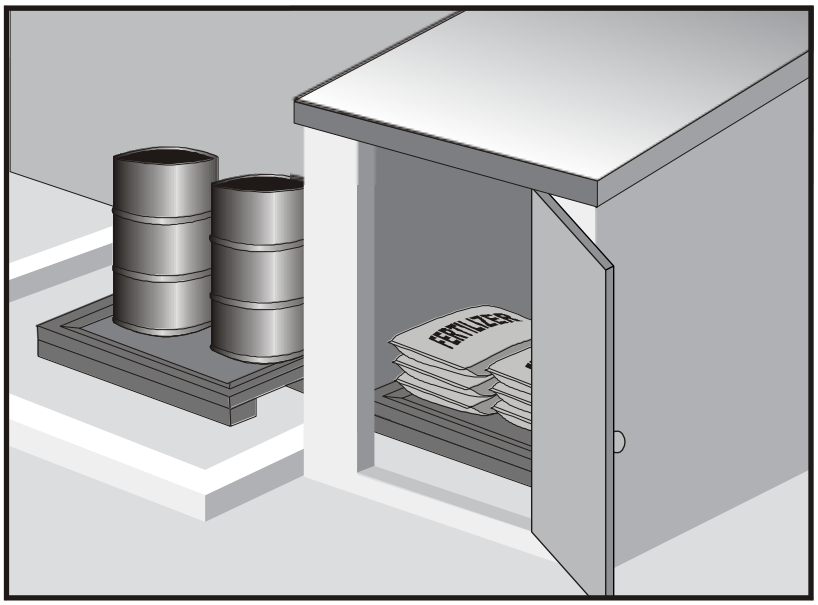
### References

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

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

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

# Material Delivery and Storage WM-1




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

**Legend:**
☑ **Primary Category**
☒ **Secondary Category**

## Description and Purpose

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

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

## Suitable Applications

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

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

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

## Potential Alternatives

None

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

### Limitations

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

### Implementation

The following steps should be taken to minimize risk:

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

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

***Material Storage Areas and Practices***

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

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

***Material Delivery Practices***

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

***Spill Cleanup***

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

## Cost

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

## Inspection and Maintenance

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

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

### References

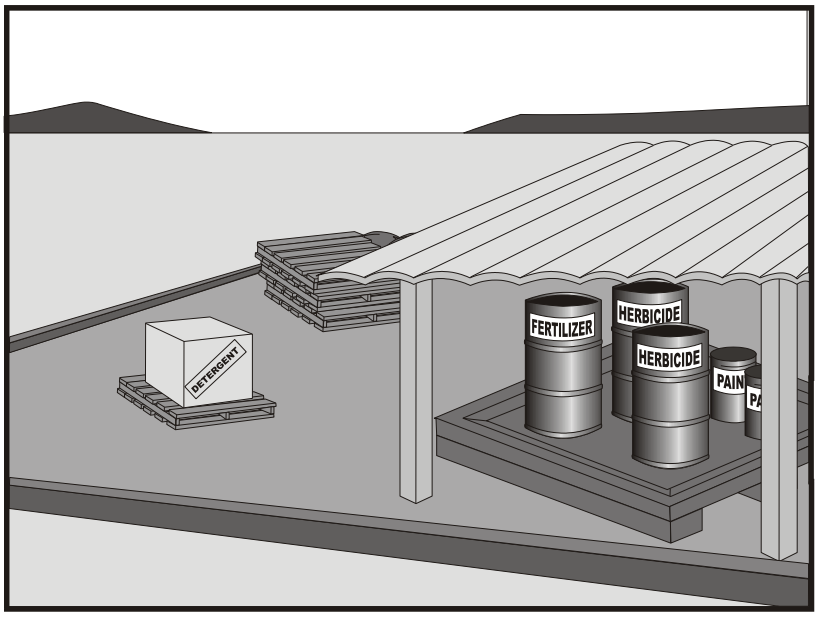
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

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

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

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

# Material Use WM-2




## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

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

## Suitable Applications

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

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

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### Limitations

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

### Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- The preferred method of termiticide application is soil injection near the existing or proposed structure foundation/slab; however, if not feasible, soil drench application of termiticides should follow EPA label guidelines and the following recommendations (most of which are applicable to most pesticide applications):
  - Do not treat soil that is water-saturated or frozen.
  - Application shall not commence within 24-hours of a predicted precipitation event with a 40% or greater probability. Weather tracking must be performed on a daily basis prior to termiticide application and during the period of termiticide application.
  - Do not allow treatment chemicals to runoff from the target area. Apply proper quantity to prevent excess runoff. Provide containment for and divert stormwater from application areas using berms or diversion ditches during application.
  - Dry season: Do not apply within 10 feet of storm drains. Do not apply within 25 feet of aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds).
  - Wet season: Do not apply within 50 feet of storm drains or aquatic habitats (such as, but not limited to, lakes; reservoirs; rivers; permanent streams; marshes or ponds; estuaries; and commercial fish farm ponds) unless a vegetative buffer is present (if so, refer to dry season requirements).
  - Do not make on-grade applications when sustained wind speeds are above 10 mph (at application site) at nozzle end height.
  - Cover treatment site prior to a rain event in order to prevent run-off of the pesticide into non-target areas. The treated area should be limited to a size that can be backfilled and/or covered by the end of the work shift. Backfilling or covering of the treated area shall be done by the end of the same work shift in which the application is made.
  - The applicator must either cover the soil him/herself or provide written notification of the above requirement to the contractor on site and to the person commissioning the

application (if different than the contractor). If notice is provided to the contractor or the person commissioning the application, then they are responsible under the Federal Insecticide Fungicide, and Rodenticide Act (FIFRA) to ensure that: 1) if the concrete slab cannot be poured over the treated soil within 24 hours of application, the treated soil is covered with a waterproof covering (such as polyethylene sheeting), and 2) the treated soil is covered if precipitation is predicted to occur before the concrete slab is scheduled to be poured.

- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydraulic application. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals before predicted rainfall.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted or contain for proper disposal off site. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.
- Document the location, time, chemicals applied, and applicator's name and qualifications.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Discontinue use of erodible landscape material within 2 days prior to a forecasted rain event and materials should be covered and/or bermed.

- Provide containment for material use areas such as masons' areas or paint mixing/preparation areas to prevent materials/pollutants from entering stormwater.

### Costs

All of the above are low cost measures.

### Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Ensure employees and subcontractors throughout the job are using appropriate practices.

### References

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

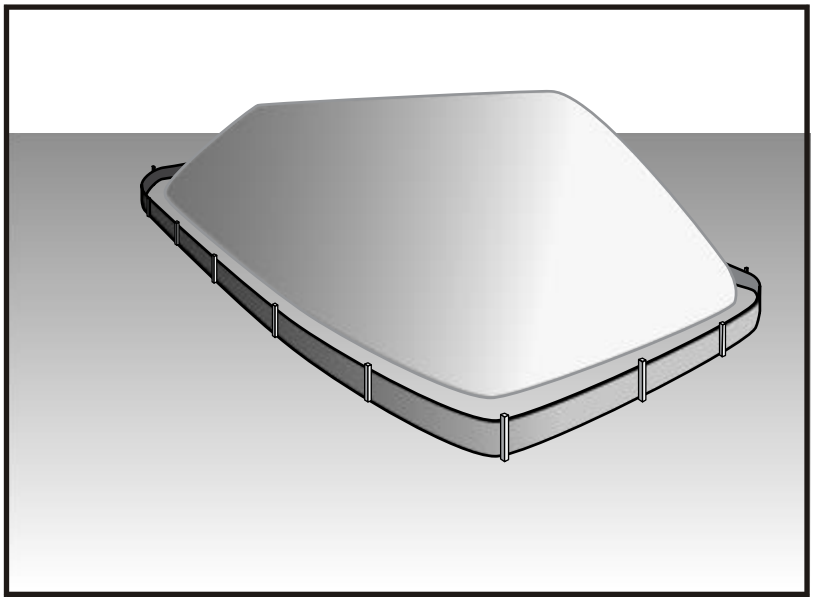
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Comments on Risk Assessments Risk Reduction Options for Cypermethrin: Docket No. OPP–2005–0293; California Stormwater Quality Association (CASQA) letter to USEPA, 2006.Environmental Hazard and General Labeling for Pyrethroid Non-Agricultural Outdoor Products, EPA-HQ-OPP-2008-0331-0021; USEPA, 2008.

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

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

# Stockpile Management WM-3



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

**Legend:**
☑ **Primary Category**
☒ **Secondary Category**

## Description and Purpose

Stockpile management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, soil amendments, sand, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

## Suitable Applications

Implement in all projects that stockpile soil and other loose materials.

## Limitations

- Plastic sheeting as a stockpile protection is temporary and hard to manage in windy conditions. Where plastic is used, consider use of plastic tarps with nylon reinforcement which may be more durable than standard sheeting.
- Plastic sheeting can increase runoff volume due to lack of infiltration and potentially cause perimeter control failure.
- Plastic sheeting breaks down faster in sunlight.
- The use of Plastic materials and photodegradable plastics should be avoided.

## Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

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

**Potential Alternatives**

None

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- On larger sites, a minimum of 50 ft separation from concentrated flows of stormwater, drainage courses, and inlets is recommended.
- After 14 days of inactivity, a stockpile is non-active and requires further protection described below. All stockpiles are required to be protected as non-active stockpiles immediately if they are not scheduled to be used within 14 days.
- Protect all stockpiles from stormwater run-on using temporary perimeter sediment barriers such as compost berms (SE-13), temporary silt dikes (SE-12), fiber rolls (SE-5), silt fences (SE-1), sandbags (SE-8), gravel bags (SE-6), or biofilter bags (SE-14). Refer to the individual fact sheet for each of these controls for installation information.
- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.
- Ensure that stockpile coverings are installed securely to protect from wind and rain.
- Some plastic covers withstand weather and sunlight better than others. Select cover materials or methods based on anticipated duration of use.

***Protection of Non-Active Stockpiles***

A stockpile is considered non-active if it either is not used for 14 days or if it is scheduled not to be used for 14 days or more. Stockpiles need to be protected immediately if they are not scheduled to be used within 14 days. Non-active stockpiles of the identified materials should be protected as follows:

*Soil stockpiles*

- Soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- Temporary vegetation should be considered for topsoil piles that will be stockpiled for extended periods.

*Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base*

- Stockpiles should be covered and protected with a temporary perimeter sediment barrier at all times.

*Stockpiles of "cold mix"*

- Cold mix stockpiles should be placed on and covered with plastic sheeting or comparable material at all times and surrounded by a berm.

*Stockpiles of fly ash, stucco, hydrated lime*

- Stockpiles of materials that may raise the pH of runoff (i.e., basic materials) should be covered with plastic and surrounded by a berm.

*Stockpiles/Storage of treated wood*

- Treated wood should be covered with plastic sheeting or comparable material at all times and surrounded by a berm.

***Protection of Active Stockpiles***

A stockpile is active when it is being used or is scheduled to be used within 14 days of the previous use. Active stockpiles of the identified materials should be protected as follows:

- All stockpiles should be covered and protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" and treated wood, and basic materials should be placed on and covered with plastic sheeting or comparable material and surrounded by a berm prior to the onset of precipitation.
- The downstream perimeter of an active stockpile should be protected with a linear sediment barrier or berm and runoff should be diverted around or away from the stockpile on the upstream perimeter.

## Costs

For cost information associated with stockpile protection refer to the individual erosion or sediment control BMP fact sheet considered for implementation (For example, refer to SE-1 Silt Fence for installation of silt fence around the perimeter of a stockpile.)

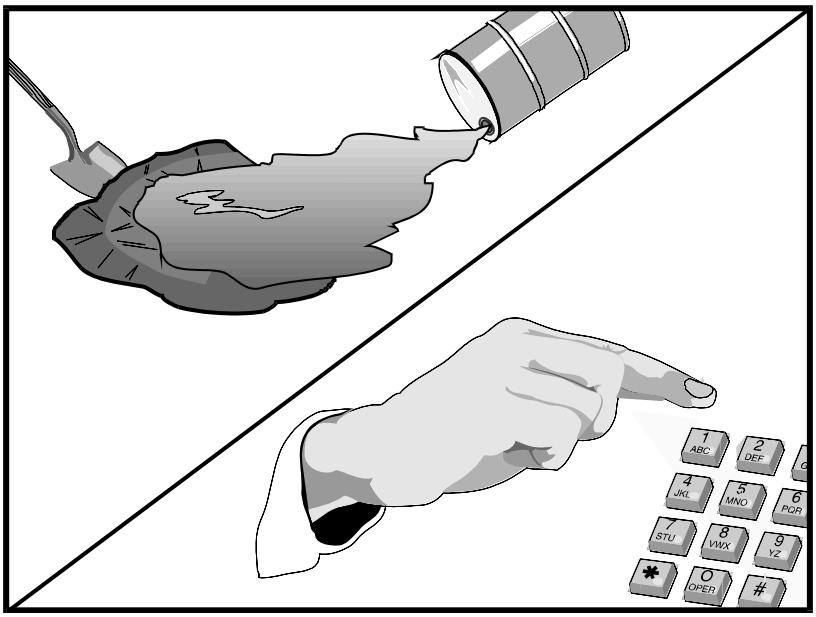
## Inspection and Maintenance

- Stockpiles must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- It may be necessary to inspect stockpiles covered with plastic sheeting more frequently during certain conditions (for example, high winds or extreme heat).
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.
- Sediment shall be removed when it reaches one-third of the barrier height.

## References

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

# Spill Prevention and Control WM-4



## Description and Purpose

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

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

## Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

### Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

### Targeted Constituents

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

### Potential Alternatives

None

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- Fuels
- Lubricants
- Other petroleum distillates

### Limitations

- In some cases, it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

### Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

#### *Education*

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

#### *General Measures*

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

***Cleanup***

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

***Minor Spills***

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the contaminated area and properly dispose of contaminated materials.

***Semi-Significant Spills***

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

***Significant/Hazardous Spills***

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spill's contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

***Reporting***

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

***Vehicle and Equipment Maintenance***

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

***Vehicle and Equipment Fueling***

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

## Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

## Inspection and Maintenance

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

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

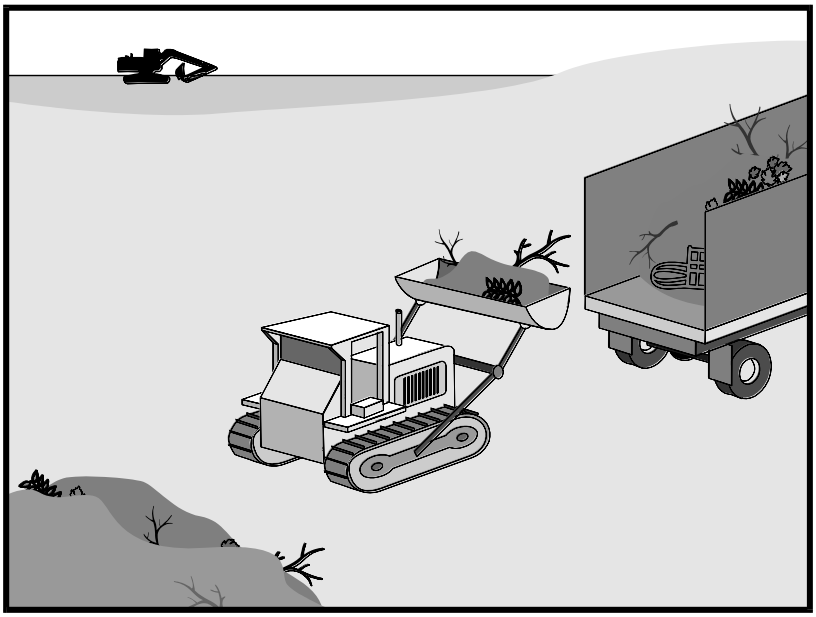
### References

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

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

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

# Solid Waste Management WM-5



## Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

## Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces, and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

### Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

### Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Cover waste containers at the end of each work day and when it is raining.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

#### *Education*

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

***Collection, Storage, and Disposal***

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

### Costs

All of the above are low cost measures.

### Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

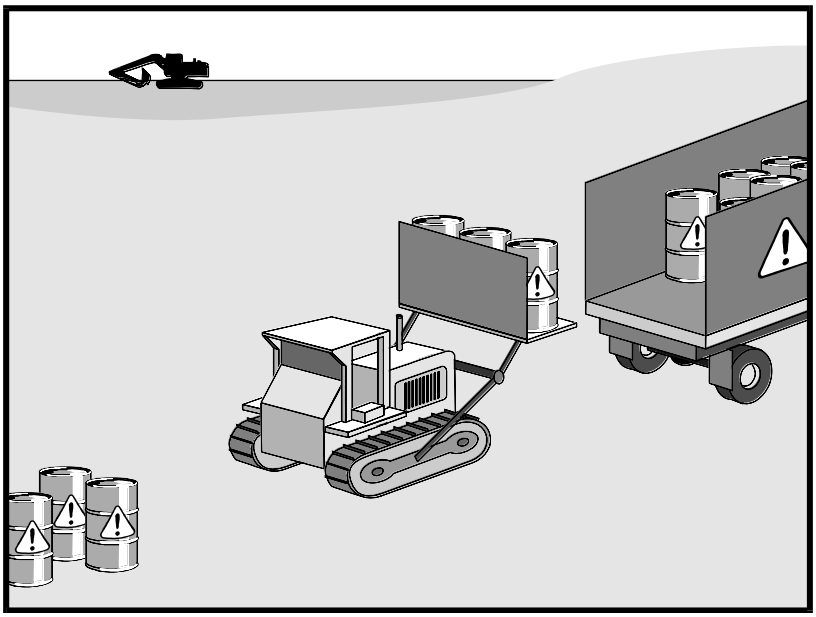
### References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

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

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

# Hazardous Waste Management WM-6



## Description and Purpose

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

## Suitable Applications

This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acids
- Septic Wastes
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar
- Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

## Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

## Targeted Constituents

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

## Potential Alternatives

None

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In addition, sites with existing structures may contain wastes, which must be disposed of in accordance with federal, state, and local regulations. These wastes include:

- Sandblasting grit mixed with lead-, cadmium-, or chromium-based paints
- Asbestos
- PCBs (particularly in older transformers)

## Limitations

- Hazardous waste that cannot be reused or recycled must be disposed of by a licensed hazardous waste hauler.
- Nothing in this BMP relieves the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.
- This BMP does not cover aerially deposited lead (ADL) soils. For ADL soils refer to WM-7, Contaminated Soil Management.

## Implementation

The following steps will help reduce stormwater pollution from hazardous wastes:

### *Material Use*

- Wastes should be stored in sealed containers constructed of a suitable material and should be labeled as required by Title 22 CCR, Division 4.5 and 49 CFR Parts 172, 173, 178, and 179.
- All hazardous waste should be stored, transported, and disposed as required in Title 22 CCR, Division 4.5 and 49 CFR 261-263.
- Waste containers should be stored in temporary containment facilities that should comply with the following requirements:
  - Temporary containment facility should provide for a spill containment volume equal to 1.5 times the volume of all containers able to contain precipitation from a 25-year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.
  - Temporary containment facility should be impervious to the materials stored there for a minimum contact time of 72 hours.
  - Temporary containment facilities should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.
  - Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

  - Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.

  - Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

- Drums should not be overfilled, and wastes should not be mixed.

- Unless watertight, containers of dry waste should be stored on pallets.

- Do not over-apply herbicides and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over application is expensive and environmentally harmful. Apply surface dressings in several smaller applications, as opposed to one large application. Allow time for infiltration and avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains. People applying pesticides must be certified in accordance with federal and state regulations.

- Paint brushes and equipment for water and oil-based paints should be cleaned within a contained area and should not be allowed to contaminate site soils, watercourses, or drainage systems. Waste paints, thinners, solvents, residues, and sludges that cannot be recycled or reused should be disposed of as hazardous waste. When thoroughly dry, latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths should be disposed of as solid waste.

- Do not clean out brushes or rinse paint containers into the dirt, street, gutter, storm drain, or stream. "Paint out" brushes as much as possible. Rinse water-based paints to the sanitary sewer. Filter and reuse thinners and solvents. Dispose of excess oil-based paints and sludge as hazardous waste.

- The following actions should be taken with respect to temporary contaminant:

  - Ensure that adequate hazardous waste storage volume is available.

  - Ensure that hazardous waste collection containers are conveniently located.

  - Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

  - Minimize production or generation of hazardous materials and hazardous waste on the job site.

  - Use containment berms in fueling and maintenance areas and where the potential for spills is high.

  - Segregate potentially hazardous waste from non-hazardous construction site debris.

  - Keep liquid or semi-liquid hazardous waste in appropriate containers (closed drums or similar) and under cover.

- Clearly label all hazardous waste containers with the waste being stored and the date of accumulation.
- Place hazardous waste containers in secondary containment.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Do not mix wastes.
- Use all of the product before disposing of the container.
- Do not remove the original product label; it contains important safety and disposal information.

***Waste Recycling Disposal***

- Select designated hazardous waste collection areas onsite.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- Place hazardous waste containers in secondary containment.
- Do not mix wastes, this can cause chemical reactions, making recycling impossible and complicating disposal.
- Recycle any useful materials such as used oil or water-based paint.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste (e.g., excess oil-based paint and sludge) is collected, removed, and disposed of only at authorized disposal areas.

***Disposal Procedures***

- Waste should be disposed of by a licensed hazardous waste transporter at an authorized and licensed disposal facility or recycling facility utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A Department of Health Services certified laboratory should sample waste to determine the appropriate disposal facility.
- Properly dispose of rainwater in secondary containment that may have mixed with hazardous waste.
- Attention is directed to "Hazardous Material", "Contaminated Material", and "Aerially Deposited Lead" of the contract documents regarding the handling and disposal of hazardous materials.

***Education***

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- Hold regular meetings to discuss and reinforce hazardous waste management procedures (incorporate into regular safety meetings).
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.
- Make sure that hazardous waste is collected, removed, and disposed of only at authorized disposal areas.
- Warning signs should be placed in areas recently treated with chemicals.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, clean up immediately.

## Costs

All of the above are low cost measures.

***Inspection and Maintenance***

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Hazardous waste should be regularly collected.
- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.
- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

- Hazardous spills should be cleaned up and reported in conformance with the applicable Material Safety Data Sheet (MSDS) and the instructions posted at the project site.
- The National Response Center, at (800) 424-8802, should be notified of spills of federal reportable quantities in conformance with the requirements in 40 CFR parts 110, 117, and 302. Also notify the Governors Office of Emergency Services Warning Center at (916) 845-8911.
- A copy of the hazardous waste manifests should be provided.

### References

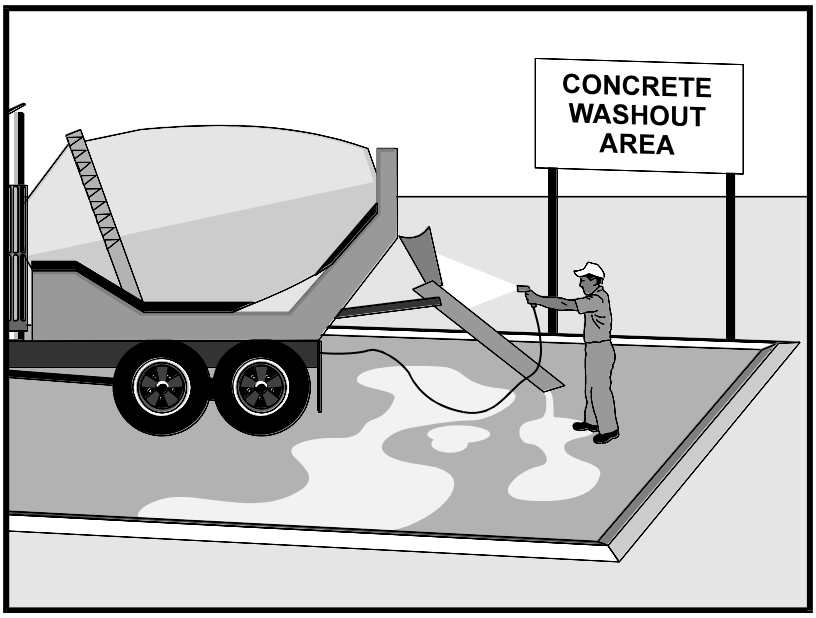
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

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

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

# Concrete Waste Management WM-8




## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

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

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

Many types of construction materials, including mortar, concrete, stucco, cement and block and their associated wastes have basic chemical properties that can raise pH levels outside of the permitted range. Additional care should be taken when managing these materials to prevent them from coming into contact with stormwater flows and raising pH to levels outside the accepted range.

## Suitable Applications

Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete is used as a construction material or where concrete dust and debris result from demolition activities.
- Slurries containing Portland cement concrete (PCC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.
- Concrete trucks and other concrete-coated equipment are washed onsite.

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- Mortar-mixing stations exist.
- Stucco mixing and spraying.
- See also NS-8, Vehicle and Equipment Cleaning.

### Limitations

- Offsite washout of concrete wastes may not always be possible.
- Multiple washouts may be needed to assure adequate capacity and to allow for evaporation.

### Implementation

The following steps will help reduce stormwater pollution from concrete wastes:

- Incorporate requirements for concrete waste management into material supplier and subcontractor agreements.
- Store dry and wet materials under cover, away from drainage areas. Refer to WM-1, Material Delivery and Storage for more information.
- Avoid mixing excess amounts of concrete.
- Perform washout of concrete trucks in designated areas only, where washout will not reach stormwater.
- Do not wash out concrete trucks into storm drains, open ditches, streets, streams or onto the ground. Trucks should always be washed out into designated facilities.
- Do not allow excess concrete to be dumped onsite, except in designated areas.
- For onsite washout:
  - On larger sites, it is recommended to locate washout areas at least 50 feet from storm drains, open ditches, or water bodies. Do not allow runoff from this area by constructing a temporary pit or bermed area large enough for liquid and solid waste.
  - Washout wastes into the temporary washout where the concrete can set, be broken up, and then disposed properly.
  - Washouts shall be implemented in a manner that prevents leaching to underlying soils. Washout containers must be water tight and washouts on or in the ground must be lined with a suitable impervious liner, typically a plastic type material.
- Do not wash sweepings from exposed aggregate concrete into the street or storm drain. Collect and return sweepings to aggregate base stockpile or dispose in the trash.
- See typical concrete washout installation details at the end of this fact sheet.

### *Education*

- Educate employees, subcontractors, and suppliers on the concrete waste management techniques described herein.

- Arrange for contractor's superintendent or representative to oversee and enforce concrete waste management procedures.
- Discuss the concrete management techniques described in this BMP (such as handling of concrete waste and washout) with the ready-mix concrete supplier before any deliveries are made.

***Concrete Demolition Wastes***

- Stockpile concrete demolition waste in accordance with BMP WM-3, Stockpile Management.
- Dispose of or recycle hardened concrete waste in accordance with applicable federal, state or local regulations.

***Concrete Slurry Wastes***

- PCC and AC waste should not be allowed to enter storm drains or watercourses.
- PCC and AC waste should be collected and disposed of or placed in a temporary concrete washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below).
- A foreman or construction supervisor should monitor onsite concrete working tasks, such as saw cutting, coring, grinding and grooving to ensure proper methods are implemented.
- Saw-cut concrete slurry should not be allowed to enter storm drains or watercourses. Residue from grinding operations should be picked up by means of a vacuum attachment to the grinding machine or by sweeping. Saw cutting residue should not be allowed to flow across the pavement and should not be left on the surface of the pavement. See also NS-3, Paving and Grinding Operations; and WM-10, Liquid Waste Management.
- Concrete slurry residue should be disposed in a temporary washout facility (as described in Onsite Temporary Concrete Washout Facility, Concrete Transit Truck Washout Procedures, below) and allowed to dry. Dispose of dry slurry residue in accordance with WM-5, Solid Waste Management.

***Onsite Temporary Concrete Washout Facility, Transit Truck Washout Procedures***

- Temporary concrete washout facilities should be located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses. Each facility should be located away from construction traffic or access areas to prevent disturbance or tracking.
- A sign should be installed adjacent to each washout facility to inform concrete equipment operators to utilize the proper facilities.
- Temporary concrete washout facilities should be constructed above grade or below grade at the option of the contractor. Temporary concrete washout facilities should be constructed and maintained in sufficient quantity and size to contain all liquid and concrete waste generated by washout operations.

- Temporary washout facilities should have a temporary pit or bermed areas of sufficient volume to completely contain all liquid and waste concrete materials generated during washout procedures.
- Temporary washout facilities should be lined to prevent discharge to the underlying ground or surrounding area.
- Washout of concrete trucks should be performed in designated areas only.
- Only concrete from mixer truck chutes should be washed into concrete wash out.
- Concrete washout from concrete pumper bins can be washed into concrete pumper trucks and discharged into designated washout area or properly disposed of or recycled offsite.
- Once concrete wastes are washed into the designated area and allowed to harden, the concrete should be broken up, removed, and disposed of per WM-5, Solid Waste Management. Dispose of or recycle hardened concrete on a regular basis.
- Temporary Concrete Washout Facility (Type Above Grade)
    - Temporary concrete washout facility (type above grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft; however, smaller sites or jobs may only need a smaller washout facility. With any washout, always maintain a sufficient quantity and volume to contain all liquid and concrete waste generated by washout operations.
    - Materials used to construct the washout area should conform to the provisions detailed in their respective BMPs (e.g., SE-8 Sandbag Barrier).
    - Plastic lining material should be a minimum of 10 mil in polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.
    - Alternatively, portable removable containers can be used as above grade concrete washouts. Also called a “roll-off”; this concrete washout facility should be properly sealed to prevent leakage and should be removed from the site and replaced when the container reaches 75% capacity.
- Temporary Concrete Washout Facility (Type Below Grade)
    - Temporary concrete washout facilities (type below grade) should be constructed as shown on the details at the end of this BMP, with a recommended minimum length and minimum width of 10 ft. The quantity and volume should be sufficient to contain all liquid and concrete waste generated by washout operations.
    - Lath and flagging should be commercial type.
    - Plastic lining material should be a minimum of 10 mil polyethylene sheeting and should be free of holes, tears, or other defects that compromise the impermeability of the material.

- The base of a washout facility should be free of rock or debris that may damage a plastic liner.

***Removal of Temporary Concrete Washout Facilities***

- When temporary concrete washout facilities are no longer required for the work, the hardened concrete should be removed and properly disposed or recycled in accordance with federal, state or local regulations. Materials used to construct temporary concrete washout facilities should be removed from the site of the work and properly disposed or recycled in accordance with federal, state or local regulations.

- Holes, depressions or other ground disturbance caused by the removal of the temporary concrete washout facilities should be backfilled and repaired.

## Costs

All of the above are low cost measures. Roll-off concrete washout facilities can be more costly than other measures due to removal and replacement; however, provide a cleaner alternative to traditional washouts. The type of washout facility, size, and availability of materials will determine the cost of the washout.

## Inspection and Maintenance

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

- Temporary concrete washout facilities should be maintained to provide adequate holding capacity with a minimum freeboard of 4 in. for above grade facilities and 12 in. for below grade facilities. Maintaining temporary concrete washout facilities should include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials should be removed and properly disposed or recycled in accordance with federal, state or local regulations.

- Washout facilities must be cleaned, or new facilities must be constructed and ready for use once the washout is 75% full.

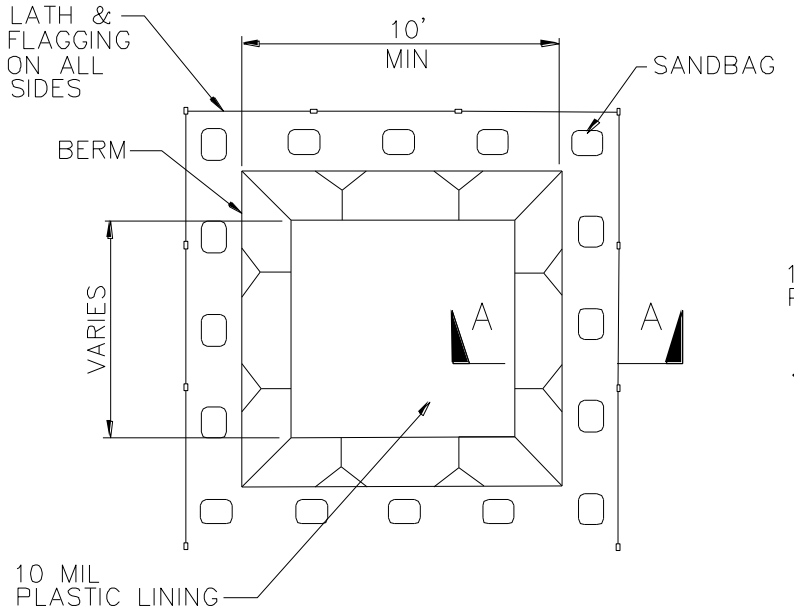
- Inspect washout facilities for damage (e.g. torn liner, evidence of leaks, signage, etc.). Repair all identified damage.

## References

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

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000, Updated March 2003.

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




PLAN
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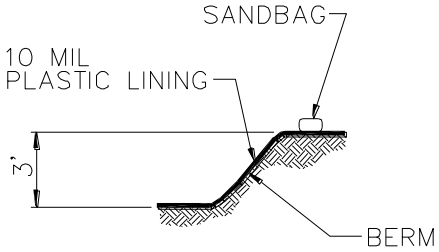
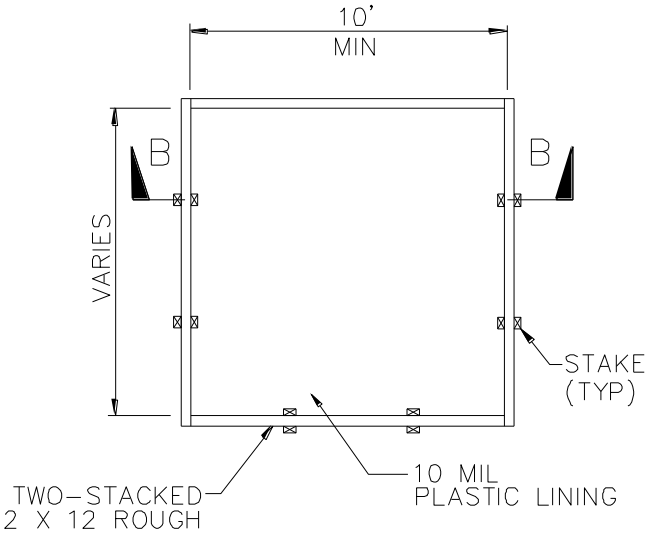



SECTION A–A
NOT TO SCALE




PLAN
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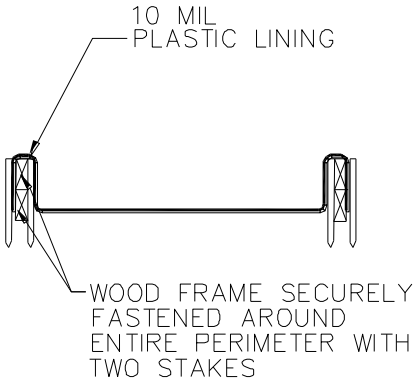
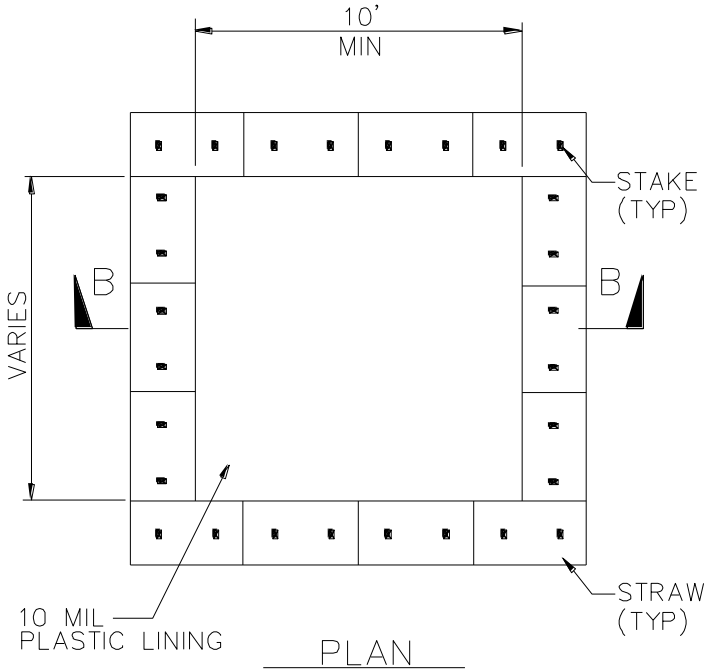
TYPE "ABOVE GRADE"



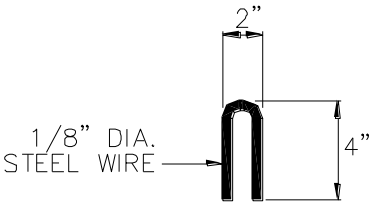

SECTION B–B
NOT TO SCALE

NOTES

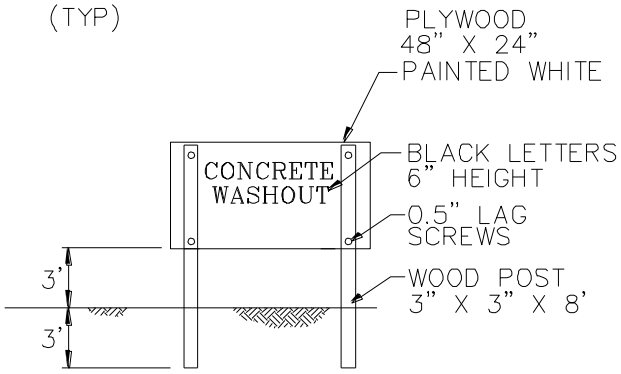
1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.



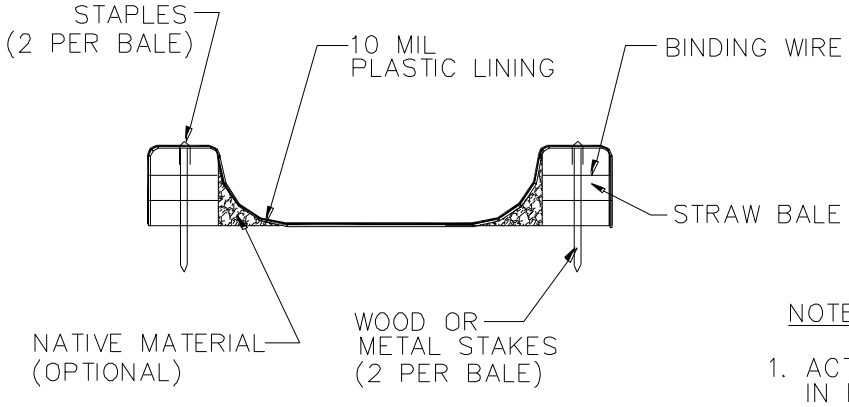

PLAN
NOT TO SCALE
TYPE "ABOVE GRADE"
WITH STRAW BALES




STAPLE DETAIL




CONCRETE WASHOUT
SIGN DETAIL
(OR EQUIVALENT)

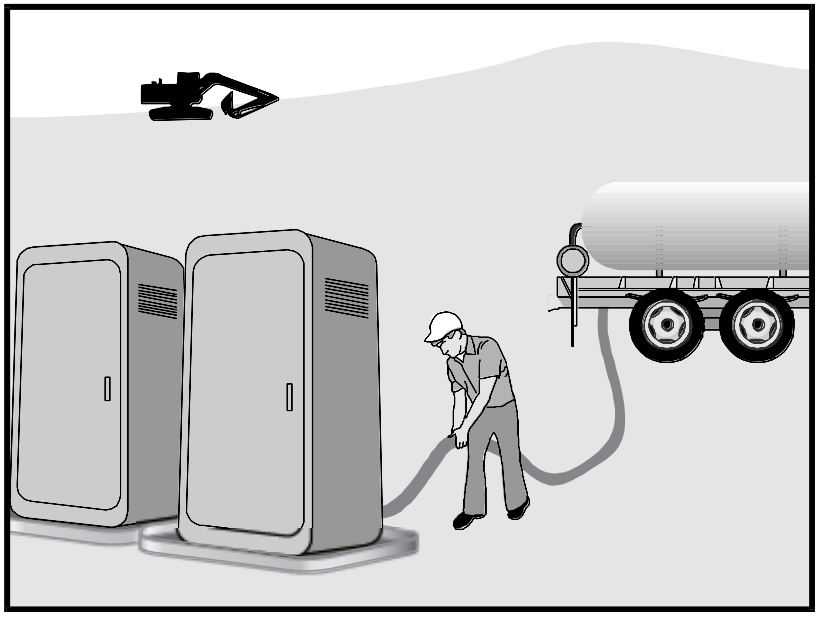



SECTION B–B
NOT TO SCALE

NOTES

1. ACTUAL LAYOUT DETERMINED IN FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30 FT. OF THE TEMPORARY CONCRETE WASHOUT FACILITY.

# Sanitary/Septic Waste Management WM-9



## Description and Purpose

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

## Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

## Limitations

None identified.

## Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

### *Storage and Disposal Procedures*

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. If site conditions allow, place portable facilities a minimum of 50 feet from drainage conveyances and traffic areas. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

None

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- Temporary sanitary facilities must be equipped with containment to prevent discharge of pollutants to the stormwater drainage system of the receiving water.
- Consider safety as well as environmental implications before placing temporary sanitary facilities.
- Wastewater should not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- If a spill does occur from a temporary sanitary facility, follow federal, state and local regulations for containment and clean-up.

***Education***

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce the use of sanitary facilities (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

## Costs

All of the above are low cost measures.

## Inspection and Maintenance

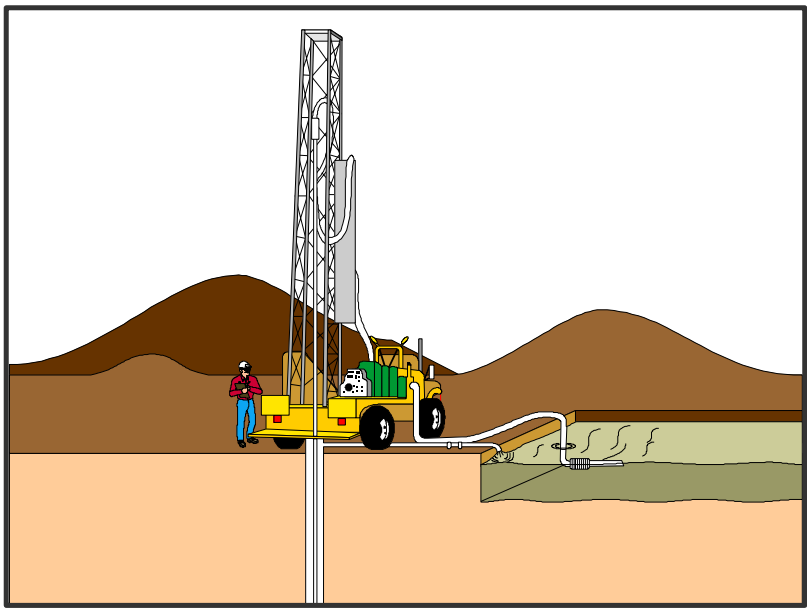
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.
- If spills or leaks from sanitary or septic facilities occur that are not contained and discharge from the site, non-visible sampling of site discharge may be required. Refer to the General Permit or to your project specific Construction Site Monitoring Plan to determine if and where sampling is required.

## References

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

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

# Liquid Waste Management WM-10



## Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

## Targeted Constituents

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

## Potential Alternatives

None

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## Description and Purpose

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

## Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

## Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous wastes (WM-6, Hazardous Waste Management), or

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concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

## Implementation

### *General Practices*

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

### *Containing Liquid Wastes*

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.

- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

### *Capturing Liquid Wastes*

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.

- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

### *Disposing of Liquid Wastes*

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.

- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.

- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.

- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

## Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

## Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

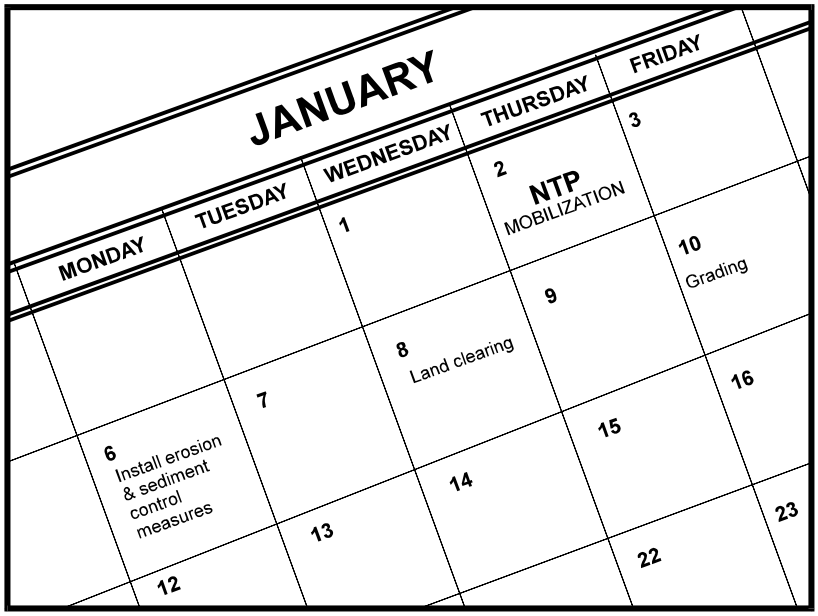
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

### References

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

# Scheduling EC-1




## Description and Purpose

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

## Suitable Applications

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

## Limitations

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

## Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase of construction. Clearly show how the rainy season relates

### Categories

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

**Legend:**

☑ **Primary Objective**

☒ **Secondary Objective**

### Targeted Constituents

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

### Potential Alternatives

None

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

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

### Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques

should be compared with the other less effective erosion and sedimentation controls to achieve a cost-effective balance.

### Inspection and Maintenance

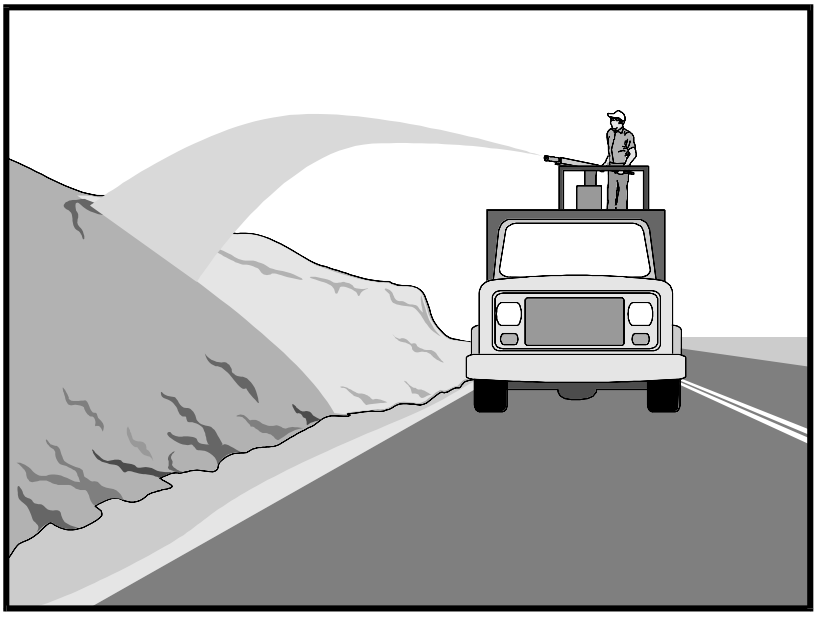
- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

### References

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

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

# Hydraulic Mulch EC-3



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

**Legend:**
☑ **Primary Category**
☒ **Secondary Category**

## Description and Purpose

Hydraulic Mulch consists of various types of fibrous materials mixed with water and sprayed onto the soil surface in slurry form to provide a layer of temporary protection from wind and water erosion.

## Suitable Applications

Hydraulic mulch as a temporary, stand alone, erosion control BMP is suitable for disturbed areas that require temporary protection from wind and water erosion until permanent soil stabilization activities commence. Examples include:

- Rough-graded areas that will remain inactive for longer than permit-required thresholds (e.g., 14 days) or otherwise require stabilization to minimize erosion or prevent sediment discharges.
- Soil stockpiles.
- Slopes with exposed soil between existing vegetation such as trees or shrubs.
- Slopes planted with live, container-grown vegetation or plugs.
- Slopes burned by wildfire.
- To stabilize earthen berms
- Areas seeded by broadcasting or drilling

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

| Potential Alternatives |
|---|
| EC-4 Hydroseeding |
| EC-5 Soil Binders |
| EC-6 Straw Mulch |
| EC-7 Geotextiles and Mats |
| EC-8 Wood Mulching |
| EC-14 Compost Blanket |
| EC-16 Non-Vegetative Stabilization |

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- Temporary stabilization during high wind conditions

Hydraulic mulch can also be applied to augment other erosion control BMPs such as:

- In conjunction with straw mulch (see EC-6 Straw Mulch) where the rate of hydraulic mulch is reduced to 100-500 lbs per acre and the slurry is applied over the straw as a tackifying agent to hold the straw in place.
- Supplemental application of soil amendments, such as fertilizer, lime, gypsum, soil bio-stimulants or compost.

### Limitations

In general, hydraulic mulch is not limited by slope length, gradient or soil type. However, the following limitations typically apply:

- Most hydraulic mulch applications, particularly bonded fiber matrices (BFMs), require at least 24 hours to dry before rainfall occurs.
- Temporary applications (i.e., without a vegetative component) may require a second application in order to remain effective for an entire rainy season.
- Treatment areas must be accessible to hydraulic mulching equipment.
- Availability of water sources in remote areas for mixing and application.
- As a stand-alone temporary BMP, hydraulic mulches may need to be re-applied to maintain their erosion control effectiveness, typically after 6-12 months depending on the type of mulch used.
- Availability of hydraulic mulching equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- Cellulose fiber mulches alone may not perform well on steep slopes or in course soils.
- This BMP consists of a mixture of several constituents (e.g., fibers/mulches, compost, tackifiers, and other chemical constituents), some of which may be proprietary and may come pre-mixed by the manufacturer. The water quality impacts of these constituents are relatively unknown, and some may have water quality impacts due to their chemical makeup. Refer to specific chemical properties identified in the product Safety Data Sheet (may not include ecological information); products should be evaluated for project-specific implementation by the SWPPP Preparer. Refer to factsheet EC-05 for further guidance on selecting soil binders.
- A water supply is needed to refill hydro mulch equipment tank.
- Cannot be disturbed by walking or driving on the surface after application.
- Recommend using in conjunction with other BMPs (i.e., fiber rolls, etc.).

### Implementation

- Where feasible, it is preferable to prepare soil surfaces prior to application by roughening embankments and fill areas with a crimping or punching type roller or by track walking.
- The majority of hydraulic mulch applications do not necessarily require surface/soil preparation (See EC-15 Soil Preparation) although in almost every case where re-vegetation is included as part of the practice, soil preparation can be beneficial. One of the advantages of hydraulic mulch over other erosion control methods is that it can be applied in areas where soil preparation is precluded by site conditions, such as steep slopes, rocky soils, or inaccessibility.
- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.
- Hydraulic mulching is generally performed utilizing specialized machines that have a large water-holding/mixing tank and some form of mechanical agitation or other recirculation method to keep water, mulch and soil amendments in suspension. The mixed hydraulic slurry can be applied from a tower sprayer on top of the machine or by extending a hose to areas remote from the machine.
- Where possible apply hydraulic mulch from multiple directions to adequately cover the soil. Application from a single direction can result in shadowing, uneven coverage and failure of the BMP.
- Hydraulic mulch can also include a vegetative component, such as seed, rhizomes, or stolons (see EC-4 Hydraulic Seed).
- Typical hydraulic mulch application rates range from 2,000 pounds per acre for standard mulches (SMs) to 3,500 lbs. per acre for BFMs. However, the required amount of hydraulic mulch to provide adequate coverage of exposed topsoil may appear to exceed the standard rates when the roughness of the soil surface is changed due to soil preparation methods (see EC-15 Soil Preparation) or by slope gradient.
- Other factors such as existing soil moisture and soil texture can have a profound effect on the amount of hydraulic mulch required (i.e. application rate) applied to achieve an erosion-resistant covering.
- Avoid use of mulch without a tackifier component, especially on slopes.
- Mulches used in the hydraulic mulch slurry can include:
  - Cellulose fiber (paper- or corn-based)
  - Wood fibers
  - Cotton
  - Synthetics
  - Compost (see EC-14, Compost Blanket)
  - Straw

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

## Categories of Hydraulic Mulches

Standard Hydraulic Mulch (SM)

Standard hydraulic mulches are generally applied at a rate of 2,000 lbs. per acre and are manufactured containing around 5% tackifier (i.e. soil binder), usually a plant-derived guar or psyllium type. Most standard mulches are green in color derived from food-color based dyes.

Hydraulic Matrices (HM) and Stabilized Fiber Matrices (SFM)

Hydraulic matrices and stabilized fiber matrices are slurries which contain increased levels of tackifiers/soil binders; usually 10% or more by weight. HMs and SFMs have improved performance compared to a standard hydraulic mulch (SM) because of the additional percentage of tackifier and because of their higher application rates, typically 2,500 – 4,000 lbs. per acre. Hydraulic matrices can include a mixture of fibers, for example, a 50/50 blend of paper and wood fiber. In the case of an SFM, the tackifier/soil binder is specified as a polyacrylamide (PAM).

Bonded Fiber Matrix (BFM)

Bonded fiber matrices (BFMs) are hydraulically-applied systems of fibers, adhesives (typically guar- or polymer-based) and chemical cross-links. Upon drying, the slurry forms an erosion-resistant blanket that prevents soil erosion and promotes vegetation establishment. The cross-linked adhesive in the BFM should be biodegradable and should not dissolve or disperse upon re-wetting. BFMs are typically applied at rates from 3,000 to 4,000 lbs. per acre based on the manufacturer's recommendation. BFMs should not be applied immediately before, during or immediately after rainfall or if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

Hydraulic Compost Matrix (HCM)

Hydraulic compost matrix (HCM) is a field-derived practice whereby finely graded or sifted compost is introduced into the hydraulic mulch slurry. A guar-type tackifier can be added for steeper slope applications as well as any specified seed mixtures. An HCM can help to accelerate seed germination and growth. HCMs are particularly useful as an in-fill for three-dimensional re-vegetation geocomposites, such as turf reinforcement mats (TRM) (see EC-7 Geotextiles and Mats).

## Costs

Average installed costs for hydraulic mulch categories are is provided in Table 1, below.

**Table**
**HYDRAULIC MULCH BMPs**
**INSTALLED COSTS**

| BMP | Installed Cost/Acre |
|---|---|
| Standard Hydraulic Mulching (SM) | $2,100 - $4,700 per acre |
| Hydraulic Matrices (HM) and Stabilized Fiber Matrices | |
| Guar-based | $2,600 - $5,200 per acre |
| PAM-based | $3,200 - $7,200 per acre |
| Bonded Fiber Matrix (BFM) | $5,000 - $8,800 per acre |
| Hydraulic Compost Matrix (HCM) | $3,800 - $4,500 per acre |

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

## Inspection and Maintenance

- Maintain an unbroken, temporary mulched ground cover throughout the period of construction when the soils are not being reworked.
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Compare the number of bags or weight of applied mulch to the area treated to determine actual application rates and compliance with specifications.

## References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Controlling Erosion of Construction Sites, Agricultural Information #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

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

Sedimentation and Erosion Control, an Inventory of Current Practices Draft, US EPA, April 1990.

Soil Erosion by Water, Agriculture Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

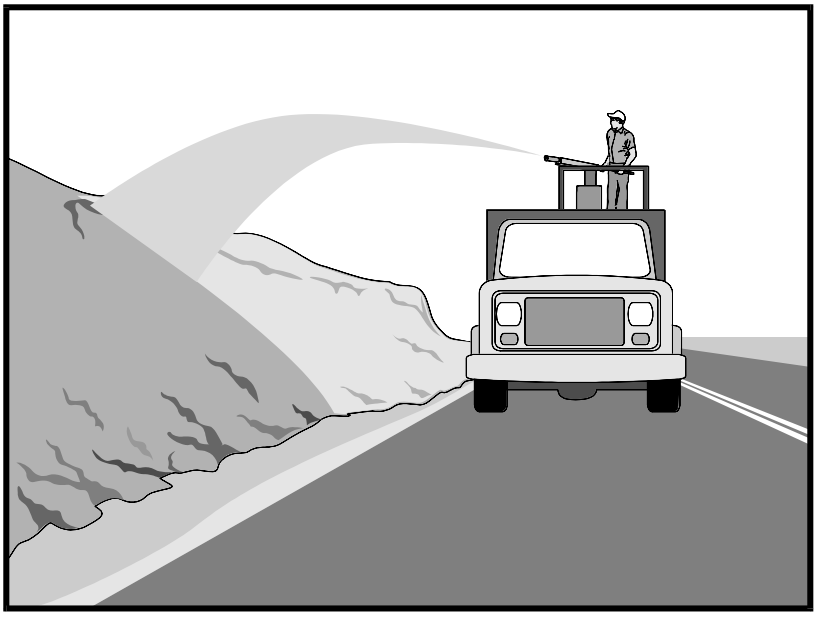
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999

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

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

# Straw Mulch EC-6



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

**Legend:**
☑ **Primary Category**
☒ **Secondary Category**

## Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

## Suitable Applications

Straw mulch is suitable for disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch can be specified for the following applications:

- As a stand-alone BMP on disturbed areas until soils can be prepared for permanent vegetation. The longevity of straw mulch is typically less than six months.
- Applied in combination with temporary seeding strategies
- Applied in combination with permanent seeding strategies to enhance plant establishment and final soil stabilization
- Applied around containerized plantings to control erosion until the plants become established to provide permanent stabilization

## Limitations

Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.

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

| Potential Alternatives |
|---|
| EC-3 Hydraulic Mulch |
| EC-4 Hydroseeding |
| EC-5 Soil Binders |
| EC-7 Geotextiles and Mats |
| EC-8 Wood Mulching |
| EC-14 Compost Blanket |

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- There is a potential for introduction of weed seed and unwanted plant material if weed-free agricultural straw is not specified.
- Straw mulch applied by hand is more time intensive and potentially costly.
- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- "Punching" of straw does not work in sandy soils, necessitating the use of tackifiers.
- Potential fugitive dust control issues associated with straw applications can occur. Application of a stabilizing emulsion or a water stream at the same time straw is being blown can reduce this problem.
- Use of plastic netting should be avoided in areas where wildlife may be entrapped and may be prohibited for projects in certain areas with sensitive wildlife species, especially reptiles and amphibians.

### Implementation

- Straw should be derived from weed-free wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw should be used.
- Use tackifier to anchor straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking can be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier should not be applied during or immediately before rainfall.
- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

### Application Procedures

- When using a tackifier to anchor the straw mulch, roughen embankment or fill areas by rolling with a crimping or punching-type roller or by track walking before placing the straw mulch. Track walking should only be used where rolling is impractical.
- Apply straw at a rate of between 3,000 and 4,000 lb./acre, either by machine or by hand distribution and provide 100% ground cover. A lighter application is used for flat surfaces and a heavier application is used for slopes.
- Evenly distribute straw mulch on the soil surface.
- Anchoring straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating) can be used in lieu of a tackifier.

- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.

  - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier should be selected based on longevity and ability to hold the fibers in place. A tackifier is typically applied at a rate of 125 lb./acre. In windy conditions, the rates are typically 180 lb./acre.

  - On very small areas, a spade or shovel can be used to punch in straw mulch.

  - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coulter, known commercially as a "crimper."

## Costs

Average annual cost for installation and maintenance is included in the table below. Application by hand is more time intensive and potentially more costly.

| BMP | Unit Cost per Acre |
|---|---|
| Straw mulch, crimped or punched | $3,150-$6,900 |
| Straw mulch with tackifier | $2,300-$6,200 |

Source: Cost information received from individual product suppliers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

## Inspection and Maintenance

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

- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.

- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives. Straw mulch as a stand-alone BMP is temporary and is not suited for long-term erosion control.

- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.

- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

## References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

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

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

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

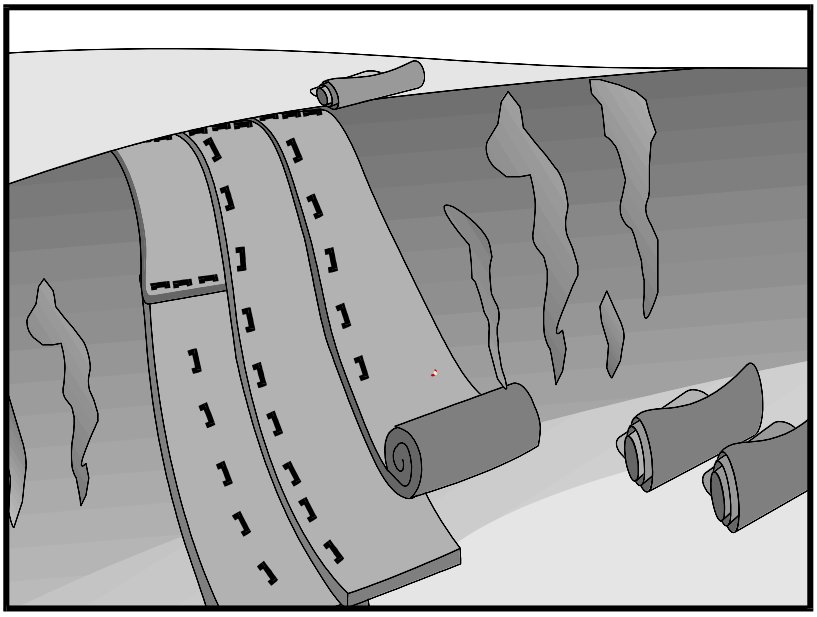
Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

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

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

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

# Geotextiles and Mats EC-7



## Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

## Targeted Constituents

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

## Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

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## Description and Purpose

Rolled Erosion Control Products (RECPs), also known as erosion control matting or blankets, can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

## Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high, and vegetation will be slow to establish. Mattings are also used on stream banks, swales and other drainage channels where moving water at velocities between 3 ft/s and 6 ft/s are likely to cause scour and wash out new vegetation and in areas where the soil surface is disturbed and where existing vegetation has been removed. RECPs may also be used when seeding cannot occur (e.g., late season construction and/or the arrival of an early rain season). RECPs should be considered when the soils are fine grained and potentially erosive. RECPs should be considered in the following situations:

- Steep slopes, generally steeper than 3:1 (H:V).
- Long slopes.
- Slopes where the erosion potential is high.
- Slopes and disturbed soils where mulch must be anchored.

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- Disturbed areas where temporary cover is needed, or plants are slow to establish or will not establish.
- Channels with flows exceeding 3.3 ft/s.
- Channels to be vegetated.
- Stockpiles.
- Slopes adjacent to water bodies.

### Limitations

- RECP installed costs are generally higher than other erosion control BMPs, limiting their use to areas where other BMPs are ineffective (e.g., channels, steep slopes).
- RECPs may delay seed germination, due to reduction in soil temperature and/or sunlight.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed (since staples and netting can catch in mowers). If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- The use of plastic sheeting should be limited to covering stockpiles or very small graded areas for short periods of time (such as through one imminent storm event) until other measures, such as seeding and mulching, may be installed.
    - Plastic sheeting is easily vandalized, easily torn, photodegradable, and must be disposed of at a landfill.
    - Plastic sheeting results in 100% runoff, which may cause serious erosion problems in the areas receiving the increased flow.
- According to the State Water Board's *CGP Review, Issue #2*, only RECPs that either do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials, such as jute, sisal, or coir fiber should be used due to plastic pollution and wildlife concerns. If a plastic-netted product is used for temporary stabilization, it must be promptly removed when no longer needed and removed or replaced with non-plastic netted RECPs for final stabilization.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard) – e.g., pad areas around buildings under construction.
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting. As per State Water Board guidance, RECPs that

contain plastic netting are discouraged for temporary controls and are not acceptable alternatives for permanent controls. RECPs that do not contain plastic netting or contain netting manufactured from 100% biodegradable non-plastic materials such as jute, sisal, or coir fiber should be used.

- RECPs may have limitations in extremely windy climates; they are susceptible to wind damage and displacement. However, when RECPs are properly trenched at the top and bottom and stapled in accordance with the manufacturer's recommendations, problems with wind can be minimized.

### *Implementation*

#### *Material Selection*

- Natural RECPs have been found to be effective where re-vegetation will be provided by re-seeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials.

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

- The following natural and synthetic RECPs are commonly used:

#### *Geotextiles*

- Material can be a woven or a non-woven polypropylene fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 $sec^{-1}$ in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Geotextiles may be reused if they are suitable for the use intended.

#### *Plastic Covers*

- Generally plastic sheeting should only be used as stockpile covering or for very small graded areas for short periods of time (such as through one imminent storm event). If plastic sheeting must be used, choose a plastic that will withstand photo degradation.

- Plastic sheeting should have a minimum thickness of 6 mils and must be keyed in at the top of slope (when used as a temporary slope protection) and firmly held in place with sandbags or other weights placed no more than 10 ft apart. Seams are typically taped or weighted down their entire length, and there should be at least a 12 in. to 24 in. overlap of all seams. Edges should be embedded a minimum of 6 in. in soil (when used as a temporary slope protection).

- All sheeting must be inspected periodically after installation and after significant rainstorms to check for erosion, undermining, and anchorage failure. Any failures must be repaired

immediately. If washout or breakages occur, the material should be re-installed after repairing the damage to the slope.

***Erosion Control Blankets/Mats***

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable. See typical installation details at the end of this fact sheet.

  - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 lb/yd$^2$, ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

  - **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd$^2$. Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

  - **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5

lb/yd$^2$. Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Straw coconut fiber blanket** should be machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber should be attached to the netting with biodegradable thread or glue strips. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd$^2$. Straw coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- Non-biodegradable RECPs are typically composed of polypropylene, polyethylene, nylon or other synthetic fibers. In some cases, a combination of biodegradable and synthetic fibers is used to construct the RECP. Netting used to hold these fibers together is typically non-biodegradable as well. Only biodegradable RECPs can remain on a site applying for a Notice of Termination due to plastic pollution and wild life concerns (State Waterboard, 2016). RECPs containing plastic that are used on a site must be disposed of for final stabilization.

  - **Plastic netting** is a lightweight biaxially oriented netting designed for securing loose mulches like straw or paper to soil surfaces to establish vegetation. The netting is photodegradable. The netting is supplied in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Plastic mesh** is an open weave geotextile that is composed of an extruded synthetic fiber woven into a mesh with an opening size of less than ¼ in. It is used with re-vegetation or may be used to secure loose fiber such as straw to the ground. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Synthetic fiber with netting** is a mat that is composed of durable synthetic fibers treated to resist chemicals and ultraviolet light. The mat is a dense, three-dimensional mesh of synthetic (typically polyolefin) fibers stitched between two polypropylene nets. The mats are designed to be re-vegetated and provide a permanent composite system of soil, roots, and geomatrix. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

  - **Bonded synthetic fibers** consist of a three-dimensional geometric nylon (or other synthetic) matting. Typically, it has more than 90 percent open area, which facilitates

root growth. It's tough root reinforcing system anchors vegetation and protects against hydraulic lift and shear forces created by high volume discharges. It can be installed over prepared soil, followed by seeding into the mat. Once vegetated, it becomes an invisible composite system of soil, roots, and geomatrix. The material is furnished in rolled strips that must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

- **Combination synthetic and biodegradable RECPs** consist of biodegradable fibers, such as wood fiber or coconut fiber, with a heavy polypropylene net stitched to the top and a high strength continuous filament geomatrix or net stitched to the bottom. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured with U-shaped staples or stakes in accordance with manufacturers' recommendations.

### *Site Preparation*

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

### *Seeding/Planting*

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), seed the matting and the entire disturbed area after installation and prior to filling the mat with soil.

Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

### *Check Slots*

Check slots shall be installed as required by the manufacturer.

### *Laying and Securing Matting*

- Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations.
- Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

### *Anchoring*

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11-gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

### *Installation on Slopes*

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd$^2$. Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd$^2$. Check manufacturer's specifications to determine if a higher density staple pattern is required.

### *Installation in Channels*

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Dig initial anchor trench 12 in. deep and 6 in. wide across the channel at the lower end of the project area.
- Excavate intermittent check slots, 6 in. deep and 6 in. wide across the channel at 25 to 30 ft intervals along the channels.
- Cut longitudinal channel anchor trenches 4 in. deep and 4 in. wide along each side of the installation to bury edges of matting, whenever possible extend matting 2 to 3 in. above the crest of the channel side slopes.

- Beginning at the downstream end and in the center of the channel, place the initial end of the first roll in the anchor trench and secure with fastening devices at 12 in. intervals. Note: matting will initially be upside down in anchor trench.
- In the same manner, position adjacent rolls in anchor trench, overlapping the preceding roll a minimum of 3 in.
- Secure these initial ends of mats with anchors at 12 in. intervals, backfill and compact soil.
- Unroll center strip of matting upstream. Stop at next check slot or terminal anchor trench. Unroll adjacent mats upstream in similar fashion, maintaining a 3 in. overlap.
- Fold and secure all rolls of matting snugly into all transverse check slots. Lay mat in the bottom of the slot then fold back against itself. Anchor through both layers of mat at 12 in. intervals, then backfill and compact soil. Continue rolling all mat widths upstream to the next check slot or terminal anchor trench.
- Alternate method for non-critical installations: Place two rows of anchors on 6 in. centers at 25 to 30 ft. intervals in lieu of excavated check slots.
- Staple shingled lap spliced ends a minimum of 12 in. apart on 12 in. intervals.
- Place edges of outside mats in previously excavated longitudinal slots; anchor using prescribed staple pattern, backfill, and compact soil.
- Anchor, fill, and compact upstream end of mat in a 12 in. by 6 in. terminal trench.
- Secure mat to ground surface using U-shaped wire staples, geotextile pins, or wooden stakes.
- Seed and fill turf reinforcement matting with soil, if specified.

***Soil Filling (if specified for turf reinforcement mat (TRM))***

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake ½-3/4 inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

### *Temporary Soil Stabilization Removal*

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

## Costs

Installed costs can be relatively high compared to other BMPs. Approximate costs for installed materials are shown below:

| Rolled Erosion Control Products | | Installed Cost per Acre |
|---|---|---|
| Biodegradable | Jute Mesh | $7,700-$9,000 |
| | Curled Wood Fiber | $10,200-$13,400 |
| | Straw | $10,200-$13,400 |
| | Wood Fiber | $10,200-$13,400 |
| | Coconut Fiber | $16,600-$18,000 |
| | Coconut Fiber Mesh | $38,400-$42,200 |
| | Straw Coconut Fiber | $12,800-$15,400 |
| Non-Biodegradable | Plastic Netting | $2,600-$2,800 |
| | Plastic Mesh | $3,800-$4,500 |
| | Synthetic Fiber with Netting | $43,500-$51,200 |
| | Bonded Synthetic Fibers | $57,600-$70,400 |
| | Combination with Biodegradable | $38,400-$46,100 |

Source: Cost information received from individual product manufacturers solicited by Geosyntec Consultants (2004). Adjusted for inflation (2016 dollars) by Tetra Tech, Inc.

### *Inspection and Maintenance*

- RECPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.

## References

CGP Review #2, State Water Resources Control Board, 2014. Available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/training/cgp_review_issue2.pdf.

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

Erosion Control Pilot Study Report, State of California Department of Transportation (Caltrans), June 2000.

Guides for Erosion and Sediment Controls in California, USDA Soils Conservation Service, January 1991.

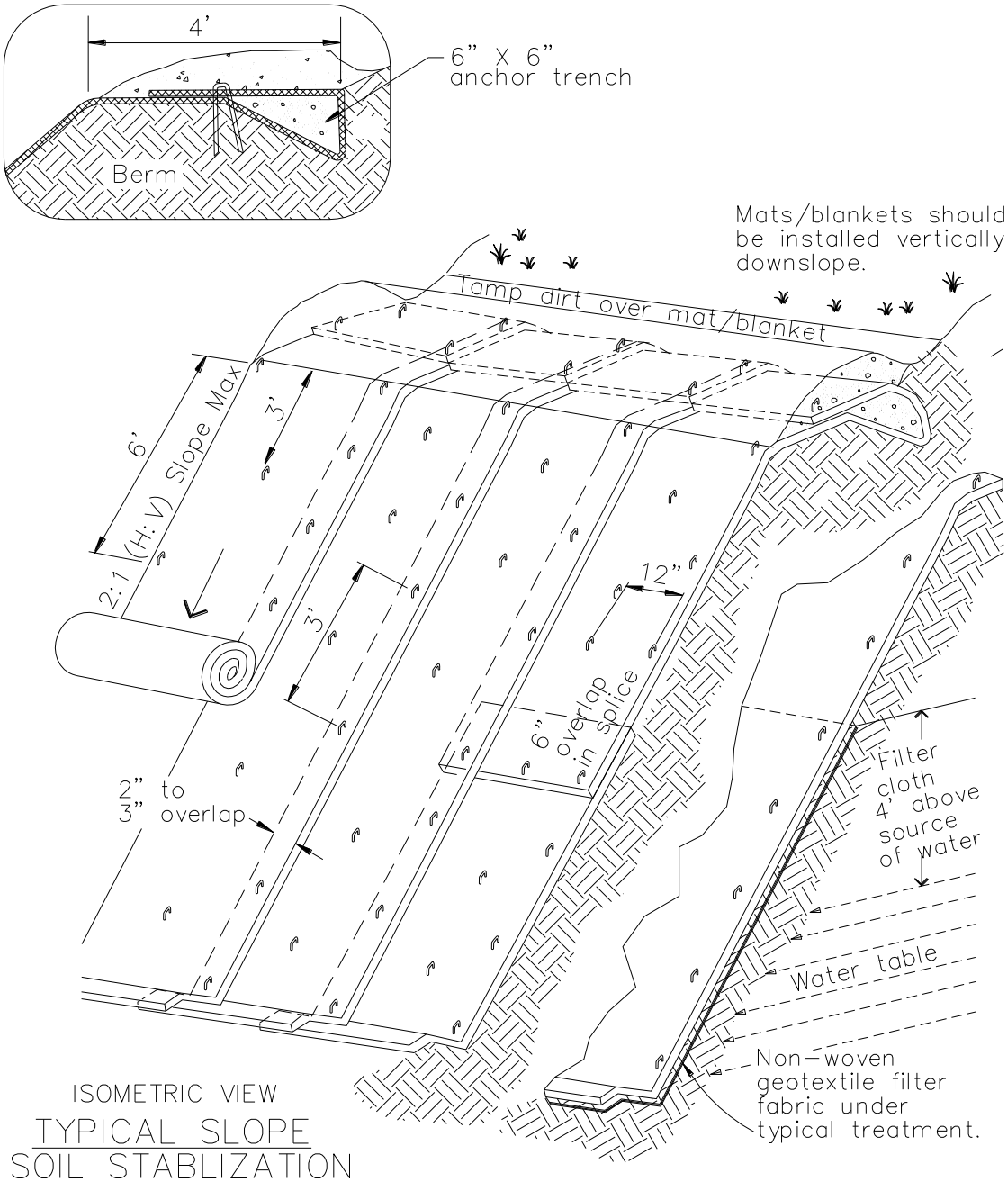
National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

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

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

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

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.




ISOMETRIC VIEW

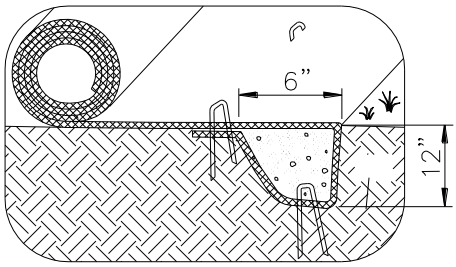
TYPICAL SLOPE
SOIL STABLIZATION
NTS

WET SLOPE LINING
NTS

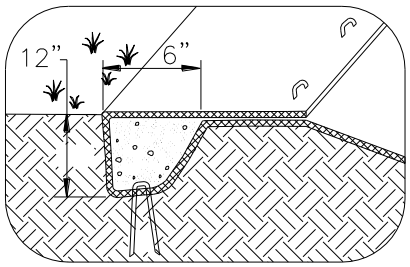
NOTES:

1. Slope surface shall be free of rocks, clods, sticks and grass. Mats/blankets shall have good soil contact.
2. Lay blankets loosely and stake or staple to maintain direct contact with the soil. Do not stretch.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL




INITIAL CHANNEL ANCHOR TRENCH
NTS




TERMINAL SLOPE AND CHANNEL ANCHOR TRENCH
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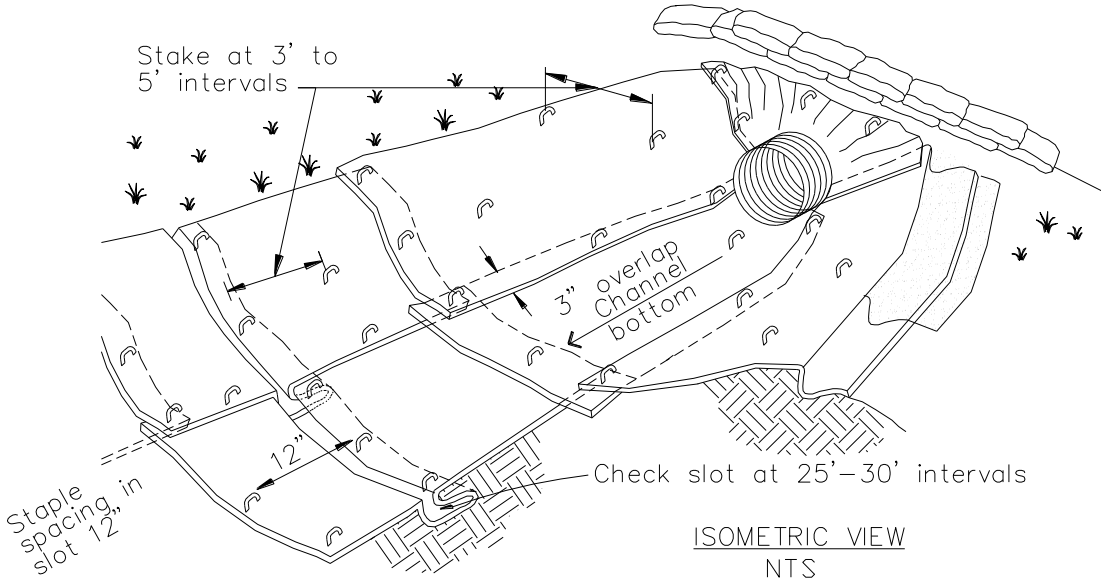


ISOMETRIC VIEW
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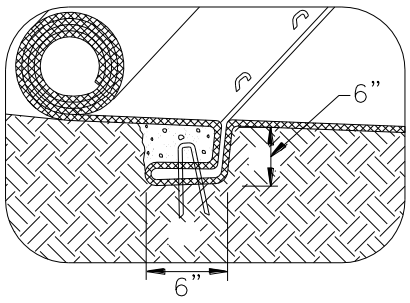


INTERMITTENT CHECK SLOT
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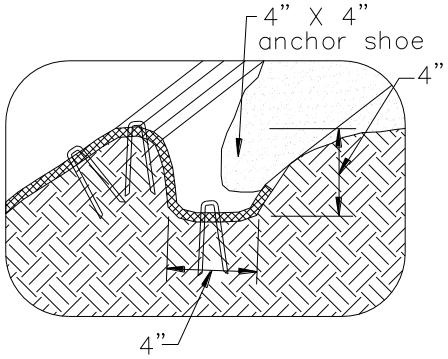


LONGITUDINAL ANCHOR TRENCH
NTS

NOTES:
1. Check slots to be constructed per manufacturers specifications.
2. Staking or stapling layout per manufacturers specifications.
3. Install per manufacturer's recommendations

TYPICAL INSTALLATION DETAIL

# Soil Preparation/Roughening EC-15

**D**

Soil Preparation/Roughening involves assessment and preparation of surface soils for BMP installation. This can include soil testing (for seed base, soil characteristics, or nutrients), as well as roughening surface soils by mechanical methods (including sheepsfoot rolling, track walking, scarifying, stair stepping, and imprinting) to prepare soil for additional BMPs, or to break up sheet flow. Soil Preparation can also involve tilling topsoil to prepare a seed bed and/or incorporation of soil amendments, to enhance vegetative establishment.

## Suitable Applications

**Soil preparation:** Soil preparation is essential to proper vegetative establishment. In particular, soil preparation (i.e. tilling, raking, and amendment) is suitable for use in combination with any soil stabilization method, including Rolled Erosion Control Products (RECPs) or sod. Soil preparation should not be confused with roughening.

**Roughening:** Soil roughening is generally referred to as track walking (sometimes called imprinting) a slope, where treads from heavy equipment run parallel to the contours of the slope and act as mini terraces. Soil preparation is most effective when used in combination with erosion controls. Soil Roughening is suitable for use as a complementary process for controlling erosion on a site. Roughening is not intended to be used as a stand-alone BMP, and should be used with perimeter controls, additional erosion control measures, grade breaks, and vegetative establishment for maximum effectiveness. Roughening is intended to only affect surface soils and should not compromise slope stability or overall compaction. Suitable applications for soil roughening include:

### Categories

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

**Legend:**

☑ **Primary Category**

☒ **Secondary Category**

### Targeted Constituents

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

### Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-7 Geotextiles and Mats

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- Along any disturbed slopes, including temporary stockpiles, sediment basins, or compacted soil diversion berms and swales.

- Roughening should be used in combination with hydraulically applied stabilization methods, compost blanket, or straw mulch; but should not be used in combination with RECPs or sod because roughening is intended to leave terraces on the slope.

## Limitations

- Preparation and roughening must take place prior to installing other erosion controls (such as hydraulically applied stabilizers) or sediment controls (such as fiber rolls) on the faces of slopes.

- In such cases where slope preparation is minimal, erosion control/revegetation BMPs that do not require extensive soil preparation - such as hydraulic mulching and seeding applications - should be employed.

- Consideration should be given to the type of erosion control BMP that follows surface preparation, as some BMPs are not designed to be installed over various types of tillage/roughening, i.e., RECPs should not be used with soil roughening due to a "bridging" effect, which suspends the blanket above the seed bed.

- Surface roughness has an effect on the amount of mulch material that needs to be applied, which shows up as a general increase in mulch material due to an increase in surface area (Topographic Index -see EC-3 Hydraulic Mulch).

## Implementation

- Additional guidance on the comparison and selection of temporary slope stabilization methods is provided in Appendix F of the Handbook.

### *General*

A roughened surface can significantly reduce erosion. Based on tests done at the San Diego State Erosion Research Laboratory, various roughening techniques on slopes can result in a 12 - 76% reduction in the erosion rate versus smooth slopes.

### *Materials*

Minimal materials are required unless amendments and/or seed are added to the soil. The majority of soil roughening/preparation can be done with equipment that is on hand at a normal construction site, such as bull dozers and compaction equipment.

### *Installation Guidelines*

#### Soil Preparation

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration and create a more favorable environment for germination and growth.

- Based upon soil testing conducted, apply additional soil amendments (e.g., fertilizers, additional seed) to the soil to help with germination. Follow EC-4, Hydroseeding, when selecting and applying seed and fertilizers.

**Cut Slope Roughening**:

- Stair-step grade or groove the cut slopes that are steeper than 3:1.
- Use stair-step grading on any erodible material soft enough to be ripped with a bulldozer. Slopes consisting of soft rock with some subsoil are particularly suited to stair-step grading.
- Make the vertical cut distance less than the horizontal distance, and slightly slope the horizontal position of the "step" in toward the vertical wall.
- Do not make individual vertical cuts more than 2 ft. (0.6 m) high in soft materials or more than 3 ft. (0.9 m) high in rocky materials.
- Groove the slope using machinery to create a series of ridges and depressions that run across the slope, on the contour.

**Fill Slope Roughening:**

- Place on fill slopes with a gradient steeper than 3:1 in lifts not to exceed 8 in. (0.2 m), and make sure each lift is properly compacted.
- Ensure that the face of the slope consists of loose, uncompacted fill 4-6 in. (0.1-0.2 m) deep.
- Use grooving or tracking to roughen the face of the slopes, if necessary.
- Do not blade or scrape the final slope face.

**Roughening for Slopes to be Mowed**:

- Slopes that require mowing activities should not be steeper than 3:1.
- Roughen these areas to shallow grooves by track walking, scarifying, sheepsfoot rolling, or imprinting.
- Make grooves close together (less than 10 in.), and not less than 1 in. deep, and perpendicular to the direction of runoff (i.e., parallel to the slope contours).
- Excessive roughness is undesirable where mowing is planned.

**Roughening with Tracked Machinery:**

- Limit roughening with tracked machinery to soils with a sandy textural component to avoid undue compaction of the soil surface.
- Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.
- Seed and mulch roughened areas as soon as possible to obtain optimum seed germination and growth.

### Costs

Costs are based on the additional labor of tracking or preparation of the slope plus the cost of any required soil amendment materials.

### Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Check the seeded slopes for signs of erosion such as rills and gullies. Fill these areas slightly above the original grade, then reseed and mulch as soon as possible.
- Inspect BMPs weekly during normal operations, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

### References

Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

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

# ATTACHMENT 2

# NON-COMPLIANCE DOCUMENTATION

# ATTACHMENT 3

# CONSTRUCTION SITE INSPECTION REPORTS

(REFERENCE ***APPENDIX G*** CONSTRUCTION SITE INSPECTION REPORT FORM)

# ATTACHMENT 4

# ANNUAL REPORTS

# ATTACHMENT 5

# SITE-SPECIFIC REAPS

(REFERENCE ***APPENDIX H*** FOR SITE-SPECIFIC REAP FORMS)

# APPENDIX A

# STATE BOARD GENERAL PERMIT

**Linda S. Adams**
*Secretary for*
*Environmental Protection*

# State Water Resources Control Board

**Arnold Schwarzenegger**
*Governor*

**Division of Water Quality**
1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

| | |
|---|---|
| This Order was adopted by the State Water Resources Control Board on: | **September 2, 2009** |
| This Order shall become effective on: | **July 1, 2010** |
| This Order shall expire on: | **September 2, 2014** |

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ [as amended by Order No. 2010-0014-DWQ] except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

Linda S. Adams
*Secretary for*
*Environmental Protection*

# State Water Resources Control Board

**Division of Water Quality**
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**Arnold Schwarzenegger**
*Governor*

## NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

## ORDER NO. 2010-0014-DWQ
## NPDES NO. CAS000002

| | |
|---|---|
| Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on: | **September 2, 2009** |
| Order No. 2009-0009-DWQ became effective on: | **July 1, 2010** |
| Order No. 2009-0009-DWQ shall expire on: | **September 2, 2014** |
| This Order, which amends Order No. 2009-0009-DWQ, was adopted by the State Water Resources Control Board on: | **November 16, 2010** |
| This Order shall become effective on: | **February 14, 2011** |

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-0009-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on **November 16, 2010.**

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

**State Water Resources Control Board**

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2012-0006-DWQ
NPDES NO**. CAS000002**

| | |
|---|---|
| Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on: | **September 2, 2009** |
| Order No. 2009-0009-DWQ became effective on: | **July 1, 2010** |
| Order No. 2010-0014-DWQ became effective on: | **February 14, 2011** |
| Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ shall expire on: | **September 2, 2014** |
| This Order, which amends Order No. 2009-0009-DWQ as amended by 2010-0014-DWQ, was adopted by the State Water Resources Control Board on: | **July 17, 2012** |
| This Order No. 2012-0006-DWQ shall become effective on: | **July 17, 2012** |

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-000-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on July 17, 2012.

| | |
|---|---|
| AYE: | Chairman Charles R. Hoppin<br>Vice Chair Frances Spivy-Weber<br>Board Member Tam M. Doduc<br>Board Member Steven Moore<br>Board Member Felicia Marcus |
| NAY: | None |
| ABSENT: | None |
| ABSTAIN: | None |

Jeanine Townsend
Clerk to the Board

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## LIST OF ATTACHMENTS


**Attachment A – Linear Underground/Overhead Requirements**
**Attachment A.1 – LUP Type Determination**
**Attachment A.2 – LUP Permit Registration Documents**
**Attachment B – Permit Registration Documents**
**Attachment C – Risk Level 1 Requirements**
**Attachment D – Risk Level 2 Requirements**
**Attachment E – Risk Level 3 Requirements**
**Attachment F – Active Treatment System (ATS) Requirements**


## LIST OF APPENDICES


**Appendix 1 – Risk Determination Worksheet**
**Appendix 2 – Post-Construction Water Balance Performance Standard**
**Appendix 2.1 – Post-Construction Water Balance Performance Standard Spreadsheet**
**Appendix 3 – Bioassessment Monitoring Guidelines**
**Appendix 4 – Adopted/Implemented Sediment TMDLs**
**Appendix 5 – Glossary**
**Appendix 6 – Acronyms**
**Appendix 7 – State and Regional Water Resources Control Board Contacts**

**STATE WATER RESOURCES CONTROL BOARD**
**ORDER NO. 2009-0009-DWQ**
**[AS AMENDED BY ORDER NO. 2010-0014-DWQ]**
**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**
**GENERAL PERMIT NO. CAS000002**

**WASTE DISCHARGE REQUIREMENTS**
**FOR**
**DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES**

# I. FINDINGS

## A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.

2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear

Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.

4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.

5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.

6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16,[1] which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.

7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.

8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.

9. Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

[1] Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.

11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.

12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.

13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.

14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.

15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.

16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.

17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

## B. Activities Covered Under the General Permit

18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.

21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[2]

23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of

[2] Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

## C. Activities Not Covered Under the General Permit

24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.

28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

29. Construction activity covered by an individual NPDES Permit for storm water discharges.

30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 (“R” in the Revised Universal Soil Loss Equation).

31. Landfill construction activity that is subject to the Industrial General Permit.

32. Construction activity that discharges to Combined Sewer Systems.

33. Conveyances that discharge storm water runoff combined with municipal sewage.

34. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

## D. Obtaining and Modifying General Permit Coverage

36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.

37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

## E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)[3]. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

40. This General Permit prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.

42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

43. This General Permit prohibits the discharge of any debris[4] from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

## F. Training

44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.

45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

[3] BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[4] Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

## G. Determining and Reducing Risk

46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.

47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.

48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.

49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.

50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS[5]) can prevent or reduce the release of fine particles from construction sites.

[5] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

Use of an ATS can effectively reduce a site's risk of impacting receiving waters.

51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

## H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, "The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities," dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel's suggestions into this General Permit, which includes numeric action levels (NALs) for pH and turbidity, and special numeric limits for ATS discharges.

**Determining Compliance with Numeric Limitations**

53. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. An exceedance of a NAL does not constitute a violation of this General Permit.

54. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is

required to provide an NAL Exceedance Report when requested by a Regional Water Board.

## I. Receiving Water Limitations

55. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

## J. Sampling, Monitoring, Reporting and Record Keeping

56. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

57. Records of all visual monitoring inspections are required to remain on-site during the construction period and for a minimum of three years.

58. For all Risk Level 3/LUP Type 3 and Risk Level 2/LUP Type 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.

59. Risk Level 3 and LUP Type 3 sites with effluent that exceeds the Receiving Water Monitoring Triggers contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring. An exceedance of a Receiving Water Monitoring Trigger does not constitute a violation of this General Permit.

60. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) as an exemptions to the receiving water monitoring requirements for Risk Level 3 and LUP Type 3 dischargers.

61. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

62. For Risk Level 3 and LUP Type 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.

63. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.

64. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.

65. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.

66. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

## K. Active Treatment System (ATS) Requirements

67. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.

68. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.

69. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.

70. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.

71. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

## L. Post-Construction Requirements

72. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, "Requiring Sustainable Water Resources Management." The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This "runoff reduction" approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.

73. LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

## M. Storm Water Pollution Prevention Plan Requirements

74. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.

75. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

## N. Regional Water Board Authorities

76. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this

General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

**IT IS HEREBY ORDERED** that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)[6]:

# II. CONDITIONS FOR PERMIT COVERAGE

## A. Linear Underground/Overhead Projects (LUPs)

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. The Legally Responsible Person is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

[6] These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

## B. Obtaining Permit Coverage Traditional Construction Sites

1. The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.

2. To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

3. PRDs shall consist of:

   a. Notice of Intent (NOI)
   b. Risk Assessment (Section VIII)
   c. Site Map
   d. Storm Water Pollution Prevention Plan (Section XIV)
   e. Annual Fee
   f. Signed Certification Statement

   Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

   Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

4. This permit is effective on July 1, 2010.

   a. **Dischargers Obtaining Coverage On or After July 1, 2010:** All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.

   b. **Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ:** Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated.

Existing dischargers shall electronically file their PRDs no later than July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, **or else lose permit coverage**. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.

6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.

7. Small Construction Rainfall Erosivity Waiver

   EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

   Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

   If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the

rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

## C. Revising Permit Coverage for Change of Acreage or New Ownership

1. The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.

2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:

   a. A revised NOI indicating the new project size;

   b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.

   c. SWPPP revisions, as appropriate; and

   d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.

   e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved "Final Stabilization" as defined in Section II.D.

4. When an LRP with active General Permit coverage transfers its LRP status to another person or entity that qualifies as an LRP, the existing LRP shall inform the new LRP of the General Permit's requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

**D. Conditions for Termination of Coverage**

1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:

   a. For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;

   b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;

   c. Final stabilization has been reached;

   d. Construction materials and wastes have been disposed of properly;

   e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated;

   f. Post-construction storm water management measures have been installed and a long-term maintenance plan[7] has been established; and

   g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

[7] For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:

   a. "70% final cover method," no computational proof required

      **OR:**

   b. "RUSLE or RUSLE2 method," computational proof required

      **OR:**

   c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Section II.D.1.a.

## III. DISCHARGE PROHIBITIONS

**A.** Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

**B.** All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.

**C.** Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;

2. The discharge does not violate any other provision of this General Permit;

3. The discharge is not prohibited by the applicable Basin Plan;

4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.

5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

6. The discharge is monitored and meets the applicable NALs; and

7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

**D.** Debris resulting from construction activities are prohibited from being discharged from construction sites.

**E.** When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

# IV. SPECIAL PROVISIONS

## A. Duty to Comply

1. The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

2. The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

## B. General Permit Actions

1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

## C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

## D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

## E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

## F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

## G. Duty to Maintain Records and Provide Information

1. The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.

2. The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

## H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

3. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

## I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

2. Changes to Authorization. If an Approved Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an Approved Signatory.

3. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's Approved Signatory.

## J. Certification

Any person signing documents under Section IV.I above, shall make the following certification:

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

## K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

## L. Bypass

Bypass[8] is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;[9]

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;

3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or

4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

## M. Upset

1. A discharger that wishes to establish the affirmative defense of an upset[10] in an action brought for noncompliance shall demonstrate,

[8] The intentional diversion of waste streams from any portion of a treatment facility

[9] Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

[10] An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the discharger can identify the cause(s) of the upset

b. The treatment facility was being properly operated by the time of the upset

c. The discharger submitted notice of the upset as required; and

d. The discharger complied with any remedial measures required

2. No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

**N. Penalties for Falsification of Reports**

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

**O. Oil and Hazardous Substance Liability**

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

**P. Severability**

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

**Q. Reopener Clause**

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

## R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[11] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

## S. Transfers

This General Permit is not transferable.

## T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

[11] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

# V. EFFLUENT STANDARDS & RECEIVING WATER MONITORING

## A. Narrative Effluent Limitations

1. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

2. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

**Table 1- Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units**

| Parameter | Test Method | Discharge Type | Min. Detection Limit | Units | Numeric Action Level |
|---|---|---|---|---|---|
| pH | Field test with calibrated portable instrument | Risk Level 2 | 0.2 | pH units | lower NAL = 6.5<br>upper NAL = 8.5 |
| | | Risk Level 3 | | | lower NAL = 6.5<br>upper NAL = 8.5 |
| Turbidity | EPA 0180.1 and/or field test with calibrated portable instrument | Risk Level 2 | 1 | NTU | 250 NTU |
| | | Risk Level 3 | | | 250 NTU |

## B. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for

pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

2. For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.

3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

   a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

      **AND/OR**:

   b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

## C. Receiving Water Monitoring Triggers

1. The receiving water monitoring triggers for Risk Level 3 dischargers with direct discharges to surface waters are triggered when the daily average effluent pH values during any site phase when there is a high risk of pH discharge[12] fall outside of the range of 6.0 and 9.0 pH units, or when the daily average effluent turbidity exceeds 500 NTU.

2. Risk Level 3 dischargers with with direct discharges to surface waters shall conduct receiving water monitoring whenever their effluent monitoring results exceed the receiving water monitoring triggers. If the pH trigger is exceeded, the receiving water shall be monitored for pH for the duration of coverage under this General Permit. If the turbidity trigger is exceeded, the receiving water shall be monitored for turbidity and SSC for the duration of coverage under this general permit.

3. Risk Level 3 dischargers with direct discharges to surfaces waters shall initiate receiving water monitoring when the triggers are exceeded unless the storm event causing the exceedance is determined after the fact to equal to or greater than the 5-year 24-hour storm (expressed in inches of rainfall) as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Verification of the 5-year 24-hour storm event shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. If run-on is caused by a forest fire or any other natural disaster, then receiving water monitoring triggers do not apply.

[12] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

## VI. RECEIVING WATER LIMITATIONS

**A.** The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

**B.** The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

**C.** The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

**D.** Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

# VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

## A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

## B. SWPPP Certification Requirements

1. **Qualified SWPPP Developer:** The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

   a. A California registered professional civil engineer;

   b. A California registered professional geologist or engineering geologist;

   c. A California registered landscape architect;

   d. A professional hydrologist registered through the American Institute of Hydrology;

   e. A Certified Professional in Erosion and Sediment Control (CPESC) ™ registered through Enviro Cert International, Inc.;

   f. A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert International, Inc.; or

   g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

3. **Qualified SWPPP Practitioner:** The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or

   b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.

5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

## VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds,[13] the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

## IX. RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

## X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

## XI. RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

## XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

[13] Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://gis.ca.gov/catalog/BrowseRecord.epl?id=22175 .

# XIII. POST-CONSTRUCTION STANDARDS

**A.** All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.

1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.

2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.

3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85$^{th}$ percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.

4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream[14] or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

[14] A first order stream is defined as a stream with no tributaries.

**B.** All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

## XIV. SWPPP REQUIREMENTS

**A.** The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;

4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and

5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

**B.** To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

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

# XV. REGIONAL WATER BOARD AUTHORITIES

**A.** In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.

**B.** Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

**C.** Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

**D.** Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

**E.** Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

## XVI. ANNUAL REPORTING REQUIREMENTS

**A.** All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.

**B.** The discharger shall certify each Annual Report in accordance with the Special Provisions.

**C.** The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

**D.** The discharger shall include storm water monitoring information in the Annual Report consisting of:

1. a summary and evaluation of all sampling and analysis results, including copies of laboratory reports;

2. the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

3. a summary of all corrective actions taken during the compliance year;

4. identification of any compliance activities or corrective actions that were not implemented;

5. a summary of all violations of the General Permit;

6. the names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;

7. the date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and

8. the visual observation and sample collection exception records and reports specified in Attachments C, D, and E.

**E.** The discharger shall provide training information in the Annual Report consisting of:

1. documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;

2. documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and

3. documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

# ATTACHMENT D
# RISK LEVEL 2 REQUIREMENTS

## A. Effluent Standards

***[These requirements are the same as those in the General Permit order.]***

1. Narrative – Risk Level 2 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk level 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

## B. Good Site Management "Housekeeping"

1. Risk Level 2 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 2 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 2 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly.

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 2 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 2 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain all fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 2 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 2 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 2 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

**C. Non-Storm Water Management**

1. Risk Level 2 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 2 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 2 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

## D. Erosion Control

1. Risk Level 2 dischargers shall implement effective wind erosion control.

2. Risk Level 2 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 2 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

## E. Sediment Controls

1. Risk Level 2 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 2 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

**Table 1 - Critical Slope/Sheet Flow Length Combinations**

| Slope Percentage | Sheet flow length not |
|---|---|

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage.
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

| | to exceed |
|---|---|
| 0-25% 20 | feet |
| 25-50% 15 | feet |
| Over 50% | 10 feet |

5. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

## F. Run-on and Run-off Controls

Risk Level 2 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

## G. Inspection, Maintenance and Repair

1. Risk Level 2 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 2 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 2 dischargers shall begin implementing repairs or

design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 2 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 2 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

## H. Rain Event Action Plan

1. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The discharger shall

ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

4. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase
   b. Trades active on the construction site during each construction phase
   c. Trade contractor information
   d. Suggested actions for each project phase

5. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

   a. Site Address
   b. Calculated Risk Level (2 or 3)
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

f. Trades active on site during Inactive Construction
g. Trade contractor information
h. Suggested actions for inactive construction sites

6. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

## I. Risk Level 2 Monitoring and Reporting Requirements

**Table 2- Summary of Monitoring Requirements**

| Risk Level | Visual Inspections | | | | | Sample Collection | |
|---|---|---|---|---|---|---|---|
| | Quarterly Non-storm Water Discharge | Pre-storm Event | | Daily Storm BMP | Post Storm | Storm Water Discharge | Receiving Water |
| | | Baseline | REAP | | | | |
| 2 | X | X | X | X | X | X | |

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 2 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 2 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 2 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 2 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 2 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 2 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i and c.iii above, Risk Level 2 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 2 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 2 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 2 – Water Quality Sampling and Analysis**

a. Risk Level 2 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 2 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 2 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 2 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

5. **Risk Level 2 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 2 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 2 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 2 dischargers shall ensure that storm water discharge collected and observed represent[4] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 2 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 2 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 2 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 “Storm Water Sample Collection and Handling Instructions” below.

6. **Risk Level 2 – Visual Observation and Sample Collection Exemptions**

a. Risk Level 2 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk

[4] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment-laden water even if most water flowing through the fence is clear.

Level 2 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 2 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 2 – Storm Water Sample Collection and Handling Instructions**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. Risk Level 2 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

c. Risk Level 2 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[5]

8. **Risk Level 2 – Monitoring Methods**

a. Risk Level 2 dischargers shall include a description of the following items in the CSMP:

i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample

[5] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml.

collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

b. Risk Level 2 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 2 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services. Risk Level 2 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 2 – Analytical Methods**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 2 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 2 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 2 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

10. **Risk Level 2 - Non-Storm Water Discharge Monitoring Requirements**

    a. Visual Monitoring Requirements:

        i. Risk Level 2 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

        ii. Risk Level 2 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

        iii. Risk Level 2 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 2 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

    b. Effluent Sampling Locations:

        i. Risk Level 2 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

        ii. Risk Level 2 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

        iii. Risk Level 2 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

11. **Risk Level 2 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 2 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 2 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 2 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 2 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 2 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 2 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 2 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 2 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[6]

h. Risk Level 2 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 2 – Watershed Monitoring Option**

Risk Level 2 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program

[6] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 2 – Particle Size Analysis for Project Risk Justification**

    Risk Level 2 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 2 – Records**

    Risk Level 2 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 2 dischargers shall retain all records on-site while construction is ongoing. These records include:

    a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

    b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

    c. The date and approximate time of analyses.

    d. The individual(s) who performed the analyses.

    e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

    f. Rain gauge readings from site inspections;

    g. Quality assurance/quality control records and results.

    h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

    i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 2 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 2 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

c. Risk Level 2 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 2 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

**Table 3 – Risk Level 2 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs**

| Parameter | Test Method / Protocol | Discharge Type | Min. Detection Limit | Reporting Units | Numeric Action Level |
|---|---|---|---|---|---|
| pH | Field test with calibrated portable instrument | Risk Level 2 Discharges | 0.2 pH | units | lower NAL = 6.5<br>upper NAL = 8.5 |
| Turbidity EPA | 0180.1 and/or field test with calibrated portable instrument | Risk Level 2 Discharges other than ATS | 1 NTU | | 250 NTU |
| | | For ATS discharges | 1 NTU | | N/A |

# APPENDIX B

# SUBMITTED PERMIT REGISTRATION DOCUMENTS

# Risk Determination Support Documentation
# For
# SNL/CA CA Site Landscaping Project
# Livermore, CA

## SEDIMENT RISK

**LEW Results** (from https://lew.epa.gov/)

### Rainfall Erosivity Factor Calculator for Small Construction Sites

### Facility Information

Start Date: 02/01/2023
End Date: 12/31/2024
Latitude: 37.67731°
Longitude: - 121.70635°

### Erosivity Index Calculator Results (See Figures 1, 2 and 3)

AN EROSIVITY INDEX VALUE OF **33.54** HAS BEEN DETERMINED FOR THE CONSTRUCTION PERIOD OF 02/01/2023 – 12/31/2024.

A rainfall erosivity factor of 5.0 or greater has been calculated for your site and period of construction. Therefore, you do NOT qualify for a waiver from NPDES permitting requirements.

### Sediment Risk Determination (RUSLE):

Rainfall Erosivity Factor (R Factor): (39.3 + 30.71) = **70.01**
Soil Erodibility Factor (K Factor): **0.37** (SMARTS)
Length and Steepness of Slope (LS Factor): **0.82** (SMARTS)
C and P Factors are equal to 1 per the General Permit Guidelines
RUSLE Calculation: A = (70.01) x (0.37) x (0.82) x (1) x (1) = **21.24** tons/acre/year
Site Sediment Risk Factor ≥ 15 tons/acre and < 75 tons/acre -> **Low Risk**
Please see Figures 1 through 3 for the methodology on how to obtain the result.

## Figure 1

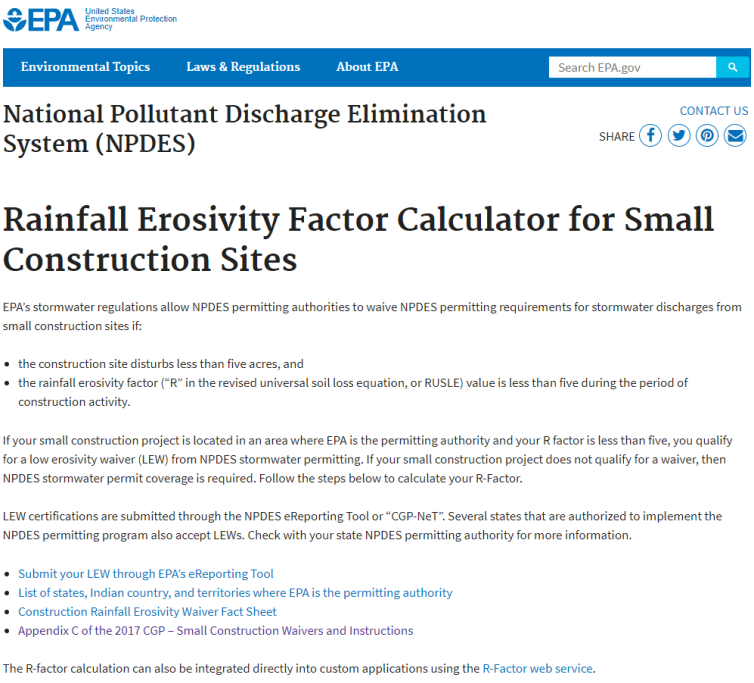


**Figure 2**

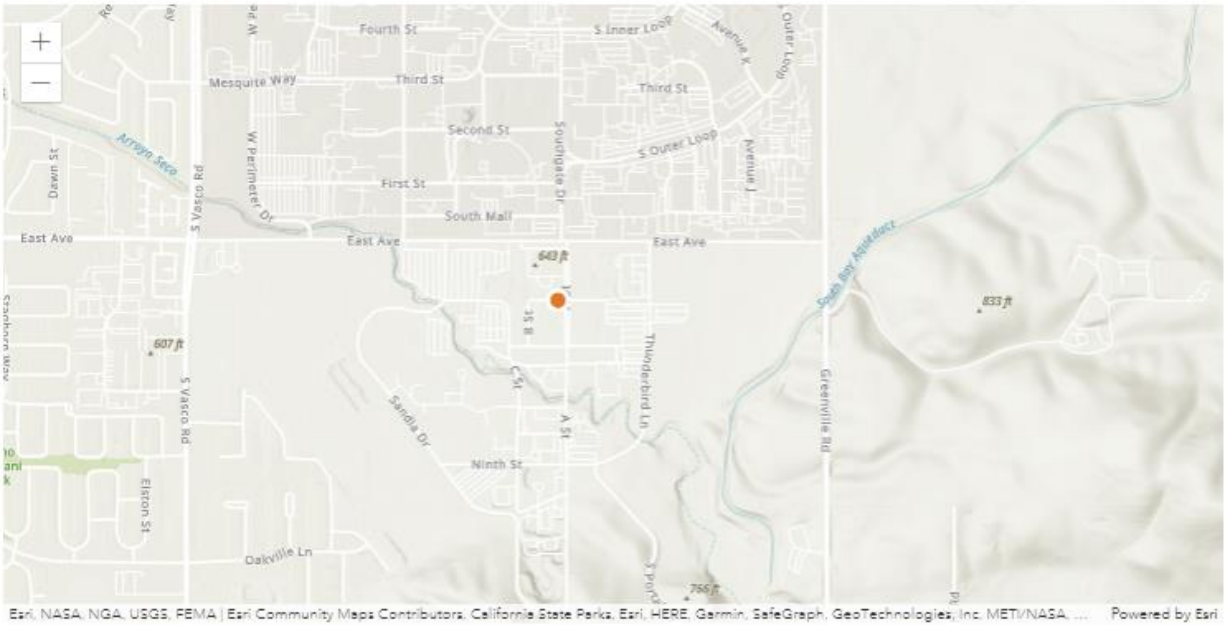
1 Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

**Start Date:** 02/01/2023 **End Date:** 01/31/2024

2 Locate your small construction project using the search box below or by clicking on the map.

**Location:** 37.67816, -121.70601 **Search**




3 Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

**Calculate R Factor**

# Facility Information

| | |
|---|---|
| **Start Date:** 02/01/2023 | **Latitude:** 37.6782 |
| **End Date:** 01/31/2024 | **Longitude:** -121.7060 |

## Calculation Results

Rainfall erosivity factor (R Factor) = **39.3**

A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

**You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage.** If you are located in an area where EPA is the permitting authority (pdf), you must submit a Notice of Intent (NOI) through the NPDES eReporting Tool (NeT).Otherwise, you must seek coverage under your state's CGP.

+

**Figure 3**

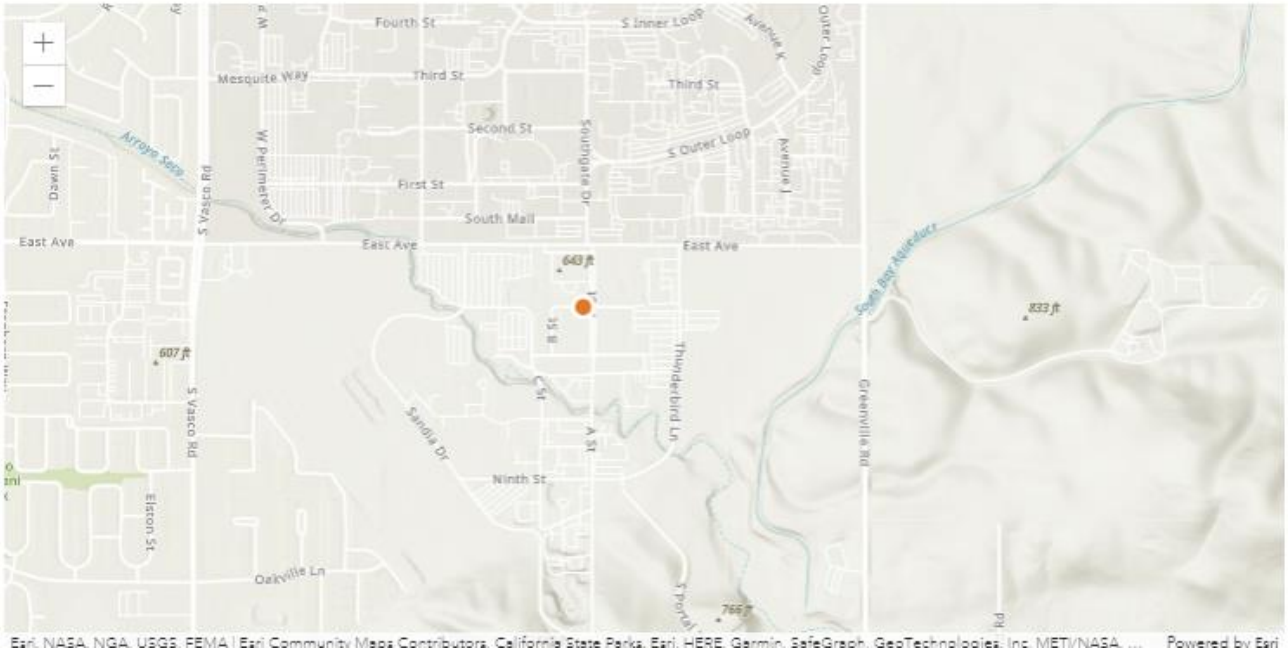
1 Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

**Start Date:** 02/01/2024 **End Date:** 12/31/2024

2 Locate your small construction project using the search box below or by clicking on the map.

**Location:** 37.67816, -121.70601 **Search**




3 Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

**Calculate R Factor**

# Facility Information

| | |
|---|---|
| **Start Date:** 02/01/2024 | **Latitude:** 37.6782 |
| **End Date:** 12/31/2024 | **Longitude:** -121.7060 |

## Calculation Results

Rainfall erosivity factor (R Factor) = **30.71**

A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

**You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage.** If you are located in an area where EPA is the permitting authority (pdf), you must submit a Notice of Intent (NOI) through the NPDES eReporting Tool (NeT).Otherwise, you must seek coverage under your state's CGP.

## RECEIVING WATER RISK

### Receiving Water Determination

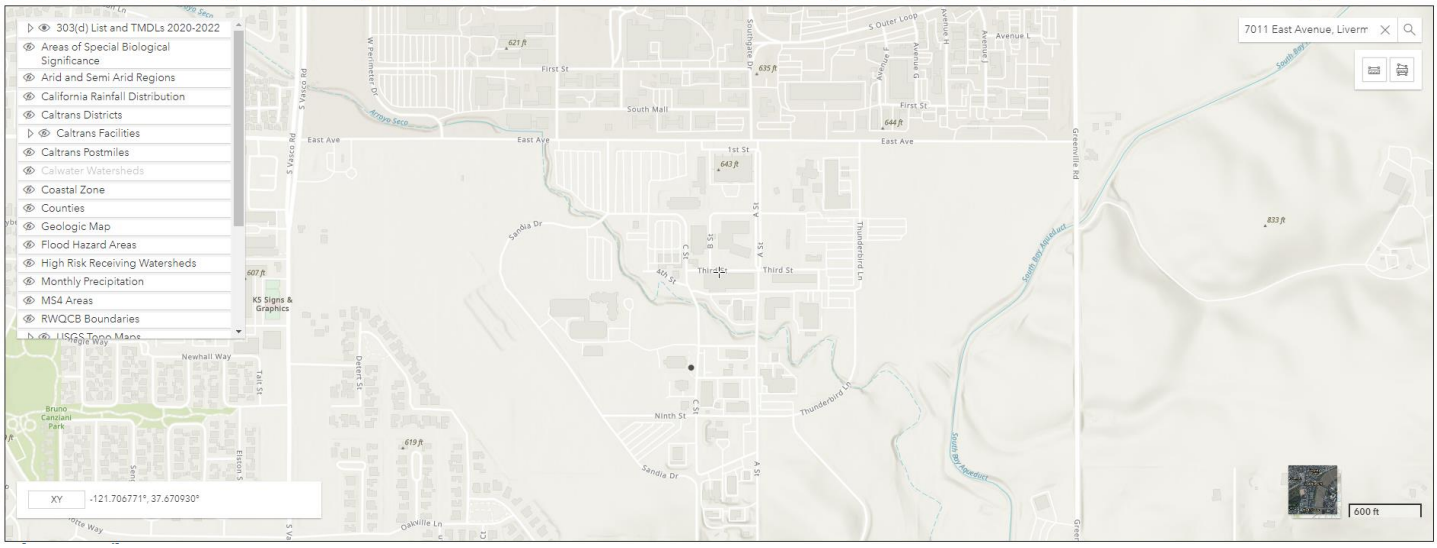
The project is located at 7011 East Avenue in Livermore, California. Surface drainage at the site currently flows towards drain inlets throughout the site into the onsite private storm drainage system. The drainage ultimately discharges to the Arroyo Seco, which outfalls to the Arroyo Las Positas. The Arroyo Seco is not listed on the 303(d) list. However, the Arroyo Las Positas is listed as impaired for diazinon and eutrophication. Neither receiving water is sediment impaired. (See Figure 4 - Caltrans Water Quality Planning Tool.)

Both the Arroyo Seco and the Arroyo Las Positas have the three Beneficial Uses of Cold, Spawn and Migratory, (See Figure 4 – San Francisco Bay Basin Plan). As a result, the receiving Water Determination for the Project is **HIGH**.

**Figure 4**

**Caltrans Water Quality Planning Tool**

The Water Quality Planning Tool was created to help planners and designers comply with environmental permits. It uses a map interface to find information based on a project's location. **This application is being updated for digital accessibility and will continue to function while updates are in progress.**




**Watershed Information**

**CALWATER WATERSHED**

| | | | | | |
|---|---|---|---|---|---|
| Hydrologic Unit | SOUTH BAY | Hydrologic Area | Alameda Creek | Hydrologic Sub-Area # | 204.30 |
| Hydrologic Sub-Area Name | undefined | Planning Watershed | 2204300900 | HSA Area (acres) | 404764 |
| Latitude, Longitude | 37.67681, -121.7068 | | | | |

**WATERSHED BOUNDARY DATASET**

| | | | | | |
|---|---|---|---|---|---|
| Watershed | Arroyo Las Positas | Subwatershed | Arroyo Seco | Hydrologic Unit Code | 180500040201 |
| Average Annual Precipitation (inches) | 13.34 | | | | |

**TMDLs & 303(d) Listed Water Bodies (2020 - 2022 List)**

Key: Water body on 303(d) list Water body with a TMDL

| Name | Pollutant | Size | Sources | Status |
|---|---|---|---|---|
| Arroyo Las Positas | Diazinon | 15.3 miles | Urban Runoff/Storm Sewers | Being addressed with USEPA approved TMDL |
| Arroyo Las Positas | Eutrophication | 15.3 miles | A Source Unknown | TMDL required |

**Figure 5**

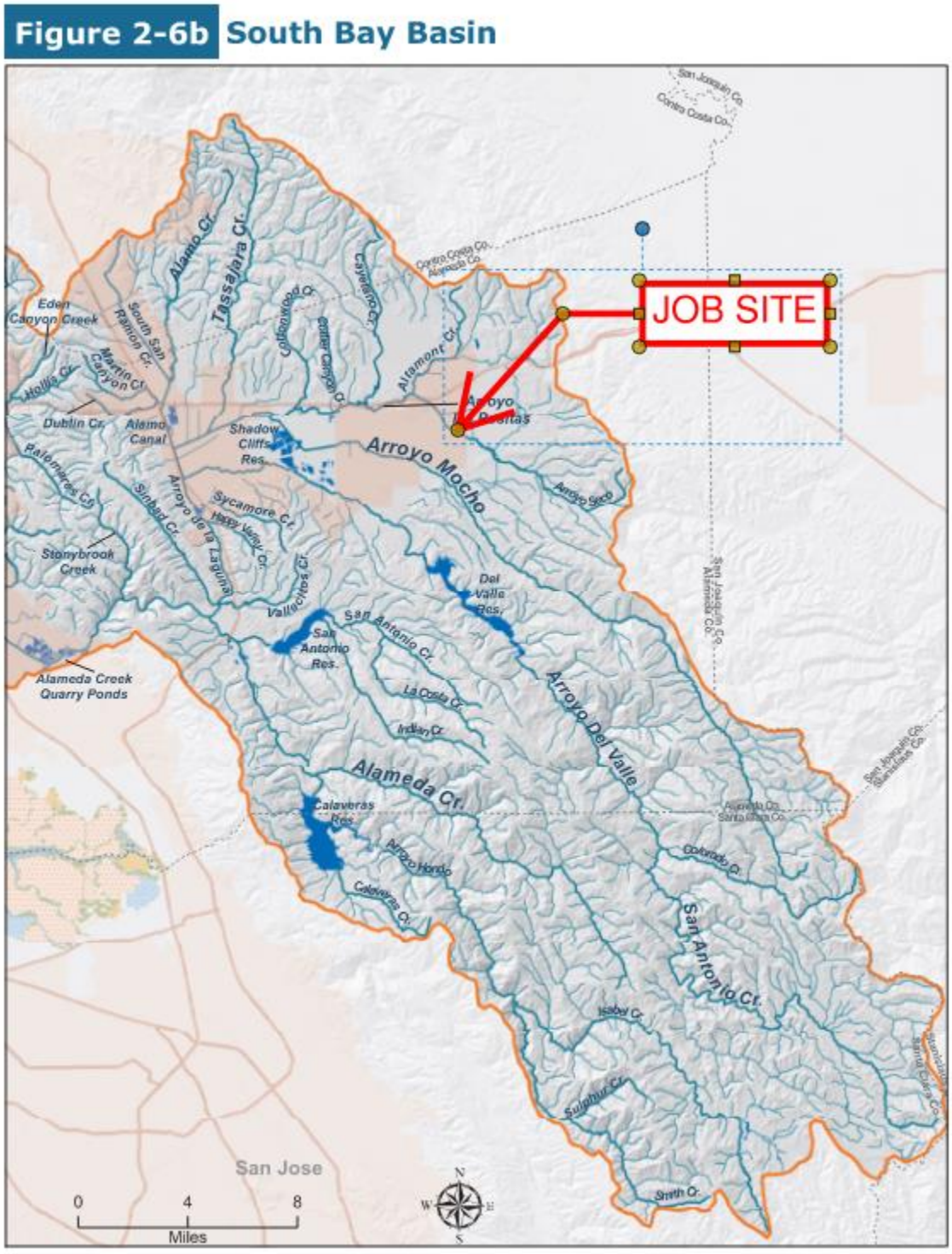


Figure 2-6b South Bay Basin
JOB SITE
Arroyo Mocho
Arroyo Del Valle
Alameda Cr.
San Antonio Cr.
Alamo Cr.
Tassajara Cr.
Arroyo Las Positas
Shadow Cliffs Res.
Del Valle Res.
San Antonio Res.
Calaveras Res.
Alameda Creek Quarry Ponds
Stonybrook Creek
Dublin Cr.
Alamo Canal
Sycamore Cr.
Indian Cr.
La Costa Cr.
Colorado Cr.
Isabel Cr.
Sulphur Cr.
Smith Cr.
San Jose
0
4
8
Miles
N
S
E
W

**Figure 5, continued**

SOUTH BAY BASIN

| COUNTY<br>Waterbody | AGR | MUN | FRSH | GWR | IND | PROC | COMM | SHELL | COLD | EST | MAR | MIGR | RARE | SPWN | WARM | WILD | REC-1 | REC-2 | NAV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *ALAMEDA COUNTY, continued* | | | | | | | | | | | | | | | | | | | |
| Indian Creek (central Alameda) | | | E | | | | | | E | | | | E | E | E | E | E* | E | |
| La Costa Creek | | | E | | | | | | E | | | | E | E | E | E | E | E | |
| Arroyo de la Laguna | | | | E | | | | | E | | | E | | E | E | E | E | E | |
| Vallecitos Creek | | | | | | | | | | | | | | | E | E | E | E | |
| Happy Valley Creek | | | | | | | | | | | | | | | E | E | E | E | |
| Sycamore Creek | | | | | | | | | | | | | | | E | E | E | E | |
| Arroyo del Valle | | E | | E | | | | | E | | | P | E | E | E | E | E | E | |
| Shadow Cliffs Reservoir | | | | E | | | E | | E | | | | | E | E | E | E | E | |
| Del Valle Reservoir | | E | | | | | E | | E | | | | | E | E | E | E | E | |
| Arroyo Mocho | | | | E | | | | | E | | | E | | E | E | E | E | E | |
| Tassajara Creek | | | | E | | | | | P | | | E | E | E | E | E | E | E | |
| Arroyo las Positas | | | | E | | | | | E | | | E | E | E | E | E | E | E | |
| Cottonwood Creek | | | | | | | | | | | | | E | | E | E | E | E | |
| Collier Canyon Creek | | | | | | | | | | | | | E | | E | E | E | E | |
| Cayetano Creek | | | | | | | | | | | | | E | | E | E | E | E | |
| Arroyo Seco (Alameda) | | | | E | | | | | E | | | E | E | E | E | E | E | E | |
| Altamont Creek | | | | E | | | | | E | | | | E | | E | E | E | E | |
| Alamo Canal | | | | E | | | | | P | | | E | | E | E | E | E | E | |
| Alamo Creek | | | | E | | | | | P | | | E | E | E | E | E | E | E | |
| Dublin Creek | | | | | | | | | | | | | | | E | E | E | E | |
| Martin Canyon Creek | | | | | | | | | | | | | | | E | E | E | E | |
| South San Ramon Creek | | | | | | | | | | | | | | | E | E | E | E | |
| *SANTA CLARA COUNTY* | | | | | | | | | | | | | | | | | | | |
| *Tributary to Alameda Creek:* | | | | | | | | | | | | | | | | | | | |
| Calaveras Creek | | | E | | | | | | E | | | | E | E | E | E | E | E | |
| Calaveras Reservoir | | E | | | | | | | E | | | | E | E | E | E | E* | E | |
| Arroyo Hondo | | E | E | | | | | | E | | | | E | E | E | E | E | E | |
| Isabel Creek | | E | E | | | | | | E | | | | | E | E | E | E | E | |
| Smith Creek | | E | E | | | | | | E | | | | | E | E | E | E | E | |
| Sulphur Creek (Santa Clara) | | E | E | | | | | | E | | | | | E | E | E | E | E | |
| Colorado Creek *Trib. to Arroyo del Val* | | | E | | | | | | E | | | | | | E | E | E | E | |

E: Existing beneficial use  E*: Water quality objectives apply; water contact recreation is prohibited or limited to protect public health  P: Potential beneficial use

## OVERALL COMBINED RISK

Based on sediment risk of **MEDIUM**, and a receiving waters risk of **HIGH**, the project has been determined to be at **Risk Level 2.**

# APPENDIX C

# SWPPP AMENDMENT LOG

# Appendix C

## *SWPPP Amendment Log*

Project Name: SNL/CA Landscape Project

Project Number: A17546-61

| Date | Description of Amendment(s) | Observed By |
|---|---|---|
| 3/23/2023 | Increasing area of scope/landscape improvements; extending completion of construction date. | R. Michael Ebenal |
| | | |
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# *SWPPP Amendment Certifications*

**SWPPP Amendment No.** 1

Project Name: SNL/CA Landscaping Project

Project Number: A17546-61

**Qualified SWPPP Developer's Certification of the**

**Stormwater Pollution Prevention Plan Amendment**

"This Stormwater Pollution Prevention Plan and its appendices were prepared under my direction to meet the requirements of the California Construction General Permit (California State Water Board Order No. 2009-009-DWQ as amended by 2010-0014-DWQ and 2012-0006-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

| | |
|---|---|
| | 3/23/2023 |
| QSD's Signature | Date |
| R. Michael Ebenal | #26242 |
| QSD Name | QSD Certificate Number |
| Senior Engineering Manager / PE / QSD | (209) 328-1123 |
| Title and Affiliation | Telephone |
| 250 Cherry Lane, Suite 208, Manteca, CA 95337 | mebenal@kierwright.com |
| Address | Email |

# APPENDIX D

# SUBMITTED CHANGES TO PRDS (DUE TO CHANGE IN OWNERSHIP OR ACREAGE)

# APPENDIX E

# PERSONNEL DOCUMENTATION

# Appendix E

## *Contractors, Subcontractors, & Individuals under direction of QSP*

Project Name: SNL/CA Site Landscaping Project

Project Number: A17546-61

| Name | Company | Phone Number | Position |
|---|---|---|---|
| | | | |
| | | | |
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# APPENDIX F

# TRAINING DOCUMENTATION

# CERTIFICATE OF TRAINING

## CALIFORNIA CONSTRUCTION GENERAL PERMIT

## QUALIFIED SWPPP DEVELOPER (QSD)
AND
## QUALIFIED SWPPP PRACTITIONER (QSP)

# R.MICHAEL EBENAL

Dec 16, 2022 - Feb 15, 2025

*Certificate # 26242*

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

California Stormwater Quality Association and
California Construction General Permit Training Team

# CERTIFICATE OF TRAINING

## CALIFORNIA CONSTRUCTION GENERAL PERMIT

## QUALIFIED SWPPP DEVELOPER (QSD)
AND
## QUALIFIED SWPPP PRACTITIONER (QSP)

# R.MICHAEL EBENAL

Feb 01, 2021 - Feb 15, 2023

*Certificate # 26242*

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION®

California Stormwater Quality Association and
California Construction General Permit Training Team

# APPENDIX G

# CONSTRUCTION SITE INSPECTION REPORT FORM

## *Risk Level 1, 2, 3*
## *Visual Inspection Field Log Sheet*

| | | | | | | |
|---|---|---|---|---|---|---|
| Date and Time of Inspection: | | | | Report Date: | | |
| Inspection Type: | ☐ Weekly | ☐ Before predicted rain | ☐ During rain event | ☐ Following qualifying rain event | ☐ Contained stormwater release | ☐ Quarterly non-stormwater |

### Site Information

| | |
|---|---|
| Construction Site Name: | |
| Construction stage and completed activities: | Approximate area of exposed site: |

### Weather and Observations

| | | | |
|---|---|---|---|
| Date Rain Predicted to Occur: | | Predicted % chance of rain: | |
| Estimate storm beginning: _____ (date and time) | Estimate storm duration:_____ (hours) | Estimate time since last storm: _____ (days or hours) | Rain gauge reading: _____ (inches) |

| Observations: If yes identify location | | |
|---|---|---|
| Odors | Yes ☐ | No ☐ |
| Floating material | Yes ☐ | No ☐ |
| Suspended Material | Yes ☐ | No ☐ |
| Sheen | Yes ☐ | No ☐ |
| Discolorations | Yes ☐ | No ☐ |
| Turbidity | Yes ☐ | No ☐ |

### Site Inspections

| **Outfalls or BMPs Evaluated** | **Deficiencies Noted** |
|---|---|
| (add additional sheets or attached detailed BMP Inspection Checklists) | |
| | |
| | |
| | |

| | | | |
|---|---|---|---|
| Photos Taken: | Yes ☐ | No ☐ | Photo Reference IDs: |

### Corrective Actions Identified (note if SWPPP/REAP change is needed)

### Inspector Information

| | |
|---|---|
| Inspector Name: | Inspector Title: |
| Signature: | Date: |

| ***Risk Level 2***<br>***Effluent Sampling Field Log Sheets*** | | | |
|---|---|---|---|
| Construction Site Name: | Date: | Time Start: | |
| Sampler: | | | |
| Sampling Event Type: | ☐ Stormwater | ☐ Non-stormwater | ☐ Non-visible pollutant |

| **Field Meter Calibration** | |
|---|---|
| pH Meter ID No./Desc.:<br>Calibration Date/Time: | Turbidity Meter ID No./Desc.:<br>Calibration Date/Time: |

**Field pH and Turbidity Measurements**

| Discharge Location Description | pH | Turbidity | Time |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Grab Samples Collected**

| Discharge Location Description | Sample Type | Time |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Additional Sampling Notes:

Time End:

| ***Risk Level 3***<br>***Effluent Sampling Field Log Sheets*** | | | | |
|---|---|---|---|---|
| Construction Site Name: | | Date: | | Time Start: |
| Sampler: | | | | |
| Sampling Event Type: | ☐ Stormwater | ☐ Non-stormwater | ☐ Non-visible pollutant | ☐ Post NEL Exceedance |

**Field Meter Calibration**

| | |
|---|---|
| pH Meter ID No./Desc.:<br>Calibration Date/Time: | Turbidity Meter ID No./Desc.:<br>Calibration Date/Time: |

**Field pH and Turbidity Measurements**

| Discharge Location Description | pH | Turbidity | Time |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Grab Samples Collected**

| Discharge Location Description | SSC | Other (specify) | Time |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Additional Sampling Notes:

Time End:

| ***Risk Level 3***<br>***Receiving Water Sampling Field Log Sheets*** | | |
|---|---|---|
| Construction Site Name: | Date: | Time Start: |
| Sampler: | | |

## Receiving Water Description and Observations

| | | |
|---|---|---|
| Receiving Water Name/ID: | | |
| Observations: | | |
| Odors | Yes ☐ | No ☐ |
| Floating material | Yes ☐ | No ☐ |
| Suspended Material | Yes ☐ | No ☐ |
| Sheen | Yes ☐ | No ☐ |
| Discolorations | Yes ☐ | No ☐ |
| Turbidity | Yes ☐ | No ☐ |

## Field Meter Calibration

| | |
|---|---|
| pH Meter ID No./Desc.:<br><br>Calibration Date/Time: | Turbidity Meter ID No./Desc.:<br><br>Calibration Date/Time: |

## Field pH and Turbidity Measurements and SSC Grab Sample

**Upstream Location**

| Type | Result | Time | Notes |
|---|---|---|---|
| pH | | | |
| Turbidity | | | |
| SSC | Collected<br>Yes ☐ No ☐ | | |

**Downstream Location**

| Type | Result | Time | Notes |
|---|---|---|---|
| pH | | | |
| Turbidity | | | |
| SSC | Collected<br>Yes ☐ No ☐ | | |

| |
|---|
| Additional Sampling Notes: |
| Time End: |

# APPENDIX H

# SITE-SPECIFIC REAP FORMS

# Rain Event Action Plan (REAP)

| | | | |
|---|---|---|---|
| **Date:** | | **WDID Number:** | |
| **Date Rain Predicted to Occur:** | | **Predicted % chance of rain:** | |

**Site Information:**

_____
Site Name, City and Zip Code  Project Risk Level: □ Risk Level 2 □ Risk Level 3

**Site Stormwater Manager Information:**

_____
Name, Company, Emergency Phone Number (24/7)

**Erosion and Sediment Control Contractor – Labor Force contracted for the site:**

_____
Name, Company, Emergency Phone Number (24/7)

**Stormwater Sampling Agent:**

_____
Name, Company, Emergency Phone Number (24/7)

**Current Phase of Construction**

*Check ALL the boxes below that apply to your site.*

| | | |
|---|---|---|
| ❑ Grading and Land Development | ❑ Vertical Construction | ❑ Inactive Site |
| ❑ Streets and Utilities | ❑ Final Landscaping and Site Stabilization | ❑ Other: |

**Activities Associated with Current Phase(s)**

*Check ALL the boxes below that apply to your site (some apply to all Phases).*

***Grading and Land Development:***

| | | |
|---|---|---|
| ❑ Demolition | ❑ Vegetation Removal | ❑ Vegetation Salvage-Harvest |
| ❑ Rough Grade | ❑ Finish Grade | ❑ Blasting |
| ❑ Soil Amendment(s): | ❑ Excavation (_____ ft) | ❑ Soils Testing |
| ❑ Rock Crushing | ❑ Erosion and Sediment Control | ❑ Surveying |
| ❑ Equip. Maintenance/Fueling | ❑ Material Delivery and Storage | ❑ Other: |

***Streets and Utilities:***

| | | |
|---|---|---|
| ❑ Finish Grade | ❑ Utility Install: water-sewer-gas | ❑ Paving Operations |
| ❑ Equip. Maintenance/Fueling | ❑ Storm Drain Installation | ❑ Material Delivery & Storage |
| ❑ Curb and Gutter/Concrete Pour | ❑ Masonry | ❑ Other: |

***Vertical Construction:***

| | | |
|---|---|---|
| ❑ Framing | ❑ Carpentry | ❑ Concrete/Forms/Foundation |
| ❑ Masonry | ❑ Electrical | ❑ Painting |
| ❑ Drywall/Interior Walls | ❑ Plumbing | ❑ Stucco |
| ❑ Equip. Maintenance/Fueling | ❑ HVAC | ❑ Tile |
| ❑ Exterior Siding | ❑ Insulation | ❑ Landscaping & Irrigation |
| ❑ Flooring | ❑ Roofing | ❑ Other: |

***Final Landscaping & Site Stabilization:***

| | | |
|---|---|---|
| ❑ Stabilization | ❑ Vegetation Establishment | ❑ E&S Control BMP Removal |
| ❑ Finish Grade | ❑ Storage Yard/ Material Removal | ❑ Landscape Installation |
| ❑ Painting and Touch-Up | ❑ Irrigation System Testing | ❑ Other: |
| ❑ Drainage Inlet Stencils | ❑ Inlet Filtration | ❑ Perm. Water Quality Ponds |
| ❑ Other: | ❑ Other: | ❑ Other: |

***Inactive Construction Site:***

| | | |
|---|---|---|
| ❑ E & S Control Device Installation | ❑ Routine Site Inspection | ❑ Trash Removal |
| ❑ E & S Control Device Maintenance | ❑ Street Sweeping | ❑ Other: |

# Rain Event Action Plan (REAP)

| **Date:** | | **WDID Number:** | |
|---|---|---|---|

**Trades Active on Site during Current Phase(s)**

*Check ALL the boxes below that apply to your site*

| | | |
|---|---|---|
| ❑ Storm Drain Improvement | ❑ Grading Contractor | ❑ Surveyor- Soil Technician |
| ❑ Street Improvements | ❑ Water Pipe Installation | ❑ Sanitary Station Provider |
| ❑ Material Delivery | ❑ Sewer Pipe Installation | ❑ Electrical |
| ❑ Trenching | ❑ Gas Pipe Installation | ❑ Carpentry |
| ❑ Concrete Pouring | ❑ Electrical Installation | ❑ Plumbing |
| ❑ Foundation | ❑ Communication Installation | ❑ Masonry |
| ❑ Demolition | ❑ Erosion and Sediment Control | ❑ Water, Sewer, Electric Utilities |
| ❑ Material Delivery | ❑ Equipment Fueling/Maintenance | ❑ Rock Products |
| ❑ Tile Work- Flooring | ❑ Utilities, e.g., Sewer, Electric | ❑ Painters |
| ❑ Drywall | ❑ Roofers | ❑ Carpenters |
| ❑ HVAC installers | ❑ Stucco | ❑ Pest Control: e.g., termite prevention |
| ❑ Exterior Siding | ❑ Masons | ❑ Water Feature Installation |
| ❑ Insulation | ❑ Landscapers | ❑ Utility Line Testers |
| ❑ Fireproofing | ❑ Riggers | ❑ Irrigation System Installation |
| ❑ Steel Systems | ❑ Utility Line Testers | ❑ Other: |

**Trade Contractor Information Provided**

*Check ALL the boxes below that apply to your site.*

| | | |
|---|---|---|
| ❑ Educational Material Handout | ❑ Tailgate Meetings | ❑ Training Workshop |
| ❑ Contractual Language | ❑ Fines and Penalties | ❑ Signage |
| ❑ Other: | ❑ Other: | ❑ Other: |

**Continued on next page.**

# Rain Event Action Plan (REAP)

| | | | |
|---|---|---|---|
| **Date of REAP** | | **WDID Number:** | |
| **Date Rain Predicted to Occur:** | | **Predicted % chance of rain:** | |

**Predicted Rain Event Triggered Actions**

Below is a list of suggested actions and items to review for this project. Each active Trade should check all material storage areas, stockpiles, waste management areas, vehicle and equipment storage and maintenance, areas of active soil disturbance, and areas of active work to ensure the proper implementation of BMPs. Project-wide BMPs should be checked and cross-referenced to the BMP progress map.

| Trade or Activity | Suggested action(s) to perform / item(s) to review prior to rain event |
|---|---|
| ❑ Information & Scheduling | ❑ Inform trade supervisors of predicted rain<br>❑ Check scheduled activities and reschedule as needed<br>❑ Alert erosion/sediment control provider<br>❑ Alert sample collection contractor (if applicable)<br>❑ Schedule staff for extended rain inspections (including weekends & holidays)<br>❑ Check Erosion and Sediment Control (ESC) material stock<br>❑ Review BMP progress map<br>❑ Other:_____<br>❑ _____<br>❑ _____ |
| ❑ Material storage areas | ❑ Material under cover or in sheds (ex: treated woods and metals)<br>❑ Perimeter control around stockpiles<br>❑ Other:_____<br>❑ _____<br>❑ _____ |
| ❑ Waste management areas | ❑ Dumpsters closed<br>❑ Drain holes plugged<br>❑ Recycling bins covered<br>❑ Sanitary stations bermed and protected from tipping<br>❑ Other:_____<br>❑ _____<br>❑ _____ |
| ❑ Trade operations | ❑ Exterior operations shut down for event (e.g., no concrete pours or paving)<br>❑ Soil treatments (e.g.,: fertilizer) ceased within 24 hours of event<br>❑ Materials and equipment (ex: tools) properly stored and covered<br>❑ Waste and debris disposed in covered dumpsters or removed from site<br>❑ Trenches and excavations protected<br>❑ Perimeter controls around disturbed areas<br>❑ Fueling and repair areas covered and bermed<br>❑ Other:_____<br>❑ _____<br>❑ _____ |
| ❑ Site ESC BMPs | ❑ Adequate capacity in sediment basins and traps<br>❑ Site perimeter controls in place<br>❑ Catch basin and drop inlet protection in place and cleaned<br>❑ Temporary erosion controls deployed<br>❑ Temporary perimeter controls deployed around disturbed areas and stockpiles<br>❑ Roads swept; site ingress and egress points stabilized<br>❑ Other:_____<br>❑ _____<br>❑ _____ |
| ❑ Concrete rinse out area | ❑ Adequate capacity for rain<br>❑ Wash-out bins covered<br>❑ Other:_____<br>❑ _____<br>❑ _____ |
| ❑ Spill and drips | ❑ All incident spills and drips, including paint, stucco, fuel, and oil cleaned<br>❑ Drip pans emptied<br>❑ Other:_____<br>❑ _____<br>❑ _____ |

**Continued on next page.**

| | |
|---|---|
| ❑ Other / Discussion / Diagrams | ❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____<br>❑ _____ |

**Attach a printout of the weather forecast from the NOAA website to the REAP.**

I certify under penalty of law that this Rain Event Action Plan (REAP) will be performed in accordance with the General Permit by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____Date: _____

Qualified SWPPP Practitioner (Use ink please)

# APPENDIX I

# CONSTRUCTION ACTIVITIES, MATERIALS USED, AND ASSOCIATED POLLUTANTS

# Appendix I

**Table I.1 Construction Activities, Materials Used, and Associated Pollutants**

| Construction Activity or Potential Pollutant Source | Pollutants | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Dust | Sediment | Nutrients | Trace Metals | Pesticides | Oil, Grease, Fuels | Other Toxic Chemicals | Misc. Waste |
| **Vehicles and Equipment Use** | | | | | | | | |
| Vehicles and equipment entering and leaving the project site | X | X | | X | | X | X | X |
| Vehicles and equipment movement and use within the project site | X | X | | X | | X | X | X |
| Temporary parking lots and staging areas | | X | | X | | X | X | X |
| **Exposed Areas** | | | | | | | | |
| Areas of exposed soil that have been cleared and grubbed | X | X | | X | | X | X | |
| Areas of exposed soil that have been excavated, filled, compacted, or graded | X | X | | X | | X | X | |
| Construction staging areas | X | X | | X | | X | X | |
| Vehicle and equipment storage and service areas | X | X | | X | | X | X | X |
| Material processing areas and transfer points | X | X | | X | | X | X | X |
| Construction roads | X | X | | X | | X | X | |
| Spilled Materials | X | | | X | X | X | X | X |
| Construction stockpiles | X | X | | X | | X | X | |
| **Construction Activities** | | | | | | | | |
| Land clearing and grubbing | X | X | X | X | X | X | X | X |
| Earthwork including soil excavation, filling, soil compaction, rough grading, and final grading | X | X | X | X | X | X | X | X |
| Drilling and blasting | X | X | | X | | X | X | |
| Batch dropping, dumping | X | X | | X | | | X | X |
| Conveyor transfer and stacking | X | | | X | | X | | |
| Crushing, milling, and screening operations | X | | | X | | X | | |
| Demolition and debris disposal | X | X | X | X | X | X | X | X |
| Tilling | X | X | X | X | X | X | | |
| Underground utility operations | X | X | | X | | X | X | X |
| **Construction Practices** | | | | | | | | |
| Dewatering operations | X | X | X | X | X | X | X | |
| Paving operations | X | | | | | X | X | X |
| Structure construction/painting | | | | X | | X | X | X |
| **Material Management** | | | | | | | | |
| Material delivery and storage | X | X | X | X | X | X | X | |
| Material use | | | X | X | X | X | X | |
| **Waste Management** | | | | | | | | |
| Solid waste | X | X | X | | | | | X |
| Hazardous waste | X | | | | | | X | |
| Contaminated spills | X | X | X | X | X | X | X | X |
| Concrete waste | X | | | | | | X | X |
| Sanitary/septic waste | | | | | | | | X |
| **Vehicle/Equipment management** | | | | | | | | |
| Vehicle/Equipment fueling and maintenance | | | | | | X | X | X |