SITE WIDE ODOR PLAN

FOR THE

WESTERN PLACER WASTE MANAGEMENT AUTHORITY'S SOLID WASTE PROCESSING AND DISPOSAL FACILITY

Prepared by:
Western Placer Waste Management Authority
December 2024
Version 2

Western Placer Waste Management Authority
Site Wide Odor Plan

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1. ACRONYMS AND DEFINED TERMS

The following is a listing of select acronyms and defined terms used throughout this document.

A. Acronyms

ADC	Alternative Daily Cover
ASP	Aerated Static Pile
BMP	Best Management Practice
C&D	Construction and Demolition
GCCS	Landfill Gas Collection and Control System
HHW	Household Hazardous Waste
LCRS	Leachate Collection and Removal System
LEA	Local Enforcement Agency
LFG	Landfill Gas
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
NOX	Oxides of Nitrogen
OIMP	Odor Impact Minimization Plan
PCAPCD	Placer County Air Pollution Control District
ROG	Reactive Organic Gasses
SVAB	Sacramento Valley Air Basin
SWOP	Site Wide Odor Plan
VOC	Volatile Organic Compound
WPWMA	Western Placer Waste Management Authority
WRSL	Western Regional Sanitary Landfill
WWTP	Wastewater Treatment Plant

B. Defined Terms

Gate Hours	The hours the WPWMA's facility is open for the receipt of wastes. Currently 7 am to 5 pm on weekdays and 8 am to 5 pm on weekends
Member Agencies	The cities of Lincoln, Rocklin, Roseville and the County of Placer
Observed Holidays	Observed Holidays include: January 1st, Martin

	Luther King Jr. Day, Lincoln's Birthday, Presidents' Day, Memorial Day, July 4th, Labor Day, Columbus Day, Veterans Day, Thanksgiving and the day after Thanksgiving, and Christmas Day. Where any of these noted holidays falls on a Saturday, the preceding Friday will be considered the "Observed Holiday". Where any of these noted holidays fall on a Sunday, the following Monday will be considered the "Observed Holiday".
Participating Agencies	Includes the Member Agencies and the cities of Auburn, Colfax and the Town of Loomis
Residue or Residual Waste	Non-recovered materials which are landfilled following processing at the MRF to recover recyclable commodities.

2. SCOPE AND INTENT OF THE SITE WIDE ODOR PLAN

The Site Wide Odor Plan (SWOP) provides an overview of the Western Placer Waste Management Authority (WPWMA), its facilities and services, and potential operational odor sources and associated mitigation measures implemented, contemplated and evaluated via pilot-scale testing at the facility. Acknowledging that odors are a natural and unavoidable byproduct of the decomposition of organic materials, the WPWMA established the SWOP to provide clear, concise information about individual facility odor sources, operational and meteorological conditions that have the potential to exacerbate the perception of odors, and the measures the WPWMA takes to reduce the potential for facility odors to be perceived by nearby receptors.

The SWOP is intended to be used as a tool by the WPWMA and its facility operators, contractors, and consultants to consistently and proactively take the appropriate steps to reduce the potential for off-site odors while continuing to ensure that WPWMA and its facility operators, contractors, and consultants meet all applicable regulatory and contractual obligations for safely and efficiently managing the solid wastes received, processed or landfilled. Compliance with current and future regulations, particularly those regulations that address enhanced management of organic wastes, have the potential to exacerbate odors from the WPWMA's facility.

The SWOP establishes best management practices (BMPs) utilized by the WPWMA to mitigate the release of odors from WPWMA facilities -- including the material recovery facility, landfill, landfill gas collection and control system (GCCS), and composting operations. The SWOP includes measures to prevent, monitor, and address odors. The BMPs contained in the SWOP are intended to: (1) be fully protective to the health, safety and well-being of the WPWMA employees, its facility operators, contractors, consultants, and facility users; and (2) ensure that WPWMA acts as a good neighbor by reducing its odor-emitting potential. The BMPs identified in this SWOP reflect current operating and regulatory conditions. Changes to operations that result from changes in regulations or programs operated by the Participating Agencies may necessitate the revision of this document.

The SWOP is intended to be considered by the Placer County Air Pollution Control District (PCAPCD) (and any other applicable regulatory bodies that oversees the WPWMA's operation) when evaluating community complaints and non-compliance issues relating to odor. Compliance with the SWOP is an indicator that the WPWMA has implemented measures to mitigate odor impacts consistent with best practices and installed equipment. When determining whether or not to issue a Notice of Violation for nuisance and determining the appropriate settlement terms when a violation is issued, including a potential deterrent monetary penalty, PCAPCD will fully consider WPWMA's adherence to, and degree of compliance with, the procedures identified in the SWOP.

Finally, the SWOP provides insight to current and future nearby receptors of odors from the WPWMA's facility and reasons facility odors may be periodically noticeable. The SWOP provides details on how the neighboring community can report odor complaints to the WPWMA and PCAPCD, how the WPWMA investigates and responds to the odor notifications/complaints, how the WPWMA cooperates on odor complaints received by the PCAPCD, and the measures implemented by the WPWMA to adjust its operations (where practical) to reduce the potential for odors.

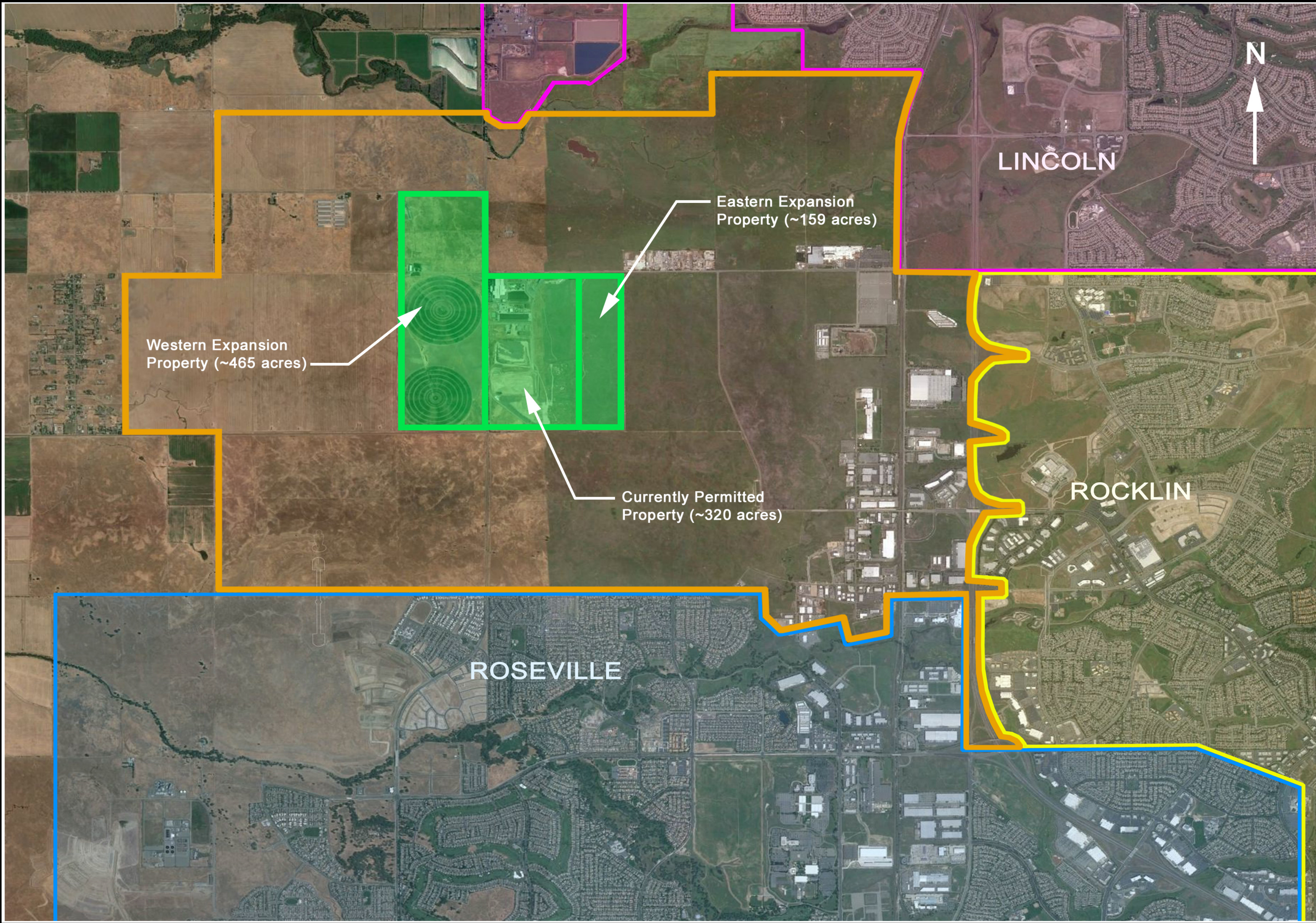
3. OVERVIEW OF THE WPWMA

The WPWMA was created pursuant to a Joint Exercise of Powers Agreement originally dated October 3, 1978, by the County of Placer, City of Roseville, City of Rocklin, and City of Lincoln. These four entities are collectively referred to as the "Member Agencies". The City of Auburn, City of Colfax, and Town of Loomis utilize the WPWMA's facilities; these entities and the Member Agencies are collectively referred to as the "Participating Agencies". The WPWMA is governed by a Board of Directors made up of elected officials from each of the Member Agencies.

The WPWMA was established for the purpose of acquiring, owning, operating, and maintaining a sanitary landfill site and all related improvements. In 1978, after evaluating an area between 350 and 400 square miles in western Placer County for suitable locations to site a sanitary landfill, the present location of the Western Regional Sanitary Landfill (WRSL) was selected. Considerations when selecting the WRSL site included technical aspects such as geology and soil conditions as well as compatibility with surrounding land uses and aesthetic factors such as odors.

The WRSL is located on approximately 320 acres in the Sunset Area (formerly known as the Sunset Industrial Area) in unincorporated Placer County north of the City of Roseville, south of the City of Lincoln and west of the City of Rocklin. The permitted area of the WRSL is approximately 291 acres, with approximately 231 acres for disposal activities. The WRSL began disposal operations in 1978 and is currently operated under a contract with a private Landfill Operator. The WPWMA also owns approximately 465 acres west and 158 acres immediately east of the active WRSL to support future expansion of its operations as necessary. As of 2024, the western and eastern properties are not permitted for solid waste-related uses; however, the WPWMA certified its Renewable Placer Waste Action Plan Environmental Impact Report in December 2022 to utilize the western and eastern properties for solid waste-related operations in the future. The WPWMA's properties are shown in Figure 3-1.

In response to California Assembly Bill 939, the WPWMA constructed the Materials Recovery Facility (MRF) to assist the Participating Agencies in complying with the regulation's waste diversion mandates. The MRF began operations in 1995 and has been operated continuously under a contract with a private MRF Operator. Non-recovered wastes ("Residue" or "Residual Waste") generated at the MRF are transported by the MRF Operator to the WRSL for final



WPWMA Site-Wide Odor Plan
Site Location

FIGURE
3-1

disposal. Current MRF operations include: 1) mixed waste receiving and processing areas for recovery of recyclable and marketable materials, 2) an organics composting area where greenwaste, foodwaste, paper waste and other organic materials recovered from the municiple solid waste stream are composted[1], 3) a woodwaste processing area where wood materials are processed to produce biofuels and landscaping products, 4) two household hazardous waste (HHW) facilities where HHW and universal wastes received from the public or recovered from the MRF are consolidated prior to shipment offsite for recycling or disposal, and 5) a commercial and residential recyclable buyback and drop-off center (Buyback) where clean, source-separated recyclable materials are received and blended with recyclable materials recovered from the MRF for shipment to recyclable commodity end users.

Placer County provides staffing to the WPWMA, including financial management scalehouse operations, general and engineering oversight of all facility operations, and implementation of public education and outreach programs. WPWMA staff also provide recommendations regarding solid waste policies and operations to the WPWMA Board of Directors.

The WPWMA has established long-term contracts with private entities for the operation and maintenance of the MRF and WRSL. The WPWMA also retains the services of professional engineering and other firms related to the ongoing facility operation, including solid waste systems design, water quality, GCCS design and operation, and odor monitoring and air dispersion modeling.

4. WPWMA FACILITY PURPOSE

The WPWMA's facilities receive and process solid wastes from within Placer County for the purposes of: 1) recovering marketable, recyclable materials that can be reintroduced into the local, national or global economy, 2) composting organic materials to produce a marketable soil amendment, 3) safely recovering household hazardous wastes, universal wastes, and electronic wastes for off-site recycling or destruction, and 4) disposing of non-marketable solid wastes within a sanitary landfill in accordance with applicable regulatory and legal requirements.

5. WPWMA FUNDING SOURCES

The WPWMA's primary funding source is tipping fees charged to customers to drop off their wastes at the WPWMA's facility. Additional sources of funding include, but are not necessarily limited to: Royalty payments from the Energy Developer; Rent payments associated with real property leases; Grant monies and interest earned on the WPWMA's reserve balances.

The WPWMA does not receive revenue from direct parcel assessments, the General Funds of any of its Participating Agencies, or from local, state or federal taxes. The WPWMA Board periodically reviews and adjusts its tipping fee structure to ensure sufficient funding is available for current and future operational needs.

6. AGENCY/STAKEHOLDER ROLES & RESPONSIBILITIES

Several primary stakeholders share an interest in regional odors, including those generated and emitted from the WPWMA's facility, and have roles and responsibilities related to the management, control and reporting of these odors.

A. Western Placer Waste Management Authority

The WPWMA is the owner and legal operator of the MRF, WRSL, composting, HHW and Buyback facilities. The WPWMA holds all operating permits for the facility and is directly responsible for complying with the permits and working with the appropriate regulatory agencies on permit-related matters.

The WPWMA Board of Directors has the ability and responsibility to establish policy related to use of the facility by generators and transporters of waste materials, how the facility is operated and maintained by contracted entities, and what, if any, specific policy provisions exist related to control of odors from the WPWMA's facility. The WPWMA contracts with multiple third-party entities to operate and maintain specific elements of the WPWMA's facilities. As such, the WPWMA has the ability to integrate odor monitoring, mitigation and reporting requirements into these various contracts as it deems appropriate and in the best interest of the WPWMA and its customers.

B. MRF Operator

The MRF, composting, HHW and Buyback facilities (collectively referred to as the MRF) are operated under a single contract with a private firm. The MRF Operator is directly responsible, as outlined in their contract with the WPWMA, for the operation and maintenance of these facilities. As such, once waste is received at the facility, the MRF Operator controls the flow and management of these materials, including when recyclable commodities are shipped off-site to end-users and when Residual Wastes are transported to the WRSL for final disposal.

The MRF Operator is contractually obligated to inspect waste loads directed by WPWMA staff to the MRF to determine if the materials are suitable for processing. If the MRF Operator judges a load to have too little recyclable or marketable value or that it contains materials that may damage MRF processing equipment, the MRF Operator may request that the WPWMA redirect the materials to the WRSL for disposal. This provides the MRF Operator the ability to also judge whether a particular load has an excessive level of odor and whether or not it would be best (from a facility odor perspective) to process the materials at the MRF, direct them to the Composting Facility, or divert them to the WRSL for immediate disposal.

The MRF Operator has some ability to adjust MRF operations to reduce the potential for heightened perception of off-site odors. Specifically, depending on other operational factors, the MRF Operator can adjust how and when certain materials are processed based on the time of day and day of the week, actual and predicted weather conditions, and potential for odors from the materials processed.

The MRF Operator is also responsible for maintaining the MRF, including regular and periodic cleaning and other “housekeeping” efforts. The MRF Operator does not have direct control over the method in which materials are generated and hauled to the MRF for disposal. As such, odors associated with waste materials during transport to the MRF are outside of the MRF Operator’s control.

C. Landfill Operator

The WRSL is operated under a separate contract than the MRF. The Landfill Operator is directly responsible, as outlined in their contract with the WPWMA, for operation and maintenance of the WRSL as it relates to the receipt, burial, and covering of the waste. The Landfill Operator is not responsible for the design, installation, operation or maintenance of the GCCS.

The Landfill Operator has some ability to adjust operations to reduce the potential for heightened perception of off-site odors. Specifically, depending on other operational factors, the Landfill Operator can adjust where and how to fill sections, within the site fill sequence plan established by the WPWMA, of the WRSL and how wastes are blended with other wastes and covered during the burial process to reduce the potential for odors.

The Landfill Operator does not have direct control over the method in which materials are generated and hauled to the WRSL for disposal. As such, odors associated with waste materials during transport to the WRSL are outside of the Landfill Operator’s control.

D. Waste Generators and Haulers

Neither the WPWMA nor its contractors and consultants are responsible for the transport and delivery of waste materials to the WPWMA’s facility. Some materials delivered to the WPWMA’s facility have a high potential for noticeable odors because of the type of material (e.g. wastewater treatment plant sludge and foodwaste, etc.) or the conditions in which the material was collected and stored prior to transport (e.g. residential greenwaste that begins to decompose and generate odors prior to collection by the hauler, etc.).

The responsibility for the individual generators and haulers to mitigate odors is outside the purview of the SWOP. However, the WPWMA and its contractors and consultants endeavor to manage these types of materials in a manner aimed at reducing their noticeable off-site odor potential.

E. Energy Developer

The WPWMA currently leases land to a private energy developer who owns and operates a landfill gas-to-energy facility located at the northern edge of the WRSL. The Energy Developer receives LFG provided by the WPWMA for the purposes of generating and selling electricity produced by running internal combustion engines fueled by LFG. The majority of LFG generated at the WRSL is conveyed by the WPWMA to the Energy Developer, thus the Energy Developer's facility serves as the primary control element for the destruction of LFG.

F. WPWMA Consultants

The WPWMA currently contracts with an engineering firm to operate, manage and maintain the WPWMA's GCCS. Their primary role is to operate the GCCS to maintain regulatory compliance and minimize emissions of landfill gas to the atmosphere which also serves to reduce LFG-related odors.

G. Placer County Air Pollution Control District

The PCAPCD is responsible for the regulation and enforcement of air quality regulations within Placer County consistent with federal, state and local statutes. The PCAPCD provides regulatory oversight and asserts enforcement of the WPWMA's air-related operating permits.

H. Placer County Local Enforcement Agency

The LEA has been delegated authority by CalRecycle to enforce state law as it relates to the operation and closure of solid waste landfills, MRFs and composting facilities. The LEA provides regulatory oversight and enforcement of the WPWMA's non-air and non-water-related operating permits.

I. Public

The public, particularly those who live and work proximate to the WPWMA's facility, can serve as real-time field monitors for the presence of odors. The WPWMA's website (www.WPWMA.ca.gov) provides an easy and convenient method for the public to provide feedback regarding when and where they experience odors, how long the odors are noticeable, and a description of the odor.

Information provided by the public provides useful data to the WPWMA that can serve to augment data collected from its odor monitoring and air dispersion system for evaluating the migration of odor from the site. To be of greatest use, it is important that odors are reported to the WPWMA as timely and accurately as possible, as described in Section 10.D.

7. Regional Odor Sources

The WPWMA is one of several known odor sources located in or adjacent to Placer County's Sunset Area. The following provides an overview of potential odor sources at or proximate to the WPWMA's facility; Figure 7-1 shows the location of these potential odor sources.

A. WPWMA Odor Sources

In its 2007 and 2009 studies conducted for the WPWMA, SCS Engineers identified the following primary sources of odor at the WPWMA's facility: 1) MRF, 2) composting facility, 3) landfill active face, and 4) landfill gas. These odor sources are discussed in greater detail in Section 8 of this report.

B. Non-WPWMA Odor Sources

i. Non-Ag (not exempt from PCAPCD nuisance regulations)

a. Rio Bravo

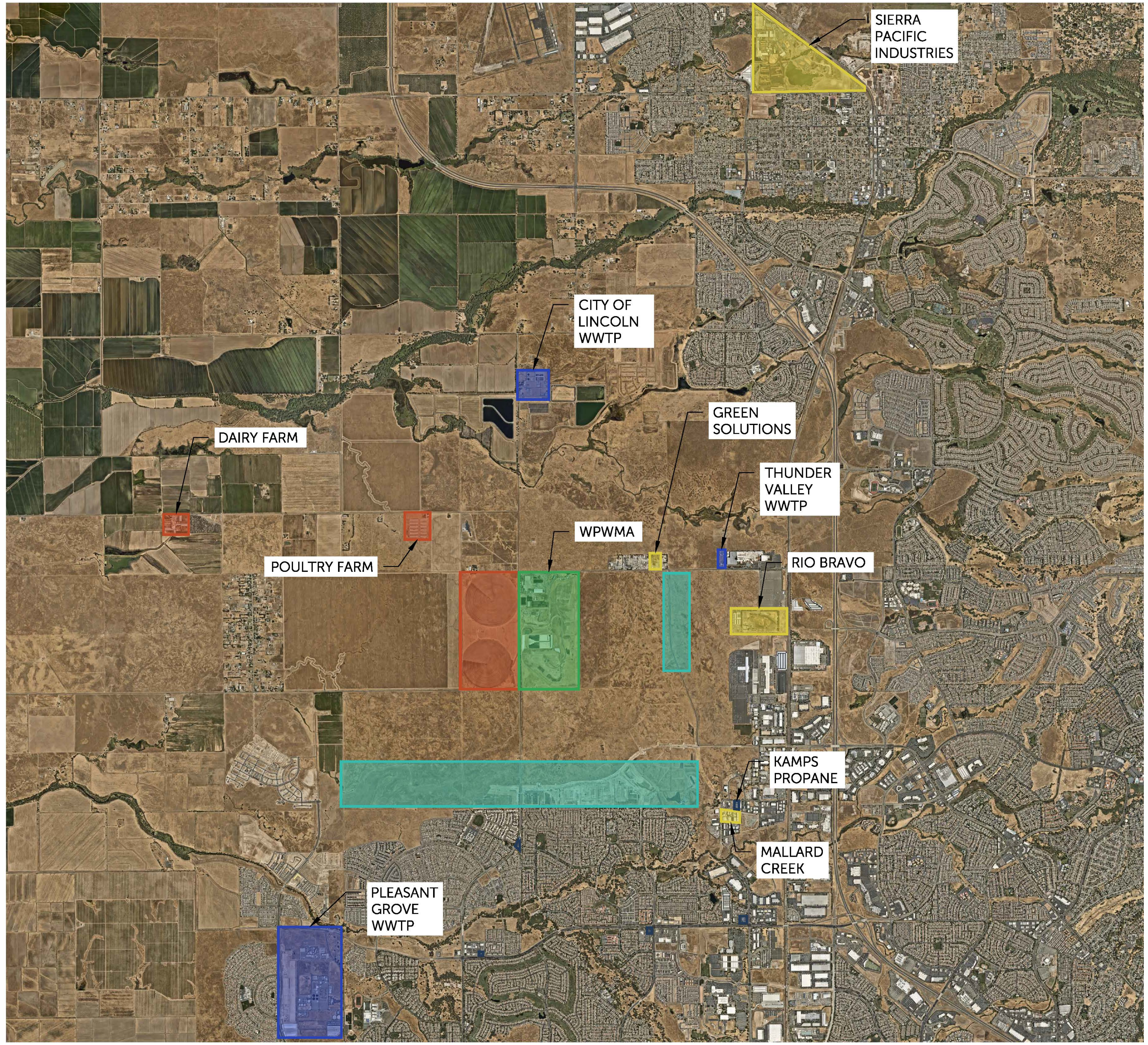
The Rio Bravo biomass facility is located approximately 1.5 miles east of the WPWMA's facility and directly south of the Thunder Valley Casino Resort. The Rio Bravo facility receives and processes woody materials for the purposes of generating electricity. As part of its operation, Rio Bravo maintains stockpiles of ground wood fuel. In some cases, these stockpiles of wood fuel can begin to decompose and generate odors similar to the WPWMA's composting operations.

b. Mallard Creek

The Mallard Creek facility is located approximately 2.2 miles southeast of the WPWMA's facility. Mallard Creek produces and markets equine and poultry bedding materials, landscaping products, pelletized fuel products and industrial fibers. These products are produced predominately from woody material received and processed at Mallard Creek's facility. Much like the Rio Bravo facility, ground and stockpiled materials have the potential to generate odors similar to that of the WPWMA's composting operations.

c. Green Solutions and More

The Green Solutions and More facility is located approximately ¾ mile east of the WPWMA's facility. Green Solutions and More accepts greenwaste and woodwaste which is ground on-site to produce mulch, wood chips and compost. The facility also accepts soil and concrete for recycling. The green and wood materials have the potential to generate odors similar to that of the WPWMA's composting operations.



LEGEND:

WPWMA	PROPANE/GAS STATION
WASTEWATER TREATMENT FACILITY	CONSTRUCTION
COMPOST/WOODCHIPS	AGRICULTURE

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www.wpwma.ca.gov

SITE WIDE ODOR PLAN
POTENTIAL REGIONAL ODOR SOURCES

SHEET
7-1

d. **Kamps Propane – Rocklin**
Kamps Propane is a propane distributor located approximately 2.5 miles southeast of the WPWMA's facility and less than ½ mile due east of Blue Oaks neighborhood. The odorant added to propane can be similar to landfill gas or other landfill-related odors.

e. **Thunder Valley WWTP**
The United Auburn Indian Community owns and operates a wastewater treatment plant at their Thunder Valley Casino. The 700,000 gallon per day facility located approximately 1.5 miles east of the WPWMA's facility serves the Thunder Valley Casino Resort exclusively. Sludge from the Thunder Valley WWTP is hauled by Recology to the WRSL or other sanitary landfill for disposal. Odors from the Thunder Valley WWTP can be similar to that of the landfill working face when sludges are received and managed.

f. **City of Lincoln WWTP**
The City of Lincoln owns and operates a regional wastewater treatment facility located approximately 1.5 miles north of the WPWMA's facility. The 5.9 million gallon per day facility serves areas between Lincoln and North Auburn. Sludge from Lincoln's WWTP is currently disposed at either the WRSL or the Ostrom Road Landfill in Yuba County. Odors from Lincoln's WWTP can be similar to that of the landfill working face when sludges are received and managed.

g. **South Placer Wastewater Authority WWTP**
The South Placer Wastewater Authority owns and operates two wastewater treatment facilities. The Dry Creek facility is located approximately 6.5 miles south southeast of the WPWMA's facility and the Pleasant Grove facility is located approximately 3.5 miles southwest of the WPWMA's facility. Materials generated at both facilities are currently suitable for land application and are generally not delivered to the WPWMA's facility. Odors from the Roseville WWTPs can be similar to that of the landfill working face when sludges are received and managed.

h. **Sierra Pacific Industries-Lincoln**
Sierra Pacific Industries operates a biomass cogeneration facility similar in nature to Rio Bravo. The plant generates energy from bark, sawdust and other low-grade byproducts of the sawmill manufacturing process and can generate odors similar to WPWMA's composting operatons.

ii. Ag (exempt from PCAPCD nuisance regulations)

a. Poultry Farm

A privately-owned poultry farm consisting of twelve (12) enclosed barn structures is located approximately 1-mile northwest of the WPWMA's facility. Odors from the facility tend to have a musty odor mixed with ammonia and can be similar to composting and landfill related odors.

b. Dairy Farm

An approximately 20-acre, privately-owned dairy farm that includes eight (8) open-sided barns/structures and associated feed lots is located approximately 3 miles northwest of the WPWMA's facility. Odors from the facility tend to have a manure odor mixed with ammonia and can be similar to landfill and landfill gas-related odors.

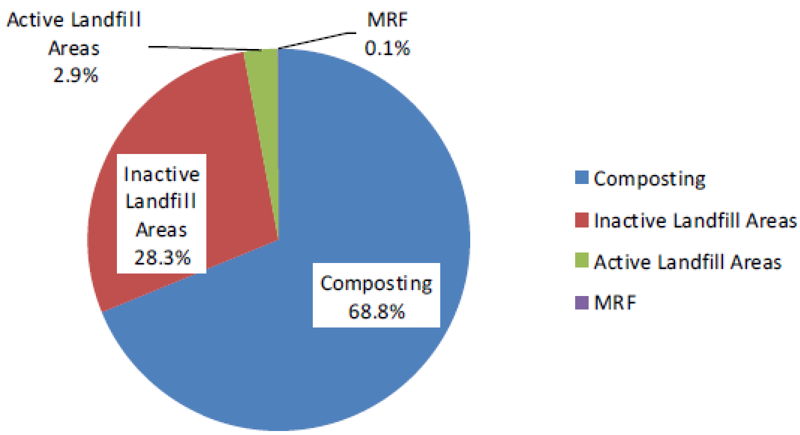
8. ON-SITE ODOR SOURCES, OPERATIONAL PLANNING AND BMPS

The following provides an overview of the primary odor-generating operations at the WPWMA's facility (MRF, compost, landfill, and LFG) and the BMPs implemented by the WPWMA to reduce the potential for odors to be noticeable off-site including the advance planning and scheduling of operational activities. A checklist template is included in Appendix A that the WPWMA will utilize to document implementation and adherence to the observable BMPs. While this list may not represent all the potential odor producing operations at the WPWMA's facility, based on previous site-specific studies conducted by the WPWMA, the following represents the operations with the greatest potential to produce odors.

A. Overview of On-Site Odor Sources

A November 2015 odor study commissioned by the WPWMA and produced by Environmental Management Consulting and Charles E. Schmidt, PhD (Appendix B) suggests the following relationship (see Figure 8-1) in terms of the relative odor potential of the primary facility odor sources.

Figure 8.1: Overall Contribution to Site Odor by Process



B. MRF

As used herein, the MRF represents the portion of the WPWMA's facility that receives and processes mixed municipal solid wastes for the purposes of recovering and marketing recyclable materials (Figure 8-2). Residual Wastes are transported to the WRSL for disposal.

Given the location of the MSW processing building relative to the WPWMA's overall facility, the potential for off-site odors associated with the MSW receiving and processing area is greatest along the sections of Athens Avenue and Fiddyment Road noted on Figure 8-2.

The materials processed at the MRF include organic materials and other putrescible wastes that have the potential to emit odors as they begin to decompose. Additionally, fines that are entrained within the mixed waste stream (including, but not limited to, dirt and grit, concrete and drywall dust, grass clippings, and small pieces of paper, wood, glass and plastic) are collected and used at the WRSL as an alternative daily cover (ADC) material. As a result, the following BMPs focus on timely and consistent processing of the materials and regular housekeeping and cleaning of facility to avoid the accumulation of potentially odiferous materials.

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SITE WIDE ODOR PLAN
FACILITY SITE LAYOUT

SHEET
8-2

i. Best Management Practices

The following represents the odor minimization BMPs related to the MRF operation.

- Process waste materials within forty-eight (48) hours of receipt of the material. For the purposes of this BMP, “process” means to sort the materials to recover marketable commodities and transport the residue to the landfill for burial.
- ADC generated from MRF fines is screened to a ½-inch minus size thereby reducing the potential for larger pieces of foodwaste to be present in the fines. The MRF Operator is responsible for regularly inspecting and properly maintaining the ADC screening system to ensure this material sizing standard.
- Transport all ADC to the landfill the same day it is produced at the MRF. No overnight storage of ADC at the MRF is allowed.
- Transport residual wastes to the landfill the same day they are produced. Limit overnight storage or residue in trailers to situations in which the MRF is operated outside of the landfill waste acceptance hours.
- Continuously operate the stormwater pond aeration system to the degree the aerators are fully submerged.
- Maintain a minimum dissolved oxygen level in the pond of at least one (1) milligram per liter at all times.
- At the end of daily waste processing operations, remove all unprocessed waste material from the processing lines and equipment. No waste material shall remain on the processing lines and equipment overnight. This provision shall not apply to any processing lines that have experienced a mechanical or electrical failure that precludes the MRF Operator from running the line. In these cases, the MRF Operator shall clear the line(s) of material upon repair of the line(s).
- Remove waste materials from the floors and other surfaces underneath MRF processing equipment following the completion of daily processing operations and return the collected materials to the receiving floor for reprocessing.
- Remove waste materials from the baling areas and recovered product storage floor and return the collected waste materials to the receiving floor following the completion of daily baling operations. Recovered recyclables which have not yet been baled are exempted from this cleaning and removal requirement.

- Remove loose waste and debris around the residue and ADC load-out conveyors at the end of daily operations.
- Close at least two (2) of the three (3) MRF receiving floor roll-up doors each night. The MRF Operator may elect to keep one door open to facilitate ease of inspection of the receiving floor for the purposes of maintaining site security and safety.
- Using a street sweeper or equivalent piece of equipment, sweep the asphalt covered areas surrounding the MRF building daily.
- To minimize system downtime, provide equipment maintenance and repair staff whenever the MRF is processing wastes to respond to and repair system faults and equipment breakdowns.
- Conduct daily preventative maintenance activities to minimize system downtime.
- On a quarterly basis, perform routine maintenance and inspection of the MRF air handling system components to ensure proper and uninterrupted operation.

C. Composting Facility

As used herein, the Composting Facility represents the portion of the WPWMA's facility that receives and processes organic materials for the purposes of producing a marketable soil amendment (Figure 8-2). The following provides additional information related to the operation of the Composting Facility as it relates to odors.

A majority of the materials received and processed at the Composting Facility consist of greenwaste (e.g.: grass, leaves, plants, sticks and small branches). With passage of recent regulations by the State of California (i.e. AB 32, AB 1826, SB 1383), foodwaste and other organic materials such as paper waste and other organics entrained in the MSW stream will need to be co-composted with greenwaste.

Greenwaste and foodwaste are received directly at the Composting Facility. Other organic materials that may be composted will generally be received as part of the MSW stream at the MRF recovered by the MRF Operator, and subsequently transported to the Composting Facility.

As received, greenwaste generally has a relatively low odor potential as sufficient oxygen is available to prevent significant anaerobic conditions. However, during certain parts of the year (typically early Spring) when there may be alternating cycles of warm weather followed by rain, the amount of grass clippings generated within the county and subsequently received at the WPWMA's facility can increase dramatically. In some cases, the greenwaste can already enter a semi-anaerobic phase (and begin producing odors) before being collected and transported to the WPWMA facility. In these cases, extra care must be taken to process these materials as soon as practical and introduce them to the composting process to reestablish aerobic conditions.

Foodwaste will most often exhibit a high odor potential upon receipt at the Composting Facility. As such, prompt processing and blending of these materials (as noted in the BMP section below) with processed, shredded greenwaste will help to minimize the odor potential of the foodwaste materials.

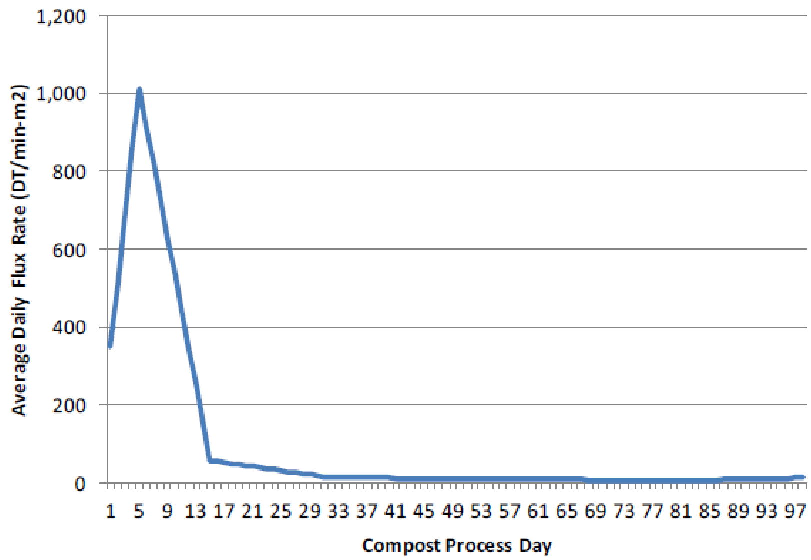
The WPWMA utilizes aerated static pile (ASP) composting methods. ASP composting methods involve placing organic materials into piles situated above a series of perforated pipes. The pipes are connected to one or more blowers (mechanical air moving systems) that allow air to be drawn from the atmosphere and pushed through the material pile to maintain aerobic conditions. A layer of finished compost is placed on top of the piles to act as a biofilter; this biofilter layer serves to absorb and biologically degrade odorous compounds. Materials in the ASP system are not turned or otherwise moved after initial placement and are left in a "static" state until the composting process is effectively completed.

All liquids that contact the compostable materials are directed to on-site composting ponds. Unlike other stormwater ponds located on-site that are designed to collect rainwater and other on-site water that has not come into contact with waste materials and allow any solids to settle before the water is released off-site, compost ponds are designed to preclude any off-site release of liquids that have come into contact with compostable materials. The water collected in the compost ponds can be reapplied to the compost piles to maintain appropriate moisture levels are evaporate to the atmosphere.

The November 2015 odor study commissioned by the WPWMA suggests that the composting operation has the greatest potential for odors and represents nearly 69% of the total site wide odor potential. At the time the study was performed, the WPWMA had not begun its ASP composting pilot testing. In addition to the operational benefits associated with ASP composting methods, the use of ASP has been demonstrated to reduce odor emissions by at least 80% compared to conventional windrow methods. [2,3]

After materials have completed the active composting phase4, the compost is moved to a separate area to cure before it is ready to be screened and then marketed. During the movement from active composting to curing, the material has some potential to release odors. However, as shown on Figure 8.3 below (source: Figure 5.1 in Appendix B), the odor potential associated with composting operations decreases rapidly and remains relatively low after the first few weeks of the active composting process (windrowing or ASP).

Figure 8.3: Compost Emission Curve



Once cured, the compost is screened to remove contaminants and is then ready for market. Similar to the when the compost is moved from the active to the curing phase, screening of the compost has the potential to release a minor amount of odors.

California Code of Regulations Title 14 Section 17863.4 requires that all compostable material handling operations and facilities prepare and maintain a site-specific Odor Impact Minimization Plan (OIMP). The WPWMA's OIMP (Appendix C) provides detailed information regarding design and operating procedures to minimize composting-related odors. The OIMP will be amended as needed as part of the Solid Waste Facility Permit (SWFP).

i. **Best Management Practices**

The following represents the odor minimization BMPs related to the composting operation. As noted above, the highest potential for odors exist during receipt and initial processing of the materials and during the first few weeks of the active composting process. As such, the following BMPs primarily focus on management practices during these initial periods as well as general housekeeping practices.

- Comply with all provisions of the approved OIMP in Appendix C.
- Plan and perform material grinding, turning, screening or blending of non-greenwaste materials with ground greenwaste materials consistent with the provisions of Section 8F.
- Perform initial processing (grinding) of green materials within seven (7) calendar days of receipt.
- Grind highly odiferous loads of greenwaste within forty-eight (48) hours of receipt.
- Introduce ground greenwaste into the windrowing or ASP piles within fourteen (14) calendar days of the grinding of the materials.
- Cover foodwaste, paper and/or other compostable materials with ground greenwaste so that no non-greenwaste materials are exposed within two (2) hours of receipt of the foodwaste, paper and/or other compostable materials.
- Move the blended materials to ASP and begin introducing air (as noted below) within seven (7) calendar days of the initial receipt of the foodwaste, paper and/or other compostable materials.
- Construct and maintain a minimum 12-inch thick biofilter layer comprised of finished, unscreened compost over the entire surface of the ASP compost piles. Biofilter material shall be placed within twenty-four (24) hours of any section of the ASP reaching its maximum height. Based on current material flowrates, it can take between 1 to 3 operational days to fully construct a new section of ASP with placement of the biofilter layer to follow.
- Introduce ambient air, via a mechanical air supply system, as necessary to generally maintain pile temperatures within the range of 131°F to 168°F. Blowers shall be used to push ambient air through the piles (positive aeration).

- Maintain materials in ASPs, under active aeration for a minimum of twenty-two (22) consecutive days. Pathogen reduction must be met pursuant to Title 14, California Code of Regulations, Chapter 3.1, Sections 17868.1 and 17868.3.

- Following the active composting time-frame noted above, maintain the composted materials in a curing pile for at least twenty-one (21) days prior to final screening of the material.

- Wash down and remove any accumulated liquids, solids and semi-solids that may have leached from the active ASP area at least once per day.

- Continuously operate the compost pond aeration system to the degree the aerators are fully submerged.

- Maintain a minimum dissolved oxygen level in the pond of at least one (1) milligram per liter at all times.

- Utilize a dedicated continuous dissolved oxygen meter to monitor oxygen levels in the compost ponds.

- On a quarterly basis, sample the compost leachate for the following parameters: pH, dissolved oxygen, total dissolved solids, fixed dissolved solids, total nitrogen and specific conductance.

- Clean and remove sediments from the south composting pond forebay and the north compost pad drainage channel at least quarterly with the first scheduled cleaning to occur by December 31, 2020. Collected sediments shall be promptly mixed with ground greenwaste and reintroduced to the active composting system or immediately transported to the WRSL for disposal and managed in the same method as wastewater treatment plant sludges. In no event shall the collected sediments be allowed to stored overnight without first being mixed or covered with ground greenwaste.

- Clean and remove accumulated compost or other debris on and adjacent to the composting pads semi-annually.

- Drain and clean all membrane-lined composting ponds at least once every four (4) years with the first scheduled cleaning to occur by December 31, 2022. When the pond is lowered below the aerators the remaining leachate must be removed in a timely manner and not allowed to become stagnant and anaerobic.

D. Landfill

As used herein, the "Landfill represents the portion of the WPWMA's facility referred to as the Western Regional Sanitary Landfill (WRSL). The WRSL is approximately 291 acres with approximately 231 acres permitted for disposal activities (Figure 8-2). As of June 2019, approximately 158 acres have received waste for disposal with the remainder identified as future landfill. Based on the currently permitted capacity of the WRSL and current and projected future filling rates, the WPWMA estimates the WRSL has sufficient capacity to operate until at least 2058.

It is the WPWMA's intent to recover and market for recycling or reuse as much material as is technically and economically practical and that is environmentally safe to do so. Wastes received at the WPWMA's facility that cannot be reasonably recovered for recycling or reuse are disposed of at the WRSL.

When the WRSL is not in operation (i.e. not actively receiving waste materials for burial), all in-place wastes are covered by soil or approved alternative daily cover (ADC). This cover serves to reduce the potential for windblown litter, vectors and odors. At the start of daily filling operations, the Landfill Operator establishes one or more daily active working faces where wastes will be disposed. The daily active working face represents the only area(s) at the WRSL where wastes are exposed. On an average day the size of the active working face is generally limited to less than one (1) acre to minimize issues associated with the exposed waste including the potential for odors. At the conclusion of each operating day, the Landfill Operator places a layer of daily cover materials (soil or ADC) over the active working face to completely cover all wastes.

The two primary sources of odor associated with the landfill are: 1) the receipt and burial of wastes and 2) landfill gas related odors. The following section addresses BMPs for minimizing odors related to the receipt and burial of materials; landfill gas related BMPs are addressed separately in Section 8E.

i. Best Management Practices

The following represents the odor minimization BMPs related to the landfilling operation.

- Discuss at the weekly landfill operations meeting, the planned location of each day's filling operations and when areas of previously buried waste that have been in place for a week or longer will need to be exposed for the purposes of establishing the daily active working face. The planned efforts will be consistent with the provisions of Section 8F.

- Provide at least twenty-four (24) hours' notice (or as soon as practical in the event of an unforeseen circumstance that would result in less than 24 hours' notice) to the WPWMA General Manager, Program Manager or Waste Management Operations Superintendent of the need to operate the WRSL on weekends, Observed Holidays or outside WPWMA facility Gate Hours.
- Minimize the size of the working face to that necessary to maintain operator and customer safety. A working face between ¼ and ½ acre is considered the minimum safe size with the maximum size of the working face generally limited to one (1) acre.
- Minimize the open-air exposure time of wastes by placing newer wastes over older wastes throughout the operating day. A study commissioned by the WPWMA suggests that odors associated with exposed waste increase over the course of the operating day.[5]
- Bury wastewater treatment plant sludges and other highly odiferous loads immediately upon receipt by covering the materials as quickly as possible with less odiferous wastes.
- When exposing areas of previously buried waste that have been in place for a week or longer, limit the time between removal of the last six (6) inches of soil cover and first placement of additional wastes to no more than one (1) hour.
- Begin placing daily cover materials immediately following receipt of the last load of waste and consistent with the requirements of Title 27, Sections 20680 and 20690 of the California Code of Regulations. Complete daily cover placement within four (4) hours of receipt of the last load of waste.
- Utilize soil or "fines" recovered from the MRF or C&D operation as an ADC as follows:
    - A six-inch minimum layer of on-site, native soil; OR
    - A six-inch layer of MRF fines covered by a six-inch layer of on-site, native soil; OR
    - A six-inch layer of MRF fines covered by a six-inch layer of C&D fines.
    - Restrict use of ADC fines to areas that will receive additional fill within twenty-four (24) hours. Exposure of alternative daily cover fines in excess of twenty-four (24) hours is prohibited.
    - Daily cover shall be compacted to minimize odor transmission. The minimum level of compaction may be achieved via track-walking the materials with a Caterpillar D-6 low ground pressure dozer or equivalent.

- Daily cover soil may be removed at the start of the operational filling day to minimize overall soil disposal rates; MRF fines and dried sewage sludge used as ADC shall not be removed and shall remain in-place once applied by the Landfill Operator.
- Submit a landfill cover plan indicating areas containing intermediate cover and areas that will have intermediate cover within the subsequent one hundred eighty 180-day period.
- Provide five (5) days written notice to the WPWMA prior to deviating from the WPWMA provided fill plan except in the case where the Landfill Operator believes surface LFG conveyance piping needs to be disconnected or relocated. Provide five (5) days written notice to the WPWMA regarding any need to relocate or disconnect LFG piping. WPWMA will provide to the PCAPCD within three (3) business days of receipt, a copy of any such five (5) day written notice regarding the need to relocate or disconnect LFG piping.
- WPWMA will maintain reasonably accurate as-built drawings, in AutoCAD format, of all surface and sub-surface GCCS infrastructure and will provide such information to the Landfill Operator.
- Place and compact a minimum of twelve (12) inches of intermediate soil cover over areas where landfilling operations will not occur for one hundred eighty (180) days or more consistent with the regulatory requirements identified in Title 27, Section 20700 of the California Code of Regulations. The depth of any previously placed soil daily cover shall apply towards the intermediate soil depth requirement. The minimum level of compaction may be achieved via track-walking the intermediate cover soils materials with a Caterpillar D-8 dozer or equivalent.

E. Landfill Gas

Landfill gas (LFG) is the byproduct of the anaerobic decomposition of wastes. As such, the composition of the waste being landfilled can have a direct impact on the generation rate and chemical constituency of the landfill gas.

Only the organic fraction of the landfilled waste will decompose and produce LFG. The generation rate of LFG generally increases over time with development of the landfill and usually peaks shortly after the landfill has reached final capacity. However, as a result of the state's mandate to reduce the amount of organic materials landfilled over time, it is reasonable to conclude that the quantity of LFG per unit volume of disposed waste may decline also over time.

LFG is composed predominately of equal parts methane and carbon dioxide; both odorless gases. LFG also includes trace amounts of volatile organic compounds (VOCs), sulfur-based compounds and ammonia. It is generally the sulfur-based compounds and ammonia that result in LFG related odors.

Federal and state law require that landfills that have the potential to produce a certain amount of LFG install a GCCS. The WRSL meets these criteria; in 1996 the WPWMA installed LFG collection wells and a flare system to destroy the LFG via combustion. Overtime as the WRSL has continued to develop, the WPWMA has expanded, modified and upgraded its GCCS. The current GCCS includes a series of collection wells that remove the LFG from the waste mass (via an applied vacuum) and conveys the LFG in an enclosed piping system to a central location (blower/flare station) where the LFG is either directed to the on-site Energy Developer to produce electricity or to an enclosed ground flare where it is destroyed through high-temperature combustion.

The design and operation of LFG systems is prescribed in both federal and state law. The U.S. EPA established New Source Performance Standards/Emission Guidelines6 for municipal solid waste landfills intended to reduce uncontrolled emissions of LFG and regulate release to the atmosphere of non-methane organic compounds entrained in LFG (40 CFR Part 60 Subpart WWW). The California Air Resources Board also approved a regulation intended to reduce emissions of methane gas from landfills.7 While both regulations are intended to reduce methane emissions to the atmosphere, compliance with the regulations also serves to reduce the potential for LFG-related odors.

The WPWMA's GCCS operations and maintenance consultant developed and follows standard operating procedures to ensure the LFG system is operated in compliance with the applicable regulations. These standard operating procedures are included in Appendix F.

i. Best Management Practices

The following represents the odor minimization BMPs related to operation of the LFG collection and control system. For the purposes of this section, these BMPs shall apply to all facility operators, contractors and consultants that have the potential to impact the operation of the LFG system. This includes, but is not limited to, the 1) the WPWMA's operations and maintenance consultant, 2) any third-party construction contractors that are hired to work on any part of the LFG system or the WRSL that would require a shutdown of the LFG system for any reason, 3) the Landfill Operator to the degree their operations require a shutdown of the LFG system for any reason, and 4) the Energy Developer. While not every BMP identified below will apply to every entity that has the potential to impact the operation of the LFG system, all entities should adhere to the appropriate BMPs to limit the potential for a disruption to the operation of the LFG system.

- Comply with all provisions of the approved standard operating procedures in Appendix F.
- Comply with the provisions of 40 CFR Part 60 Subpart WWW and Title 17, CCR Section 95460, et seq.
- Maximize the recovery of LFG from the WRSL while minimizing the potential for subsurface combustion events and oxygen levels in excess of three percent (3%) by volume in the extracted LFG stream.
- Plan and perform all operations that have the potential to disrupt operations of the LFG collection and control system consistent with the provisions of Section 8F.
- Avoid operations that have the potential to disrupt LFG collection and control system operations on weekends, Observed Holidays, and outside of the WPWMA's Gate Hours.
- Where landfill operations require the temporary disconnection of landfill gas collection or conveyance equipment, coordinate with the WPWMA and Landfill Operator to minimize the potential for fugitive LFG emissions by:
    - Minimizing the number of LFG wells that must be temporarily taken off-line
    - Adjusting adjacent LFG wells in an attempt to capture LFG that would otherwise be captured by the wells that are to be disconnected

  - o Coordinate schedules with the Landfill Operator to reconnect the LFG as soon as it is safe and practical to do so.

- Although not required, the WPWMA will consider placing additional soil cover in excess of regulatory requirements identified in Title 27, Section 20700 of the California Code of Regulations or the use of cover membranes or other non- or low-permeable cover systems when odors associated with LFG surface emissions cannot be reasonably controlled through consistent implementation of the BMPs noted herein.

F. Planning and Scheduling Operational Activities

Each facility operator, contractor and consultant shall utilize the daily odor risk forecasting tool described in Section 10B to plan their respective operations. Where possible, operations that may result in noticeable off-site odors should be avoided during:

- Any continuous three (3) hour period where each hourly risk potential is noted as "HIGH"; or
- Any continuous six (6) hour period where each hourly risk potential is noted as "MODERATE" or "HIGH".

Appendix D provides an example of these odor risk avoidance periods.

If a facility operator, contractor or consultant identifies that a specific operation or activity must occur to comply with operational needs or compliance with permits and that the timing of the identified activity will not comply with the aforementioned standards, the facility operator, contractor or consultant shall submit notification to the WPWMA, via reports@WPWMA.ca.gov, which includes the following information:

- Description of the activity or operation.
- Date(s) and time period(s) of the activity or operation.
- Reason why the activity or operation could not reasonably be delayed or rescheduled.
- Specific measures taken to reduce the potential for odors.

Any such notice must be submitted to the WPWMA within twenty-four (24) hours of initially conducting the activity or operation.

9. WEATHER & TOPOGRAPHY

The WPWMA's facilities are located within the Sunset Area and immediately north of the Placer One (formerly Placer Ranch) development area. The following is an excerpt from the Draft Environmental Impact Report for the Sunset Area Plan/Placer Ranch Specific Plan[8].

[U]nincorporated land in west Placer County is part of the Sacramento Valley Air Basin (SVAB). The SVAB comprises the western portion of Placer County, the eastern portion of Solano County, and all of Shasta, Tehama, Glenn, Butte, Colusa, Sutter, Yuba, Yolo, and Sacramento Counties.

Ambient concentrations of air pollutants are determined by the amount of pollutants emitted and the atmosphere's ability to transport and dilute such emissions. Natural factors that affect transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight. Therefore, existing air quality conditions in the SVAB are determined by such natural factors as climate, meteorology, and topography, in addition to the level of emissions released by existing air pollutant sources. These factors are discussed separately below.

The SVAB is a relatively flat area bordered by the north Coast Ranges to the west and the northern Sierra Nevada to the east. Air flows into the SVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento–San Joaquin Delta (Delta) from the San Francisco Bay Area.

The Mediterranean climate in the SVAB is characterized by hot, dry summers and cool, rainy winters. During the summer, daily temperatures range from 50 degrees Fahrenheit (°F) to more than 100°F. The average winter temperature is a moderate 49°F. The inland location and surrounding mountains shelter the area from much of the ocean breezes that keep the coastal regions moderate in temperature. Most precipitation in the area results from air masses that move in from the Pacific Ocean, usually from the west or northwest, during the winter months. The prevailing winds are moderate in speed and vary from moisture-laden breezes from the south to dry land flows from the north.

The mountains surrounding the SVAB create a barrier to airflow, which leads to the entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution. The highest frequency of poor-quality air movement occurs in the fall and winter when high-pressure cells are present over the SVAB. The lack of surface wind during these periods, combined with the reduced vertical flow caused by a decline in surface heating, reduces the influx of air and leads to the concentration of air pollutants under stable metrological conditions. Surface concentrations of air pollutant emissions are highest when these conditions occur in combination with agricultural burning activities or with temperature inversions, which hinder dispersion by creating a ceiling over the area and trapping air pollutants near the ground.

Elevated levels of ozone typically occur May through October in the SVAB. This period is characterized by poor air movement in the mornings with the arrival of the Delta breeze from the southwest in the afternoons. In addition, longer daylight hours provide ample sunlight to fuel photochemical reactions between reactive organic gases (ROG) and oxides of nitrogen (NOX), which *form ozone. Typically, the Delta breeze transports air pollutants northward out of the SVAB; however, a phenomenon known as the Schultz Eddy prevents this from occurring during approximately half of the time from July to September. The Schultz Eddy phenomenon causes the wind to shift southward and blow air pollutants back into the SVAB. This phenomenon exacerbates the concentration of air pollutant emissions in the area and contributes to the area violating the ambient-air quality standards.*

The local meteorology of the project area and surrounding area is represented by measurements recorded at the Lincoln Regional Airport (Karl Harder Field) station. The National Oceanic and Atmospheric Administration's National Centers for Environmental Information has records for that station dating back to 2009. According to these data, the average annual precipitation in the project area is approximately 20 inches, January temperatures range from a normal minimum of 36°F to a normal maximum of 56°F, and July temperatures range from a normal minimum of 61°F to a normal maximum of 96°F. The predominant wind direction is from the southeast (NOAA 2018).

While the PCAPCD does not classify odors as air pollutants, the meteorological and topographical conditions that affect the concentration and dispersion of air pollutants generally apply to the localized concentration and dispersion of odors as well. As noted above, the area surrounding the WPWMA's facilities generally experiences moderate wind patterns and minimal air movement or temperature inversion conditions the majority of the year. These factors can result in poor dispersion of odors and result in a greater potential for WPWMA facility-related and other regional odors to be perceptible by nearby receptors regardless of facility operations or time of day.

10. ODOR MONITORING AND INVESTIGATIONS

The following provides an overview of the WPWMA's effort to estimate potential off-site dispersion of odors generated from its facility, solicit feedback from nearby receptors related to when they experience odors they believe are from the WPWMA's facility, and to investigate and monitor on-site and off-site odors. WPWMA staff responsible for conducting odor monitoring, investigations, operational evaluations and responses to the public, PCAPCD, LEA or other applicable agencies include the WPWMA's a) Program Manager, b) Waste Management Operations Superintendent, c) Associate and Assistant Engineers, d) Environmental Resource Specialist(s) and e) Engineering Technician(s).

A. Odor Monitoring and Dispersion Modeling System

The WPWMA employs a site-wide continuous odor monitoring and dispersion modeling system and meteorological station. Data collected by onsite sensors along with static estimates of odor flux from select sources at the WPWMA's facility are combined with atmospheric data to produce air (odor) dispersion models using the CALPUFF[9] modeling system. Values for the static odor flux emissions were developed using a U.S.

EPA-approved flux chamber testing methodology as part of the WPWMA's 2015 Odor Study (Appendix B).

The odor monitoring and dispersion modeling system is utilized to provide objective, quantifiable, visual representations of the probable off-site odor concentrations over time associated with the WPWMA's operations.

B. Predictive Odor Risk Modeling

The WPWMA's odor monitoring and dispersion system includes a feature that uses weather forecast data to prepare a 3-day odor risk forecast that identifies periods of time (on an hourly basis) where there could be an increased potential for odors to be experienced off-site.

The odor risk forecast is updated daily and made available to the facility operators, contractors and consultants to help them better plan their operations and minimize the potential for off-site odors. Use of this forecasting tool is included as a BMP in Section 8. An example of the odor risk forecast is included in Appendix D.

The following criteria are used when determining the hourly odor risk assessment:

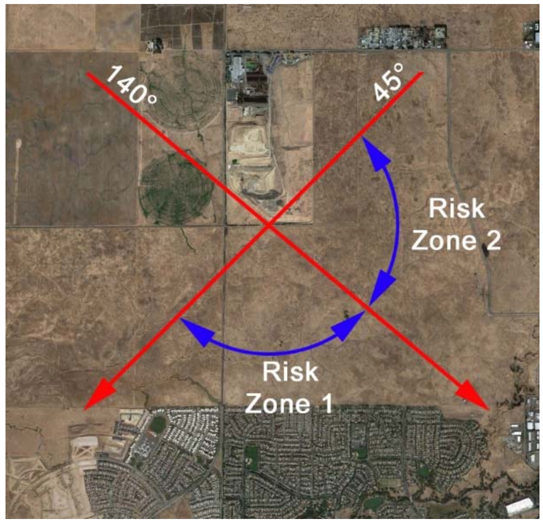
Risk Zone 1:

- If the forecast wind speed is lower than 1 meter per second (2.2 miles per hour), the risk is set to "HIGH"
- If the forecast wind speed is between 1 and 3 meters per second (2.2 to 6.7 miles per hour), the risk is set to "MODERATE"
- If the forecast wind speed is greater than 3 meters per second (6.7 miles per hour), the risk is set to "LOW"

Risk Zone 2:

- If the forecast wind speed is lower than 1 meter per second (2.2 miles per hour), the risk is set to "MODERATE"
- If the forecast wind speed is greater than 1 meter per second (6.7 miles per hour), the risk is set to "LOW"

Figure 10-1: High Odor Risk Wind Direction Zone



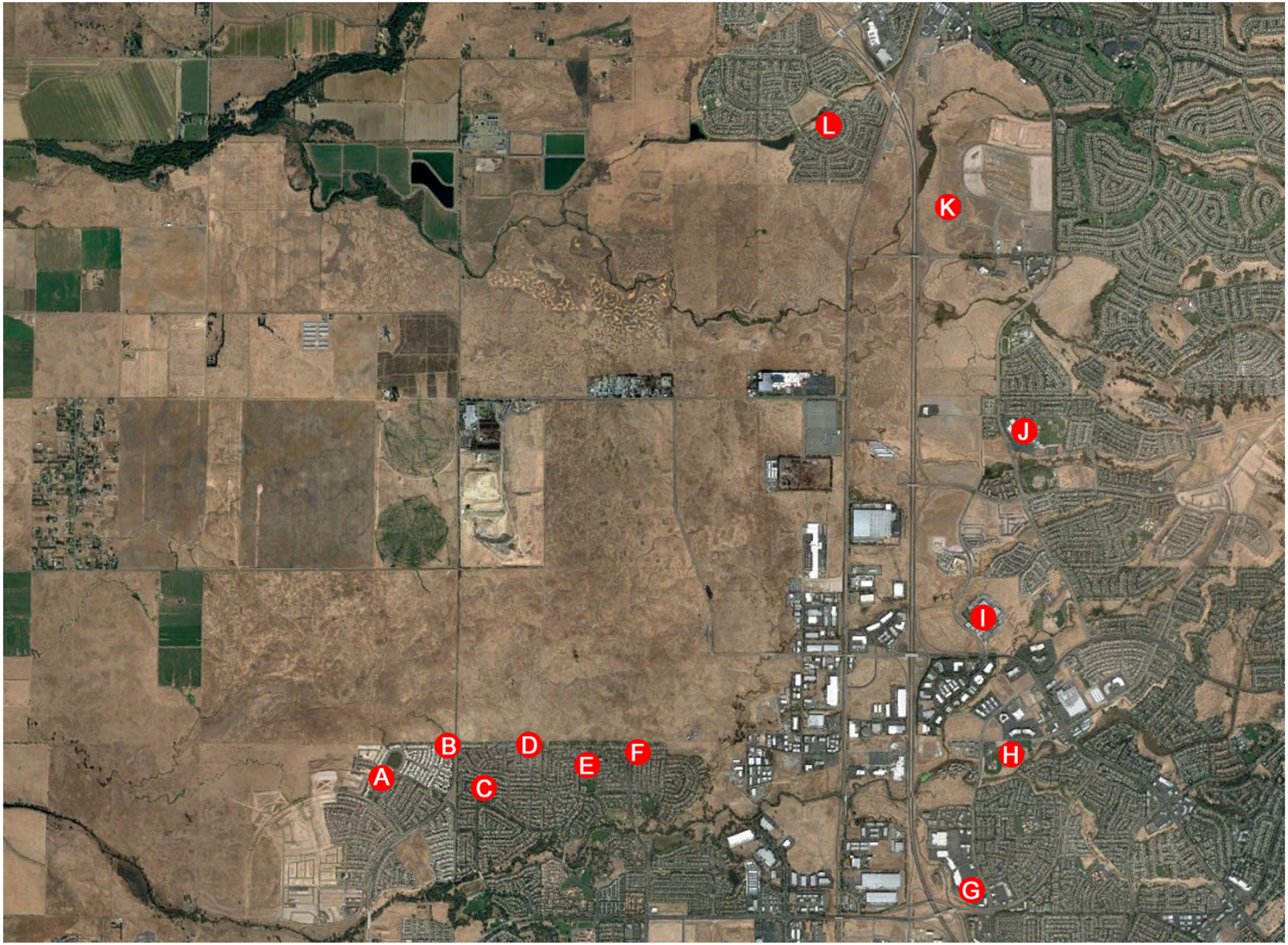
The WPWMA intends to use on- and off-site odor monitoring results to calibrate and verify the accuracy and efficacy of this odor risk tool and will adjust the aforementioned criteria, as necessary, to provide reasonable and realistic odor risk predictions for use by the WPWMA, its facility operators, contractors and consultants.

C. Routine On- and Off-site Odor Monitoring by WPWMA Staff

In addition to the odor investigation efforts by WPWMA staff as noted in Section 10E below, the WPWMA conducts periodic on- and off-site odor monitoring to record the type and intensity of odors that have the potential to be experienced by nearby receptors. Figure 10-2 identifies the off-site odor monitoring locations.

On- and off-site monitoring is performed weekly and at times when odors are expected to be the most noticeable. Based on historical odor notification records received by the WPWMA, odors are most commonly reported as being experienced between the hours of 6 am and 9 am and between 5 pm and 8 pm. As a result, routine on- and off-site monitoring will most commonly be performed during staff's regularly scheduled-hours of 7:30 am to 9 am, which is within the most reported timeframe. At each observation location, WPWMA staff record: 1) time, 2) noticeable odors and their description and intensity (on a scale of 1 to 5 with 5 being the most intense), and 3) specific observations about on-site facility operating conditions or off-site conditions (e.g. if it is trash collection day in the area, construction activities, surrounding land use conditions, etc.) that could be contributing to perceived odors. The facility may use a paper form such as the template inspection report included in Appendix E or it may use a digital application to record the findings. These forms may be updated as needed by the facility.

Upon return to the office, WPWMA staff will review and make a qualitative assessment of odor dispersion estimates from the WPWMA's dispersion



WPWMA Site-Wide Odor Plan
Routine Offf-Site Odor Monitoring Locations

FIGURE
10-2

modeling system corresponding to the recorded time of field observations, and a brief statement of how well these conditions matched with observed field conditions.

In the event that specific areas of the WPWMA's operations are noted as emitting higher than average odors, WPWMA staff meet and confer with its applicable facility operators, contractors or consultants to identify and document immediate mitigation measures that can be implemented by the applicable entity to reduce the potential for off-site odors.

D. Odor Notification System

The WPWMA utilizes an online odor notification system that allows individuals who experience an odor to report it directly to the WPWMA. A link to the online notification system is prominently displayed on the WPWMA's website(www.WPWMA.ca.gov).

The online notification system provides users the ability to report the following information to the WPWMA:

1. Date and time the odor was first experienced
2. Duration of the odor
3. A description and relative intensity of the odor
4. The location where the odor was experienced
5. Individual's contact information (optional)
6. Any other comments pertinent to the notification (optional)

When a person files an odor notification with the WPWMA, an email summarizing the data noted above is automatically generated and emailed to WPWMA, PCAPCD, and the LEA. Additionally, WPWMA staff receive a text message of the notification. The email and text alerts are generated within approximately fifteen (15) minutes of the notification being filed.

E. Odor Notification Investigation Protocol

It is the goal of the WPWMA to conduct a field investigation in the reported area for as many of odor notifications as the WPWMA deems practical. When the WPWMA receives an odor notification via its website or from the PCAPCD, the following criteria will be used to determine if a field investigation will be conducted:

1. Was the odor notification filed in a timely manner and is it reasonable to conclude the reported odor conditions are still applicable? Unless the notification would suggest otherwise, field investigations will only be performed when odors are reported within two (2) hours of being experienced.

2. Is the identified location of the odor proximate enough to the WPWMA's facilities to suggest the WPWMA's operations could be a contributing source of the reported odors? Based on historical data, the WPWMA considers any notifications outside of a five (5) mile radius measured from the center of its facility to not be sufficiently proximate to warrant a field investigation. Figure 10-3 represents the area in which field odor investigations will generally be conducted.

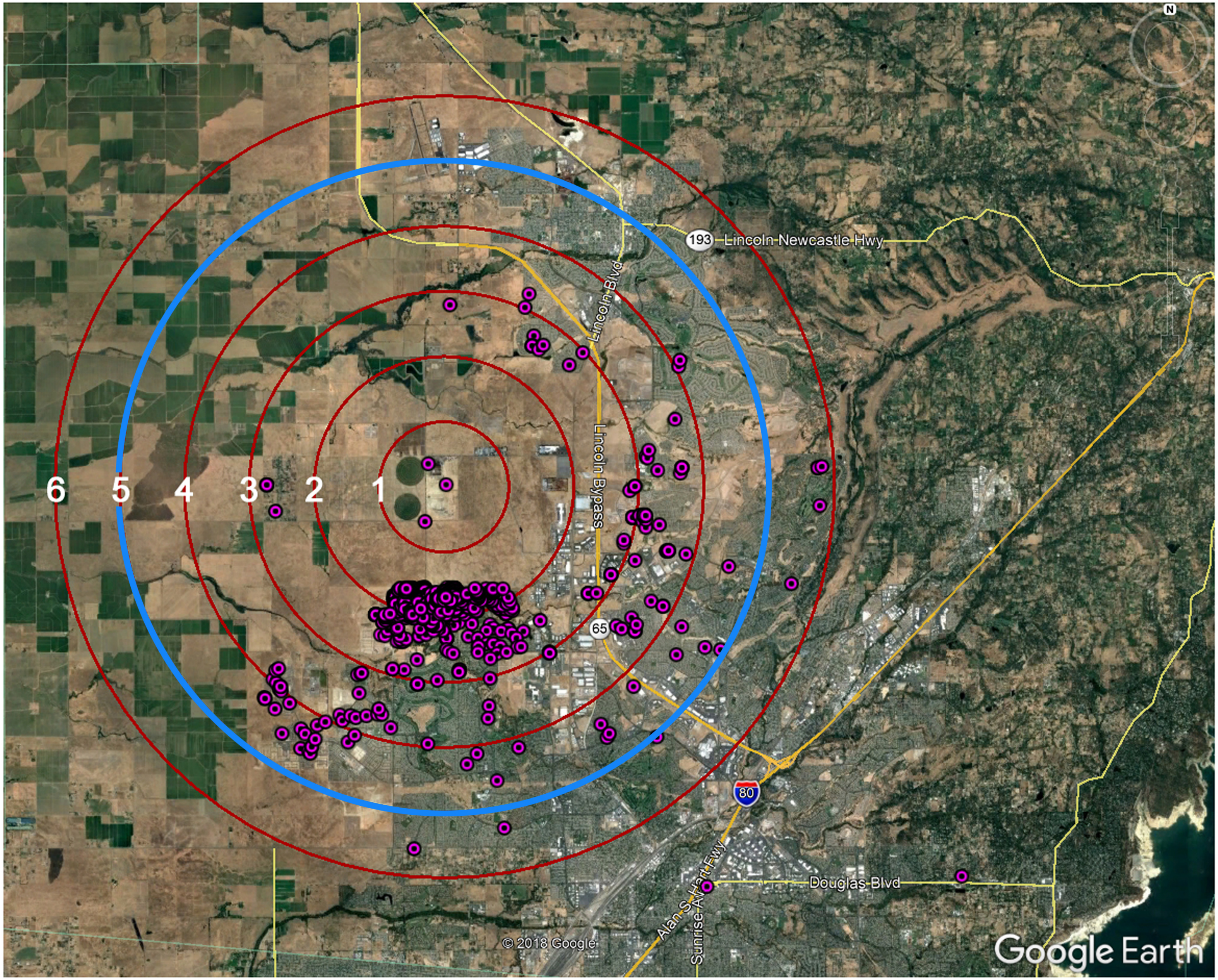
3. A field investigation will not be conducted for notifications received outside of normal business hours (8 am to 5 pm, Monday through Friday) or on WPWMA Observed Holidays unless specifically directed by the WPWMA Board of Directors or WPWMA Executive Management or as noted below.

    - If five (5) or more independent notifications are received within a one (1) hour period and when:
        - the notifications are clustered within a ¼-mile radius of one another
        - the odors are reported within one (1) hour of being experienced
        - the reported odor intensities are equal to or greater than 4
        - the notifications include the individual's name, phone number and email contact information

4. A field investigation will not be conducted if conditions could put WPWMA staff in physical danger (e.g. during thunderstorms, heavy rains, extreme heat, etc.) or would necessitate WPWMA staff to trespass on private property or other clearly marked non-accessible areas.

5. A field investigation will not be conducted if insufficient staff is available to conduct the investigation or other business needs of the WPWMA are determined by WPWMA's management (Program Manager or above) to be or greater immediate importance to facility operations, the environment, or public health than performing the investigation.

   If, based on the above criteria, a field odor investigation is warranted, one or more WPWMA staff will perform the investigation in accordance with the following protocol:



WPWMA Site-Wide Odor Plan
Location of Odor Notifications and 5-Mile Investigation Zone

FIGURE
10-3

1. Identify where the reported location is relative to the WPWMA's facility.

2. Check the WPWMA's facility weather station and observe the surrounding environment to ascertain general wind speed and direction and any other relevant atmospheric conditions.

3. If leaving from the WPWMA offices, wear a safety vest with WPWMA logo, Placer County-issued or other form of photo identification, and WPWMA business cards. If possible and practical, use a WPWMA vehicle. Proceed to the reported address noting any presence of odors between the WPWMA's facility and the subject address. Note the exact time of arrival at the subject location.

4. If safe, walk around the vicinity of the reported address and record any noticeable odors. To the degree possible, document a description of the odor(s) and rank the intensity on a scale of 1 to 5 with 5 being the most intense. If no odors were detected, record as "No odor detected".

5. If members of the public are noted outdoors in the vicinity of the subject address (e.g. at a park, gas station, outside their residence, etc.), inquire if they smell (or smelled) anything recently that would corroborate the notification. Identify and explain who you are and what you are doing. Ask open ended, non-leading questions to not inadvertently bias responses.

6. Prior to leaving the area, note the exact time of departure. If returning the WPWMA's facility, attempt to follow a route that is directly downwind of the facility (and upwind of the reported location) noting any change in odor and intensity.

7. If any of the odors noted during the field investigation are reasonably identifiable as potentially emanating from the WPWMA's facility, conduct a brief facility inspection of the suspect operations to identify any factors that may have resulted in an increased release of odors (e.g. compost turning and grinding operations, recent receipt of highly odiferous loads, GCCS shutdown, etc.)

8. To the degree possible, document the findings within 24 hours. The facility may use a paper form such as the Investigation Summary Report template included as Appendix E or it may use a digital application to record the findings. These templates may be updated as needed by the facility.

F. Odor Notification Investigation Report Procedures

The following summarizes the procedures the WPWMA follows for preparing and issuing an odor notification investigation report:

1. Prepare and download a video clip from the WPWMA's odor monitoring and dispersion modeling system that displays the estimated odor dispersion plume relative to the location identified in the odor notification. Depending on conditions and other proximate (time and location) odor notifications, prepare the video clip to begin approximately 30 minutes to 1 hour prior to the earliest time the odor was reported as first being experienced and approximately 1 hour after the latest time the odors were experienced.

2. If the notification is within the defined five-mile delineation of the facility, run a reverse trajectory model, which represents the location and the specific time of the odor report (where and when the odor was experienced) approximately sixty (60) minutes prior to the time and location the odor was experienced based upon wind speed and direction.

3. Add a summary of the onsite investigation (if any) to the report template.

4. Email the completed report, video clip, and reverse trajectory if applicable to the individual who reported the odor (if an email was provided), to the PCAPCD and the LEA.

G. Operational Review, Analysis and Adjustment

If, as a result of on-site or off-site odor monitoring (including odor notification field investigations), WPWMA staff are able to reasonably identify one or more of its facility operations as being a contributor to the documented odors, WPWMA staff will meet and confer with its applicable facility operator(s), contractors or consultants to identify factors that may have resulted in an increased release of odors.

As part of this discussion, WPWMA staff and the applicable facility operator(s), contractors, or consultants will work to determine if any of the identified BMPs were not met which, if implemented, may have reduced the potential for the odor to noticeable off-site.

If it is determined that an identified BMP was not followed, the WPWMA will submit a Non-Compliance Event Form to the PCAPCD and WPWMA staff or the applicable facility operator(s), contractors or consultants will provide the necessary follow-up and training of operational staff to ensure the BMPs are adhered to.

If it is determined that the identified BMPs were followed but were insufficient on ten (10) or more occasions within a one-year period, changes to the applicable facility operation(s) may be implemented (to the degree they are technically and economically feasible and fully comply with all applicable laws and operating permit conditions) which could include, but not necessarily be limited to, the following:

1. Identify additional BMPs, including investigation or identification of emerging technologies or innovative practices, and update the SWOP as appropriate;

2. Reduce the frequency of the operational practice to the degree practical while continuing to maintain regulatory compliance with all other material throughput requirements and to maintain customer and facility operator safety;

3. Provide information to neighbors (via the WPWMA's website) regarding operational practices or facility construction activities that have the potential for increased odors and an estimate of the possible duration of the applicable operational practice or construction project.

H. Odor Monitoring and Investigation Document Retention Policy

All information collected or produced under this section, including but not limited to, routine on- and off-site odor investigation findings and reports, odor notification information received by the WPWMA via its online odor notification system, odor notification investigation reports and findings related to any necessary operational review and adjustment will be kept in electronic format for at least three (3) years and will be available for review upon request.

11. PUBLIC EDUCATION & OUTREACH

The WPWMA continues to engage with residents to help educate and inform them about the critical function the WPWMA plays in managing solid wastes generated in Placer County in an environmentally secure and financially stable manner while meeting federal and state regulations related to solid waste management.

At the appropriate time and venue, the WPWMA is also able to provide information about facility and non-WPWMA odors sources, efforts by the WPWMA to reduce odors at its facility, mechanisms for the public to report odors they experience directly to the WPWMA, and the procedures the WPWMA uses to investigate and follow-up on reported odors.

Opportunities to engage the public regarding odors include, but are not necessarily limited to, the following:

A. Annual Meetings

Beginning in 2011, the WPWMA has conducted an annual public meeting at its facility designed to specifically engage nearby residents who have the potential to experience odors associated with operation of the WPWMA's facility. These meetings have typically focused on the WPWMA providing information about its operations, why odors from these operations may be experienced by nearby residents and specific efforts the WPWMA has taken to monitor, measure and reduce odors associated with its operation. The meetings also serve to provide an open forum for residents to engage directly with WPWMA staff.

Subject to the limitations noted in Section 14 of this SWOP, the WPWMA intends to continue conducting these meetings in the future to the degree the public finds them helpful and informative.

B. Website

The WPWMA will post and maintain an up to date version of this SWOP on its website. Information from the annual meetings noted above will also be posted and maintained on the WPWMA website.

To provide timely, useful information to the public and the PCAPCD regarding potential odor events, the WPWMA will investigate developing an area on its website devoted to identifying current operational factors (e.g.: anticipated GCCS downtime for maintenance or construction, after hours or weekend operation of the WRSL, significant short-term variations in the waste received that could result in excessive odors, etc.) that could lead to the increased perception of off-site odors.

C. National Night Out Event

When possible, and when invited by the sponsoring neighborhoods, WPWMA staff will attend National Night Out events at proximate neighborhoods to provide information about the WPWMA's facility and answer questions about odors and how they can be reported to the WPWMA and the PCAPCD.

D. Coordination with Neighborhood and Homeowner Associations The WPWMA will contact each of the neighborhood or homeowner associations in Lincoln, Rocklin and Roseville that are located within five (5) miles of the WPWMA's facility for the purposes of establishing a consistent method of communicating with these communities regarding facility odor issues. The WPWMA will suggest that each interested association appoint a representative that will serve as the primary contact for communications with the WPWMA. The emphasis of these communications will be to inform the public about the critical public service the WPWMA provides, how and why odors from the operation may be experienced, how to report odors to the WPWMA, and any known operations or projects by the WPWMA that may result in increases to notable odors.

As a part of these (and other appropriate outreach venues), WPWMA will provide information on how to report odors to the WPWMA via its on-line odor notification system.

12. REVIEW OF ODOR CONTROL TECHNOLOGIES

WPWMA staff will regularly monitor the solid waste industry, including active participation in the Solid Waste Association of North America trade group, to identify, evaluate and consider implementation of new odor control technologies or operating methodologies and will report and/or recommend implementation of the identified technologies or methodologies to its Board of Directors at a regularly scheduled meeting.

13. REPORTING AND RECORDKEEPING

All records and reports prepared or received in accordance with the provisions of this SWOP will be maintained by the WPWMA for a period of three (3) years and will be made available for review by the public in accordance with applicable law.

14. WPWMA BOARD APPROVAL PROCESS AND AVAILABILITY OF FUNDING

Any and all actions noted in this SWOP are subject to the approval by the Western Placer Waste Management Authority Board of Directors, including but not limited to the annual allocation of financial resources to cover the cost of all equipment and labor necessary to perform these actions and the need to comply with all current and future regulatory mandates.

REFERENCES

[1] Placer County Department of Public Works. (1977). *Southwestern Placer County Regional Sanitary Landfill Environmental Impact Report*, (State Clearinghouse #77121995). Page 6

[2] Environmental Management Consulting/C.E. Schmidt, PhD, *WPWMA Odor Assessment* (2015)

[3] T.R. Card and C.E. Schmidt (2012, March 14) *Air Emissions Control for Composting Operations*. Retrieved from https://www.biocycle.net

[4] As defined in California Code of Regulations Title 14, Division 7, Chapter 3.1

[5] Environmental Management Consulting/C.E. Schmidt, PhD, *Landfill Active Face Odor Management Handbook* (2019)

[6] http://www.epa.gov/stationary-sources-air-pollution/municipal-solid-waste-landfills-new-source-performance-standards

[7] https://ww3.arb.ca.gov/regact/2009/landfills09/landfillfinalfro.pdf

[8] Placer County Community Development Resources Agency, Planning Services Division. (2018). *Draft Environmental Impact Report: Sunset Area Plan/Placer Ranch Specific Plan* (State Clearinghouse #2016112012) Page 4.3-2

[9] https://en.wikipedia.org/wiki/CALPUFF

APPENDIX A: BMP CHECKLIST TEMPLATE

Subject to revision by the facility and may be held as a digital record

Site-Wide Odor Plan- Operational Best Management Practices Checklist

Date		Prepared by:	

MRF

1	Process MSW within 48 hours of receipt	YES		NO	
NOTE: May not be able to be measured. Based on reasonable observations does it appear materials have been processed within the required timeframe?					
2	ADC screened to remove oversized materials	YES		NO	
If NO, document observation.					
3	No overnight storage of ADC	YES		NO	
If NO, document observation.					
4	No overnight storage of residue	YES		NO	
If NO, document observation.					
5	Stormwater pond aeration system operating	YES		NO	
If NO, document observation or check appropriate box. ☐ Insufficient water volume ☐ DO reading ≥ 1 mg/l reading					
6	No overnight storage of residue	YES		NO	
If NO, document observation or check appropriate box. ☐ MRF operated outside of Landfill waste acceptance hours.					
7	Waste removed from processing lines at end of shift	YES		NO	
If NO, document observation or check appropriate box. ☐ Mechanical or electrical issue limiting operability.					
8	Waste removed from floors and other surfaces underneath processing equipment	YES		NO	
If NO, document observation or check appropriate box. ☐ Cleaning in process.					
9	Waste removed from floors and other surfaces underneath processing equipment	YES		NO	
If NO, document observation or check appropriate box. ☐ Cleaning in process.					
10	Waste removed from floors and other surfaces underneath processing equipment	YES		NO	
If NO, document observation or check appropriate box. ☐ Cleaning in process.					
11	Waste removed around baling areas	YES		NO	
If NO, document observation or check appropriate box. ☐ Cleaning in process.					
12	Waste removed around ADC load-out area	YES		NO	
If NO, document observation or check appropriate box. ☐ Cleaning in process.					
13	Close at least 2 of the 3 MRF receiving floor doors at the end of the day	YES		NO	
If NO, document observation or check appropriate box. ☐ Confirmed via CCTV cameras.					
14	Sweep asphalt areas around the MRF	YES		NO	
If NO, document observation or check appropriate box. ☐ Cleaning in process.					

Site-Wide Odor Plan- Operational Best Management Practices Checklist

Compost Facility

1	Plan and perform operations consistent with weather predictions and SWOP Section 8F	YES		NO	
NOTE: Based on reasonable observations does it appear operations were planned consistent with the daily odor risk forecast? If NO, document observation.					
2	Perform initial grinding of greenwaste within 7 days of receipt	YES		NO	
NOTE: May not be able to be measured. Based on reasonable observations does it appear materials have been processed within the required timeframe? If NO, document observation.					
3	Perform initial grinding of highly odiferous load of greenwaste within 48 hours of receipt	YES		NO	
NOTE: May not be able to be measured. Based on reasonable observations does it appear materials have been processed within the required timeframe?					
4	Introduce ground greenwaste to windrows or ASP within 14 days of grinding	YES		NO	
NOTE: May not be able to be measured. Based on reasonable observations does it appear materials have been introduced to windrows or ASP within the required timeframe? If NO, document observation.					
5	Cover foodwaste and other compostable materials with ground greenwaste within 2 hrs	YES		NO	
NOTE: May not be able to be measured. Based on reasonable observations does it appear materials have been covered within the required timeframe?					
6	Move applicable materials to ASP and begin introducing air within 7 days	YES		NO	
NOTE: May not be able to be measured. Based on reasonable observations does it appear air was introduced within the required timeframe? If NO, document observation.					
7	Only windrow compost greenwaste	YES		NO	
If NO, document observation.					
8	Biofilter placed over ASP within 24 hours of a section reaching maximum height	YES		NO	
If NO, document observation.					
9	ASP air system connected and operational	YES		NO	
If NO, document observation.					
10	Maintain materials in windrows or ASP for minimum prescribed timeframes	YES		NO	
Will require documentation from MRF Operator.					
11	Maintain materials in curing piles for minimum prescribed timeframes	YES		NO	
Will require documentation from MRF Operator.					
12	Wash down ASP surface areas daily	YES		NO	
If NO, document observation.					
13	North compost pond aeration system operating	YES		NO	
If NO, document observation or check appropriate box. ☐ Insufficient water volume ☐ DO reading ≥ 1 mg/l reading					
14	South compost pond aeration system operating	YES		NO	
If NO, document observation or check appropriate box. ☐ Insufficient water volume ☐ DO reading ≥ 1 mg/l reading					

Site-Wide Odor Plan- Operational Best Management Practices Checklist

Landfill

1	Minimize size of working face necessary to maintain safety	YES		NO	
NOTE: Based on reasonable observations does it appear the working face is as small as practical and safe? If NO, document observation.					
2	Minimize open air exposure time of wastes	YES		NO	
NOTE: Are newer wastes being placed over older wastes on a consistent basis? If NO, document observation.					
3	Bury sludge and other highly odiferous loads immediately upon receipt	YES		NO	
If NO, document observation.					
4	Begin placing daily cover immediately following last load of waste	YES		NO	
If NO, document observation.					If NO, document observation.
5	Utilize soil, MRF and C&D fines as specified in SWOP	YES		NO	
If NO, document observation.					

APPENDIX B:
2015 ODOR STUDY

Western Placer Waste Management Authority
Roseville, CA

Odor Assessment

Report

Revision 4

November 2015

Prepared by

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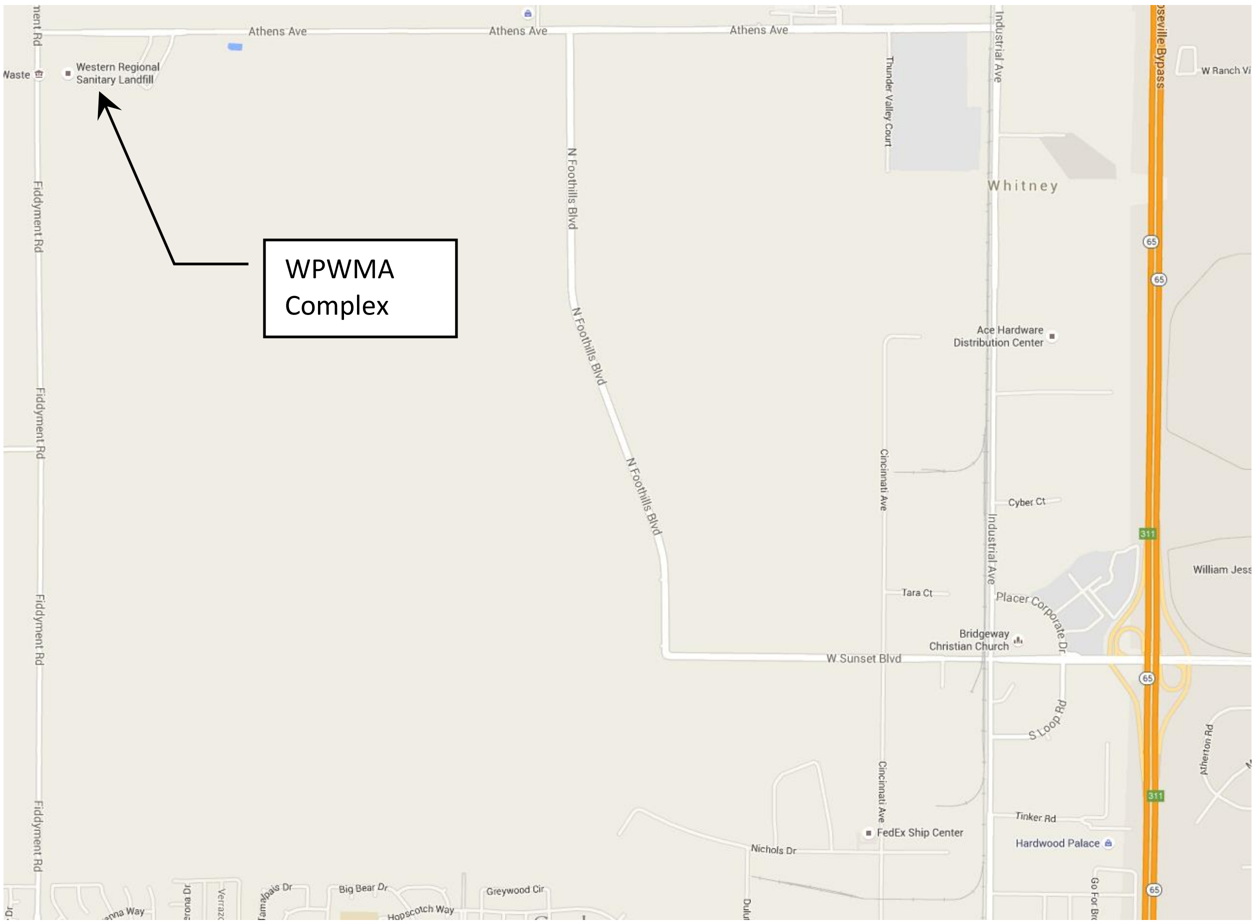
1. Data Validation Technical Memorandum
    a. Field Data Sheets
    b. Chain of Custody Sheets
    c. Laboratory Reports
2. Sampling Plan

1. Introduction

Site Location

The test site, Western Placer Waste Management Authority (WPWMA) facility is located in Roseville, California. The site includes a municipal solid waste (MSW) landfill, a Materials Recovery Facility (MRF), and a green waste composting facility.

Figure 1.1 –WPWMA Location Map.



Objectives

The project objective of the Odor Assessment was to quantify surface odor emissions from the active landfill face, inactive landfill surface, the MRF, and the green waste compost facility. These sources are considered all major odor emission sources from this facility and the report for these sources is intended to be comprehensive. The primary specific objectives included:

1) Perform an odor source assessment/evaluation of key odor emitting sources on site,
2) Generate odor emission factors for odor sources,

3) Provide data that can be used to enhance the existing Odowatch® monitoring system for the purpose of providing more representative and accurate predictions (real-time) of off-site odor impacts to the surrounding areas, and
4) Coordinate with Odotech to integrate the resulting data into the WPWMA's Odowatch® monitoring system.

Scope

The project assessment includes four tasks:

1. quantifying the odor emissions from the landfill active face, including recently covered refuse;
2. quantifying the odor emissions from the landfill inactive surface;
3. quantifying the odor emissions from the MRF; and
4. quantifying the odor emissions from the windrow compost facility.

A summary of the scope per task is provided in Table 1-1. Samples were collected following the methodology and protocols identified in the Sampling Plan.

Sampling and analysis included the following methods.

- **Direct Odor Flux Chamber Measurements-** Odor samples were collected using a flux chamber conforming to EPA-approved design parameters and sampling methodologies (see Ref 1). Odorous air samples were collected and shipped overnight express, for next day laboratory analysis. Screening was also performed using a real-time instrument for hydrogen sulfide (H2S) and colorimetric detector tubes for ammonia.

- **Olfactometry** – Odor concentration by olfactometry (ASTM E-679, see Ref 2) using Odor Science and Engineering, Inc. odor panel analyses was completed to determine the magnitude of odor emissions from each source, to determine the relative offensiveness of odors from each source, and to provide input data for dispersion modeling. Odor panel analysis included odor concentrations expressed as dilutions to threshold (D/T), odor offensiveness as measured by hedonic tone, and odor character descriptors.

- **Advective Flow Assessment-** Advective flow from appropriate sources (e.g., compost piles) was determined using a trace gas (10% helium) in the flux chamber sweep air by collecting gas samples for analysis of residual helium by ASTM Method D-1945.

Table 1-1. Summary of Source Testing at WPWMA (Active LF working face, Inactive LF surfaces, MRF, and Green waste compost facility).

Test Condition	Flux Tests	Comments
Landfill Active Working Face and Interim Cover	12	Samples were collected over several days representing a spectrum of municipal waste and different ages of daily cover (no gas well installation).
Inactive Landfill Surfaces	20	One grid cell for the 'zero-detect' area and four grid cells for the methane detected area; four flux test per grid cell.
MRF	12	Source testing on waste piles, inside and outside of structure over several days.
Windrow Compost Site	40	Testing of green waste tipping pile, chop pile, 5-to-6 days in the compost cycle, cure pile, and finish pile.
Compost Leachate Pond	1	
Blank Test	6	Minimum 5%
Replicate Test	6	Minimum 5%
TOTAL SAMPLES	97	

2. Executive Summary

Key Findings and Recommendations

1. The composting operation shows very low odor for a green waste composting process as compared to industry average. Consequently, there are not many alternatives that for the classic windrow composting operations to improve site emissions from composting. However, odor from the composting processes dominates the odor from the site (see pie chart). In order to significantly reduce odor from composting, a new technology must be applied such as aerated static pile (ASP) composting. Recent test data have shown ASP technologies can reduce odor emissions by at least 80%, and employing one of several ASP technologies would likely decrease site odor by over 50%. The second largest composting source, the chop pile, should also see and emissions reduction if the size of the pile were reduced. Given that the compost cycle is greatly compressed with the ASP Technology, a proportional reduction in this source is also expected to be gained since there will be a much greater demand for chopped green waste in the process.

2. The materials recycling facility (MRF) shows low odor as compared to the industry standard for refuse sorting and processing. The contribution to site odor from the MRF is relatively minor. But, since the MRF is very close to the site border, operational practices (closing doors) that would further reduce odors from the MRF should be considered since odor sources nearest to the property fence line have a relatively greater effect on odors detected off site.

3. The active face of the landfill shows odors that are typical of municipal landfills, however two waste streams tested show relatively high odor in this small area of the site. The land filling of municipal wastewater biosolids has a very high contribution to the odor from the active face. In addition, the alternative daily cover (ADC) from the MRF also has high odor compared to the municipal refuse. Options for controlling odors from these sources, as well as best operational management practice, should reduce odors from the active face. Engineering options may need to be considered for reducing the odors from the biosolids such as temporary cover applications.

4. The inactive landfill was tested using the screening data for methane from the regulatory required monitoring program. High variability was observed in the in these data. This was likely related to operational changes experienced in the field related to the energy plant operations. In addition, some of the inactive landfill areas showed about twice normal odor emissions on a surface area basis. This is also likely related to the collection of landfill gas as controlled by the energy plant on site. It is important that the landfill gas collection system be operated in such a fashion that the fugitive emissions from the inactive, covered landfill (which is a huge surface area of the site) results in the minimum fugitive landfill gas emission. Note that it is likely that the conditions experienced during the testing on site reflects an upset condition, and it is recommended that a retest of the inactive landfill be conducted in order to generate more representative odor emissions from the inactive landfill surfaces.

Program Summary

All sampling took place during the week of August 17, 2015 and the following Monday, August 24, 2015. All sampling was completed per the attached Sampling Plan. All data taken is provided in the attached Data Validation Technical Memorandum.

The overall contribution to total site odor for each of the site processes is shown in Figure 2.1. Composting and the inactive landfill surfaces dominate the site odor, with composting being the largest contributor to site odor.

Figure 2.1 Overall Contribution to Site Odor by Process.

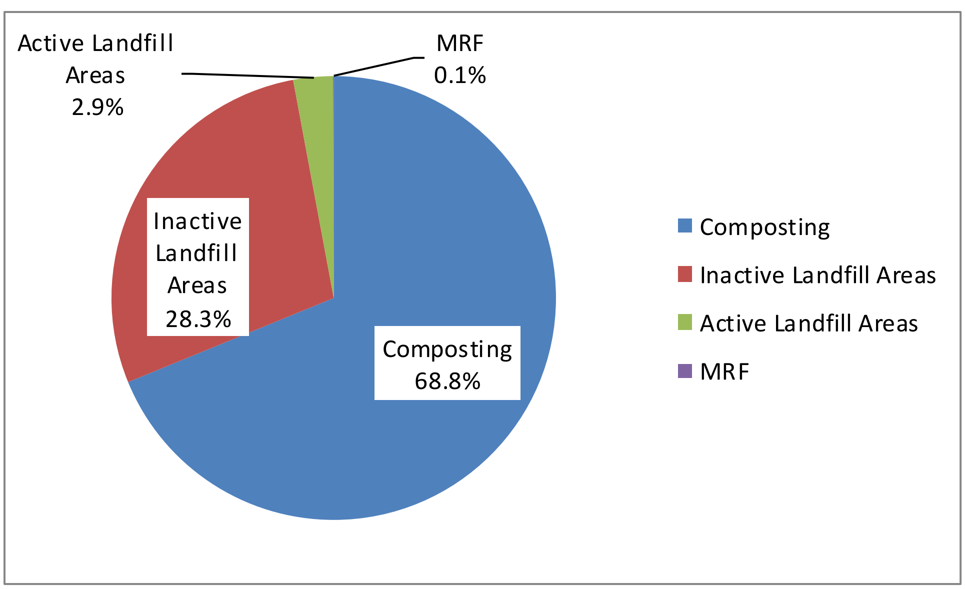


Table 2.1 presents a more detailed summary of sampling results. The windrow composting was the largest odor source on site. However, the composting operation was the lowest emitting composting source on a ton/day size basis, than any compost facility that we have recently tested (we have tested five similar facilities for odor in the last five years). This means that it is unlikely that any process changes to the windrow composting technology could lower the odor emission rate.

The next highest odor source on site are the inactive surfaces at the landfill. The estimate of the inactive surface emissions is driven predominantly by Grid Cell #39, that was anticipated to be low based on previous CARB screening, but turned out to be quite high. This grid cell may not be representative of all the low emitting cells. If not, then the estimate of the inactive landfill surfaces could be biased high by as much as a factor of 3. If Grid Cell #39 had the expected emissions, then the overall inactive surface emission value would be reduced to 700,000 DT/min instead of the measured 2,100,000 DT/min.

The remaining sources were very low, perhaps inconsequential. There were noticeable odors, from these sources, directly adjacent to these sources, but the odor from these sources was, in general, not detectable past the property lines.

The units in Table 2.1 are in DT/min. One DT/min is an odor emission rate approximately equal to 1 μg/min of hydrogen sulfide. If the site were vacant land, it would have an approximate emission rate of 650,000 DT/min.

Table 2.1 Summary of Sampling Results.

Source	**Odor Emissions (DT/min)**
Compost Tipping Pile	21,654
Compost Chop Pile	1,604,055
Compost Windrows	3,500,295
Compost Product	1,013
Ponds	31,126
Total	5,127,017
MRF Non-recycle Material	2,860
MRF Recycle Material	944
MRF ADC	199
Total	4,003
Open Face MSW	82,872
Open Face Biosolids	87,065
ADC on Landfill	33,249
Soil Cover on Landfll	10,963
Total	214,150
Inactive Landfill	2,105,365
Total Odor	7,481,661

3. Background on Odor Assessment Technology

Odors can be measured using both field and laboratory instruments. In the field, a scentometer is used (see Photo 3.1). This instrument is routinely used for odor regulation enforcement and can reliably measure odors down to 7.5 dilutions to threshold (DT). This means that the odor would require 7.5 cubic feet of odor free air to every 1 cubic foot of odorous air to render the result not-detectable by the average person.

Odor can also be measured in the laboratory using an olfactometer. A field sample is taken in a Tedlar® bag and shipped to a laboratory for analysis. The same units of measurement, dilutions to threshold (DT) are used for this. Photos 3.2 and 3.3 show the laboratory olfactometer and the odor bag sample.

When an odor sample is taken from a USPEA flux chamber (see photo 3.4) the odor source strength for a facility can be quantified. After a source has been quantified, the offsite impacts can be predicted using USEPA-approved dispersion models.

For this project, odor assessment included flux chamber testing, collection of gas samples in Tedlar bags, and off site analysis by the laboratory. Rather than ambient air testing using a scentometer, off site odor will be predicted by dispersion modeling. The advantage to this assessment approach is that the source assessment using the flux chamber provided valuable on site source apportionment data that is useful for diagnosing and remediating process odors, and these flux data are also used to develop odor emission factors which provide quantitative input to dispersion modeling that can be used to describe off site odors.

Photo 3.1 A Nasal Ranger® Scentometer.

Photo 3.2 Laboratory Olfactometer

Photo 3.3 Odor Sample in Tedlar® Bag

Photo 3.4 USEPA Flux Chamber

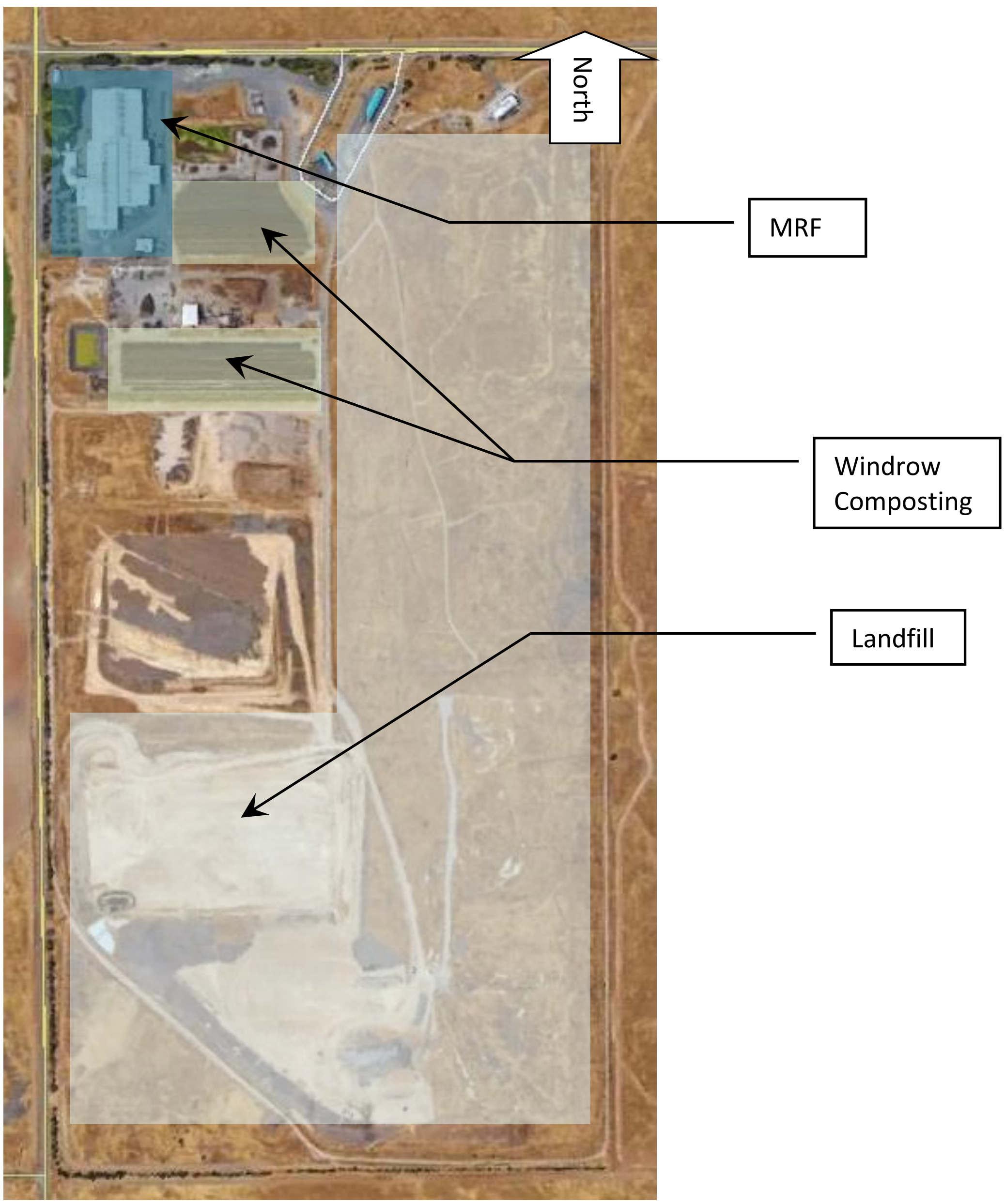
4. Odor Sampling Results

All sampling took place during the week of August 17, 2015 and the following Monday, August 24, 2015. All sampling was completed per the attached Sampling Plan. All data taken is provided in the attached Data Validation Technical Memorandum.

Process Description

The WPWMA Complex includes a Materials Recovery Facility (MRF), windrow composting, and a landfill. The location of these activities is shown in Figure 4.1. The site is approximately one-mile-long and 0.5 mile wide.

Figure 4.1 – WPWMA Process Locations.



Landfill Inactive Surfaces

Sample locations were selected based on the analysis of the annual/quarterly landfill gas screening data for methane emissions (integrated grid cell methane concentration data) that has been collected per the California Air Resources Board protocol (**Implementation Guidance Document for The Regulation To Reduce Methane Emissions From Municipal Solid Waste Landfills**). Methane screening data from 2012 to current was used as a surrogate for odor emissions. The CARB protocol is based on dividing the landfill into 50,000 ft^2 grid cells. Based on the analysis of the quarterly methane monitoring data, for the grid cells that are accessible and included in survey, all regularly monitored site grid cells have been placed into three groups, representing the highest emitting cells, lowest emitting cells, and the cells in between (see Table 4.1). Within these three groups, the grid cells have been ranked based on integrated methane grid data as shown, and one grid cell per group has been selected, on a methane emitted mass basis, to represent the group. The grid cell that represented the average methane emission for the group was selected as the primary target for sampling (see Table 4.1 for calculation). If that target grid cell was unavailable for testing, or not representative on the day of the test, then the grid cell closest to the average was selected.

In addition, a grid cell with no methane detection was selected to represent the 36 grid cells were no methane has been detected.

The technical approach for assessing the inactive landfill surface where historic methane emissions are used to represent current methane and odor emissions as a surrogate for odor, assumes that the operation of the landfill gas collection system is similar to the time of testing. Since operational changes in the landfill gas collection system were experienced prior to testing, it is likely that variation in landfill gas emissions compared to historic landfill operations resulted in additional variability in methane and odor emissions. This does not weaken the analysis per se, but it does add to variability in the measured data set and assumptions used in the calculation of inactive landfill gas odor emissions.

Although we had back-up grid cells selected for each test cell identified by the process described above, as shown in the data, divergence was found, in particular, with grid cell 39. The results found with this cell showed that the odor flux was actually the second highest cell tested where the historic methane data placed it in the low category of grid cells. Unfortunately, since the screening data collected for methane was also highly variable during the testing, there was no clear indication that an alternative grid cell should be used to represent this category. Regardless, the measured odor flux data were used to generate representative odor flux from the inactive landfill surface accounting for the observed variability in the data.

A summary of the tested grid cells is shown in Figure 4.2 and is given below:

Potential High Range Emitting: 129
Potential Mid-Range Emitting: 106, 104
Potential Low Range Emitting: 39
Zero-detect: 52

Figure 4.2 Sampled Grid Cells.

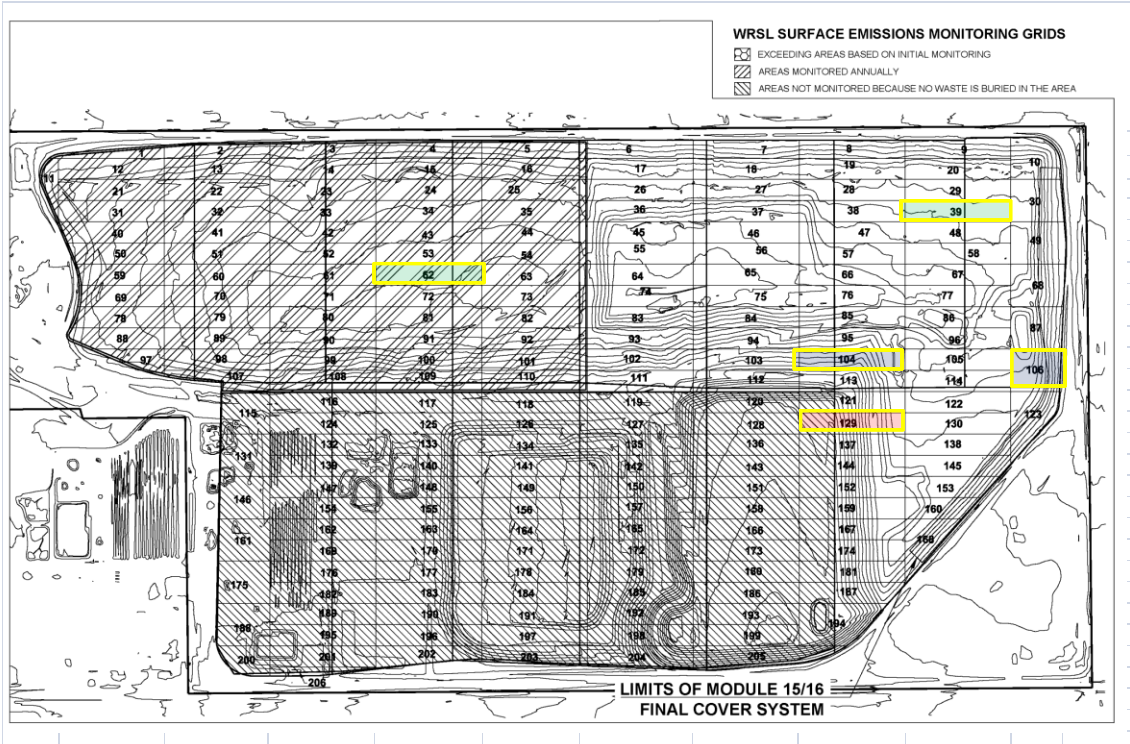


Table 4.1 Summary of Landfill Gas Survey Data Since 2012 (Sampled Cells Highlighted).

Index	Cell#	Average	StDev	Cumulative Sum	% of Total
1	123	39.10	28.27	39.10	5.8%
2	130	36.31	40.67	75.41	11.1%
3	145	35.39	38.60	110.80	16.4%
4	129	33.14	42.00	143.94	21.3%
5	138	30.83	34.67	174.77	25.8%
6	121	30.00	28.48	204.77	30.3%
7	122	28.47	21.34	233.24	34.5%
8	194	26.06	26.34	259.30	38.3%
9	113	24.06	24.55	283.36	41.9%
10	106	22.63	11.94	305.98	45.2%
11	114	20.43	9.71	326.41	48.2%
12	104	19.82	15.61	346.23	51.2%
13	153	19.57	21.41	365.81	54.1%
14	96	16.36	15.62	382.17	56.5%
15	137	15.07	13.52	397.24	58.7%
16	87	14.73	11.81	411.97	60.9%
17	144	14.73	14.42	426.70	63.1%
18	105	12.71	5.59	439.42	64.9%
19	152	12.00	11.53	451.42	66.7%
20	160	11.33	14.76	462.75	68.4%
21	159	11.25	15.73	474.00	70.1%
22	95	10.85	8.63	484.85	71.7%
23	174	8.92	10.65	493.76	73.0%
24	167	8.83	7.71	502.60	74.3%
25	168	8.18	7.72	510.78	75.5%
26	48	7.00	6.11	517.78	76.5%
27	58	6.77	7.36	524.55	77.5%
28	77	6.23	6.26	530.78	78.4%
29	86	6.17	6.13	536.94	79.4%
30	68	6.00	4.69	542.94	80.2%
31	181	6.00	6.03	548.94	81.1%
32	9	5.62	4.82	554.56	82.0%
33	39	5.62	4.74	560.17	82.8%
34	67	5.46	5.70	565.64	83.6%
35	20	4.62	5.08	570.25	84.3%
36	8	4.43	9.88	574.68	84.9%
37	29	4.23	5.85	578.91	85.6%
38	187	4.00	4.84	582.91	86.2%
39	84	3.77	6.23	586.68	86.7%
40	85	3.69	3.61	590.37	87.3%
41	103	3.62	3.80	593.99	87.8%
42	111	3.54	4.22	597.53	88.3%
43	102	3.15	4.54	600.68	88.8%
44	112	3.15	4.14	603.83	89.2%
45	49	3.00	3.00	606.83	89.7%
46	66	2.92	4.21	609.76	90.1%
47	10	2.77	3.00	612.53	90.5%
48	37	2.77	4.19	615.30	90.9%
49	94	2.69	3.30	617.99	91.3%
50	47	2.62	3.50	620.60	91.7%
51	46	2.54	3.02	623.14	92.1%
52	93	2.54	4.89	625.68	92.5%
53	19	2.46	4.07	628.14	92.8%
54	83	2.46	5.95	630.60	93.2%
55	92	2.33	4.04	632.94	93.5%
56	76	2.15	2.76	635.09	93.9%
57	57	2.08	2.93	637.17	94.2%
58	38	2.00	2.83	639.17	94.5%
59	78	2.00	3.46	641.17	94.8%
60	88	2.00	3.46	643.17	95.1%
61	89	2.00	3.46	645.17	95.4%
62	90	2.00	3.46	647.17	95.6%
63	91	2.00	3.46	649.17	95.9%
64	30	1.92	2.72	651.09	96.2%
65	55	1.62	2.02	652.71	96.5%
66	56	1.54	2.54	654.24	96.7%
67	28	1.31	2.46	655.55	96.9%
68	65	1.23	2.45	656.78	97.1%
69	6	1.15	1.46	657.94	97.2%
70	27	1.15	2.73	659.09	97.4%
71	79	1.00	1.73	660.09	97.6%
72	97	1.00	1.73	661.09	97.7%
73	107	1.00	1.73	662.09	97.9%
74	109	1.00	1.73	663.09	98.0%
75	110	1.00	1.73	664.09	98.2%
76	7	0.92	1.38	665.01	98.3%
77	75	0.92	1.32	665.94	98.4%
78	45	0.85	1.57	666.78	98.5%
79	64	0.85	1.72	667.63	98.7%
80	36	0.77	1.17	668.40	98.8%
81	17	0.69	1.70	669.09	98.9%
82	26	0.69	1.49	669.78	99.0%
83	74	0.69	0.85	670.48	99.1%
84	42	0.67	1.15	671.14	99.2%
85	98	0.67	1.15	671.81	99.3%
86	99	0.67	1.15	672.48	99.4%
87	108	0.67	1.15	673.14	99.5%
88	18	0.46	0.78	673.60	99.6%
89	3	0.33	0.58	673.94	99.6%
90	11	0.33	0.58	674.27	99.7%
91	12	0.33	0.58	674.60	99.7%
92	21	0.33	0.58	674.94	99.8%
93	50	0.33	0.58	675.27	99.8%
94	51	0.33	0.58	675.60	99.9%
95	53	0.33	0.58	675.94	99.9%
96	100	0.33	0.58	676.27	100.0%
97	101	0.33	0.58	676.60	100.0%
98	1	0.00	0.00	676.60	100.0%
99	2	0.00	0.00	676.60	100.0%
100	4	0.00	0.00	676.60	100.0%
101	5	0.00	0.00	676.60	100.0%
102	13	0.00	0.00	676.60	100.0%
103	14	0.00	0.00	676.60	100.0%
104	15	0.00	0.00	676.60	100.0%
105	16	0.00	0.00	676.60	100.0%
106	22	0.00	0.00	676.60	100.0%
107	23	0.00	0.00	676.60	100.0%
108	24	0.00	0.00	676.60	100.0%
109	25	0.00	0.00	676.60	100.0%
110	31	0.00	0.00	676.60	100.0%
111	32	0.00	0.00	676.60	100.0%
112	33	0.00	0.00	676.60	100.0%
113	34	0.00	0.00	676.60	100.0%
114	35	0.00	0.00	676.60	100.0%
115	40	0.00	0.00	676.60	100.0%
116	41	0.00	0.00	676.60	100.0%
117	43	0.00	0.00	676.60	100.0%
118	44	0.00	0.00	676.60	100.0%
119	52	0.00	0.00	676.60	100.0%
120	54	0.00	0.00	676.60	100.0%
121	59	0.00	0.00	676.60	100.0%
122	60	0.00	0.00	676.60	100.0%
123	61	0.00	0.00	676.60	100.0%
124	62	0.00	0.00	676.60	100.0%
125	63	0.00	0.00	676.60	100.0%
126	69	0.00	0.00	676.60	100.0%
127	70	0.00	0.00	676.60	100.0%
128	71	0.00	0.00	676.60	100.0%
129	72	0.00	0.00	676.60	100.0%
130	73	0.00	0.00	676.60	100.0%
131	80	0.00	0.00	676.60	100.0%
132	81	0.00	0.00	676.60	100.0%
133	82	0.00	0.00	676.60	100.0%

Within each grid cell, the field screening instantaneous methane data on the day prior to, and the day of sampling, allocated the area in each grid cell as low, middle, and high. Table 4.2 shows the portion of area in these ranges for each grid cell. For example, for Grid Cell #104, 85% of the total grid cell area (50,000 ft2) was represented by the low instantaneous methane screening range.

Table 4.2 Portion of each Grid Cell Sampled Represented by the Methane Instantaneous Screening Ranges (internal spatial representation of grid cells tested).

Cell Category	Grid No.	Low	Mid	High	Highest
Non-detect Grid Cells	52	25.0%	25.0%	25.0%	25.000%
Low Grid Cells	39	75.0%	20.0%	10.0%	0.003%
Mid Grid Cells	106	85.0%	10.0%	5.0%	0.003%
Mid Grid Cells	104	50.0%	25.0%	25.0%	0.003%
High Grid Cells	129	40.0%	40.0%	20.0%	0.003%

Finally, Table 4.3 presents the measured odor flux for each of these regions in each of the grid cells.

Table 4.3 Sampling Results for Grid Cells (Odor Flux, DT/min-m2).

		Inter Cell Range Represented			
Cell Category	**Grid No.**	**Low**	**Mid**	**High**	**Highest**
Non-detect Grid Cells	52	0.50	0.50	0.62	0.62
Low Grid Cells	39	5.27	0.42	6.27	6.81
Mid Grid Cells	106	0.35	0.42	13.62	405.08
Mid Grid Cells	104	2.04	2.42	1.23	0.88
High Grid Cells	129	0.50	1.23	29.19	163.00

Note that in Table 4.3, the highest reading only represents a single point in the 50,000 ft2 grid cell and is therefore inconsequential to average grid emissions. The highest point was measured just to determine if there was odor breakthrough at any point on the grid surface.

Landfill Active Working Face

Five samples were taken from the active face (taken on two separate days) and one sample was taken from deposited biosolids. The sample values are presented in Table 4.4. The five measurements taken on two different days represent a normal variability of raw MSW on an active face. This source is typically highly variable, and the range of odor emissions observed on two different days and at five test locations is common to other active landfill surfaces tested at other sites.

The biosolids odor flux rate was about 50 times higher than the average MSW odor flux rate. This material, as demonstrated by the measured odor flux, is a significant contributor of active face odor emissions making the amount of this material or the surface area of this material disposed of at the active face of the landfill and key source of odor emissions. However, the active face as a source has been shown to contribute to only about 3% of the total site odor.

Table 4.4 Measured Odor Flux Values from the Active Working Face.

Source	Odor Flux DT/m2-min
Active Face	14.85
Active Face	22.88
Active Face	6.81
Active Face	6.81
Active Face	126.00
Average	35.47
Biosolids	1,863

Materials Recovery Facility (MRF)

Samples were taken from the various segregated materials in the MRF. Table 4.5 presents the sampling results. Based on these results, for MRF site odor analysis, all the combined solid waste values were averaged together and all the sorted recovered material were averaged together. The alternative daily cover was treated separately.

Table 4.5. Sampling Results for the MRF Odor Sources.

Source	Odor Flux (DT/min-m2)
Raw Commerical SW	4.81
Raw Commerical SW	4.08
Average	4.44
Raw Residential SW	4.08
Raw Residential SW	1.23
Raw Residential SW	1.58
Raw Residential SW	3.42
Average	2.58
Post-Sort SW	3.15
Post-Sort SW	3.15
Average	3.15
Plastics	0.88
Plastics	1.04
Average	0.96
Cardboard	1.23
Cardboard	0.88
Average	1.06
Alternative Daily Cover Material	6.81
Alternative Daily Cover Material	7.42
Average	7.12

Green Waste Composting Facility

Samples were taken from the feedstock pile, from active windrows at various stages (times) during the active composting process and from the finished product storage piles. The results are summarized in Table 4.6. Note the extreme variability of the chopped feedstock pile and the early compost cycle. In addition, mixing the compost rows resulted in the immediate lowering of emissions. Based on our experience emissions can either increase, decrease, or remain constant during mixing events. There currently is no hypothesis as to why the emissions decreased at this location. Our only comment is that highly aerobic compost material emissions are not very much affected by mixing. It is possible that the added aeration and the release of any gases in the interstitial spaces within the pile could result in lowering of the emissions after mixing.

Table 4.6. Summary of Compost Facility Sampling Results.

SOURCE	DAY	Odor D/T	Helium (%)	Helium Dilution	Total Flow (lpm)	Total Flow (m3/min)	Odor Flux DT/m2,min-1
Tipping Pile	Newer	30	9.91	1.304	38	0.038	8.8
Tipping Pile	Newer	12	9.91	0.638	78	0.078	7.2
Tipping Pile	Older	13	9.86	0.688	72	0.072	7.2
Tipping Pile	Older	58	9.86	0.686	72	0.072	32.1
Chopped Feedstock Pile	Newer	210	9.91	0.73	68	0.068	110
Chopped Feedstock Pile	Newer	354	9.91	0.8	62	0.062	169
Chopped Feedstock Pile	Older	11,615	9.86	0.775	64	0.064	5,684
Chopped Feedstock Pile	Older	163	9.86	1.024	48	0.048	60
Pre-mix Compost Windrow	0	638	9.89	0.366	135	0.135	663
Pre-mix Compost Windrow	0	82	9.89	0.816	61	0.061	38
Compost Windrow	1	35	9.86	0.874	56	0.056	15
Compost Windrow	1	45	9.86	0.967	51	0.051	18
Compost Windrow	1	23	9.91	0.696	71	0.071	13
Compost Windrow	1	2,990	9.91	0.85	58	0.058	1,341
						Average	347
Compost Windrow	5	979	9.89	0.426	116	0.116	874
Compost Windrow	5	126	9.89	0.272	182	0.182	176
Compost Windrow	5	4,602	10.01	0.642	78	0.078	2,760
Compost Windrow	5	250	10.01	0.409	122	0.122	235
						Average	1,011
Post Mix Windrow	5, T=0	1,553	9.89	0.893	55	0.055	662
Post Mix Windrow	5, T=4 hr	1,066	9.89	1.332	37	0.037	304
Compost Windrow	15	9	9.89	1.437	34	0.034	2.4
Compost Windrow	15	693	9.89	1.684	29	0.029	156.5
Compost Windrow	15	38	10.01	2.437	21	0.021	6.0
						Average	55.0
Compost Windrow	32	137	9.89	2.022	24	0.024	25.8
Compost Windrow	32	23	9.86	1.105	45	0.045	7.9
Compost Windrow	32	32	9.89	2.232	22	0.022	5.5
Compost Windrow	32	41	9.86	2.979	17	0.017	5.2
						Average	11.1
Compost Windrow	81	15	9.91	1.531	32	0.032	3.7
Compost Windrow	81	11	9.91	2.355	21	0.021	1.8
Compost Windrow	81	16	9.86	2.06	24	0.024	2.9
Compost Windrow	81	29	9.86	2.089	24	0.024	5.3
						Average	3.4
Compost Windrow	98	32	10.01	1.465	34	0.034	8.4
Compost Windrow	98	69	10.01	1.494	34	0.034	17.8
Compost Windrow	98	32	9.89	2.118	23	0.023	5.7
Compost Windrow	98	35	9.89	1.385	36	0.036	9.6
						Average	10.4
Finished Product	Newer	23	9.86	1.761	28	0.028	5.0
Finished Product	Newer	23	9.86	1.801	27	0.027	4.8
Finished Product	Older	38	9.89	3.983	12	0.012	3.6
Finished Product	Older	35	9.89	3.399	15	0.015	3.9
						Average	4.3
South Pond	As is	82	NA	NA	5	0.005	3.2

5. Data Analysis

In general, total process emissions are calculated by multiplying the measured odor flux value by the area the flux sample represented. However, in this section, the specific calculation methodology will be discussed in detail.

Inactive Landfill Surfaces

Each sampled grid cell was screened to determine the area to be represented (Table 4.2) and the measured flux values for each cell category (Table 4.3). Table 5.1 shows the total odor emissions calculated in this manner for each measured cell. Each cell is nominally 4,673 m^2. For example Non-detect grid low = 4,673 m^2 x 0.5 DT/min*m^2 x 25% = 584 DT/min

Table 5.1 Calculated total emissions (DT/min) for each measured cell.

Cell Category	Grid No.	Low	Mid	High	Highest	Total
Non-detect Grid Cells	52	584	584	719	719	2,606
Low Grid Cells	39	18,467	395	2,930	1	21,793
Mid Grid Cells	106	1,375	198	3,181	57	4,811
Mid Grid Cells	104	4,763	2,831	1,438	0	9,031
Highest Grid Cells	129	935	2,301	27,283	23	30,540

Then, based on Table 5.1, the number of cells that each tested cell represented were calculated. The total emissions from landfill inactive surfaces are the sum of all these individual emission cell ranges. Note that the second highest emission category was the low range grid cell. The sampling results for this cell (39) were not what were anticipated based on the screening assessment. The anticipated results would produce an emission estimate that would be dramatically lower than the measured results. It is possible that temporary gas system transients may have affected these results. The gas system was shut down due to power outage during the week of testing.

Table 5.2 Calculated total Emissions from Landfill Inactive Surfaces.

Cell Category	Avg Flux (DT/min-m2)	Emissions (DT/min)	# of Cells	Total Emissions (DT/min)
Non-detect Grid Cells	0.56	2,606	36	93,817
Low Grid Cells	4.66	21,793	79	1,721,634
Mid Grid Cells	1.48	6,921	11	76,131
Highest Grid Cells	6.54	30,540	7	213,783
				2,105,365

The anticipated emission rate for the low grid cells (based on the analysis of the CARB screening data) would be about 4,000 DT/min. If this were true, the total emissions would be reduced to about 700,000 DT/min instead of the 2,100,000 DT/min

Landfill Active Working Face

The emissions from the landfill working face area were calculated by using average areas multiplied the average measured flux values. Table 5.3 presents a summary of these calculations. Note that even though the biosolids on the active face is a very small surface area, because their unit flux rate is significantly larger than that of the other solid wastes being buried, the resulting emissions from the biosolids are significant.

Table 5.3 Summary of Landfill Active Working Face Odor Emissions.

	Odor Flux	Area		Emissions
Source	**(DT/min-m2)**	**(ft2)**	**(m2)**	**(DT/min)**
Open Face MSW	35.47	25,000	2,336	82,872
Open Face Biosolids	1,863	500	47	87,065
ADC on Landfill	7.12	50,000	4,673	33,249
Soil Cover on Landfll	0.59	200,000	18,692	10,963
Total				214,150

Materials Recovery Facility (MRF)

Table 5.4 shows the emission calculations for the MRF. These emissions are quite low as compared to other solid waste sorting facilities. As they are now, they represent an insignificant odor source compared to the other process odor sources on site.

Table 5.4 Summary of MRF Odor Emissions.

	Odor Flux	Area		Emissions
Source	**(DT/min-m2)**	**(ft2)**	**(m2)**	**(DT/min)**
MRF Non-recycle Material	3.19	9,600	897	2,860
MRF Recycle Material	1.01	10,000	935	944
MRF ADC	7.12	300	28	199
Total				4,003

Green Waste Composting Facility

Computing the emissions from the windrow composting first involve calculating and averaging the flux rate for the windrow composting process. The process is first simulated by interpolating the measured process life cycle or 'days' to estimate the emissions for the process days that were not measured. For example, of the 90 to 100 days it takes the compost to mature, six of those days were sampled with the remaining day's emissions were estimated by interpolation. Figure 5.1 shows this interpolated emissions curve. The data represented by this curve was integrated to determine that the average compost emission rate at 94.5 DT/min-m^2 for the windrow process life cycle. Therefore, the average emissions, for each compost windrow, over the compost life cycle, is 94.5 DT/min-m^2.

Note that the vast majority of the emissions occur early in the compost cycle.

Based on the dimensions of the compost windrow, we can calculate the fraction of compost surface area per m^2 of pad area. This calculation shows that the compost surface area is 96.1% of the pad area.

Using these data, Table 5.5 was generated showing the total emissions from the composting operations. The emissions are dominated by the windrows, with a significant contribution from the chop piles.

The facility processes about 50,008 tons per year. This provides a compost emission factor of 25,548 DT/min per ton/day. The industry average (based on limited data) is about 200,000 DT/min per ton/day. This means that this facility is about 8 times lower in odor production than the industry average. This is the lowest odor emission factor for any windrow compost facility that we tested.

Figure 5.1 Interpolated Windrow Compost Emission Curve.

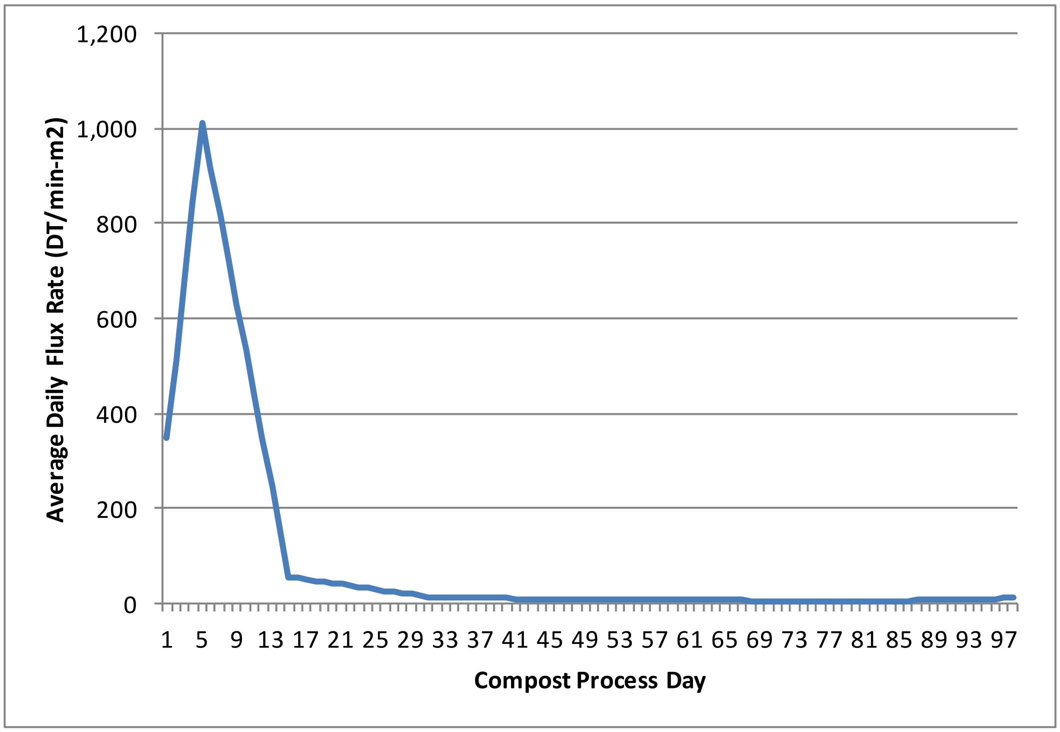


Table 5.5. Summary of Compost Emissions.

	Odor Flux	Area		Emissions
Source	**(DT/min-m2)**	**(ft2)**	**(m2)**	**(DT/min)**
Compost Tipping Pile	14	16,800	1,570	21,654
Compost Chop Pile	1,506	11,400	1,065	1,604,055
Compost Windrows	94	396,346	37,042	3,500,295
Compost Product	4	2,500	234	1,013
Ponds	3.15	105,600	9,869	31,126
Total				5,158,143

APPENDIX C:
COMPOST ODOR IMPACT MINIMIZATION PLAN

The OIMP is subject to revision pursuant to the Solid Waste Facility Permit

Western Placer Waste Management Authority

Odor Impact Minimization Plan

Prepared by:

Integrated Waste Management Consulting, LLC
19375 Lake City Road, Nevada City, CA 95959

June 2008

Revised by Jacobs Engineering Group Inc. for WPWMA:

July 2016
October 2020

Revised by WPWMA:
June 2023

Western Placer Waste Management Authority Compost Facility

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Client Name:	Western Placer Waste Management Authority
Project Manager:	Jordan Norris/Jacobs
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Contents

Acronyms and Abbreviations

ASP	Aerated Static Pile
CalRecycle	California Department of Resource Recycling and Recovery
CCR	California Code of Regulations
facility	Western Placer Waste Management Authority compost facility
MRF	material recovery facility
OIMP	Odor Impact Minimization Plan
project	Western Placer Waste Management Authority compost facility
RCSI	Report of Composting Site Information
WPWMA	Western Placer Waste Management Authority

1. Introduction

California Department of Resource Recycling and Recovery (CalRecycle) regulations, Title 14, California Code of Regulations (CCR) Section 17863.4 require that all compostable material handling operations and facilities prepare and maintain a site-specific Odor Impact Minimization Plan (OIMP). The following OIMP has been developed to meet regulatory requirements and to serve as documentation of site-specific operating procedures designed to minimize the potential for nuisance-level offsite odors at the Western Placer Waste Management Authority (WPWMA) compost facility (facility; project).

2. Background Information

Project Name:	WPWMA Organics Permitting Assistance
Project Location:	3033 Fiddyment Road Roseville, CA 95747
Mailing Address:	3013 Fiddyment Road Roseville, CA 95747
Landowner:	Western Placer Waste Management Authority 3013 Fiddyment Road Roseville, CA 95747
Project Contacts:	Eric Oddo, Program Manager Western Placer Waste Management Authority 3013 Fiddyment Road Roseville, CA 95747 916-543-3984
Regulatory Contacts:	Paul Holloway, R.E.H.S. Placer County Department of Health & Human Services Environmental Health Division 3091 County Center Drive, Suite 180 Auburn, CA 95603 530-745-2345

3. Odor Impact Minimization Plan

The following sections provides specific information on compliance with CCR Section 17863.4 (b) – (d). For each of the sections below, the section starts with the exact text from Title 14, presented in *italics,* followed by the Facility's proposed method of compliance.

(b) Odor impact minimization plans shall provide guidance to on-site personnel by describing, at a minimum, the following items. If the operator will not be implementing any of these procedures, the plan shall explain why it is not necessary.

3.1 Odor Monitoring Protocol

1) an odor monitoring and data collection protocol which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and

The closest receptors are WPWMA staff and the operators that work at the compost facility, buy-back facility, material recovery facility (MRF), scalehouse, and landfill. Onsite staff are the best source of real-time information regarding odors.

One mile south, southeast, and southwest of the Western Regional Sanitary Landfill (WRSL) property boundary are residential developments referred to as Crocker Ranch and Fiddyment Farm; the composting facility is approximately 0.7 mile north of the WRSL southern property boundary. Both developments include residential housing and schools. These are the primary offsite receptors.

Other potential receptors not in the primary path of air movement but also of concern since the wind direction sometimes moves towards these locations in relation to the WPWMA's facilities are established residential neighborhoods approximately 2 miles north of the WPWMA site and a casino approximately 1.5 miles to the northeast of the WPWMA site. The majority of land within proximity of the WPWMA site is designated as agriculture/pasture and no residential, commercial, or industrial developments exist, though some are planned for the future.

A number of additional potential odor sources are within reasonable vicinity of the composting facility, as well. Approximately 2.5 miles southeast of the WPWMA's composting facility is a composting and soil blending facility (Mallard Creek). The Rio Bravo wood-burning power plant is located approximately 2 miles to the east. Both of these sources stockpile significant amounts of organic materials. These receptor locations are directly in the primary path of the air movement in relation to the WPWMA's compost facility. North of the WPWMA's composting facility are a chicken farm and a dairy. The aforementioned casino, in addition to being a potential receptor, is also a potential odor source as the facility operates its own onsite wastewater treatment plant.

Approximately 1.5 miles to the east and southeast of the WPWMA site are various industrial plants, including a propane dealer.

Figure 1 (located at the end of this report) shows the relationship of the facility to nearby receptors and competing odor sources. Appendix A contains a compost odor wheel.

As discussed above, a number of potential odor sources are located on the WPWMA site and in the vicinity of the site. In its 2007 and 2009 studies conducted for the WPWMA site, SCS Engineers identified four primary sources of odor at the WPWMA's facility, as described in Sections 3.1.1 and 3.1.2.

3.1.1 Potential Onsite Odor Sources

The following four potential odor sources are located onsite:

- Western Regional Sanitary Landfill active face
- Material Recovery Facility
- Composting Facility
- Landfill gas

3.1.2 Potential Offsite Odor Source

The following potential odor sources are located offsite:

- Rio Bravo – wood waste to energy power plant facility located 1.5 miles east of the WPWMA site
- Mallard Creek – composting facility located 2.2 miles southeast of the WPWMA site

- Green Solutions and More – green waste and wood waste processor located 0.75 mile east of the WPWMA site
- Kamps Propane – propane dealer located 2.5 miles southeast of the WPWMA site
- Invirotec –septage processor located 0.75 mile east of the WPWMA site
- Thunder Valley Casino Wastewater Treatment Plant located 1.5 miles to the east-northeast of the WPWMA site
- City of Roseville Wastewater Treatment Plants located 6.5 miles south-southeast of the WPWMA site (Dry Creek) and 3.5 miles southwest of the WPWMA site (Pleasant Grove)
- City of Lincoln Wastewater Treatment Plant located 1.5 miles north of the WPWMA site
- Poultry farm located 1 mile northwest of the northwestern corner of the WPWMA site
- Dairy farm located 3 miles northwest of the northwestern corner of the WPWMA site

3.1.3 Method for Assessing Odor Impacts

The compost operator evaluates weather conditions, onsite odor conditions, and planned operations to minimize the potential release of objectionable odors. These include good composting practices as described in the Report of Composting Site Information (RCSI) (for example, appropriate C:N ratio, sufficient moisture content, and adequate porosity, among others) to minimize production and persistence of odors; and good housekeeping measures (like clearing spilled materials between piles, eliminating areas where water could pond, and maintaining reasonably sized stockpiles of feedstock and finished compost). Table 1 (located at the end of this report) describes sources of possible odor and potential site-specific odor-minimization techniques. The mitigation measures contained in Table 1 are not necessarily cumulative, i.e., not all measures will be implemented simultaneously. It will be up to the operator to determine the applicability of a given technique to a given situation.

If WPWMA or the operator detect an objectionable onsite odor, they will adhere to the following protocol:

1. Investigate and determine the likely source of the odor.
2. Determine if onsite management practices could remedy the problem and immediately take steps to remedy the situation. Potential odor sources and likely management actions are shown in Table 1.
3. Determine whether or not the odor is traveling beyond the site by patrolling the site perimeter and noting existing wind conditions.
4. Enter observations in an odor log.
5. Make updates to Table 1 in the event that the management action taken was not already included.

3.2 Description of Meteorological Conditions

2) a description of meteorological conditions effecting migration of odors and/or transport of odor causing material off-site. Seasonal variations affect wind velocity and direction shall also be described; and

The geographic proximity of the compost facility is classified as an Intermediate/Semi-Mediterranean climate. It is Mediterranean in the sense that there is a dry season and a wet season. The length of the “wet” and “dry” seasons can be highly variable. Typically rain falls between October and May, and is far less likely in June through September. Average yearly rainfall for the nearby town of Lincoln is 24.62 inches.

Summers are much like coastal Southern California, only slightly warmer, when "Delta" maritime breezes are present. Ocean breezes flow from the southwest to the northeast, traveling up the Sacramento River Delta. Because of the river delta and the absence of coastal mountains blocking ocean maritime breezes, cooling takes place during the normally hot summer months in the Sacramento Valley and Sierra Nevada Foothills. When Delta breezes are not blowing and the winds come overland from the north, generally hot conditions prevail.

Winters are more characteristic of Oregon and Washington, with rain and fog, but with slightly warmer temperatures due to more southerly latitude. Winter storms can come from three different sources. The first and the most common is the North Pacific storm, which brings rain and fog to the coast, and then through the Sacramento River Delta and up into the foothills. The second type of winter storm comes from the Gulf of Alaska. These are much colder than the North Pacific storms. The third type of winter storm comes from Canada and is rare. These are very cold and occur when storms manage to make it across Idaho, Montana, and Nevada and the barrier mountains to the east, and can result in snowfall as low as the Sacramento Valley floor.

Historical wind directional data have been compiled for the area surrounding the WPWMA site. Additional historical information is contained in Appendix B. Wind roses for the project area showing the wind speed and direction for each month with direction estimated as emanating from a particular direction are contained in Appendix C. The general direction of the wind during the winter months is to the south-southeast (from the north-northwest) and to the south-southwest (from the north-northeast) in the summer months.

With ambient air as the pathway, three different mechanisms may cause odors to migrate to the surrounding residential areas: inversion, diffusion, and advection.

Inversions are stable atmospheric conditions resulting in limited vertical air movement. Certain atmospheric conditions can cause a temperature inversion to occur, trapping odors near the ground. A temperature inversion is a situation where a warmer body of air is located above a colder air mass, inhibiting the vertical movement of gases. One situation in which a low level, or surface inversion, might take place is on a clear night, when the earth's surface radiates heat away rapidly. If the air is clear, the ground and the air directly above it can be cooler than the air at higher altitudes. In many cases, temperature inversions are most prevalent from the evening to the early morning, which could explain why odors are more prevalent at those times.

Diffusion is the process whereby compounds move from a region of higher concentration to one of a lower concentration. Odors experienced when wind is coming from varying directions could be an indication of diffusion causing dispersion of odors.

The third pathway is *advection*. Odors can be carried long distances by the wind. Based upon review of meteorological data in the vicinity of the compost facility, the wind generally blows from the facility toward the residences, indicating that advection may contribute to the dispersion of odors to residential areas.

The facility has an onsite weather station to monitor wind speed and direction, temperature, and other meteorological functions. The onsite weather station is consulted prior to scheduling major material handling activities. Daily records are logged to generate site-specific historical weather pattern information.

3.3 Complaint Response Protocol

3) a complaint response protocol; and

3.3.1 Overview

Facility management will use the following protocol in responding to citizen-reported odor notifications and complaints.

3.3.2 Response to Citizen Complaints

The WPWMA solicits feedback from the public regarding facility odors and provides an Odor Notification Form on its website so that residents can quickly and easily report any experienced odors.

Upon receipt of an odor notification, WPWMA staff will:

1. Check and record weather conditions (especially wind direction) at the time of the notification.

2. Visit the location of the compliant (when possible) and attempt to characterize the odor.

3. If the complainant location is downwind of the WPWMA facility, contact the operator to verify the operating conditions and activities at the time of the complaint.

4. Document the information gathered and potential source(s) of the odor in the Odor Complaint Log.

5. Respond to the complainant within 24 hours of receiving the complaint, or within 24 hours of returning from weekends or holidays should the complaint be received during those times.

Upon receipt of a complaint or notification of a complaint by the WPWMA staff, the compost facility operator will:

1. Promptly provide information needed to assess the nature and source of the odor.

2. Consider implementing one or more of the management techniques (if deemed feasible, given the time of year, particular source of the odor, etc.) listed in Table 1.

3. Monitor and adjust management techniques and report results to WPWMA staff.

4. Document odor-related actions and results in the Odor Complaint Log.

3.4 Design Considerations for Minimizing Odors

4) a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns as applicable; and

3.4.1 Method and Degree of Aeration

Green waste windrow composting aeration is largely a function of the particle size of the feedstock, the moisture content and the height of the pile; collectively this is often referred to as “porosity”; aeration is also affected by the frequency of turning the windrows. Aerated Static Pile (ASP) composting of food waste and other organics uses active aeration via perforated pipes at the base of the piles that is either pushed or pulled through the piles, eliminating the need for turning. Covered ASP uses SG Heap and Gore Cover systems. The Heap system includes an aeration fan and combined aeration and leachate system and is fully automated with oxygen sensors to regulate aeration.

3.4.2 Moisture Content of Materials

Most of the material received consists of mainly woody material (e.g., shrubs, trees, bushes) with a small percentage of materials that have high moisture content, like grass clippings and food waste. It has historically been necessary to add significant amounts of water to maintain the minimum amount of moisture for effective composting. As the percentage of food waste feedstock increases, the moisture content will be monitored to maintain optimum moisture content.

3.4.3 Feedstock Characteristics

Windrow composting feedstock consists of green material, yard trimmings, and wood waste, as they are defined in 14 CCR Section17852. ASP composting feedstock may include green waste, food waste, and mixed paper or a mix of these and other organic materials. CASP feedstock may include the same materials as ASP, as well as organics and MRF fines recovered from mixed waste processing through the WPWMA's materials recovery facility (MRF).

3.4.4 Airborne Emission Production

The main sources of potential odor-carrying particles at the facility are from material handling, grinding, windrow turning, ASP composting, screening, and traffic. All access roads to the site are paved and properly maintained to minimize airborne emissions. Proper moisture management during the composting process also helps to prevent generation of airborne emissions. Because of these measures, the storage and transfer of feedstock does not typically increase ambient levels of airborne emissions around the site. To the extent possible, activities that generate airborne emissions will be scheduled based on wind conditions to prevent offsite migration.

3.4.5 Process Water Distribution

Process water used to minimize airborne emissions and to add moisture to composting piles and feedstocks. Water is moved around the site using water trucks.

3.4.6 Pad and Site Drainage and Permeability

The compost facility drainage system consists of ditches, berms, culverts, and two lined and aerated compost leachate retention basins. All contact water/leachate from the green and wood waste receiving, processing and storage area is directed to the northern compost retention basin. The northern compost pad is paved and bisected by a drainage channel that drains the grinding pad and the compost pad into the north retention basin.

The south leachate pond receives runoff from the southern compost pad.

3.4.7 Equipment Reliability

All equipment will be maintained per manufacturer recommendations. The compost operation has onsite front-end loaders. The MRF has additional front-end loaders and personnel power that could be directed to the composting operation in the event of an equipment failure. In addition, equipment is available from nearby heavy equipment rental agencies if necessary.

3.4.8 Personnel Training

Personnel assigned to the compost site have been trained in subjects applicable to the compost site operation and maintenance, load checking procedures, and heavy equipment operations. Monthly safety meetings occur on various topics to ensure proper and safe procedures are followed. All heavy equipment operators must go through a training period before they are able to run each piece of machinery (e.g., loaders, roll-off, water truck). The training records and safety meeting attendance are kept on file.

3.4.9 Weather Event Impacts

Inversions are the most likely weather event to impact the facility (see discussion in Section 3.2, Description of Meteorological Conditions). Occasional severe rains could limit production at the compost site, but rarely last long enough to severely interrupt operations. The facility can be impacted by peak loads that can arrive after wet periods in the winter. As described in Table 1, the facility has developed contingency measures for these conditions.

The facility is equipped with a recording weather station and also has a prominently displayed windsock to direct onsite operations.

3.4.10 Utility Service Interruptions

Most mobile equipment is powered by diesel engines, with the exception of the horizontal grinder, which is electric. Incoming green material could be run across the adjacent construction and demolition processing line, which also has an electric grinder, assuming the cause of the outage is not electrical in nature. During extensive downtime, a contract grinder could be brought in, though this would be an unlikely occurrence.

3.4.11 Water Source

Potable water is available via onsite wells.

3.5 Operating Procedures to Minimize Odor

5) *a description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel) weather impacts, biofiltration, and tarping as applicable.*

The facility manages potential odor-producing areas to minimize the development of conditions that could lead to odor problems. A key management tool in this effort is the use of a recording weather station and the windsock. Other possible management techniques are summarized in Table 1.

Areas with the potential for odor generation include the following:

Feedstock Receiving Area. Incoming feedstocks can generate odors if they are stored for excessive periods of time, particularly during the rainy season. In order to minimize these potential odors, the facility will process material regularly and within regulatory limits. Food waste feedstock is mixed with ground green waste regularly throughout the day and introduced to the ASP piles as soon as practical, typically within by the end of the day of receipt. Odors from incoming materials may be generated upstream of the facility depending on collection frequency and ambient weather conditions that can cause the material to begin composting prior to arrival at the site. Timely processing and incorporation of feedstocks will help to mitigate these issues.

Aisles between Processing Areas. Aisles between processing areas and compost piles can be sources of odor if raw, uncomposted, or improperly mixed material is left for excessive amounts of time without exposure to the high temperatures of composting. The facility practices good housekeeping methods such as regular patrolling of aisles to clean any spilled materials. Additionally, all surfaces from the receiving area through the composting pads have been designed and graded so that contact water moves efficiently into the leachate ponds, minimizing potential ponding in raw feedstock areas.

Composting Windrows and Aerated Static Piles. Odors emanating from compost piles typically indicate problems in the initial mixing, turning frequency, pile porosity, and/or moisture content of the pile. The operator strives to manage the compost piles with appropriate carbon to nitrogen ratio, assure adequate initial mixing, and maintain adequate moisture within the piles. Windrows are typically turned weekly. Any odors detected from the compost piles will be corrected using the techniques described in Table 1.

Odors from ASP are controlled by the pile conditions such as initial mixing, porosity, and moisture content. Odors are also controlled via the biofilter layer consisting of compost overs, ground wood, and/or finished compost applied over the piles as well as the introduction of air into the piles via perforated pipes. Odors emanating from the ASP system typically indicate problems in the initial mixing, pile porosity, moisture content of the pile, and/or ASP system issues.

Odors migrating from the compost and feedstock piles will be investigated to determine the cause and corrective actions will be implemented.

Curing Piles. Curing piles have the potential to create odors if unstable material is moved to curing too soon. In order to minimize curing odors, the operator will ensure that material is adequately composted prior to moving it into the curing pile.

Compost Leachate Retention Basin. The compost leachate ponds could cause odors if they were overloaded with sediment or nutrients. The ponds are aerated allowing some volatile particles to be released in a controlled manner.

3.5.1 Aeration

Windrow composting relies on the particle size of the feedstock and periodic turning to allow for aeration. The spaces between the particles are referred to as porosity. A rough measure of porosity can be obtained by measuring bulk density. Piles are turned regularly which may help to reestablish porosity.

ASP composting uses active aeration via perforated pipes at the base of the piles that is either pushed or pulled through the piles.

3.5.2 Moisture Management

The majority of the feedstocks processed at the facility have relatively low moisture content and generally require the application of liquids to maintain optimal composting conditions. The site is adequately graded and paved to minimize ponding of water that could lead to odors. Moisture management may also be controlled via sensors, and feedstock piles will be processed and introduced into the composting process as quickly as possible to limit the potential for odors.

3.5.3 Feedstock Quality

Windrow composting uses clean, source-separated green waste, and wood waste when material bulking is necessary. Despite relatively mature collection programs, contamination continues to be a concern in green waste processing. In some cases the frequency of collection can have an impact on odor generation. The operator will work with the green waste material haulers to identify loads which may have been left sitting for substantial time periods prior to collection and delivery to the facility. When possible, these loads should be expedited to assure that they are processed in a timely manner and that the processed material is rapidly incorporated into a windrow or ASP pile.

ASP feedstock may include source separated food and green waste and/or a mixture of organic materials recovered from MRF processing operations. ASP feedstocks are generally more odiferous than the green-only windrow feedstock, thus they are not stored longer than necessary for incorporation into the ASP process and are covered with a biofilter upon pile formation.

3.5.4 Drainage Controls

As discussed above, the facility separates stormwater from “contact” water. Any water that contacts compost feedstock or active compost on the northern compost pad is directed to the central channel drain which bisects the pad and drains to the northern compost leachate pond. The drain could become a source of odors from entrapped sediment if not cleaned out regularly. Any water that contacts compost on the southern pad is directed to the southern compost leachate pond.

3.5.5 Pad Maintenance

The pads are maintained regularly on an as-needed basis.

3.5.6 Wastewater Pond Controls

Regular maintenance of the stormwater and leachate ponds should minimize potential odors from these features. The leachate ponds are a potential source of odors, though they are aerated regularly.

3.5.7 Storage Practices

Stored, mature, finished compost is not expected to be a significant source of offsite odors. Finished compost ready for sale may be stockpiled at the north end of both the northern and southern compost pads and/or on a portion of the green/wood/C&D self-haul tipping area pad. Additionally, small bags of finished compost are manually bagged and marketed. On average, compost is stored for approximately ninety days to approximately nine months. If stored compost accumulates, the operator will determine the best course of action for preventing material from interfering with operations.

3.6 Contingency Plans

The following list provides information on contingency planning for facility equipment, water, power, personnel, weather impacts, biofiltration, tarping and storage.

Equipment. Equipment is maintained per the manufacturer recommendations. The facility has a fulltime mechanic who does scheduled maintenance and repairs on the composting equipment. In the event of equipment breakdown, composting services can be contracted out or equipment could be rented to continue operations. Front-end loaders and excavators are used onsite in other operations and can be diverted to the compost operation if the need arises.

Water. If needed, water could be brought in by tanker truck, but this is an unlikely situation. In the short term the facility could reuse water from either of the retention basins during periods when the regular water supply is interrupted.

Power. Most mobile equipment, except for the horizontal grinder, is powered by diesel engines. During the unlikely event of a prolonged power outage a contract grinder could be used to grind incoming material.

Personnel. Additional trained personnel could be made available from other operations.

Weather impacts. The only severe weather event expected to impact the facility are heavy rainfall or high wind conditions that could temporarily impede processing activities.

Biofiltration. The composting process may use a “pseudo-biofilter,” “biocover,” or “compost blanket” to reduce odors in the compost piles. This may include adding compost “overs” into the initial compost mix to increase porosity or may include using compost overs and/or finished compost as a windrow blanket during the first few weeks. The ASP composting process utilizes a 1-foot thick biofilter cover on each pile that is comprised of finished compost, compost overs, or other ground organics materials such as wood chips.

Tarping. The operator may use tarps if necessary to assist with odor reduction of compost feedstock.

Storage. Compost will be stored onsite. If the operator becomes limited by the amount of available pad space, the operator will determine the best course of action to prevent interference with operations.

3.7 Plan Revision

6) *The odor impact minimization plan shall be revised to reflect any changes, and a copy shall be provided to the enforcement agency, within 30 days of those changes.*

A copy of this Odor Impact Minimization Plan will be kept at the facility's onsite administration office. Revisions will be made when significant changes to operations affect the OIMP.

Table

Table 1. Sources of Odor and Management Techniques

Source of Odor	Possible Cause	Management Technique
Feedstock receiving	Material sitting too long prior to processing	Reduce size of processed material stockpiles. Create discrete feedstock stockpiles with greater surface to volume ratio. Consider blanketing odiferous materials with 1-foot thick layer of woody overs (water lightly to reduce odor releases).
Feedstock receiving	Material arrives with odors	Expedite material processing and incorporation Develop load-specific handling measures Consider blanketing odiferous materials with 1-foot thick layer of woody overs (water lightly to reduce odor releases). Develop alternative processing option for odiferous loads. Consider treating odiferous loads with an odor neutralizer added to the water truck or otherwise sprayed on.
Material processing (Grinding)	Grinding volatizes particles	Expedite material processing. Increase operating shifts or grinder capacity. First in, first out, processing. Consider using odor neutralizer in the water spray for the grinder. Use the weather station, windsock, and/or operational experience to curtail grinding operations during unfavorable weather conditions.
Processed material storage	Storing processed materials for extended periods can cause odors	Move processed material to a windrow within 48 hours. Stockpile woody overs for use in adjusting porosity and/or for blanketing material stockpiles and/or windrows.
Material handling (during composting)	Material handling releases odorous gases Anaerobic conditions can form odorous compounds Ammonia odor (high nitrogen level). Sulfur odor (anaerobic conditions) Varying odors in pile Odors generated after turning Excessive temperature	Reduce handling activities during stagnant air conditions. Check and correct carbon to nitrogen ratio and porosity in windrows. Maintain adequate moisture in piles. Avoid over-watering piles. Increase turning frequency, check temperatures, check pH, increase porosity, increase additive. Increase surface to volume ratios of active piles. Consider using a 1-foot biofilter layer over the pile to reduce emissions. Verify 1-foot biofilter layer is constructed properly. Verify ASP system is operating properly.

Table 1. Sources of Odor and Management Techniques

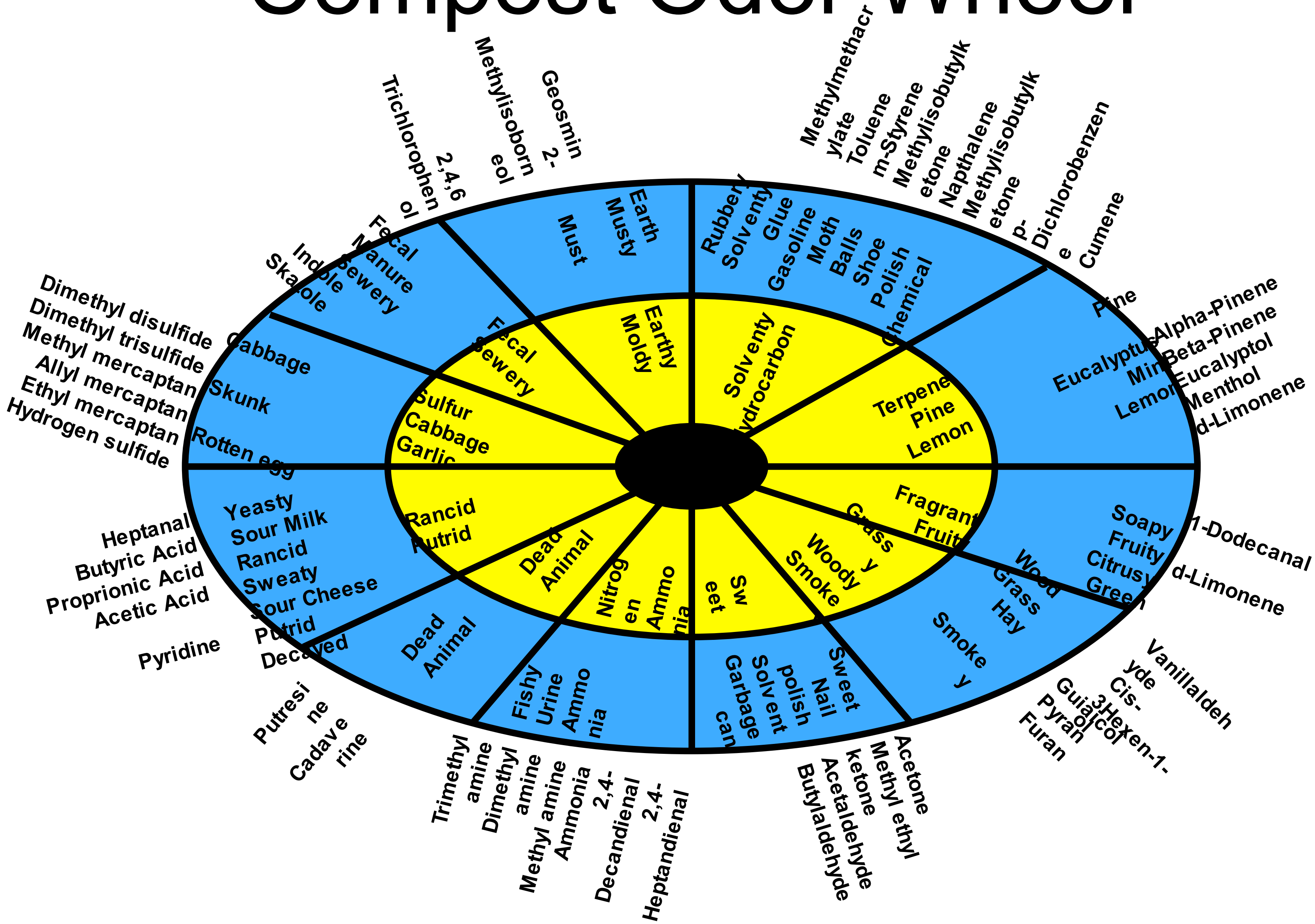
Source of Odor	Possible Cause	Management Technique
Material handling (turning)	Turning releases odorous gases and volatizes particles	Reduce or avoid turning activities during stagnant weather conditions. Reduce turning activities when light winds are in the direction of sensitive receptors. Consider adding an odor neutralizer to the water truck to be used as a topical odor neutralizer (after windrows are turned) and/or into the windrow via a front-end loader.
Curing piles	Excessive temperatures	Decrease curing pile size (height). Increase compost residence time prior to moving to curing. Review moisture content of in-process compost. Use passive aeration to add oxygen to the curing pile.
Material processing (screening)	Screening volatizes particles	Reduce screening activity during stagnant air conditions. Reduce screening activity when wind is in direction of sensitive receptors. Mist water or neutralizer at dust generation points.
Aisles	Leachate allowed to pond on the pad Uncomposted material in aisles	Clean or sweep aisles of spilled material (particularly at the end of each day). Remove and replace woody overs and spilled materials from the pad on a regular basis. Mechanically sweep paved areas at the end of each day. Apply water and/or neutralizer to reduce dust conditions.
Drainage channels	Channel can become saturated and overloaded with sediment	Increase cleaning frequency of the drainage channel. Install filter socks at the upstream end of the windrow pad, especially during the rainy season.
Leachate ponds	Standing water overloaded with nutrients or sediment	Install filter berm before ponds. Consider increasing aeration Clean leachate ponds during the dry season.

Appendix A
Compost Odor Wheel

Appendix A. Compost ODOR Wheel

A Compost Odor Wheel, used to help determine the nature and therefore the cause of typical compost odors, follows this page.

Compost Odor Wheel



By Paul Rosenfeld Ph.D.[1] and Mel Suffet Ph.D.[2]

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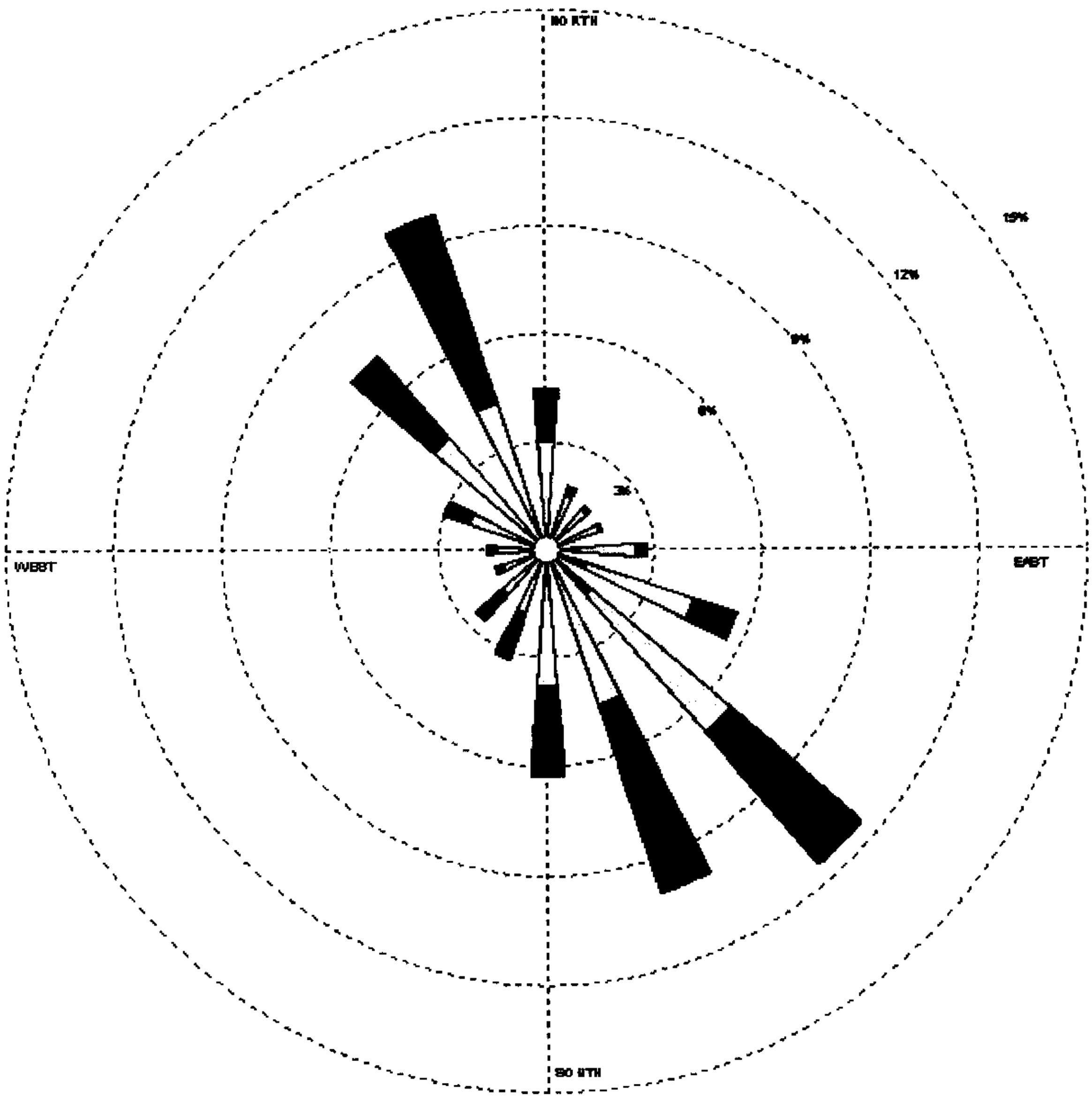
Appendix B. Historical Meteorological Information

Historical wind speed and direction for the Compost Site follows this page.

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA

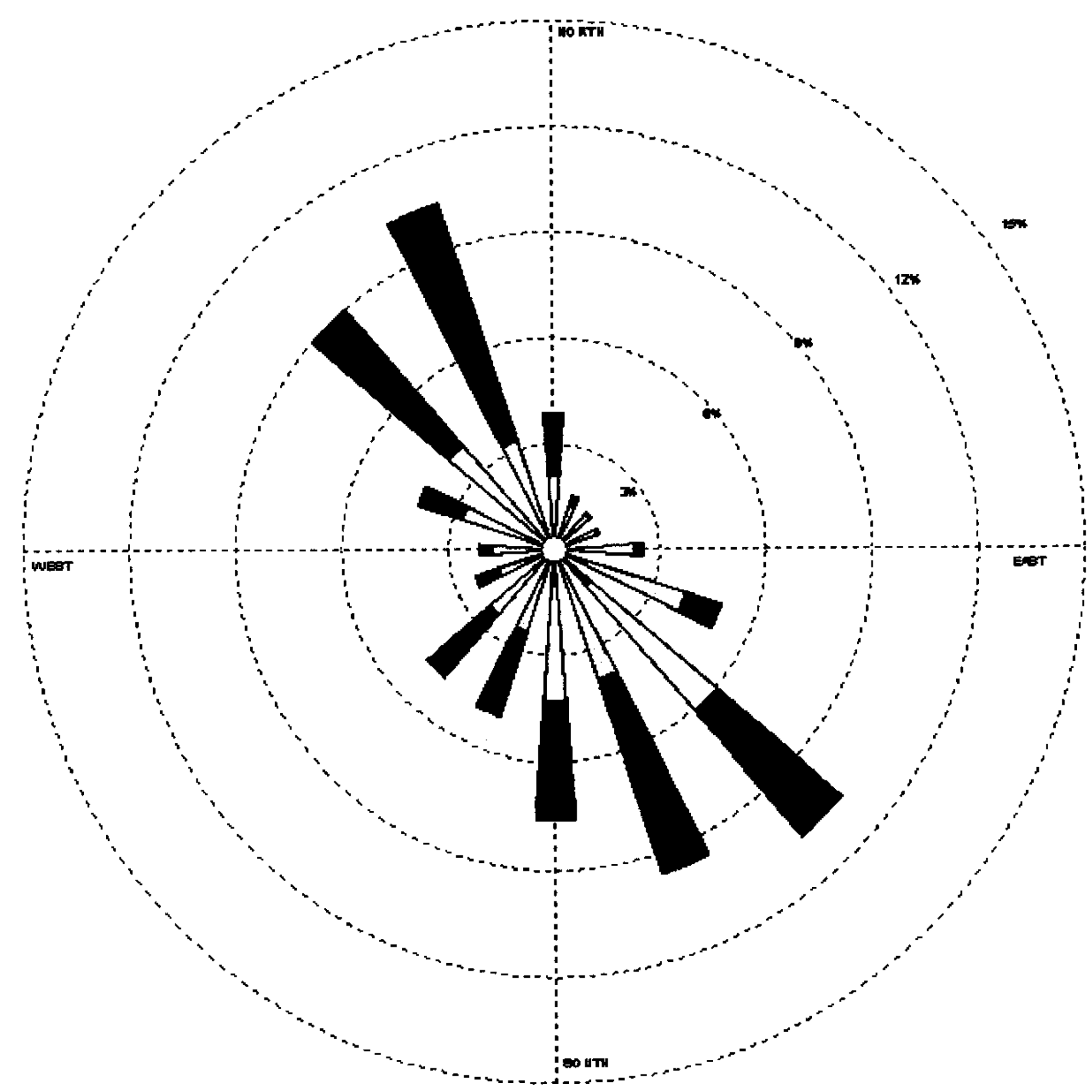


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06	Sara West	8/19/2002	USDA-ARS
8.49 - 11.06	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of January
5.40 - 8.49	AVG. WIND SPEED 3.47 m/s	CALM WINDS 25.31%	
3.34 - 5.40			
1.80 - 3.34	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Jan 1 - Jan 31 Midnight - 11 PM	Figure 3a
0.51 - 1.80			

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

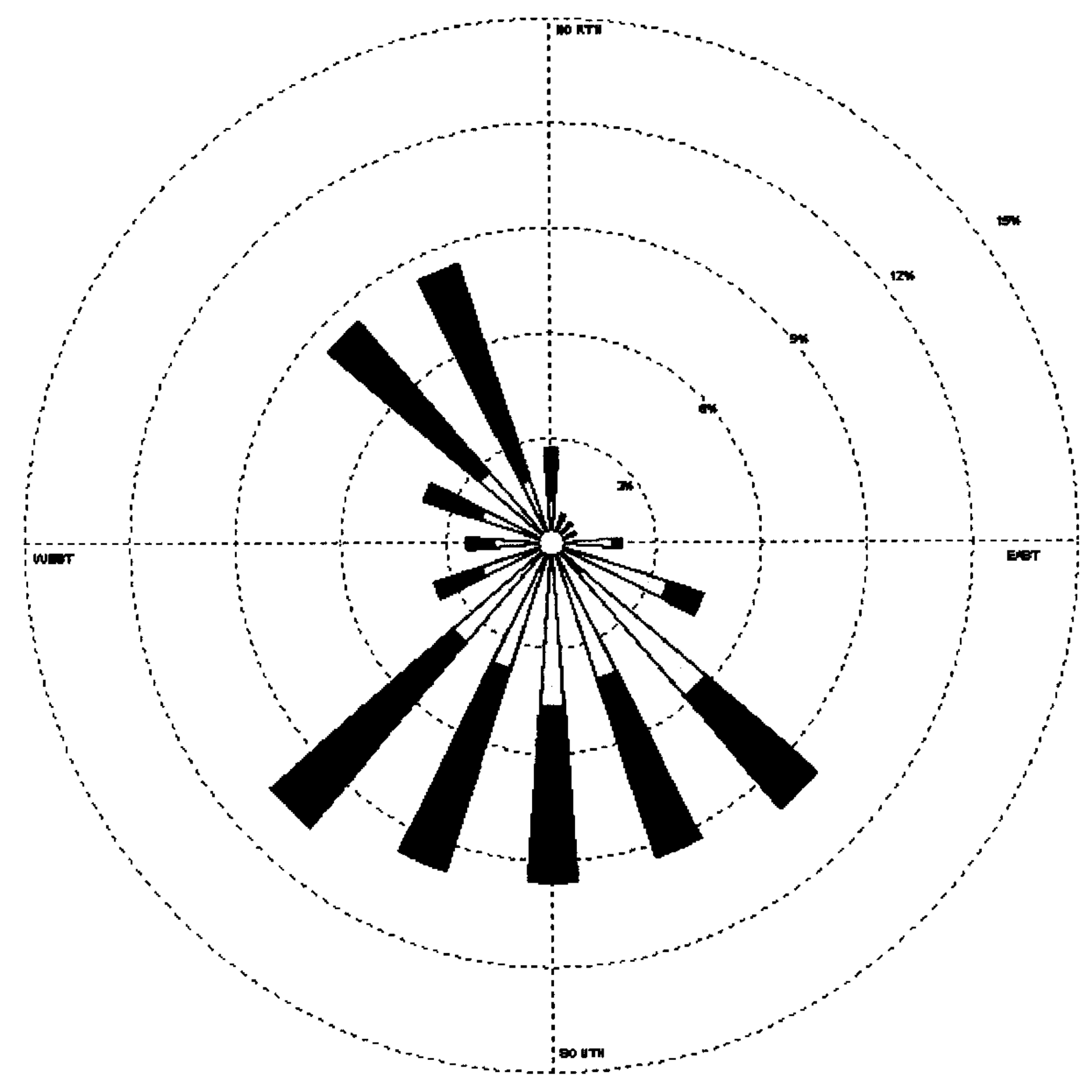
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06	Sara West	8/19/2002	USDA-ARS
8.49 - 11.06	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for month of February
5.40 - 8.49	AVG. WIND SPEED 3.78 m/s	CALM WINDS 18.74%	
3.34 - 5.40			
1.80 - 3.34	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Feb 1 - Feb 29 Midnight - 11 PM	Figure 3b
0.51 - 1.80			

WIND ROSE PLOT

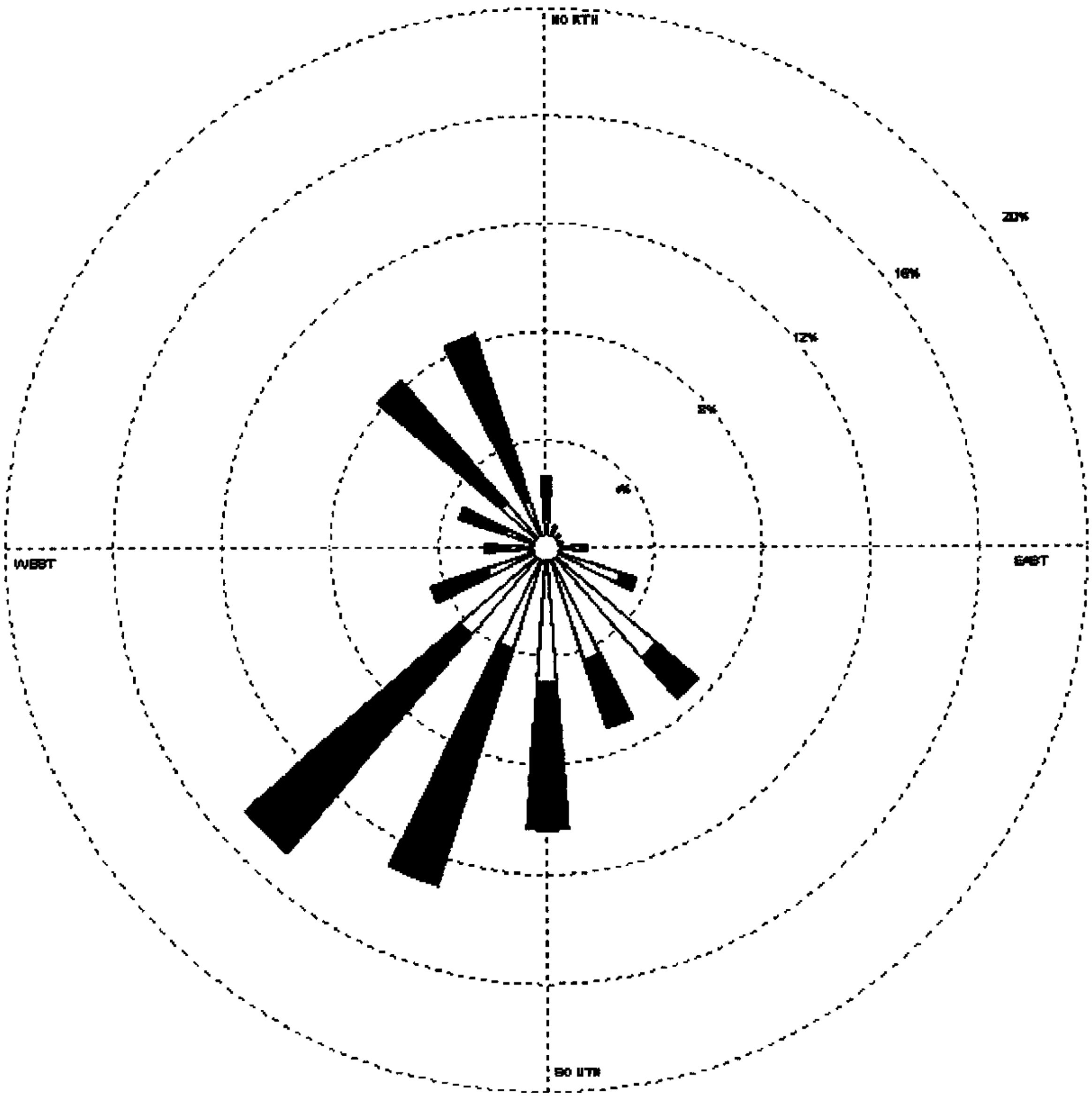
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06	Sara West	8/19/2002	USDA-ARS
8.49 - 11.06	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of March
5.40 - 8.49	AVG. WIND SPEED 4.01 m/s	CALM WINDS 12.31%	
3.34 - 5.40			
1.80 - 3.34	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Mar 1 - Mar 31 Midnight - 11 PM	Figure 3c
0.51 - 1.80			

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA

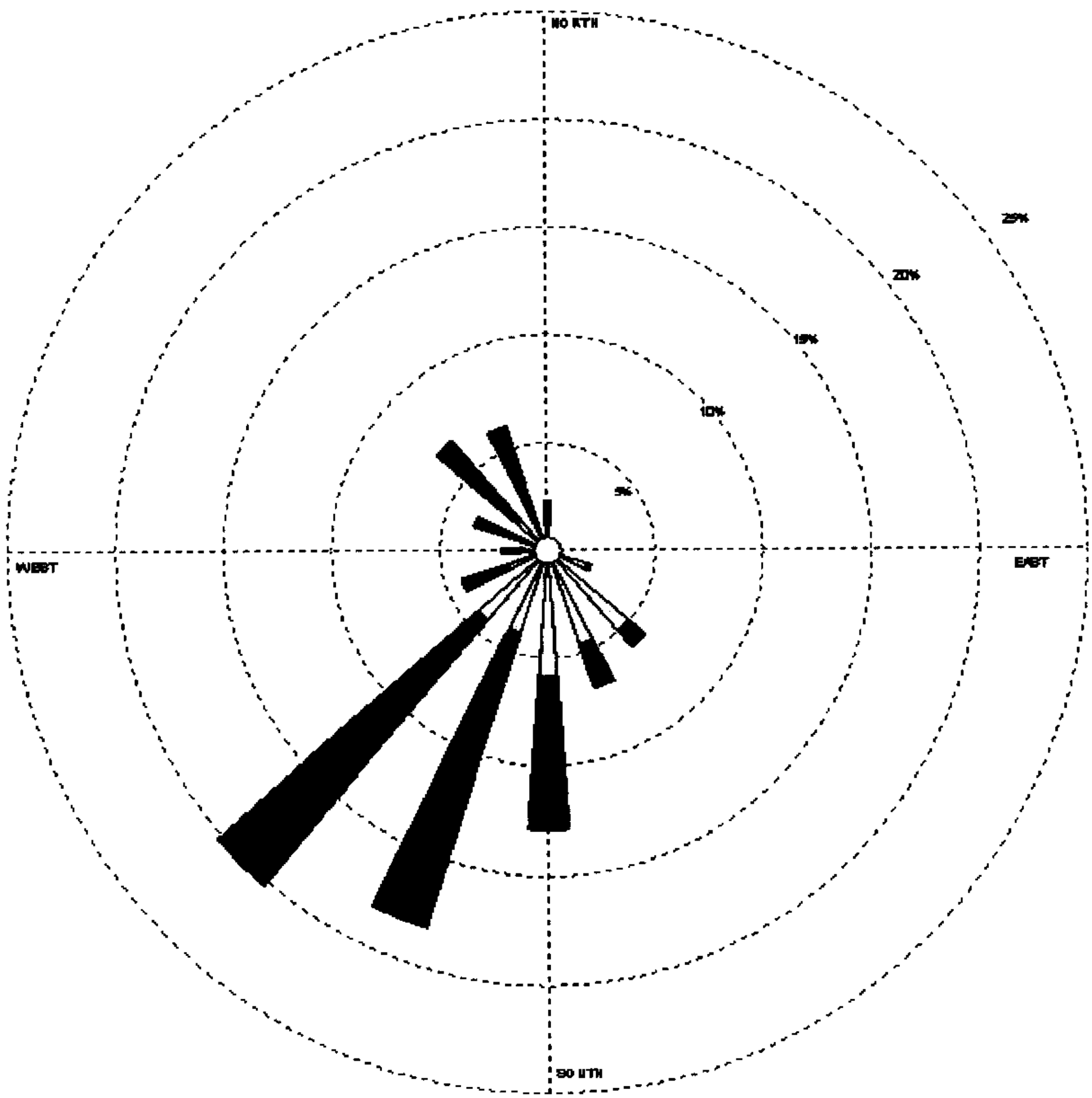


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06	Sara West	8/19/2002	USDA-ARS
8.49 - 11.06	DISPLAY: Wind Speed	UNIT: m/s	COMMENTS: Rose Diagram for Month of April
5.40 - 8.49 / 3.34 - 5.40	AVG. WIND SPEED: 4.09 m/s	CALM WINDS: 10.68%	
1.80 - 3.34 / 0.51 - 1.80	ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1961 Apr 1 - Apr 30 Midnight - 11 PM	Figure 3d

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

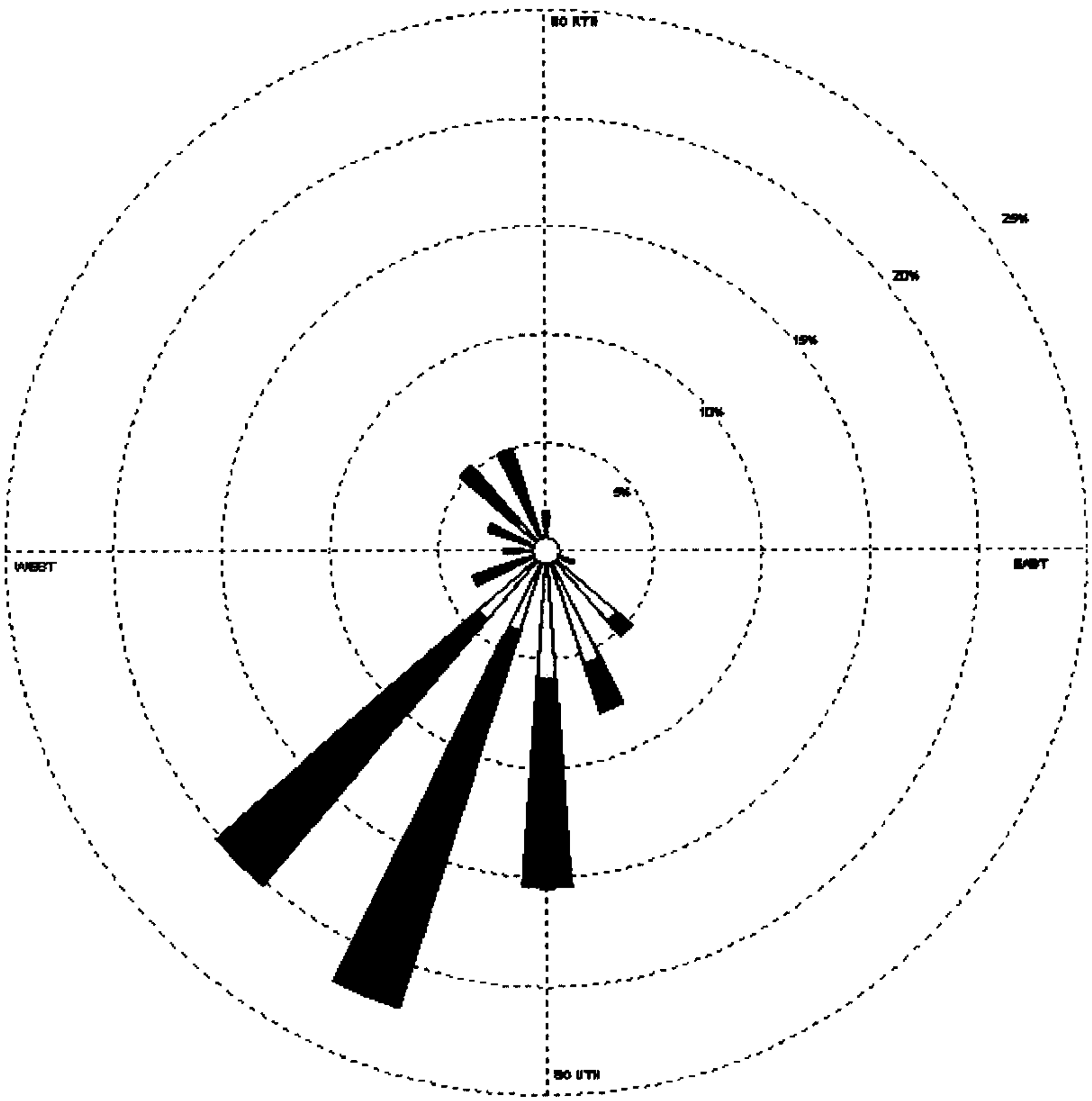
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	Sara West	8/19/2002	USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of May
	AVG. WIND SPEED 4.20 m/s	CALM WINDS 6.55%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 May 1 - May 31 Midnight - 11 PM	Figure 3e

WIND ROSE PLOT

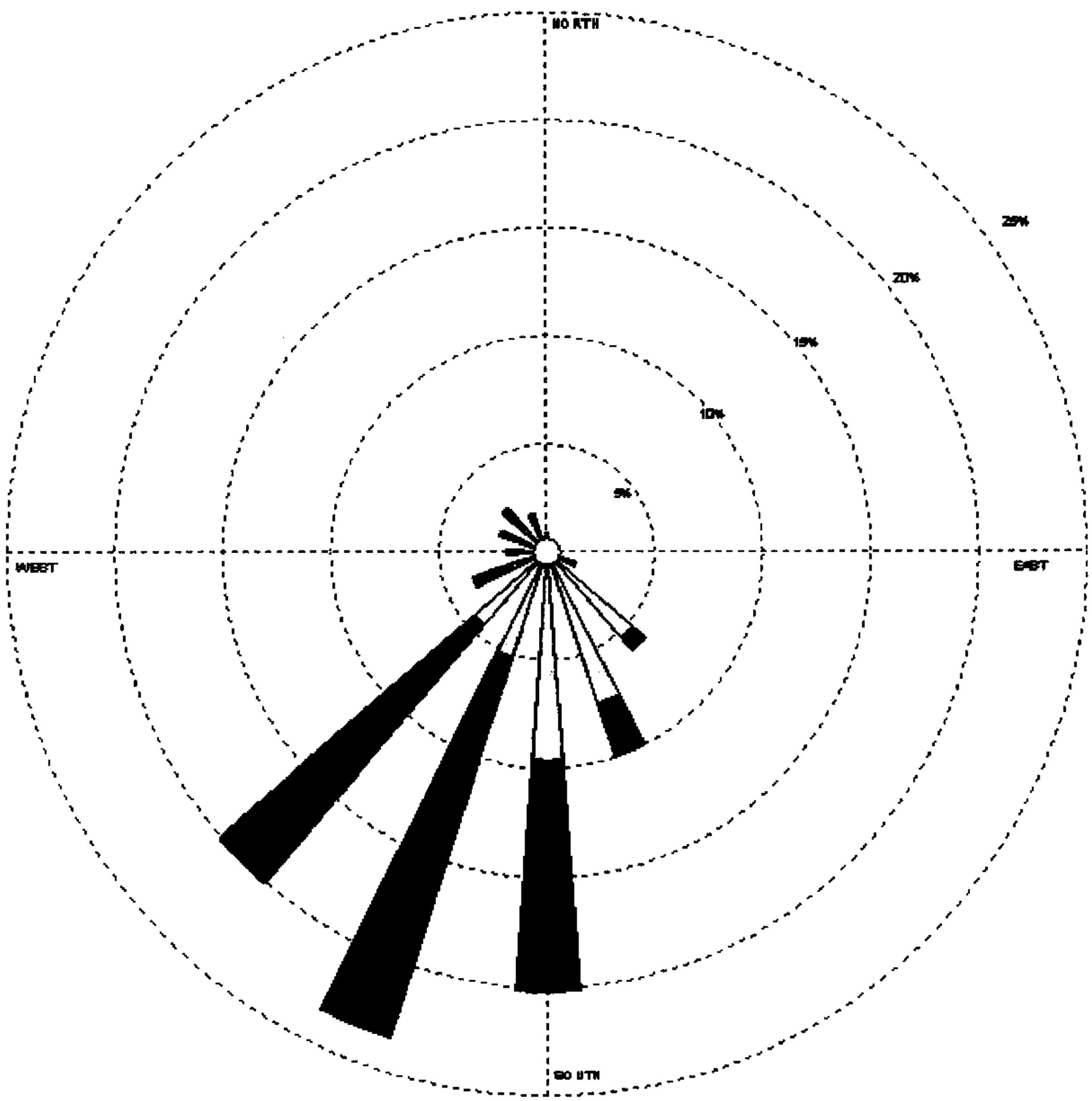
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)			
>11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of June
	AVG. WIND SPEED 4.29 m/s	CALM WINDS 5.59%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Jun 1 - Jun 30 Midnight - 11 PM	Figure 3f

WIND ROSE PLOT

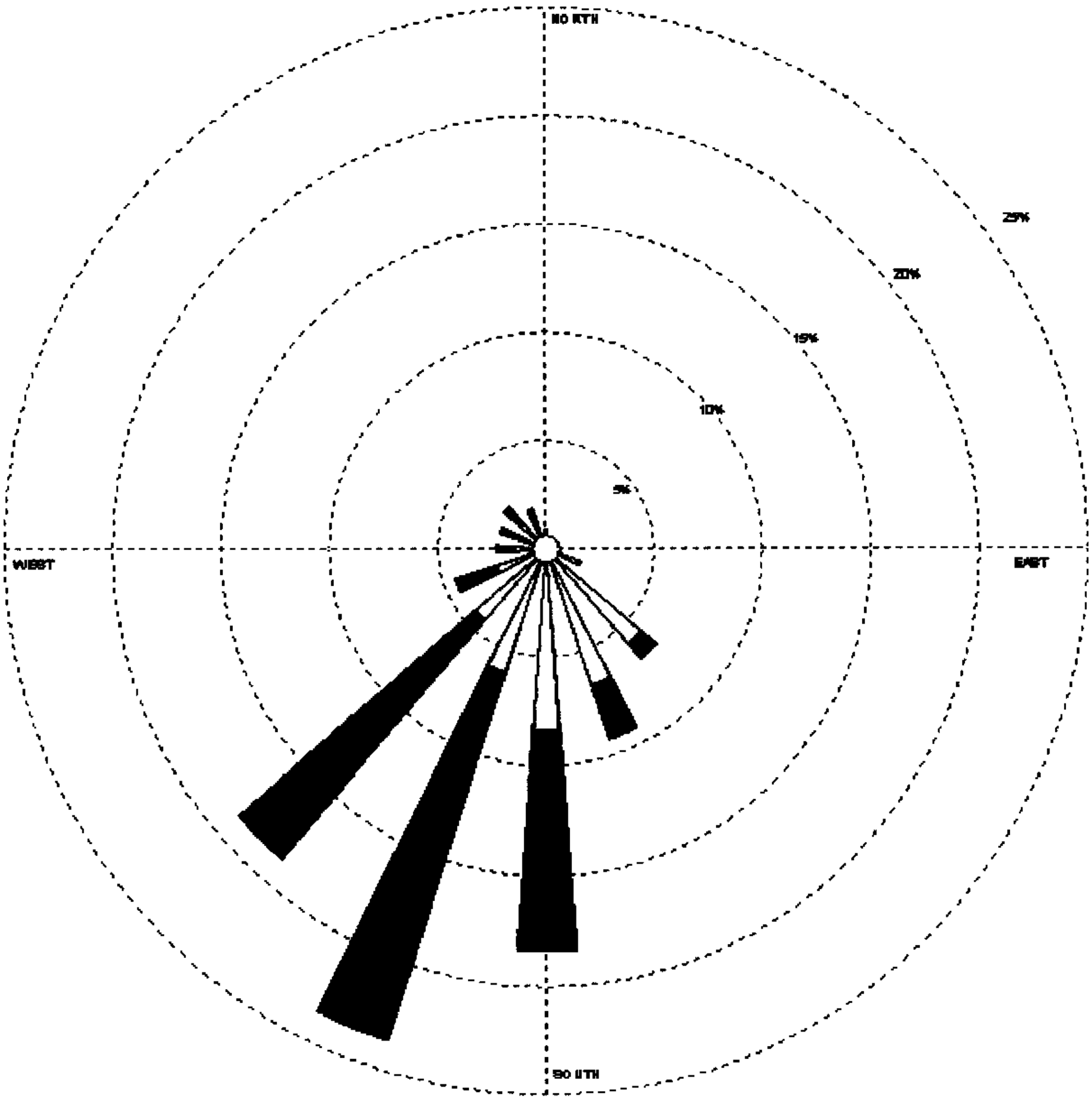
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06	Sara West	8/19/2002	USDA-ARS
8.49 - 11.06	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of July
5.40 - 8.49	AVG. WIND SPEED 3.92 m/s	CALM WINDS 4.29%	
3.34 - 5.40			
1.80 - 3.34	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Jul 1 - Jul 31 Midnight - 11 PM	Figure 3g
0.51 - 1.80			

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



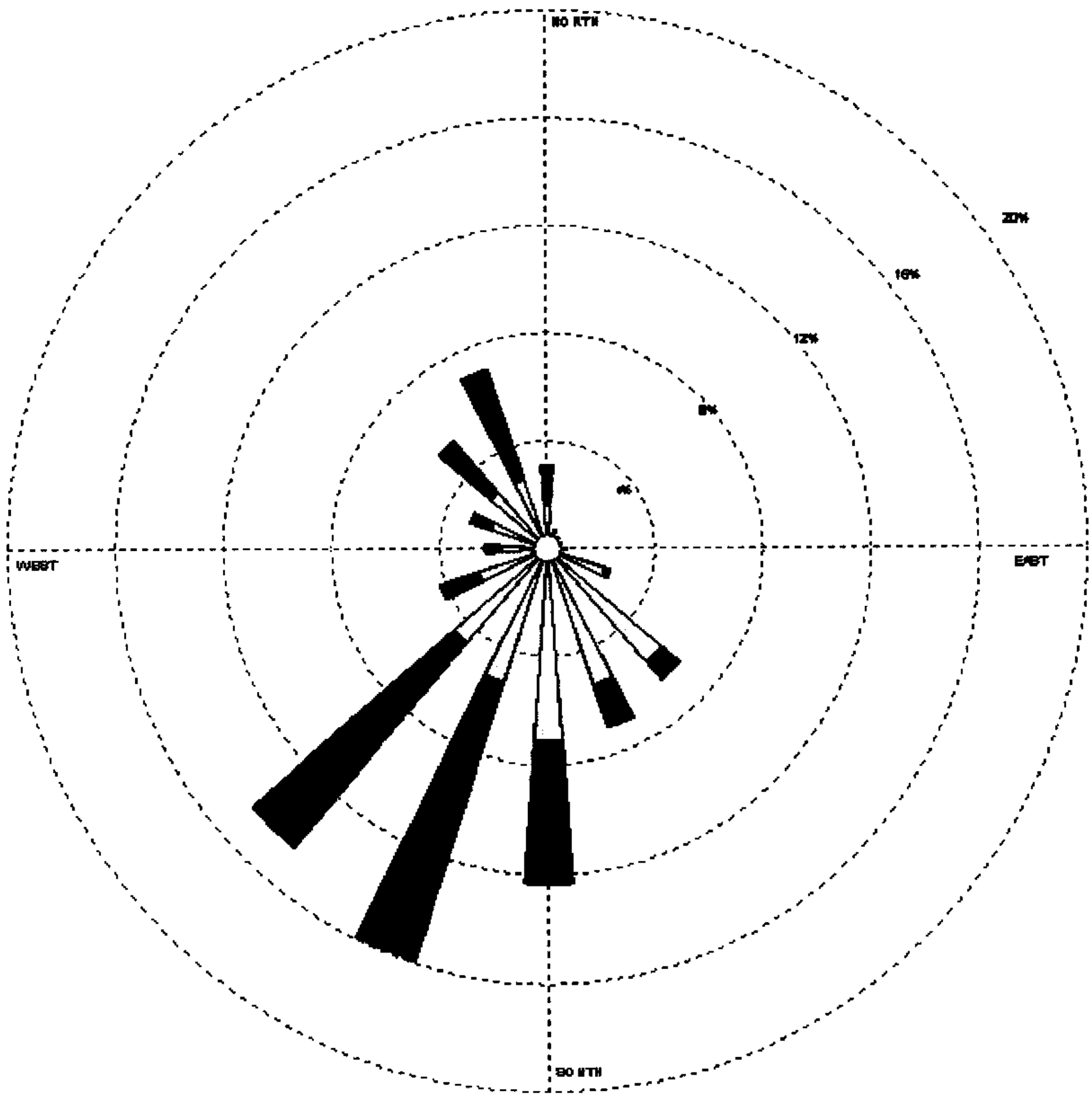
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of August
AVG. WIND SPEED 3.84 m/s	CALM WINDS 6.18%	
ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Aug 1 - Aug 31 Midnight - 11 PM	Figure 3h

WIND ROSEPLOT

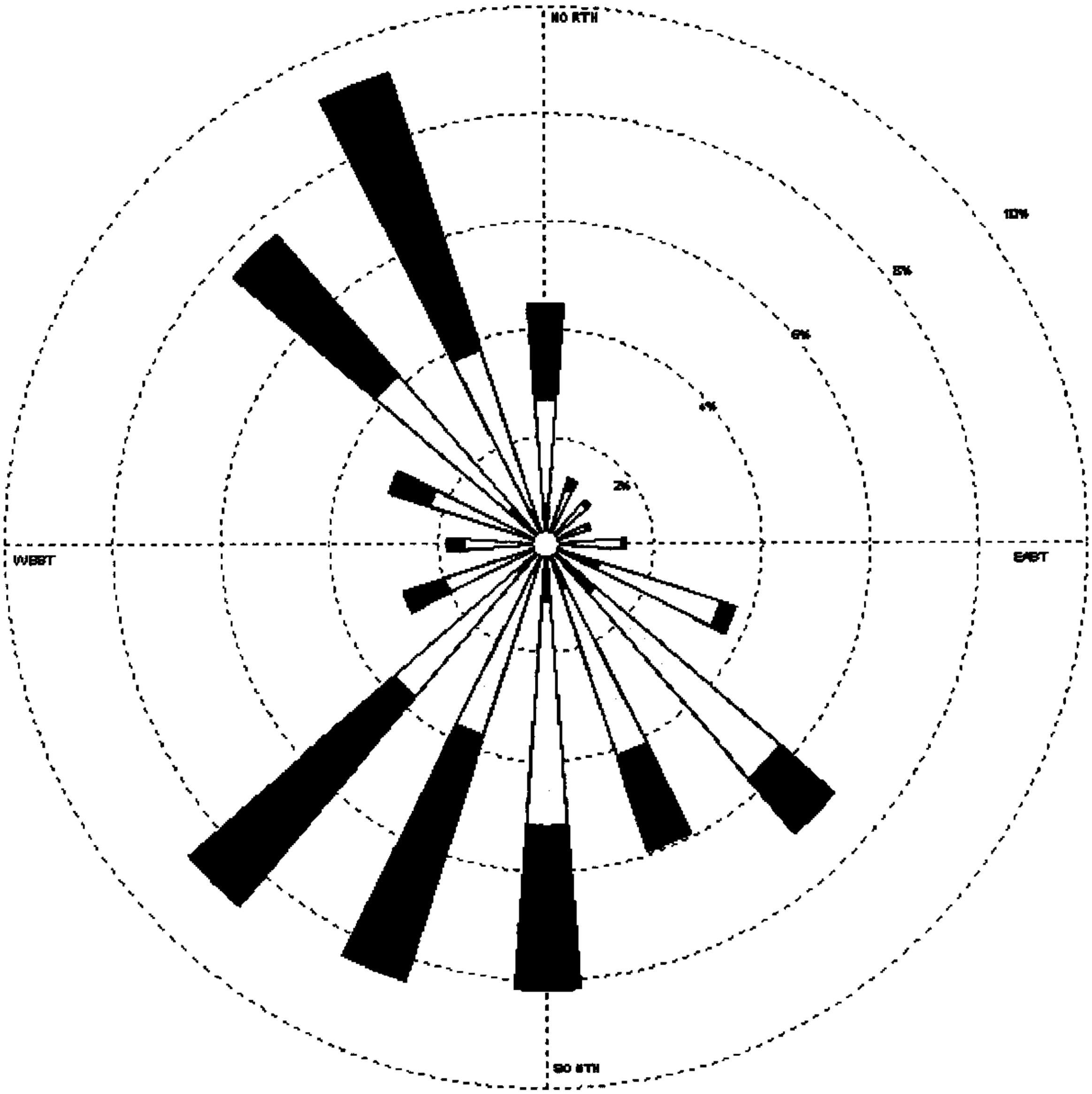
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of September
	AVG. WIND SPEED 3.65 m/s	CALM WINDS 13.59%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Sep 1 - Sep 30 Midnight - 11 PM	Figure 3i

WIND ROSE PLOT

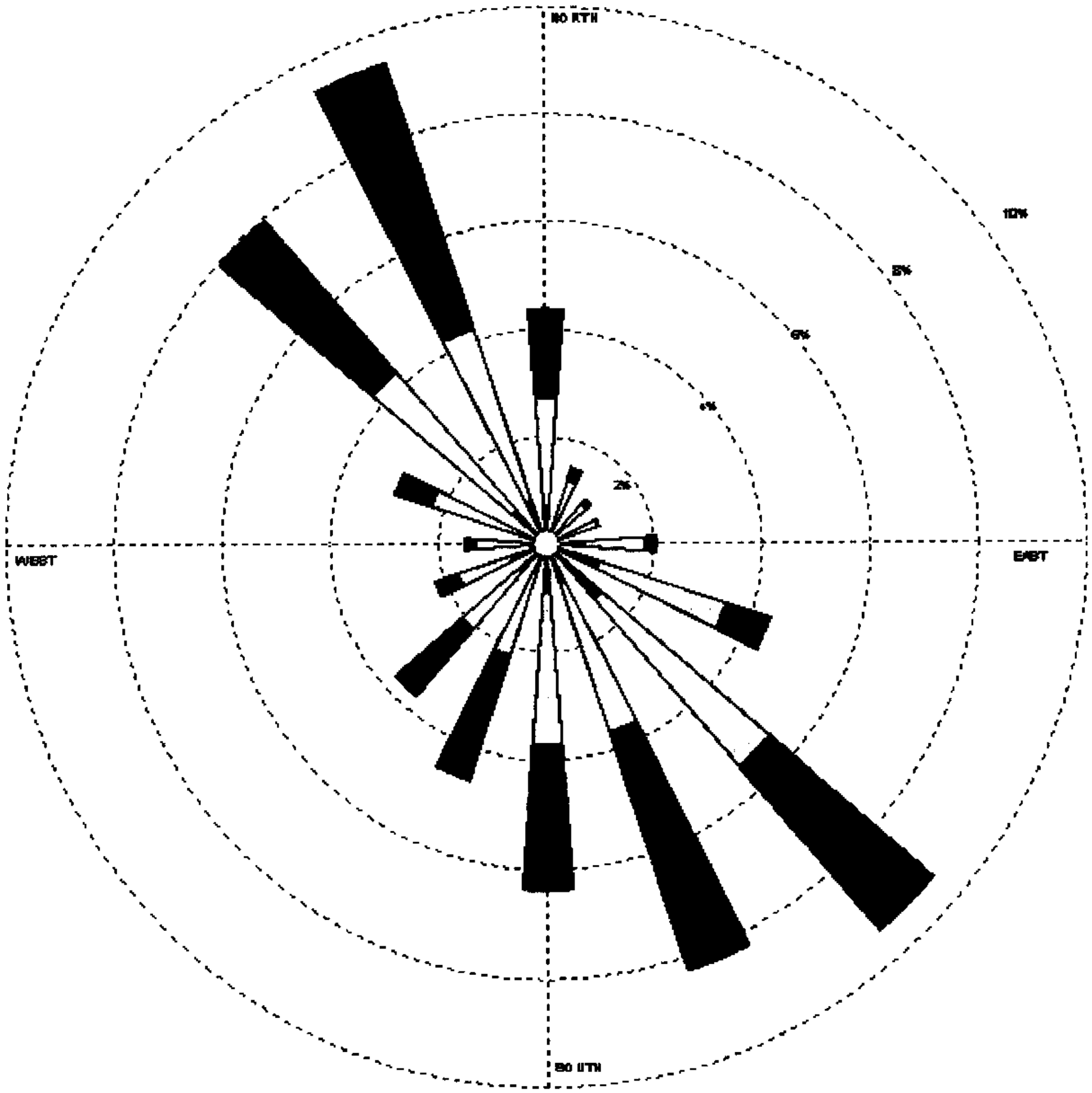
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of October
	AVG. WIND SPEED 3.39 m/s	CALM WINDS 24.26%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Oct 1 - Oct 31 Midnight - 11 PM	Figure 3j

WIND ROSE PLOT

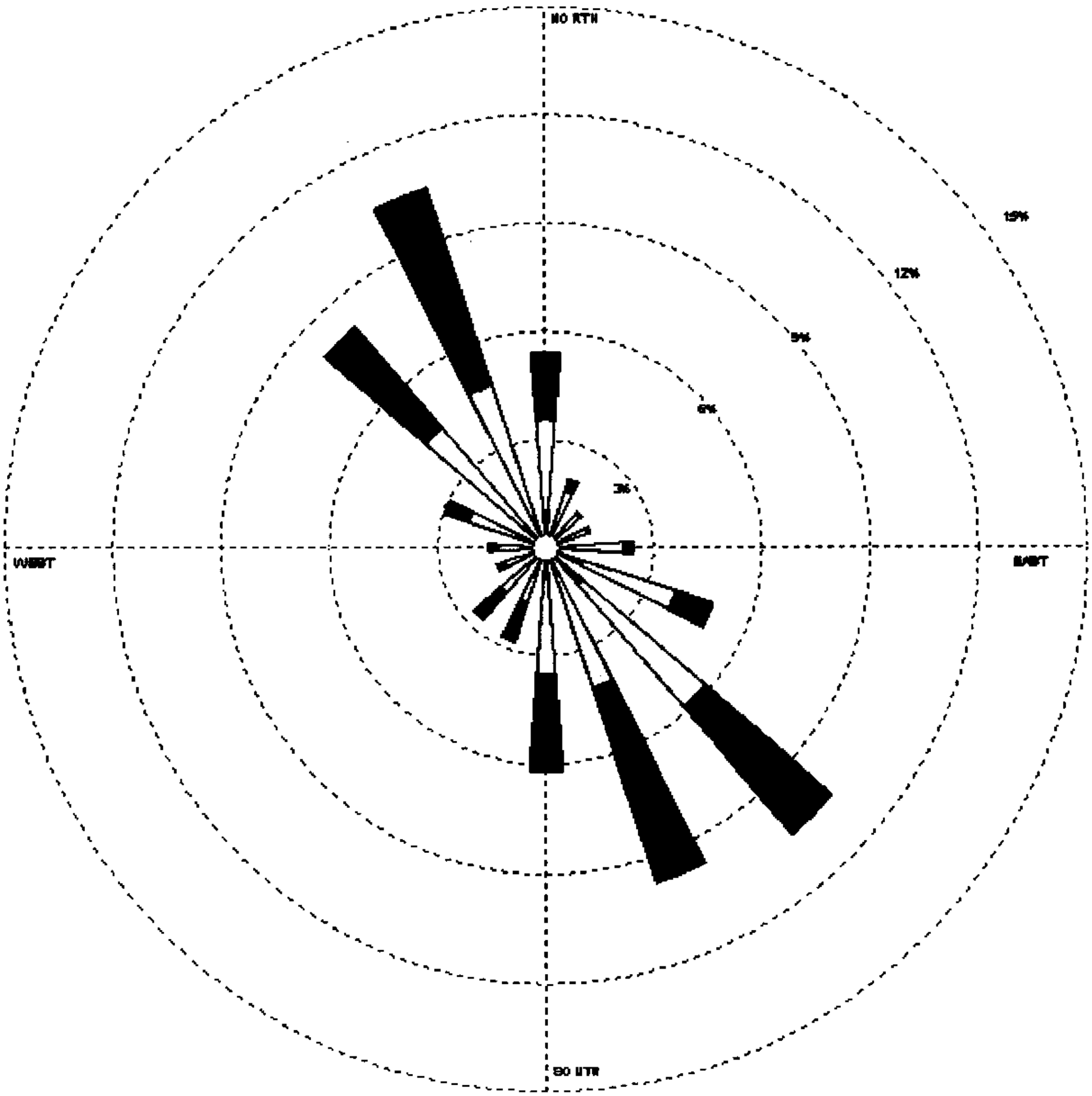
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of November
	AVG. WIND SPEED 3.47 m/s	CALM WINDS 29.14%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Nov 1 - Nov 30 Midnight - 11 PM	Figure 3k

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



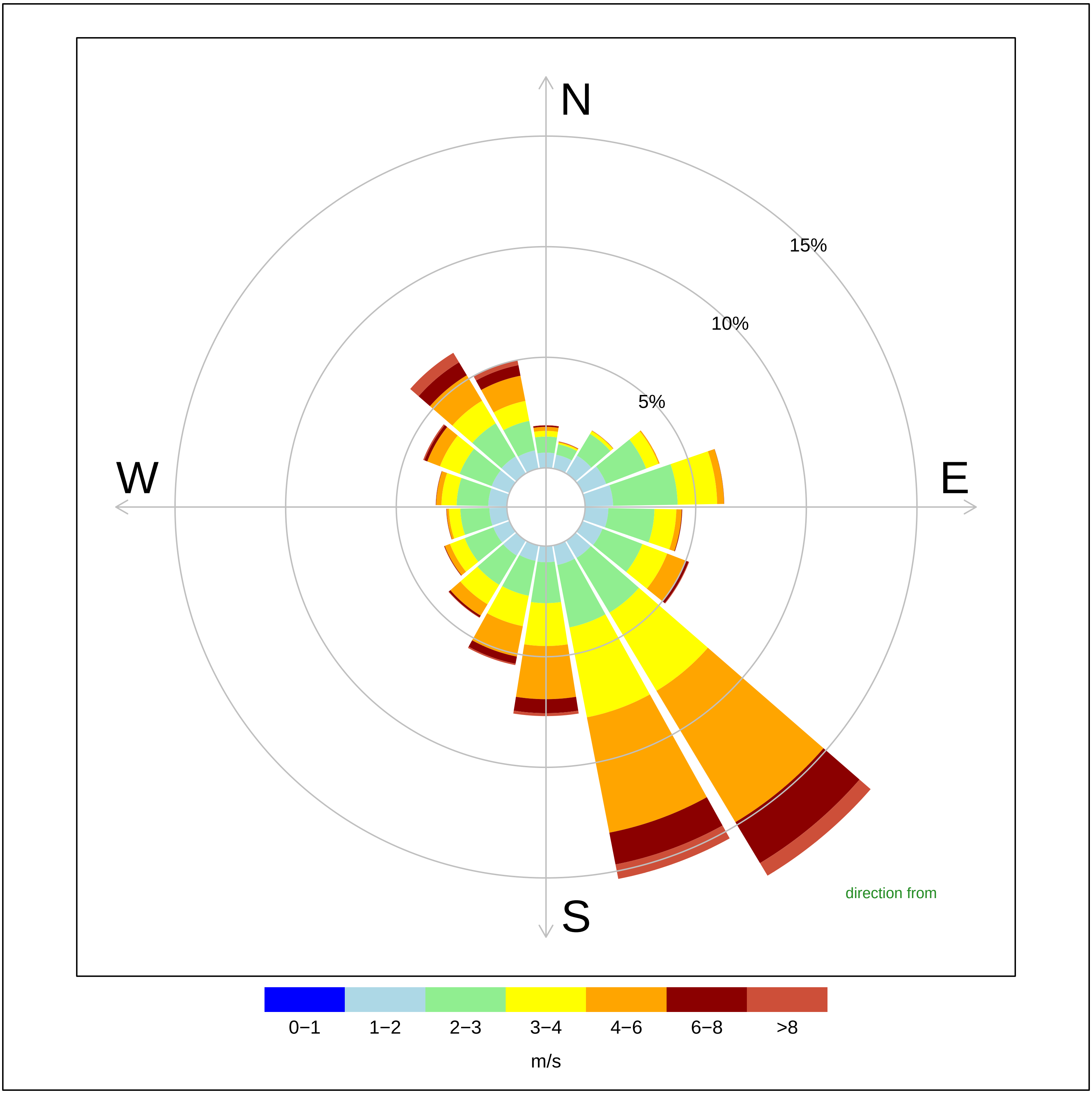
Wind Speed (m/s)			
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of December
	AVG. WIND SPEED 3.52 m/s	CALM WINDS 26.30%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Dec 1 - Dec 31 Midnight - 11 PM	Figure 31

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

Appendix C
Wind Rose

Appendix C. Wind Rose

A wind rose for the Compost Site follows this page.



LINCOLN REGIONAL AIRPORT

Location KARL HARDER FIELD, CA US	Average wind speed (m/s) 2.68
Observation Period From 2009−05−10 to 2018−05−10	Number missing 424
Project WPWMA	Total calm 42624
Comments Station ID: 720614−00205 Data is in 15−20 minute intervals	Anemometer threshold (m/s) 0.44704

Attachment 3
Site Contact List

Table C-1. Site Contact List

Name	Organization	Position	Phone Number	Email Address
Eric Oddo	WPWMA	Environmental Engineering Program Manager	(916) 543-3984	eoddo@placer.ca.gov
Ryan Schmidt	WPWMA	Associate Civil Engineer	(916) 543-3982	ryanschmidt@placer.ca.gov
Stephanie Ulmer	WPWMA	Environmental Resources Specialist	(916) 543-3985	sulmer@placer.ca.gov
Bryon Hildenbrand	FCC	Senior General Manager	(916) 938-0774	Byron.hildenbrand@fccenvironmental.com
Raymond Taylor	FCC	Compost Operations Manager	(530) 925-6991	Raymond.taylor@fccenvironmental.com

APPENDIX D:
ODOR RISK FORECASTING TOOL

Odor Risk

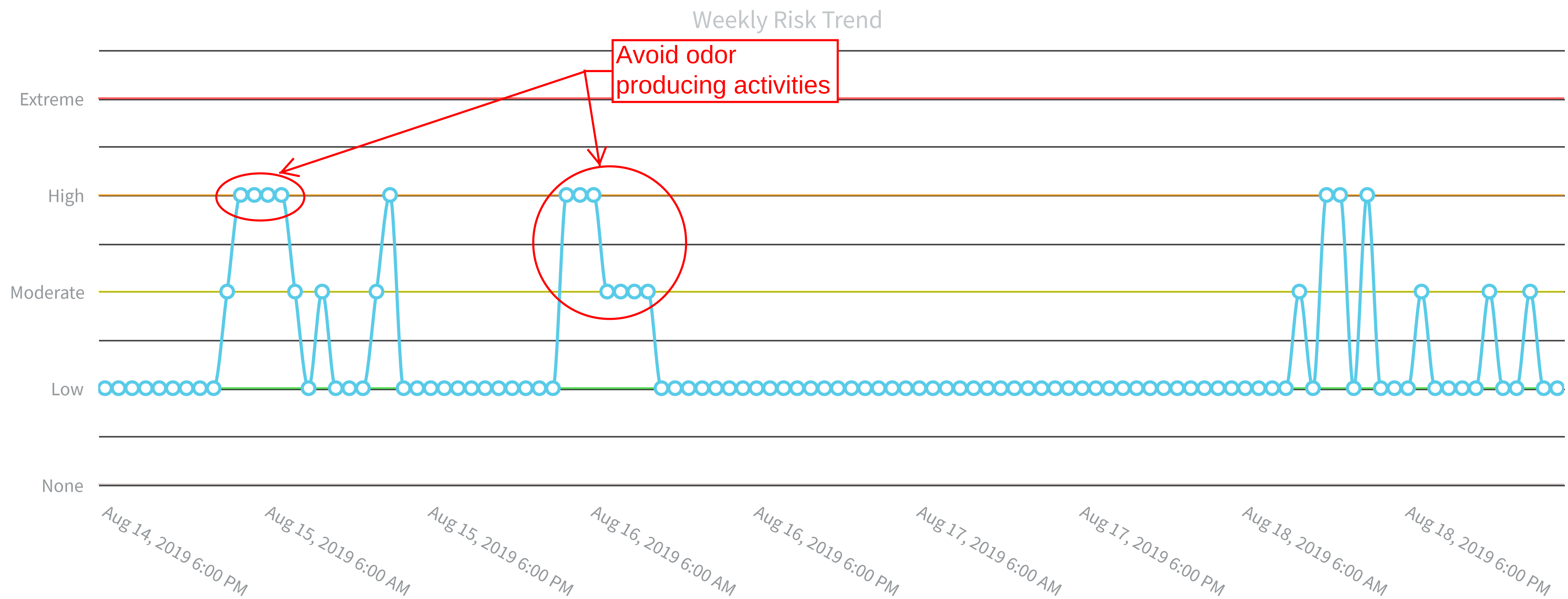
Daily Risk

Site: Western Placer Waste Management Authority - Western Regional Sanitary Landfill

Report Issued: Aug 15, 2019 5:30 AM

Report Period: Shift starting Aug 14, 2019 6:00 PM

No Data | None | Low | Moderate | High | Extreme



Night Shift - Wednesday

Aug 14, 2019 6:00 PM - Aug 15, 2019 6:00 AM

Hours	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 00	00 - 01	01 - 02	02 - 03	03 - 04	04 - 05	05 - 06
Risk	Low	Low	Low	Low	Low	Low	Low	Low	Low	Moderate	High	High
Wind Direction	SW	S	S	SE	SE	E	SE	SE	SE	E	N	N
Mixing Height (m)	46.96	23.27	23.20	26.24	46.70	130.58	123.59	86.62	34.33	22.43	44.33	22.20
Temperature (°F)	89.37	83.32	80.86	75.37	73.82	74.15	70.87	68.76	67.21	67.92	63.27	62.52
Wind Speed (mph)	4.91	3.84	3.26	5.66	6.48	8.60	6.89	5.31	5.56	1.49	5.27	5.07
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Wednesday 18:00 - Thursday 03:00: Low odor risk
Thursday 03:00 - 04:00: Low speed winds are causing a moderate odor risk
Thursday 04:00 - 06:00: High odor risk due to winds blowing towards town

Day Shift - Thursday

Aug 15, 2019 6:00 AM - Aug 15, 2019 6:00 PM

Hours	06 - 07	07 - 08	08 - 09	09 - 10	10 - 11	11 - 12	12 - 13	13 - 14	14 - 15	15 - 16	16 - 17	17 - 18
Risk	High	High	Moderate	Low	Moderate	Low	Low	Low	Moderate	High	Low	Low
Wind Direction	N	N	W	NW	W	W	W	W	NW	NW	W	W
Mixing Height (m)	32.09	47.37	99.42	214.96	320.04	442.11	496.21	579.25	678.45	810.26	536.20	99.33
Temperature (°F)	61.38	66.02	72.66	77.93	83.67	86.51	90.15	92.28	94.77	97.09	95.36	95.08
Wind Speed (mph)	3.73	3.01	2.71	4.69	2.95	6.15	5.11	5.21	2.80	2.45	7.07	4.28
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Thursday 06:00 - 08:00: High odor risk due to winds blowing towards town
Thursday 08:00 - 09:00: Low speed winds are causing a moderate odor risk
Thursday 09:00 - 10:00: Low odor risk
Thursday 10:00 - 11:00: Low speed winds are causing a moderate odor risk
Thursday 11:00 - 14:00: Low odor risk
Thursday 14:00 - 15:00: Low speed winds are causing a moderate odor risk
Thursday 15:00 - 16:00: High odor risk due to winds blowing towards town
Thursday 16:00 - 18:00: Low odor risk

Avoid odor producing activities due to 3 continuous hour period of "high" odor risk. (See previous page for start of "high" risk period.)

Night Shift - Thursday

Aug 15, 2019 6:00 PM - Aug 16, 2019 6:00 AM

Hours	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 00	00 - 01	01 - 02	02 - 03	03 - 04	04 - 05	05 - 06
Risk	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	High	High
Wind Direction	SW	S	SE	SE	SE	E	SE	S	SE	E	NE	N
Mixing Height (m)	49.23	23.28	23.11	55.71	86.33	185.50	129.77	89.84	40.97	22.47	45.88	22.35
Temperature (°F)	90.39	84.13	79.29	76.18	74.67	75.78	71.50	69.16	67.20	66.73	64.18	64.15
Wind Speed (mph)	4.40	3.62	4.72	7.20	6.95	10.73	6.48	5.95	5.59	4.57	6.36	5.80
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Thursday 18:00 - Friday 04:00: Low odor risk
Friday 04:00 - 06:00: High odor risk due to winds blowing towards town

Day Shift - Friday

Aug 16, 2019 6:00 AM - Aug 16, 2019 6:00 PM

Hours	06 - 07	07 - 08	08 - 09	09 - 10	10 - 11	11 - 12	12 - 13	13 - 14	14 - 15	15 - 16	16 - 17	17 - 18
Risk	High	Moderate	Moderate	Moderate	Moderate	Low	Low	Low	Low	Low	Low	Low
Wind Direction	N	SE	W	W	W	W	W	W	W	W	W	W
Mixing Height (m)	22.28	35.16	124.04	289.80	487.19	620.08	646.72	680.19	904.73	907.91	731.59	263.94
Temperature (°F)	63.94	67.81	74.40	79.39	83.80	86.26	90.51	92.47	94.73	95.52	94.18	92.88
Wind Speed (mph)	3.83	1.61	1.41	2.75	2.67	3.18	3.75	4.62	4.48	5.24	6.57	4.32
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Friday 06:00 - 07:00: High odor risk due to winds blowing towards town
Friday 07:00 - 11:00: Low speed winds are causing a moderate odor risk
Friday 11:00 - 18:00: Low odor risk

Avoid odor producing activities due to a 6 hour (or more) continuous time period of "moderate" (or worse) odor risk. (See previous page for start of "moderate" or worse risk period.)

Night Shift - Friday

Aug 16, 2019 6:00 PM - Aug 17, 2019 6:00 AM

Hours	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 00	00 - 01	01 - 02	02 - 03	03 - 04	04 - 05	05 - 06
Risk	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Wind Direction	S	S	SE	SE	SE	SE	SE	S	S	SE	S	SE
Mixing Height (m)	50.84	71.92	150.53	135.85	155.54	222.49	168.87	172.71	290.21	165.28	137.52	77.39
Temperature (°F)	89.26	82.74	77.80	75.21	73.35	72.92	69.89	67.44	65.60	62.71	61.17	59.94
Wind Speed (mph)	4.15	5.02	4.06	7.58	9.15	10.84	10.10	10.43	11.25	5.55	6.16	3.58
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Friday 18:00 - Saturday 06:00: Low odor risk

Day Shift - Saturday

Aug 17, 2019 6:00 AM - Aug 17, 2019 6:00 PM

Hours	06 - 07	07 - 08	08 - 09	09 - 10	10 - 11	11 - 12	12 - 13	13 - 14	14 - 15	15 - 16	16 - 17	17 - 18
Risk	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Wind Direction	S	S	S	SW	SW	S	S	S	SW	SW	SW	SW
Mixing Height (m)	95.84	71.66	205.62	457.26	691.83	793.17	926.64	994.66	1038.81	1031.80	890.86	419.16
Temperature (°F)	59.83	64.10	68.22	72.47	77.64	81.57	84.21	85.12	85.99	87.26	86.43	84.67
Wind Speed (mph)	4.43	5.20	6.67	3.94	3.04	8.03	8.17	11.98	7.81	7.12	7.36	8.94
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Saturday 06:00 - 18:00: Low odor risk

Night Shift - Saturday

Aug 17, 2019 6:00 PM - Aug 18, 2019 6:00 AM

Hours	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 00	00 - 01	01 - 02	02 - 03	03 - 04	04 - 05	05 - 06
Risk	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Wind Direction	SW	SW	S	S	SE	S	SE	S	S	S	SE	SE
Mixing Height (m)	62.91	27.04	319.23	67.29	339.14	410.00	439.97	368.24	378.23	195.34	149.25	49.74
Temperature (°F)	80.62	76.08	73.13	68.56	66.93	62.40	60.32	59.19	58.82	58.58	59.30	59.92
Wind Speed (mph)	8.27	10.10	13.06	9.14	7.60	14.52	12.32	10.31	9.94	11.59	7.77	4.36
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Saturday 18:00 - Sunday 06:00: Low odor risk

Day Shift - Sunday

Aug 18, 2019 6:00 AM - Aug 18, 2019 6:00 PM

Hours	06 - 07	07 - 08	08 - 09	09 - 10	10 - 11	11 - 12	12 - 13	13 - 14	14 - 15	15 - 16	16 - 17	17 - 18
Risk	Low	Low	Low	Low	Moderate	Low	High	High	Low	High	Low	Low
Wind Direction	SE	S	S	S	SW	NW	NW	NW	W	NW	W	NW
Mixing Height (m)	255.35	287.72	495.73	532.39	769.66	929.97	925.92	903.57	846.37	955.45	950.34	819.55
Temperature (°F)	58.29	60.63	63.29	64.93	69.80	73.26	75.63	77.16	79.58	80.48	80.63	80.59
Wind Speed (mph)	4.51	3.37	4.15	3.41	1.89	5.38	4.46	7.66	5.18	8.34	4.99	4.74
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Sunday 06:00 - 10:00: Low odor risk
Sunday 10:00 - 11:00: Low speed winds are causing a moderate odor risk
Sunday 11:00 - 12:00: Low odor risk
Sunday 12:00 - 14:00: High odor risk due to winds blowing towards town
Sunday 14:00 - 15:00: Low odor risk
Sunday 15:00 - 16:00: High odor risk due to winds blowing towards town
Sunday 16:00 - 18:00: Low odor risk

Night Shift - Sunday

Aug 18, 2019 6:00 PM - Aug 19, 2019 6:00 AM

Hours	18 - 19	19 - 20	20 - 21	21 - 22	22 - 23	23 - 00	00 - 01	01 - 02	02 - 03	03 - 04	04 - 05	05 - 06
Risk	Low	Moderate	Low	Low	Low	Low	Moderate	Low	Low	Moderate	Low	Low
Wind Direction	SW	W	SW	S	SE	SE	S	SW	SW	SE	S	--
Mixing Height (m)	68.73	60.55	232.63	191.73	200.07	240.66	22.28	89.46	120.59	86.33	113.56	--
Temperature (°F)	78.16	74.03	71.67	68.72	66.33	63.17	63.42	61.15	59.77	59.15	57.89	--
Wind Speed (mph)	6.65	2.95	8.34	8.75	4.67	5.87	2.46	4.07	4.87	2.13	5.20	--
Rainfall (mm)	--	--	--	--	--	--	--	--	--	--	--	--

Alerts

Sunday 18:00 - 19:00: Low odor risk
Sunday 19:00 - 20:00: Low speed winds are causing a moderate odor risk
Sunday 20:00 - Monday 00:00: Low odor risk
Monday 00:00 - 01:00: Low speed winds are causing a moderate odor risk
Monday 01:00 - 03:00: Low odor risk
Monday 03:00 - 04:00: Low speed winds are causing a moderate odor risk
Monday 04:00 - 05:00: Low odor risk

APPENDIX E:
ODOR INVESTIGATION SUMMARY REPORT TEMPLATE

Subject to revision by the facility and may be held as a digital record

On- and Off-Site Odor Monitoring Event Summary

Date		Prepared by:	
Observed weather conditions			

Off-Site Location Notes

Location	A: Fiddyment Farms Elementary		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	B: Fiddyment Road and Settlers Ridge		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	C: Mel Hamel Park		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	D: Verrazona Drive and Vignolia Loop		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	E: Leonard Davis Park		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	F: Greywood Circle		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			

On- and Off-Site Odor Monitoring Event Summary
(continued)

Location	G: Blue Oaks Theatres		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	H: Kathy Lund Park		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	I: William Jessop University		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	J: Whitney Highschool		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	K: Kaiser Lincoln		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			
Location	L: Pete Demas Park		
Time		Noticeable Odor: Y / N	Odor Intensity: N/A 1 2 3 4 5
Notes:			

Comparison of Field Observations to Odor Dispersion Model Estimates

Notes:

APPENDIX F:
LFG AND LEACHATE MANAGEMENT SOP

LANDFILL GAS and LEACHATE MANAGEMENT

STANDARD OPERATING PROCEDURES

This document identifies the procedures for conducting operations and maintenance of landfill gas collection and control systems at the Western Regional Sanitary Landfill in compliance with regulatory obligations in a timely and safe manner.

Version **DRAFT**

Date: July 2020

Table of Contents — Page

ABBREVIATIONS AND DEFINITIONS

Because it is common for state or local regulatory agencies to be delegated authority from U.S. EPA to implement federal environmental regulations, each state or local agency may define applicable terms differently or have different interpretations of how a Rule is to be implemented. Because of the wide variation that exists among agencies, specific definitions and interpretations are not addressed. It is the responsibility of the OM&M Provider to be aware of definitions and interpretations of Rules used by state or local agencies and to apply them appropriately, including the use of the following terms which, for purposes of this document, have these meanings:

Abandoned Well	An extraction well permanently removed from GCCS
ACO	Alternative Compliance Option(s)
APCD	Placer County Air Pollution Control District
CPVC	Chlorinated polyvinyl chloride pipe
Decommissioned Well	An extraction well that is temporarily removed from GCCS
EG	State Emission Guidelines for Municipal Solid Waste Landfills
GCCS	Gas collection and control system (landfill gas management system)
HASP	Health and Safety Plan
HDPE	High Density Polyethylene Pipe
Landfill Operations Manager	Person responsible for landfill operations - Other titles typically assigned to this individual include: General Manager, Site Manager, Operations Manager
LFG	Landfill gas
LFGE	Landfill Gas to Energy Facility
NSPS	New Source Performance Standards for Municipal Solid Waste Landfills
OM&M	GCCS operation, maintenance, and monitoring
OM&M Provider	Personnel responsible for the Operations and Maintenance of the GCCS. This term is used for internal WPWMA Environmental Technicians, Specialists, and management team and OM&M contractors.
OSHA	Occupational Safety and Health Agency
Prime Mover	Fan, blower, compressor or similar device used to generate negative pressure on the landfill gas collection system
PVC	Polyvinyl Chloride Pipe
SCADA	Supervisory Control and Data Acquisition
SEM	Surface Emissions Monitoring
SOP	Landfill gas management Standard Operating Procedures as described in this document
SOW	Site-specific scope of work for GCCS OM&M services
SSM	Startup, Shutdown and Malfunction
SWANA	Solid Waste Association of North America
WPWMA	Western Placer Waste Management Authority
WPWMA LFG Operations Manager	WPWMA staff representative(s) designated by the WPWMA to oversee the GCCS and LCRS operation

Terms not defined above shall have the meaning expressly defined in the body of this document.

SECTION 1
INTRODUCTION

This document presents the standard operating procedures (SOP) and minimum operation, maintenance, and monitoring (OM&M) efforts required of those parties responsible for performing landfill gas collection and control system (GCCS) management and leachate collection and recovery system (LCRS) OM&M services at the Western Regional Waste Management Authority (WPWMA) landfill. The procedures and guidelines apply to WPWMA employees and consultants and contractors providing GCCS OM&M services.

This document includes the procedures and minimum requirements for:

- Monitoring, inspection, and maintenance of GCCS and LCRS system components and ancillary equipment;
- Monitoring, inspection, and maintenance of blower stations and LFG control devices (flares, etc.);
- Data management; and
- Reporting related to GCCS and LCRS management.

1.1 GOALS

The WPWMA is committed to complying with federal, state, and local regulations related to LFG management and to being a good neighbor by controlling odor and subsurface migration of explosive gases that could potentially impact the surrounding community. To accomplish these goals and other goals, the WPWMA has adopted a stringent program for operating the GCCS and LCRS. This program may require effort above and beyond that which WPWMA is obligated to perform under applicable permits or regulations. The objective of this effort is to operate the GCCS in a proactive manner before issues arise that might otherwise demand immediate attention and/or substantial cost to remedy.

To ensure consistent and reliable GCCS operation, meet regulatory requirements, and be a good neighbor in the community, the GCCS must be operated with the following goals in mind:

- Meet and/or exceed the requirements of the federal New Source Performance Standards (NSPS) and Emission Guidelines (EG).
- Operate within the limits and guidelines of WPWMA's SOP.
- Control fugitive odors and surface emissions.
- Control subsurface LFG migration.
- Avoid negative groundwater impacts from LFG.
- Operate the GCCS using best industry practices in a professional and safe manner.
- Operate the GCCS to maximize the flow and methane content to the abatement devices

1.2 SITE-SPECIFIC VARIANCES

Site conditions and permit requirements may necessitate future site-specific revisions or modifications. Therefore, modifications may be requested with appropriate approvals of those changes by WPWMA's Manager, Landfill Gas Operations.

1.3 PROCEDURES FOR REQUESTING SITE-SPECIFIC SOP VARIANCES

If variances to the SOP are warranted to address updated conditions or permit requirements and not just as a matter of convenience, the process outlined below may be followed. Modifications will be considered and must be approved by WPWMA LFG Operations Manager.

At a minimum, a request for an SOP variance shall include:

A. The original SOP statement, condition, or procedure redlined to illustrate the proposed changes.

B. Engineering evaluation and supporting documentation that justifies the change, including:

   1. Engineering evaluation of the GCCS illustrating that changing the SOP, system or equipment would be beneficial, that the SOP cannot be met and is outside the control of the OM&M Provider and cannot be resolved through appropriate system or equipment modifications.
   2. Minimum of six months of data, testing information, or engineering calculations supporting the proposed change.
   3. Analysis showing that the proposed change does not impact any WPWMA goals or regulatory obligations.

1.4 SOP UPDATES

This SOP may be modified as new technology, methods, and procedures related to landfill gas management are adopted. Suggestions for changes should be directed to WPWMA's Manager, Landfill Gas Operations.

1.5 DISCLAIMER

Nothing presented in this document grants permission to any party engaged in GCCS OM&M services at the WPWMA facility to violate federal, state, or local laws, regulations, permits, ordinances, or consent orders while conducting the services.

SECTION 2
GENERAL INFORMATION

2.1 FORMAT OF SOP

Imperative and abbreviated language is used in the SOP that is directed at the party performing the OM&M services unless specifically noted otherwise. Note that whether stated imperatively or otherwise, all requirements must be met unless an approved variance is granted.

For incomplete sentences, the reader should insert “shall”, “OM&M Provider shall”, or similar mandatory phrases by inference.

2.2 HEALTH AND SAFETY

All WPWMA personnel performing work on LFG management systems shall abide by WPWMA health and safety policies and shall participate in WPWMA’s general safety training and supplemental training specifically related to landfill gas and leachate management. Each contractor, including the WPWMA GCCS and LCRS OM&M Provider(s) shall file with the WPWMA their own corporate and project-specific health and safety plans (HASP) prior to the commencement of work at any site, and abide by it.

2.3 QUALIFICATIONS AND GENERAL REQUIREMENTS

OM&M technicians are critical to the proper functioning of the GCCS. In order to ensure the project is staffed with professional and experienced technicians who perform services with WPWMA’s best interests in mind, WPWMA has implemented the following minimum personnel requirements.

- OM&M Providers shall provide routine and periodic training of field and office personnel from the Solid Waste Association of North America (SWANA) or similar trade group to ensure that services provided WPWMA are in accordance with the most recent state of the practice and consistent with industry standards and best practices.

2.3.1 Self-Performance of Work

The OM&M Provider must be able to self-perform all routine and non-routine services and have capability for performing monitoring, maintenance, troubleshooting, and repair work on all portions of the GCCS with the following exceptions:

A. Electrical and mechanical repair and troubleshooting of proprietary systems (such as control logic, Supervisory Control and Data Acquisition [SCADA] Systems)
B. Medium or high voltage electrical panel work
C. Flare source testing

2.3.2 Work by Trained and Certified Personnel

Any confined space, excavation, or pipe fusion work conducted in support of OM&M work shall be performed only by trained and certified individuals, and the OM&M Provider shall take full responsibility for the safety and quality of work by their employees, contractors, and subcontractors. Certifications for such training shall be posted on the inside wall of the onsite job office.

2.3.3 Skills and Knowledge

Technicians performing OM&M services at WPWMA facilities must have a working knowledge of:

A. Equipment
   1. Monitoring equipment (hardware, software, calibration procedures, etc.) used to perform the work.
   2. Prime mover equipment (blowers, flares, control systems, compressors, piping, valves, gas driers, gas coolers, flow measurement devices, etc.).
   3. LFG wellfield components (wellheads, vertical and horizontal wells, vents, geosynthetic liners and boots, electric and pneumatic pumps, drip legs, gravity traps, sumps, etc.).
   4. Personal computers, specifically, software to download data, upload data to WPWMA's web-based LFG data management, email, and spreadsheets.
   5. The WPWMA's GE iFix SCADA system software and related Historian Excel plug in.

B. Regulations and Permits
   1. New Source Performance Standards (NSPS) for Municipal Solid Waste (MSW) Landfills (40 CFR 60 Subpart WWW)
   2. Site-specific Title V operating permit and relevant state permits,
   3. Federal and state regulations applicable to landfills and OM&M services
   4. Site-specific consent orders, operation plans, guidance documents, etc., related to the GCCS, odor control, and perimeter probe and surface emission monitoring, including:
      i. GCCS Design Plan
      ii. SEM Plan

C. COORDINATION WITH LFGE PLANT OPERATOR

If the GCCS supplies gas to a LFGE plant or other beneficial use facility, WPWMA shall notify the plant operator of the schedule for obtaining liquid levels, performing system repairs and modifications and/or emergency repairs, so the plant can make adjustments to its operations during that time and reduce unnecessary downtime. The WPWMA, OM&M Provider, and LFGE Plant Operator shall conduct bi-weekly meetings to discuss operations, scheduled maintenance and areas of concern, etc. A group text message shall be established with the WPWMA, OM&M Provider and LFGE Plant Operator to ensure communication on shutdowns, wellfield activity and changes, unscheduled maintenance and/or repairs. During scheduled maintenance, construction or repairs, shut downs to the GCCS may be necessary. In the event of a shut down the following protocol will be followed:

1. The OM&M Provider shall send notification on the group text message to confirm LFGE Operator is prepared for the shut down of system. An estimated time of work completion will be given and verification of ready status will be given.
2. The OM&M Provider shall send group text message updates to work status during shut down and alert LFGE Operator to any delays.
3. The OM&M Provider shall send notification upon completion of work and GCCS start-up. Upon start-up of GCCS the OM&M Provider shall monitor the gas flow at the BFS to ensure the gas composition is within normal range for the safe start-up of the LFGE Plant.

2.4 GCCS EMERGENCIES

A GCCS emergency is defined as an urgent matter regarding the operation and maintenance of the GCCS (and not otherwise covered by other procedures, specifically the SSM or HASP) that is, or has the potential to be, a violation of the site's permit(s) or federal, state, or local regulations or could cause significant damage to the landfill or its infrastructure.

2.4.1 Notification to WPWMA Personnel

Communicate the GCCS emergency to the Landfill Operations Manager as soon as practical, but no more than 1 hour after identifying the event. The OM&M technician or project manager shall attempt to notify the Landfill Operations Manager by phone and then text; notification via e-mail alone shall only be acceptable if multiple attempts by phone or in person are unsuccessful in reaching the WPWMA personnel. In communicating the nature of emergencies to WPWMA, include the following information:

- A description of the GCCS emergency,
- Specific condition of the permit(s) or federal, state, or local regulation that may have been or could be exceeded if action is not taken immediately, and
- Specific location where the GCCS emergency occurred or is occurring.

If the GCCS emergency was conveyed verbally, follow up with an e-mail or other written documentation within one business day confirming the discussion.

The OM&M Provider shall not leave the site before either the Landfill Operations Manager is notified of the GCCS emergency and has agreed that the services of the OM&M Provider are not required to address the situation. If the Landfill Operations Manager is not available to address the GCCS emergency, the OM&M Provider shall use the call tree to contact another WPWMA representative regarding the situation.

2.4.2 Regulatory Notification

If necessary, the Landfill Operations Manager will notify the appropriate regulatory agency of the situation. The OM&M Provider shall not contact any federal, state, or local agencies on behalf of WPWMA unless specifically directed to do so by the Landfill Operations Manager.

2.4.3 Press/News Agencies

Only authorized WPWMA personnel are permitted to speak to the press, civic leaders, or other outside parties regarding WPWMA facilities or operations. The OM&M Provider shall not speak to these parties on behalf of WPWMA.

2.5 CONTACT CALL TREE FOR GCCS EMERGENCIES

Before starting field work, the OM&M project manager shall prepare a call tree that specifies, in order, who should be called in case of a GCCS emergency. At a minimum, the call tree shall include:

- OM&M lead technician and alternate technicians
- OM&M project manager

- Landfill Operations Manager – Person responsible for landfill operations - Other titles typically assigned to this individual include: General Manager, Site Manager, Operations Manager
- WPWMA LFG Operations Manager

Include the following information for each person:

- Office Phone
- Cell Phone
- Home Phone (optional)
- Email address
- Business Address

Provide a copy of the call tree to each person listed on the tree, including all OM&M personnel who perform work at the site. Place a copy of the call tree in a conspicuous location at the site's blower station control panel.

SECTION 3
GCCS OPERATING GOALS

3.1 DEFINITIONS

The following terms are used in this section and the remainder of this SOP.

- Pressure vs. vacuum: These terms are well known, but it is important to understand that vacuum is defined as negative pressure, and as such, there are two ways in which we can describe the pressure in a header or well. For example, we can say that a well has an initial static pressure of -3.5 inches of water column (in-w.c), or that it has a vacuum of +3.5 in-w.c. Similarly, we can say that the inlet of a blower skid has either -40 in-w.c. pressure or +40 in-w.c. vacuum.

  Note that in most cases, WPWMA will refer to "pressure" and not "vacuum" in order to be consistent with nomenclature and standards used in typical monitoring equipment. The exception to this is when referring to the negative pressure set point at the inlet of the blower system, which is almost universally referred to in the industry as the "vacuum set point". We recognize this inconsistency, but retain the use of that term since it is so commonly used in the LFG industry.

- System pressure: The static pressure measured in the header or lateral piping.

3.2 VACUUM SET POINT

WPWMA considers the vacuum set point an integral part of maintaining the overall "health" of the GCCS wellfield. Vacuum in the header should be held steady by using variable frequency drives (VFDs) on the blowers that are controlled by a pressure transmitter mounted upstream of the inlet of the blower station condensate knockout pot (KOP). Vacuum should be maintained as low as possible while ensuring minimum acceptable vacuum is available to the furthest points of the collection system. The site-specific vacuum set point is established and monitored at the inlet of the blower system (i.e., at the inlet of the KOP).

3.2.1 Goal of Vacuum Set Point

A vacuum "set point" shall be established by determining <u>the highest pressure (i.e., smallest vacuum)</u> at the blower skid inlet that allows the wells to remain within the operating range goals and to maximize LFG collection. The wellfield will be consistently balanced and tuned to this set point. The set point, once established, should not be changed unless wellfield conditions warrant an increase or decrease in pressure to accomplish balancing and tuning goals.
The goal of the vacuum set point is to:

- Provide sufficient vacuum to all portions of the LFG piping network
- Provide LFG extraction consistency.
- Facilitate consistent balancing and tuning of the wells.
- Minimize the potential to over pull the wells, which can lead to introducing ambient air into the waste mass.
- Prevent under pull, which can lead to reduced gas extraction and increased surface emissions, odors, and subsurface gas migration.
- Eliminate unnecessary use of electricity to generate unnecessary vacuum.

- Minimize impact if GCCS pipeline, fitting, or joint fails. Having minimal vacuum reduces the potential for large amounts of soil, trash, air and debris to enter the GCCS if a failure occurs.

A minimum system vacuum set point will be set based on the following:

- Input from the OM&M Provider.

- Other data, including engineering calculations and equipment performance limits and capacities.

- Analysis of the GCCS to ensure that the set point achieves sufficient negative pressure to keep the wellfield in compliance with:

    - Established operating parameters and thresholds
    - Perimeter gas probe limits
    - Programs to control fugitive gas emissions/odors
- As of July 2020, the inlet vacuum setting was 63.5" w.c.

3.2.2 Changing the Vacuum Set Point

Once established, the vacuum set point shall not be changed unless deemed necessary by WPWMA and OM&M Provider. If the set point is to be changed, the OM&M Provider shall notify WPWMA of the proposed change and why the change is necessary. The OM&M Provider shall not change the vacuum set point more than 10% (+ or -) without approval of the WPWMA.

3.3 NSPS/EG THRESHOLDS AND WPWMA SOP TARGETS

WPWMA is committed to providing consistent and reliable GCCS operation, and each GCCS must be operated with the goals listed in Section 1 in mind:

- Meet and/or exceed the requirements of the federal New Source Performance Standards (NSPS) and Emission Guidelines (EG).
- Operate within the limits and guidelines of WPWMA's SOP.
- Control fugitive odors and surface emissions.
- Control subsurface LFG migration.
- Avoid negative groundwater impacts from LFG.
- Operate the GCCS using best industry practices in a professional and safe manner.
- Operate the GCCS to maximize the flow and methane quality to the flare and on site LFGTE facility.

The following default operational targets have been established to ensure that WPWMA GCCS achieve the minimum criteria consistent with the NSPS or the California Landfill Methane Rule The OM&M Provider shall meet the more stringent of either the:

- NSPS/LMR, state, or local regulatory operating limits,
- WPWMA SOP target operational levels, or
- Site-specific operating limits.

The table below summarizes NSPS/EG regulatory thresholds and WPWMA SOP targets. State, local, or site-specific limits may be inserted as they are approved (site-specific limits must be approved per the procedures presented in Section 1).

Parameter at the Wellhead	NSPS/EG Threshold	SOP Target
Oxygen (% by volume)	<5	<2 maximum (<1 typical)
Pressure (in-w.c.)	<0	<0
Gas temperature (°F)	<131	<131 (1) (<120 typical)
Methane (% by volume)	N/A	(50 typical)
Balance gas (% by volume)	N/A	<20
Gas flow rate (scfm)	N/A	≥ 5
Minimum system pressure (in-w.c.)	N/A	≤ -10 (2)
Monitoring frequency	Monthly	Monthly (see Section 3.3)

(1) Unless reasonable higher operating values (HOVs) have been approved by the applicable regulatory agency or enhanced monitoring has been performed and appropriate measures are in place to accommodate elevated temperatures.
(2) Measured at the hydraulically most distant point of the GCCS (i.e., the point in the GCCS with the highest system pressure (lowest system vacuum)).

3.4 ESTABLISHING SITE-SPECIFIC OPERATING LIMITS

There are alternate operating limits that can be established for a GCCS:

1) **Variances to regulatory parameter thresholds.** Variances to NSPS/EG parameter thresholds are also known as "higher operating values" (HOVs). Regulatory HOVs cannot be exceeded, regardless of any site-specific SOP limits. If applicable, establishing a site-specific operating value shall be performed in conjunction with obtaining an approved variance from the applicable regulatory agency.
2) These must be proposed by WPWMA to the APCD with assistance from the air compliance consultant and with input from the OM&M Provider, as necessary.

3.4.1 Management of Regulatory HOVs

Higher operating values may be requested from the applicable regulatory agency as deemed appropriate by WPWMA's Landfill GCCS Design Plan provided in Appendix A.

WPWMA or the air compliance consultant shall track and document all alternate operating limits or HOVs approved by local, state, or federal regulatory agencies in accordance with the requirements of WPWMA's *Landfill GCCS Design Plan provided in Appendix A* At a minimum, the following information must be tabulated, kept up-to-date, and uploaded to WPWMA's LFG database for each approved HOV:

1. Well ID
2. Date of approval of alternate value
3. Duration of approval (if temporary)
4. Parameter for which the alternate operating limit was granted
5. New allowable operating threshold
6. Regulatory citation or copy of document granting approval

If applicable, the OM&M Provider shall input pertinent information into WPWMA's LFG database for the purpose of automatically identifying exceedances or compliance timelines.

3.4.2 Temporary Alternate Operating Limits

Temporary alternate operating limits may be applicable under certain circumstances, including the following:

- Subsurface oxidation (SSO) or landfill fire – An example of this would be when wells are turned off in an attempt to prevent pulling oxygen into the waste mass.

- Decommissioned well(s) – This includes wells taken off-line from the permitted GCCS with regulatory approval. In this case, the well is left in place and is available to be reconnected to the GCCS in the event surface emissions in the area are detected.

- Other conditions as defined by permit or consent order.

If temporary alternate operating limits are used, the OM&M Provider shall make note that such limits are being applied within the monthly GCCS operating report.

3.4.3 Permanent Alternate Operating Limits

Alternate values for pressure, temperature, or oxygen may be established by:

- Variance letter from the local permitting authority or U.S. EPA.

- Permit condition listing the approved alternate value.

- Rule citing other allowable limits.

- Site-specific conditions, provided that limits established by permit, rule, or consent order are not exceeded.

SECTION 4
WELLFIELD OPERATION, MONITORING, AND TUNING

4.1 OVERVIEW AND GENERAL PRINCIPLES

To assure proper GCCS operation, WPWMA has established the following:

- Single source of vacuum for the wellfield. Negative system pressure shall be supplied by a single blower station for the wellfield. This requires the site infrastructure to be designed and constructed to accommodate all of the LFG flow to a single point, regardless of the number of control devices or end uses of the LFG. The single blower station then pushes the gas at minimal positive pressure to the flares and/or a delivery point from which it then travels to a beneficial end use (i.e., LFGE) project.

- Blowers run on inlet vacuum control. The blower system has VFDs that adjust the blower speed based on the blower discharge pressure continuously monitored at the outlet to the LFGE and flares that control vacuum applied to the wellfield.

- Comprehensive wellfield data collection and wellhead flow rates. This site-specific scope of work lists a myriad of data that must be collected. All of this information is vital to properly assess, troubleshoot, and improve, if necessary, the GCCS. For this reason, it is imperative that valid wellhead monitoring data include accurate wellhead flow rates and technician comments entered into the monitoring instrument (If applicable).

- All data is considered compliance data. All data, whether taken by the OM&M Provider, other parties, or regulatory agencies shall be treated as "compliance data". All data must be uploaded to WPWMA's LFG database, and all of it is subject to regulatory thresholds and scrutiny. Under no circumstances shall the OM&M Provider obtain data and not provide it to WPWMA or fail to enter it into the site operating record via the LFG database.

- All data must be uploaded to WPWMA's LFG database. Without exception, all GCCS and gas migration monitoring (i.e., probes and structures) data must be uploaded to WPWMA's LFG database.

- Competency of OM&M personnel. WPWMA has minimum standards for technician experience and competency, as listed Section 2.4.

4.2 DATA TAGS

Various information tags are used in this SOP and are commonly used in the practice of performing OM&M at the site. Some of these are defined or described below.

- Location – This is the physical location where the reading is taken. In many cases, the "Location" and "Point Name" will be the same, unless there are multiple sampling points at a given location. For example, if GP-5 has a shallow and deep component, the "Location" is designated as GP-5, but the actual monitoring "Points" would be designated as GP-5S and GP-5D for the shallow and deep probes, respectively, located at GP-5.
- Point Name – The Point Name is the name by which the well, probe, or sampling location is known (e.g., EW-01, GP-08, inlet, outlet, etc.) The Point Name is not limited by the number of

characters. It should be descriptive enough so that users understand what it is, but should not be overly long, either.

- Point ID – This is the ID used by the LFG monitoring instrument (commonly known as the "GEM ID" when using a Landtec instrument). Point IDs must be unique for each site and for each monitored location.
- Point Type – Points are described as any of the following:
    - Well
    - Monitoring Probe
    - Sample Port
    - Flare-Engine-GHG
    - Calibration Record
    - Grid

Additional types may be added to the database in the future. Users are responsible for knowing the options available and ensuring that each Point ID is characterized properly with the correct "point type" designation.

4.3 IDENTIFICATION OF WELLS AND PROBES REQUIRING MONITORING

The WPWMA shall provide the OM&M Provider a copy of the most recent site plans and permit requirements and shall direct any questions on the required scope of work to WPWMA. At least annually, the WPWMA will communicate whether there are any changes in the wells to be monitored or if changes are expected based on planned GCCS expansions.

LFG Wells and Collectors

Regardless of NSPS/EG status, all wells/collectors are to be monitored at least once per month, unless otherwise noted by WPWMA. This includes vertical wells, horizontal collectors, shallow collectors, under-liner collectors (tie-ins to the leachate collection and removal system (LCRS), soil vapor extraction (SVE) wells, etc. In addition, the requirement to obtain flow rate measurements for each wellhead reading applies to all of these collectors as well.

Gas Migration Monitoring Probes and Structure Monitoring Locations

As with the GCCS components, the OM&M Provider shall verify the gas migration monitoring probe and structure locations are current to ensure the correct locations for probes and structure monitoring are covered. The site and OM&M Provider shall confirm that the OM&M Provider has a copy of the most recent site monitoring plan. If probes or structures have been added to the site's monitoring plan, WPWMA shall provide an updated list or map to the OM&M Provider.

4.4 MONITORING EQUIPMENT MINIMUM STANDARDS

The accuracy, completeness and dependability of the monitoring equipment used in the field is key to providing OM&M personnel with reliable results on which to base tuning decisions.

All GCCS field monitoring equipment must meet the following minimum requirements:

1. Infrared sensor technology for CH_4 and CO_2 measurement.
2. Electrochemical sensor for O_2 measurement.

3. Temperature probe to measure the temperature of the gas stream.
4. Internal pressure sensors to measure static, system, and differential pressures.
5. Ability to be calibrated in the field.
6. Ability to store measured data and user defined comments electronically.
7. Data shall be exported via a .csv file or encrypted file format supported by WPWMA's LFG database.

4.5 MONITORING POINT NAMING AND STANDARD COMMENTS

Each monitoring location must have a site-specific ID that is unique to the monitoring point. The IDs must be:

- Consistent with the site's GCCS Design Plan and Record Drawings
- Configured in the meter to accurately calculate flow rates from the well by recognizing the type and size of wellhead and the flow measuring device (pitot tube, orifice plate, venturi, etc.)

The OM&M Provider shall compile the Point IDs into a single ID set that shall be used for all work related to the site and upload it to WPWMA's LFG database. This will ensure that the most recent file is always available for alternate technicians and others who may perform monitoring at the site.

4.5.1 Calibration Reading IDs

All instrument calibrations shall be stored in the monitoring device and uploaded to WPWMA's LFG database. Calibration IDs shall consist of the 3 letter site code ("WES"), followed by "CG" to designate a calibration gas, followed by an indicator of the gas concentration. The "M" in the following examples indicates methane. The "O" indicates oxygen.

50% CH_4/35% CO_2/balance gas =	WESCGM50
15% CH_4/15% CO_2/remainder balance gas =	WESCGM15
4% O_2/remainder balance gas =	WESTCGO4
Atmospheric air =	WESCGAIR

4.5.2 Prime Mover Inlet and Outlet IDs

Establish IDs for the inlet and outlet of the prime movers (i.e., blower station) to differentiate readings taken at the beginning and end of each monitoring event.

4.5.3 Inlet and Outlet of Each Blower IDs

Establish IDs for the inlet and outlet of each individual blower. Each monitoring port shall be have a Point ID label affixed. These ports are used to measure pressure at the inlet and outlet of the blowers, without any losses that would be attributable to valves or fittings, and allow personnel to compare inlet and outlet pressure and flow rates to the blower curve for troubleshooting purposes or to confirm proper performance. For the Prime Movers, establish IDs to differentiate readings taken at the beginning and end of each monitoring event and record them. For all other blowers, it is not necessary to obtain readings at these monitoring locations during each monitoring event, however, these should be monitored periodically (i.e., at least semiannually) to compare blower performance to the blower curve.

4.5.4 Flame Arrestor Inlet and Outlet IDs

Flame arrestor ports provide the following important information:

1. Gas quality to the control device (for GHG monitoring purposes).

2. Flame arrestor inlet pressure (indicates whether excess pressure is present on the discharge side of the blowers, which impacts the amount of negative pressure that can be applied to the wellfield).

3. Flame arrestor outlet pressure (identifies whether there is excess pressure to the flare, which for an enclosed flare indicates clogging of the burner tips, or for an open flare may indicate that an orifice plate installed at the flare tip is too small).

4. Differential pressure across the flame arrestor indicates whether the flame arrestor element is in need of cleaning or other maintenance.

4.5.5 Greenhouse Gas Monitoring IDs

A separate Point ID is required for each LFG control device, including:

- Each flare
- LFG energy projects or other end users

If a control device is decommissioned and no longer in use, the OM&M Provider is responsible for changing the status of the applicable ID in the LFG database so that it is designated as inactive or decommissioned. Readings are not required for control devices that have been decommissioned and identified as such in the database.

4.5.6 Replacement/Redrilled Wells

If a well/collector is replaced (redrilled/reconstructed), a new collector name and Point ID must be established in accordance with the naming convention used on the Construction Drawings.

> *…Redrills shall have the same number as the well that it replaces, followed by a letter that indicates the number of times the well has been replaced. For example, if EW-16 is being abandoned and replaced with a new well, the replacement well shall be named EW-16A. If EW-16A is later abandoned and replaced with a new well, the new well shall be named EW-16B, and so on.*

The OM&M Provider shall designate the ID for the old well as “Abandoned” in WPWMA’s LFG database, and the ID shall not be re-used in the future.

4.5.7 Allowable Comments

The OM&M Provider shall create a standard list of operational comments to utilize in the meter when monitoring and making adjustments. Comment Lists shall be unique for each point type. The utilized comments list will be the same on all site meters and OM&M technicians shall be trained to apply comments consistently. The following list presents suggested comments. Actual comments used can differ; however, a comment must be created and saved that clearly reflects the adjustment made:

a.) No Change
b.) Opened Valve ½ turn or less
c.) Opened Valve ½ to 1 turn
d.) Opened Valve > 1 turn
e.) Valve already open 100%
f.) Closed Valve ½ turn or less
g.) Closed Valve ½ to 1 turn
h.) Closed Valve > 1 turn
i.) Valve already closed 100%
j.) Barely Open
k.) Second reading
l.) Vadose Well NSPS Exempt
m.) Decom SSO Concern (temporary)
n.) Offline this Date
o.) Reconnected this Date
p.) Abandoned this Date (wellhead removed)
q.) GHG Point not in use
r.) Can Not Sample due to Access/Safety
s.) Remote Wellhead
t.) CO Tube Sample Completed
u.) H2S Tube Sample Completed
v.) Opened for Sample/Then Closed
w.) Prime Mover Set Point Changed

The OM&M Provider shall also create a standard list of operational comments to utilize in the meter if an operational issue is observed. Examples are as follows:

i) Surging in header (watered out)
ii) Surging in well (watered in)
iii) Bad sample ports
iv) Orifice Plate Changed
v) Valve needs replacement
vi) Flex hose needs extension
vii) Flex hose needs replacement
viii) Header vacuum loss
ix) Repair well bore seal
x) Well needs to be extended/lowered
xi) User defined – See field notes.

4.6 VACUUM SET POINT AND BLOWER/FLARE STATION OPERATION

The blower/flare station must be operated and maintained to provide a consistent negative pressure on the wellfield at the established set point. The OM&M Provider shall make necessary adjustments to the wellfield and the blower/flare station to maintain the set point during and after wellfield monitoring and tuning.

In the unique case where an outside party such as a LFGE plant is responsible for the prime mover operation (such as a temporary bypass condition if WPWMA's blower skid is offline), WPWMA or the OM&M Provider shall notify the party responsible for the prime mover of the following:

- Set point to be maintained
- The schedule for when monitoring will be performed.

The following actions shall be taken for situations in which consistent negative pressure is not being applied by the prime movers:

Prime Mover Shutdown

- If the prime mover(s) is/are down for 1 hour or more, WPWMA shall be notified immediately.
- Start back-up device (if present) and adjust the device to reach the vacuum to set point. Continue to monitor the wellfield once vacuum has stabilized from the back-up device.
- When prime mover shutdowns are the result of LFGE plant maintenance, it is imperative that monitoring schedules are communicated with the OM&M Provider to prevent future episodes.

Malfunction

- Postpone monitoring and adjustments until the malfunction is resolved, unless postponement will result in non-compliance of permit terms or regulatory requirements to obtain readings within a certain timeframe.
- Follow the SSM Plan.
- Perform postponed monitoring and adjustment as soon as practical after the resolution of the malfunction, but in no circumstance shall the postponement result in an exceedance of the applicable monitoring or adjustment standard timeline.

Design or Equipment Limitation

- WPWMA may initiate an investigation into system design or equipment limitations that may be preventing the application of a consistent negative pressure. The investigation must include at a minimum:
    - Analysis of cause of inconsistent negative pressure,
    - Evaluation of existing equipment,
    - Pricing to repair existing equipment or purchase of new equipment, and
    - Feasibility of achieving consistent negative pressure in a cost effective manner using best industry practices.
- If design or equipment modifications are not possible, the operator of the prime mover shall make periodic adjustments of the vacuum to maintain the set point. Adjustments should be made as necessary and at least weekly.

4.7 WELLFIELD COMPONENT INTEGRITY CHECKS

The purpose of the wellfield component integrity check is to identify any condition that renders or could render the GCCS inoperable or impair performance. This information will be used by WPWMA to approve system improvements and schedule repairs. OM&M Provider shall submit this information to the WPWMA with the monthly report and bring any urgent issues to the attention of WPWMA and Landfill Operations Manager immediately.

4.7.1 Survey Stakes or Poles

During GCCS construction events, the contractor may use stakes or pipes to mark underground pipes to be surveyed. These are supposed to be removed before the contractor demobilizes from the site. Because the stakes can leave holes from which surface emissions may occur and because survey pipes can be conduits for direct emissions of LFG to the atmosphere, the OM&M Provider shall inform WPWMA if any stakes or pipe markers are left in place by the construction contractor so that WPWMA can coordinate their removal.

4.7.2 LFG Well and Collector Integrity

Before leaving each well, the technician shall check the well casing, wellhead, and lateral to ensure all components are tight, not leaking, and functioning properly. Issues observed during monthly inspections shall be documented and included in the monthly report or communicated to WPWMA by another means if otherwise requested. Repairs shall be made as expeditiously as possible, and in some cases, as listed below, shall be performed during the routine monitoring event. Items to inspect are listed below:

- Flex Hose: Ensure all flexible hoses are of adequate length, are not bound, kinked or constricted in any way and are providing proper drainage of condensate. Weathering of the hose shall be noted (breaks, cracks, brittle condition, etc.) and the hose shall be replaced if necessary.

- Wellhead Valve: Ensure all wellhead valves are properly functioning. This can only be performed by occasionally exercising the valve along its entire operating range to ensure proper function. Replace broken valve components as needed.

- Sample and Temperature Ports:
  - Check all sample and temperature ports on the well and wellhead to ensure they are installed tightly, functioning properly, and are not leaking. Replace leaking ports.
  - Ensure ports are free of debris, and clean as necessary.
  - Inspect sample port caps for damage or deterioration and replace if necessary.
  - Damaged or leaking sampling ports or missing port caps shall be replaced during routine monitoring.
  - Thermometers that are permanently installed shall be inspected for proper operation. Check thermometers that are installed with quick-connect fittings quarterly and those without quick-connect fittings annually, at a minimum.
    - Compare measurements to known standards to determine accuracy.
    - Rotate to ensure proper dial operation.
    - Inspect O-rings or seals for damage or wear.
    - Replace thermometer if necessary.

- Flow Measurement Components:
  - Flow measurement is mandatory for wellheads with flow capability, and the OM&M Provider shall take steps to ensure accurate readings are obtained.
  - Ensure that flow measurement components (pitot tubes, orifice plates, etc.) are properly installed and that the monitoring device is set up properly to record flow rates.

  - If orifice plates are used, the OM&M Provider shall ensure the orifice plate is properly sized so that excessive pressure loss is not occurring across the plate, that the differential pressure is in the desired range specified by the wellhead manufacturer (generally between 6 and 0.5 inches of water column vacuum) to ensure accurate readings, and that the orifice plate size is correctly entered into the monitoring instrument and Site Build table in the WPWMA LFG database.

- Mechanical Joints:
  - Ensure all mechanical joints (Fernco [rubberized flexible] couplers, PVC unions, electrofusion couplings, etc.) are tight, functioning properly, and are not leaking.
  - Ensure all clamps and mechanical fasteners are tight and operating properly.
  - Document indications of vacuum leaks and immediately repair. Potential leaks include but are not limited to:
    - Hissing sound coming from a joint.
    - Staining or accumulation of liquid on a well casing or wellhead.

- Well Casing: Check well casing integrity and general ground conditions surrounding the extraction well. Voids and settlement near any well shall be noted and communicated to WPWMA and Landfill Operations Manager.

- Well ID Label: If the well is not labeled, the OM&M Provider shall install appropriate sized labels with the ID number.

- Dewatering Pumps: Note any kinked liquid discharge hoses, leaking liquid discharge hoses and fittings, leaking air supply components (regulators, fittings, valves), etc. The OM&M Provider shall bring these items to the attention of WPWMA or Landfill Operations Manager and make arrangements to fix them.

4.7.3 Valves and Condensate Management System Integrity

The OM&M Provider shall also inspect all condensate sumps/traps and isolation valves (header, air supply, and condensate/dewatering system force mains) to ensure the following:

- Vacuum is present in the sump or trap at expected and appropriate values.
- All sump components (gaskets, lids, bolts, etc.) are tight and not leaking.
- The pump is functioning and air is available to the pump. All pneumatic pumps shall have cycle counters to help ensure that the pump is cycling at the expected rate between inspections. If the pump is electric, check the control panel and totalizer (if present) to ensure the pump is properly functioning and pumping at the expected rate between inspections.
- All valves are operational. This can only be accomplished by regular exercise of the valve.
- No PVC or CPVC fittings or valves may be used on any air supply lines per OSHA. The OM&M Provider shall bring to the attention of WPWMA if PVC or CPVC components are installed on compressed air systems and coordinate replacing those components as soon as possible.

4.8 WELLFIELD MONITORING

Without complete and accurate data, improper tuning adjustments can occur, which can lead to compliance, odor, and/or migration issues, and potentially cause long-term damage to the gas producing bacteria population in the landfill. A complete and accurate data set for each monitoring event is required by WPWMA. Data will be used to document compliance, track wellfield trends, and assist with budgeting wellfield expenditures, etc. Incomplete data sets, corrupted data, missing data, chevrons (placeholder data/blanks), etc., are unacceptable.

This section defines standards intended to help ensure valid data is obtained by the OM&M Provider.

4.8.1 Monitoring Schedule and Tuning Frequency

The ultimate goals of balancing and tuning a wellfield are to:

- Maintain the wellfield in accordance with federal, state and local regulations
- Maintain compliance with site permits
- Control odors
- Control subsurface migration and fugitive surface emissions of LFG

The following balancing and tuning protocols have been developed to achieve these goals and include flexibility to address site-specific situations.

Wellhead tuning shall typically occur at the same time the wells are monitored. Balancing and tuning events will be performed in one day or, if additional time is required, on consecutive days. The negative pressure at the blower/flare station must remain consistent for the entire monitoring event. Follow-up monitoring between events will be performed as needed.

4.8.1.1 NSPS/EG Regulated Sites

IMPORTANT: *The NSPS/EG regulations do not include exceptions to the monthly monitoring or recheck requirements. It is the responsibility of the OM&M Provider to work with WPWMA to ensure all parties understand the monitoring requirements and to properly document if any approved regulatory variances are applicable.*

At a minimum, the entire GCCS shall be monitored and tuned one time per month. If local, state or federal regulations dictate a different frequency, monitoring and tuning shall be performed according to the more stringent frequency.

Scheduling (NSPS/LMR Site)

The initial monitoring and tuning event should be completed by the 15^{th} of the month, unless site conditions dictate otherwise. This guideline is intended to allow regulatory follow up monitoring, if required, within the month to meet the 30-day timeline.

A. Perform NSPS/LMR 5-day corrective actions on the same day that the parameter exceeded the limit, if possible.

B. Perform additional monitoring to troubleshoot compliance or operations issues as needed, with prior approval of WPWMA.

C. WPWMA may place the site on a twice per month monitoring frequency if it is determined that there are odor concerns, there is evidence of subsurface gas migration (or concerns about subsurface migration), if there are excessive surface emissions, or for other reasons. Failure to meet site permit conditions may also warrant this level of increased monitoring frequency. Twice per month monitoring shall continue until the more frequent monitoring is no longer necessary or appropriate.

D. If the site is required to perform twice per month monitoring, the second monitoring and tuning event must be completed within 15 days of the start of the initial monitoring event and before the end of the month. The OM&M Provider shall schedule any 15-day remonitoring from the initial event in order to coincide with the second wellfield monitoring event. That is, the OM&M Provider shall avoid making special trips to the site for remonitoring events as much as possible.

4.8.2 Conditions Required for Wellfield Monitoring

Monitoring shall only be performed if the system pressure is stable and operations are representative of typical operating conditions. The exception to this shall be if regulatory deadlines are impending. (*Recall that earlier in this document it was explained that the NSPS/EG does not include provisions for not obtaining readings within the regulatory timeframes even if upset conditions exist.*) In that case, monitoring may proceed even if an uncharacteristically high number of exceedances might result (such as if the blower station is offline for multiple days and cannot be repaired in time to bring the system on line before the regulatory deadline for monitoring).

4.8.3 Field Monitoring Equipment Calibrations

Properly functioning equipment is vital for GCCS monitoring and ensuring data collected is accurate and reliable. This begins with using equipment that is properly calibrated and is functioning as designed by the manufacturer. The following section assumes that the monitoring unit has been factory calibrated and checked for proper performance at an interval recommended by the manufacturer, both of which are required by WPWMA.

Upon verification that the monitoring unit is properly maintained and functioning properly, use the following procedure for field calibration:

A. Utilize the appropriate site Calibration Reading IDs to store all calibration data in the monitoring instrument so that it may be uploaded to WPWMA's LFG database with the other monitoring data that will be collected. Include the calibration gas cylinder Lot # in the comments field for documentation and quality control (QC) purposes.

B. Inspect in-line filters for moisture and fine particles, and replace if necessary.

C. Inspect the integrity of the sample train and replace parts as necessary.
   1. Test the sample train for leaks. Tubing should seal tight onto the hose barbs.
   2. Note the condition of the tubing.
   3. Note the condition of sample fitting O-ring(s).
   4. Inspect the carbon filter for signs of breakthrough, and replace at least monthly.
   5. Inspect the water trap for signs of blockage and replace at least monthly

D. Perform field calibrations per the manufacturer's specifications. Including letting unit initialize and equilibrate to sampling conditions prior to calibration. At a minimum equipment calibration needs to be performed prior to each day of monitoring activities.

4.8.4 Blower/Flare Station Monitoring

The blower/flare station shall be monitored at the beginning and end of each day during which the wellfield is monitored. Data required to be collected includes the inlet gas concentrations, system pressure, flow rate, and blower system discharge pressure. Section 7 includes a comprehensive description of additional monitoring and maintenance activities that are required for the blower/flare station.

4.8.5 Wellhead Monitoring

The following requirements apply for wellhead monitoring:

1. If the initial reading at a well is not within NSPS/EG limits or the SOP targets, the technician must adjust the well <u>and record a second complete reading</u>. Utilizing the "adjusted flow", "adjusted pressure", and "adjusted temperature" in lieu of a complete second reading is not allowed because adjusted gas composition is not stored. If field instrument manufacturers modify their equipment in the future to record adjusted gas composition, WPWMA may reconsider not requiring a second complete reading.

2. The OM&M provider must make every attempt to avoid causing an NSPS/EG exceedance due to a well adjustment.

3. A "complete reading" is defined as an entire new set of measurements of methane, carbon dioxide, oxygen, balance gas, temperature, pressures, flow rate, etc. This includes the "Adjusted Values" that may be collected by a meter.

4. If any part of a complete reading (initial values or adjusted values) is not within the NSPS/EG limits, then the reading is considered an exceedance and corrective actions and rechecks must be performed.

5. A 15-day recheck is not required if the second complete reading that was taken to document the 5-day corrective action shows the well is back within NSPS/EG operating thresholds.

4.8.6 Initial Wellhead Measurements

The procedures listed in this section assume that the wellfield is already operating.

1. Make no wellhead adjustments while taking the initial readings. Adjustments should only be made while viewing the side-by-side (initial pressure vs. adjusted pressure) screen.
2. ID Selection: Select the appropriate well ID in the meter.
3. Purge: With the sample train and pressure sensor hoses disconnected, activate the meter's internal sample pump so that the entire sample train is purged and the results are indicative of ambient air (approximately 20-21% O_2 and 79-80% balance gas).
4. Zero Pressure Transducers: Perform transducer zero function to ambient air conditions. Be sure to minimize wind effects during the procedure by shielding the hose ends. Do not block hose ends while zeroing pressure transducers.
5. Monitoring Port Integrity: Check wellhead sample ports and fittings for cracks, bad o-rings and blockage by liquid, ice, spider webs, or other substances.
6. Sampling:
    a.) Connect all applicable sample train hoses. Verify that all connections are snug and air tight and that hoses are not pinched or kinked.

b.) **Temperature:** Record temperature using the permanently installed thermometer, if installed, or by inserting a temperature probe or dial thermometer into wellhead temperature sample port. Verify and store temperature reading (measured in degrees Fahrenheit).

c.) **Static Pressure:**

i. Ensure the wellhead static pressure has stabilized before storing readings.

ii. If pressure readings indicate surging, store the comment “surging” in the instrument.

d.) **Differential pressure:**

i. The OM&M Provider shall ensure differential pressures are maintained within the range specified for each wellhead type to ensure accurate flow readings:

a. Orifice Plate (0.5 – 5.0 inches of water column vacuum) – *Currently the WPWMA exclusively uses this type*. The OM&M Provider shall increase/decrease the orifice plate size to bring the differential pressure within the acceptable range.

b. Pitot Tube (0.025 – 4.0) or Venturi (0.1 – 5.0) - OM&M Provider shall change the wellhead to the size required to maintain differential pressure is in the desired range.

ii. Negative differential pressures – not acceptable. Negative differential pressures may indicate the following:

a. An error in measurement.

b. Well ID is not set-up properly in the meter.

c. Surging

e.) **System Pressure:**

i. Record the system pressure (i.e., header vacuum) from the port installed on the lateral side of the wellhead valve.

f.) **Flow Rate:** <u>Flow rate measurements are required for each wellhead reading.</u>

i. Verify that the flow rate is properly displayed and appear accurate.

ii. Verify that the differential pressure is within the range specified by the particular wellhead manufacturer to ensure accurate readings.

iii. Provide results to WPWMA in the monthly report and identify if wellhead flow measuring device needs to be replaced or upgraded to the correct size to facilitate future flow rate measurements.

g.) Confirm the Point ID is properly set up in the meter and the correct ID has been selected. If not, restart the monitoring process.

h.) Select correct comment if an adjustment was made.

i. Ensure each adjusted reading has a stored comment.

ii. Choose a comment from the list in Section 5.5.9.

7. Store the reading.
8. **Exceedances:** If a wellhead adjustment was made, the technician shall take a second complete reading.

a.) If the reading indicates an exceedance of NSPS/EG or other permit requirements, make an adjustment following the adjustment guidelines listed below and adhere to the monitoring procedures listed in the following sections for documenting 5-day corrective action implementation and 15-day recheck events.

4.8.7 Adjusted Wellhead Measurements

If a wellhead adjustment is required, a complete second reading is required by WPWMA.

A. Follow the monitoring procedures defined above for the initial reading.

B. Limit vacuum or flow change to 10% increase or decrease from the initial reading, except in the following situations. If these situations arise, a more aggressive adjustment can be made, but must be justified in the monthly report.
   1. Elevated levels of oxygen greater than or equal to 5% by volume,
   2. Wellhead temperatures greater than or equal to 131 degrees Fahrenheit,
   3. The well is in the vicinity of an SSO or suspected SSO.
   4. Other conditions discussed with WPWMA that warrant more aggressive tuning adjustments.

C. Once the adjustment has stabilized, store the reading with comments as described in Section 5.5.9.

4.8.8 Corrective Action Documentation and Rechecks

The NSPS requires two initial actions if an exceedance of the pressure, temperature, or oxygen (PTO) thresholds are detected:

- Within 5-days, implement corrective action to remediate the exceedance.
- Within 15-days, re-monitor the well to show that the exceedance has been remediated.

Additional steps may also be required by state or local regulatory agencies and other steps follow if the exceedance cannot be remediated within 15 days.

The OM&M Provider shall initiate/perform the corrective action (e.g., perform wellhead adjustments, address vacuum losses in a lateral pipe, etc.) on the same day as the initial monitoring. If this is not possible, the OM&M Provider shall implement the appropriate corrective within 5 days of the initial exceedance and re-monitor the well within 15 days of the initial exceedance.

4.8.8.1 NSPS/EG 5-Day Corrective Action Implementation

A. If wellhead adjustments, alone, are able to correct the exceedance, then the OM&M Provider shall make the wellhead adjustments on the date of the initial exceedance reading or within 5 days of that initial reading. This “second reading” shall be complete with gas quality, temperature, pressures, flow rate, and a comment entered into the “Comment” field in the instrument documenting the corrective action taken.

B. Comments entered into the monitoring instrument to document corrective actions must be consistent with the data collected.

C. Make adjustments during the recheck in accordance with procedures listed earlier in this section, as applicable.

   1. Make no wellhead adjustments while taking the initial readings. Adjustments should only be made in the side-by-side (initial pressure vs. adjusted pressure) screen.

2. Allow sufficient time after making an adjustment for the well/collector to stabilize prior to taking and storing data.

3. Stabilization times will vary but **cannot** be allowed to extend beyond applicable regulatory timelines.

4. It is not permissible to sacrifice one compliance parameter for another.

5. Measure the same parameters as those that were recorded for the initial reading.

D. Document corrective action or well adjustment.

4.8.8.2 NSPS/EG 15-Day Recheck

If the recheck and correction of the exceedance cannot be performed on the day of initial monitoring or within the 5-day corrective action implementation timeline, the recheck must be performed within 15 days of the initial exceedance.

The OM&M Provider shall document any additional corrective actions performed and provide this information to WPWMA and air compliance consultant in the monthly report for recordkeeping and reporting purposes.

4.8.9 120-Day Exceedance Clock

If a wellhead exceedance cannot be corrected within 15 days, per the NSPS/EG, the well must be replaced or additional corrective actions must be taken within 120 days. The well still must be monitored during this 120-day period, regardless of whether the exceedance exists. The NSPS/EG does not provide a mechanism that allows this monitoring to be skipped although the WPWMA has an approved Alternative Compliance Option that may extend this deadline on a case-by-case basis with APCD approval. Because it is a significant compliance issue, failure by the OM&M Provider to read a well during this 120-day period may be cause to terminate the OM&M contract.

4.8.10 Additional Monitoring Required

Various data must also be collected monthly from condensate sumps, condensate/liquids management drain lines and force mains, and leachate dewatering pumps as listed below.

4.8.10.1 Header Monitoring Points

- Collect pressure, flow and gas composition readings from main header pipeline sample ports. If ports are not currently installed at these locations, the OM&M Provider shall install ports of the same type as those used on the wellheads.

4.8.10.2 Condensate Sumps

- Collect system pressure at each condensate sump riser. If a port is not installed on the riser, the OM&M Provider shall install a port as part of its routine monitoring services. If monitoring ports are installed on the inlet and outlet piping of a sump, vacuum readings shall be taken at those ports, instead. If system pressure is not in line with expected values, the technician shall troubleshoot the cause. The OM&M Provider shall notify WPWMA of any system pressure issues within 2 hours of detection.

- Collect liquid levels from permanently mounted devices.

- Collect pump cycle count or totalizer reading and condition of air filter, regulator, and other above grade components of pumps, including any leaks or items requiring repair or replacement.

- Collect readings from any condensate sump flow meters.

4.8.10.3 Gas Well Dewatering Pumps

- Cycle count (totalizer reading from the cycle counter) for each installed pump.

- Condition of air filter, regulator, and other above grade components of pump, including any leaks or items requiring repair or replacement.

- Collect liquid levels monthly to ensure proper operation

4.8.10.4 GCCS-Related Force Mains and Gravity Drain Lines

- Force main pressure as measured by any gauges installed on lines.
- Gallon Meter readings for condensate force mains shall be collected weekly

SECTION 5
GREENHOUSE GAS MONITORING

The OM&M Provider shall take monthly greenhouse gas (GHG) readings as part of the routine work. Monitoring shall be performed in accordance with the monitoring requirements of the federal GHG Mandatory Reporting Rule (MRR) and any applicable state or local requirements. At present, the MRR requires monthly readings of methane concentration. In addition to the gas concentrations, the OM&M Provider also shall record the flow rate to each control device and the gas temperature and pressure for each reading. This is consistent with the requirements for general blower/flare station and control device monitoring. Specific requirements include:

1. The OM&M Provider shall be familiar with and abide by the monitoring requirements for greenhouse gas.

2. A schematic showing the monitoring points and IDs shall clearly show the general location of the monitoring points relative to blower equipment, valves, control devices (flares, leachate evaporators, continuous LFG pilots on flares, LFGE end users), and piping appurtenances such as tees to the various control devices.

3. Obtain gas quality readings using a certified calibrated instrument in accordance with the regulations.

4. Reading frequency and timeframe between subsequent readings must be in accordance with applicable rules. The OM&M Provider shall be aware of the requirement regarding number of days between readings.

    a. If readings are taken monthly, per WPWMA's standard policy, there must be at least 14 days between readings.

5. GHG readings must be obtained when the GCCS is operating. Individual control devices may be off as a course of normal operation, but the overall flow rate from the blower skid should be representative of typical extraction rates.

6. Use the site-specific GHG monitoring IDs for each control device.

7. Obtain GHG readings for all operating control devices at the same general time on a single day, and under the same operating condition. These readings should provide a "snapshot" of the operating condition at a given point in time. If a control device is offline, Contractor shall do one of the following:

    a. Create a manual entry in the LFG database for the control device that is offline using the appropriate GHG ID, and indicate in the Comments field that the unit was not in use (NIU).

8. If a control device is decommissioned and no longer in use, the OM&M Provider is responsible for changing the status of the applicable ID in the LFG database so that it is designated as abandoned or decommissioned. Readings are not required for control devices that have been decommissioned and identified as such in the database.

9. All GHG readings must include a flow rate recorded (or manually entered) as the initial flow rate, at a minimum. An adjusted flow rate may also be recorded, but at a minimum the initial

flow rate field shall be populated. This flow data is used by WPWMA for periodic data evaluation, so it is imperative that the flow rate be recorded in the initial flow rate field. The OM&M Provider shall either type into the monitoring device the flow rate reading obtained from the flow meter or manually enter it in the database.

a. Upload data to WPWMA's LFG database within 24 hours of taking the reading, and review and approve the data (or take other appropriate actions related to the data) within 48 hours of upload.

10. Flow meters shall be calibrated annually unless the flow meter manufacturer requires more/less frequent calibrations.

SECTION 6
BLOWER/FLARE STATIONS

6.1 OPERATING PHILOSOPHY

As referenced at the beginning of Section 5, WPWMA has established a standard operating philosophy for extracting LFG from its landfill.

First and foremost, there should be a single source of vacuum for the wellfield, which is the blower system owned and operated by WPWMA. <u>WPWMA's blower system is to be the sole mechanism by which LFG is removed from the landfill and conveyed to WPWMA's flares, leachate evaporators, or other end users of the gas (e.g., LFGE facilities, etc.)</u>. The only exception to this is during a temporary outage of WPWMA's blower system, during which a LFGE plant may be allowed to exert vacuum on the wellfield until WPWMA's system is brought back on line. Other general standards are as follows:

- Header design – With a single source of vacuum, the site infrastructure must be designed and constructed to accommodate all of the LFG flow to a single point, regardless of the number of control devices or end uses of the LFG.

- Distribution of collected gas – The single blower station pushes LFG at a user-defined positive pressure to the flares and/or a delivery point from which it then travels to a beneficial end use (e.g., LFGE) project. As of July 2020 this setpoint was 16.0" w.c.

- Dual Zone Flare - The Dual Zone flare shall operate at all times at a minimum of 100 scfm. Zone A shall operate at flows ranging from 100 to 450 scfm. Zone B shall operate at a minimum flow of 450 scfm and maximum 2500 scfm. Setpoints are established to enable automatic switching between zones based on flow. The system was designed to operate automatically in conjunction with the LFGE plant engines, as well as in lieu of plant operation.

- VFDs and inlet vacuum control – Providing a consistent vacuum to the wellfield, irrespective of flow rate and end use of the gas has shown to be the most effective way to ensure stable wellfield operations, maximize LFG recovery, and minimize compliance, odor, and offsite migration issues. To this end, the WPWMA uses a dual zone flare with redundant blowers that maintains blower speed and gas throughput by controlling the blowers off discharge pressure to the LFGE facility and modulates flare flow to maintain wellfield vacuum at the flare station. The only time that inlet vacuum control is not maintained stabile by the WPWMA blower/flare station is if LFGE facility is the only control device online. Once the flare is put back into service, the blower controls must return to establish vacuum control and LFG flow. The OM&M provider shall work with WPWMA to minimize the time of the shutdown and bring the flare back on line so that full control can resume as soon as practical.

  Blower redundancy – Blower systems are to always have full redundant capacity so that if a blower is offline for maintenance or because of failure, the other blower(s) can handle the full amount of LFG that can be collected. Blowers are to be rotated in and out of service monthly at maximum so that each unit has an approximately equal number of runtime.

6.2 MONITORING MINIMUM REQUIREMENTS

The OM&M Provider shall monitor the blower/flare station at the beginning and end of each wellfield monitoring event and on other occasions as may be necessary to confirm or ensure proper system operation. In general, this shall include but may not be limited to monitoring and/or checking the following. All pressure and gas concentration readings must be taken using unique monitoring point IDs and the data must be uploaded to WPWMA's LFG database for recordkeeping and troubleshooting purposes. Other data (such as blower amps, blower hours, liquids present in the KOP, etc.) should be logged electronically in an Excel spreadsheet or other means approved by WPWMA, and WPWMA may require it to be uploaded to its LFG database.

- Remote Monitoring, Control and Alarm Systems:
  - Check that the SCADA system, including monitoring and control, and alarm system autodialer are working properly and continuously.
  - Periodically (but at least monthly) review data recorded online by the data acquisition system to ensure that data is being properly recorded, and report any problems to WPWMA.
  - Check that the system is properly recording flow rate to each flare or other control device, control device combustion temperature, and inlet vacuum to the KOP, at a minimum.
  - If the system provides email, text, and/or telephone notifications for alarm conditions, confirm the notification list programmed into the system is up to date.
    - Confirm that email addresses and phone numbers are correct.
    - Remove any of the OM&M Provider's employees who are no longer employed by the OM&M Provider or who no longer perform work at the site.
    - Review the list of individuals receiving notifications and who have access to the web-based system with WPWMA to ensure that only authorized individuals have access. The OM&M Provider shall be responsible for removing access for individuals no longer requiring access.
  - Make adjustments, as necessary, and notify WPWMA or Landfill Operations Manager if the SCADA is not functioning properly.
- Automatic Mode: Ensure the blowers and flare are operating in "Auto" mode.
  - Never allow the system to operate in "Hand" or "Manual" mode, except during short-duration testing. Operation in anything other than Auto mode is against WPWMA policy. Failure to comply with this may be cause to immediately terminate the OM&M Provider's contract.
  - If automatic mode is not working, immediately troubleshoot the system with the assistance of the flare manufacturer.
  - Electrical jumpers shall not be used to bypass Auto mode or any of the system safeties. The OM&M Provider shall immediately notify WPWMA if jumpers are found in the control panel. The flare manufacturer shall be contacted and their service technician or controls engineer shall remove any jumpers, correct the wiring, and ensure proper system operation. If it is determined that the OM&M Provider is responsible for the jumpers or modifications to wiring, the OM&M Provider shall reimburse all costs related to flare manufacturer's service call(s) and engineering support.
- Blower Station/Prime Mover Inlet:
  - Measure the gas composition and negative pressure at the inlet of the blower station/prime mover. The flow rate corresponding to this location shall also be stored with the reading. This flow rate may be read from the blower station control panel.
    - The location of the measurement shall be representative of the negative pressure applied to the main GCCS header.

- BFS Condensate Sump Maintenance

  - The pump at the condensate sump located at the BFS may need to be inspected and/or repaired while the GCCS is operational the following steps shall be taken prior to removing the pump for safety and to reduce risk of air intrusion into GCCS:

    1. The LFGE Plant Operator shall be notified of inspection being performed.The isolation valve on the west side of the condensate vault shall be closed.
    2. The pressurized air, equalization and condensate discharge line valves shall be closed.
    3. Safely remove pump for inspection.
    4. Reinstall pump and open valves.
- Condensate Knockout Pot (KOP):
  - o Differential pressure across the KOP demister pad.
    - If pressure gauges are present, check the zero of each gauge to ensure the measured pressure is correct before recording a reading.
    - If differential pressure exceeds 3 inches of water column (in-w.c.), the OM&M Provider shall clean the demister pad. In general, the demister pad should be inspected and cleaned as needed.
  - o Liquid level in the KOP.
    - Open the inlet and outlet valves of the liquid level sight glass in order to identify if liquid is present in the KOP.

- Blower Inlet/Outlet Pressure:
  - o Record inlet and outlet pressure of each operating blower.
    - Note that these are the pressures <u>immediately at the inlet and outlet of the blower, before any valves, fittings, etc</u>. These are the true operating pressures of the blower and are needed in order to confirm the blower is achieving the flow and pressure shown on the blower curve. If pressure readings are instead taken at, say, the inlet of the blower skid and inlet of the flame arrestor, the readings will not be representative due to pressure losses. For example, it is common to have 5 to 10 in-w.c. pressure loss between the inlet of the blower and the inlet of the KOP.
- Blower Amps: Check and record blower amps. If amperage is excessive, begin troubleshooting blower operation.
- Blower Vibration: Note any excessive vibration and report to WPWMA or Landfill Operations Manager so that the blowers may be serviced.
- Blower Hours: Record the hours of blower operation (totalized) displayed at the blower station control panel.
- Flow Meter: Confirm that the flow meter is properly aligned. The OM&M Provider shall periodically clean the flow meter element in accordance with the manufacturer's recommended frequency or site-specific needs to ensure accurate flow rate readings.
- Flame Arrestor:
  - o Measure the differential pressure across the flame arrestor.
  - o If ports are not installed, the OM&M Provider shall install monitoring ports that are compatible with the ports on the wellheads.
  - o If the drain port on the base of the flame arrestor is piped to a condensate drain line, open the valve to remove built-up condensate.
  - o If the drain port is not connected to a hard-piped drain line, the OM&M Provider shall coordinate with WPWMA to have a drain line installed. Condensate shall not be drained onto the ground or concrete pad.

- If differential pressure exceeds 2 in-w.c., the OM&M Provider shall notify WPWMA and clean the flame arrestor element.
- If the flame arrestor requires cleaning more than once per year, the OM&M Provider shall coordinate with WPWMA to identify the reason for the fouling and attempt to remediate it.

- Enclosed Flare Operating Temperature:
  - Performance tests are required for enclosed flares (the frequency of testing varies by regulatory agency and permit). The OM&M Provider shall obtain the minimum temperature at which the flare is required to operate from WPWMA and air compliance consultant and enter the appropriate flare shut down set point temperature into the control panel. When the flame temperature drops to this level, the flare will shut off and trigger an alarm. This ensures that the flare does not operate below its permitted temperature.
  - Flare controls should be set to automatically select the appropriate thermocouple based on LFG flow rate or other parameter defined by the flare manufacturer.
  - **Thermocouples should not be set on manual selection unless specifically directed by the flare manufacturer and agreed by WPWMA and the Manager, Landfill Gas Operations.**
- Enclosed Flare Inlet:
  - Record the pressure measured between the outlet of the flame arrestor and the inlet of the enclosed flare stack.
    - If pressure exceeds 3 in-w.c., notify WPWMA of the need to clean the burner tips.
    - If they are clogged or partially clogged, burner tips shall be removed and cleaned per manufacturer recommendations. The OM&M Provider shall not leave the burner tips in place and pressure wash debris back into the burner manifold (i.e., back-flush them).

- Enclosed Flare Shell Temperature:
  - At least once per quarter, measure the temperature of the outside shell of the enclosed flare on a 10' grid and at all visible paint color changes or other suspicious areas using an infrared gun with an appropriate range to determine if there are any "hot spots" or areas of potential burn-through.
  - Notify WPWMA of the presence of any hot spots so that inspection and repair of the insulation may be performed.
- Enclosed Flare Shell Condition:
  - Note whether burn-through or significant corrosion is visible on the outer shell and immediately report it to WPWMA so that troubleshooting and repair can be performed.
  - Annually, shut down and visually inspect the flare internal lining for refractory conditions and photo document.
- Electronic Chart Recorder:
  - Check that the chart recorder is properly recording flow rate to each flare or other control device, control device combustion temperature, and inlet vacuum to the KOP, at a minimum.

  The OM&M Provider shall be responsible for understanding the proper way to download data and ensure that the recording function is working and no data is not lost during the data transfer/review process.

6.3 PRIORITY OF DATA RECORDERS

WPWMA's standard for which data recorders take priority for regulatory compliance is as follows:

1. Electronic chart recorders

2. SCADA recorders

This prioritization is in place due to regulatory reporting considerations and features available in some equipment.

6.3.1 Remote Data Acquisition Systems

WPWMA does not have a written operations manual for its SCADA system. OM&M Providers must understand the operation of the system because of the value it brings in terms of quick visibility of operations data and troubleshooting information for technicians, project managers, and flare manufacturers. The WPWMA will provide annual training on the SCADA system to the OM&M Provider upon request. WPWMA's LFG Operations Manager can be consulted regarding features and past performance and track records of the various systems.

6.4 RESTRICTION ON MODIFYING CONTROL PANELS

Only the flare manufacturer is authorized to perform work inside blower and flare station control panels at the site. Consultants, OM&M Providers, LFGE developers or plant operators, or any other party is prohibited from performing any wiring modification, modifying touchscreens (also known as operator interface panels or OIPs), replacing or modifying PLCs, modifying controls logic, or any other work inside control panels without the express written consent of the flare manufacturer and approval from WPWMA.

SECTION 7
SUBSURFACE GAS MIGRATION MONITORING

7.1 GENERAL

The requirements for gas migration monitoring (e.g., methods, frequency, monitoring locations, compliance triggers, etc.) vary by regulatory agency and permit, and therefore, site-specific monitoring plans and protocols typically are required or recommended. This section of the SOP highlights minimum standards for gas migration monitoring at WPWMA landfills; more stringent requirements dictated by site permit, regulations, or site needs take precedent over these minimum standards.

7.2 SITE-SPECIFIC MONITORING REQUIREMENTS

Prior to beginning work at a site, the OM&M Provider shall obtain the following from WPWMA:

- Copy of the permit that includes the gas migration monitoring requirements and compliance thresholds.
- List and site map showing locations required to be monitored (probes and on-site structures).
- List and map of any off-site structures requiring monitoring.

It is imperative that the OM&M Provider has up-to-date information on which probes and structures are required to be monitored, as this can change over time due to landfill footprint expansions, regulatory agency action, construction of new buildings or other structures on the property, or other situations. For this reason, the OM&M Provider shall request updates to the monitoring plan and monitoring requirements each calendar quarter before monitoring. Or at the monthly meetings.

7.3 MONITORING PROBE CONSTRUCTION

While the construction details of probes is based on engineering design and regulatory requirements, the OM&M Provider is responsible for ensuring that each probe is capped and has a labcock or quick-connect monitoring port.

Static pressure in a probe is an important parameter for gas migration evaluation purposes. Probes cannot be sampled by removing a cap and slipping a sampling tube down into the probe. All probes must be capped and have an acceptable monitoring port installed. Hose barb fittings with no inline valves are not permitted on monitoring probes because built-up pressure in the probe can escape between the time the barbed fitting's cap is removed and the sampling hose of the instrument is attached. If probe piping is not capped or the caps do not have labcock or quick-connect monitoring ports, the OM&M Provider shall work with WPWMA to install these items.

Probe caps should incorporate a means to potentially take liquid levels in the probes. Therefore, caps should be threaded and not glued. Alternatively, the cap may have a port or bushing that allows a liquid level meter probe to be inserted down the probe. Note that liquid level meters that have been used for LFG extraction well liquid level measurements must <u>never be used in groundwater wells or gas probes</u>, as they can introduce contaminants to groundwater or the surrounding soils.

7.4 TIMELINE FOR MONITORING

Gas migration monitoring shall be performed in the first or second month of the quarter, as determined by WPWMA. However, monitoring frequency may be adjusted as directed by WPWMA or a regulatory agency as needed.

7.5 MONITORING PROCEDURES

Unless more stringent requirements are provided in the site-specific monitoring plan or regulations, the OM&M Provider shall adhere to the following:

1. Data collection and handling requirements for gas migration monitoring are consistent with the requirements for wellfield monitoring.

2. Calibrate the gas monitoring instrument as described in Section 5. All calibrations shall be stored in the instrument and uploaded with the rest of the monitoring data to WPWMA's LFG database.

The OM&M Provider must also be aware of all regulatory thresholds for gas concentration prior to performing any monitoring and enter those thresholds into the monitoring device and LFG database to be automatically verified upon data entry.

7.5.1 On-Site Structure Monitoring

On-site structures required to be monitored include the scale house, office buildings, maintenance garage, etc. Non-enclosed structures such as pole barns may be exempted from monitoring if sufficient natural ventilation is present, regulations permit the exemption, and approved by WPWMA and LEA.

If in-place explosive gas monitors are installed in sufficient locations inside structures, monitoring with handheld instruments may not be necessary, if allowed by permit. If permanent monitors are installed, the OM&M Provider shall document the locations of the meters on the floor plan/site map included with the written report to WPWMA and shall perform manufacturer recommended checks/calibrations on the in-place monitors to ensure proper operation.

1. Use site-specific monitoring IDs for all structures and calibrations in accordance with Section 5.5.1.

2. Calibrate the gas monitoring instrument as described in Section 5.8.3. All calibrations shall be stored in the instrument and uploaded with the rest of the monitoring data to WPWMA's LFG database.

3. Hold sample tubing approximately 4 inches from the floor.

4. Monitor:
    a. Along each floor/wall interface
    b. Inside ground level cabinets
    c. Inside closets
    d. At floor drains and plumbing penetrations
    e. Along cracks in concrete slabs

5. The technician shall be aware of the instrument's response time when conducting monitoring and factor this in when investigating detections of methane, especially those that are intermittent or instantaneous/fleeting.

7.5.2 Probe Monitoring

1. Use site-specific monitoring IDs for all structures and calibrations in accordance with Section 5.5.1.

2. Calibrate the gas monitoring instrument as described in Section 5.8.3. All calibrations shall be stored in the instrument and uploaded with the rest of the monitoring data to WPWMA's LFG database.

3. Operate the meter in accordance with the requirements defined in Section 5.8.6, except related to pressure measurement as described below.

4. <u>Do not purge the probe</u> before monitoring. Any methane detected during monitoring shall be reported, as described below.

5. Zero the pressure transducers and attach the instrument hose to the monitoring port. If a labcock valve is installed on the probe cap, open the valve after attaching the hose and observe the relative pressure.

6. Record the initial pressure in the instrument.

    a. Continue to observe the pressure and note any changes.
    b. Record the final stabilized pressure (Note: Probe pressure must be measured before sampling for gas qualities because turning on the instrument's pump while connected to the probe may change the static pressures within the probe.

7. Measure gas qualities as described in Section 5.5. Continue to run the instrument's pump and record the reading when the methane concentration (if detected) has stabilized.

8. Store the stabilized gas reading.

Notify WPWMA immediately if any reading is above 5% methane (100% LEL) by volume.
Provide monitoring report that complies with Section 12.

7.6 REPORTING

The OM&M Provider shall immediately notify WPWMA if any non-zero methane value is detected in any on-site structure (and off-site structure if required to be monitored) so that steps may be taken to protect building occupants. WPWMA shall also be notified by phone or email at the end of the monitoring event if methane exceedances were detected in any of the probes so that any regulatory notifications or remedial actions can be coordinated.

Unless a faster turnaround time is required by WPWMA or regulatory agency, the OM&M Provider shall submit a report detailing the monitoring results to WPWMA within two weeks of the end of each quarterly event. The report shall include the following:

- Brief summary of monitoring event

- Monitoring results
    - Calibration data
    - Static pressure and gas concentration for probes
    - Gas concentrations measured in on-site structures
    - Confirmation that in-place explosive gas meters were checked for proper operation (either by landfill personnel or OM&M technician)
- Identification of any regulatory exceedances
- Site map showing monitored locations
- Summary of any probes that need repair or replacement due to damage

SECTION 8
SURFACE EMISSIONS MONITORING

To comply with NSPS regulations (40 CFR 60.755(c)(1)), the EG, and the California Landfill Methane Rule (LMR) or other state or local regulations that may require it, surface emissions monitoring (SEM) shall be performed quarterly. This monitoring is intended to identify fugitive LFG emissions, but also acts as a GCCS performance test allowing WPWMA to evaluate areas of the collection system that may require upgrades or modifications to further minimize surface emissions.

This section addresses the SEM method required by NSPS/EG/LMR regulations. The OM&M Provider shall review the site-specific monitoring plan and determine the appropriate SEM method and procedures that are required during each quarterly event.

Please refer to Appendix B – Surface Emissions Monitoring Plan Dated July 29, 2013

SECTION 9
LIQUID LEVEL MEASUREMENTS

In order to maximize the efficiency of the vertical LFG extraction wells, WPWMA requires periodic liquid level measurements to aid in evaluating the wellfield.

Also, the OM&M Provider shall establish a baseline liquid level measurement for each new GCCS and for all new wells within the first 2 weeks of well operation.

9.1 OVERVIEW OF LIQUID LEVEL EVALUATION PROCESS

WPWMA's program of evaluating liquid levels in LFG extraction wells is designed to account for the following 3 scenarios, and the calculations are set up to be valid whether or not there is an obstruction in the well casing.

- Scenario A – Obstruction, pinch, or silt in the bottom of the perforated pipe section, and liquid level is beneath the top of perforations.

- Scenario B – Obstruction, pinch, or silt in the bottom of the perforated pipe section, and liquid level is above the top of perforations.

- Scenario C – Obstruction, pinch, or silt is above the top of perforated pipe section. (i.e., 100% obstructed perforations).

9.1.1 Basis of Calculations

The calculations are based on:

- Elevation of the top of perforated pipe
- Length of perforated pipe
- Total length of pipe below ground surface at the time of well installation
- Ground surface at the time of well installation
- Current ground surface elevation
- Field measurements of top of casing (TOC) to ground surface, TOC to liquid, TOC to bottom of well or any obstruction in the well.

Note: *Because the calculations use the elevation of the top of perforated pipe and the elevation of the bottom of the well pipe at time of installation, accurate as-built information is imperative.*

9.2 MEASUREMENT FREQUENCY

Liquid levels shall be measured in GCCS wells annually, as needed or directed by WPWMA if data indicate liquids are impacting gas extraction rates or if the data is necessary to aid in more aggressive troubleshooting, pursuant to the approval by WPWMA. The WPWMA may omit wells from water level monitoring list if prior measurements showed minimal water or change in water levels.

9.3 EQUIPMENT SPECIFICATIONS

At present, the preferred and most common method for measuring liquid levels is to use a down-hole electrical conductance probe with an indicator tape, as described below. The WPWMA may use a down-hole camera if the conductive probe is yielding unrepeatable or questionable results.

To maintain measurement consistency between monitoring events, the user must measure liquid levels from the same point of the well every time (i.e., top of casing, north side, i.e. towards the flare). To account for changes in top of casing elevation over time, WPWMA requires a ground surface elevation and measurement of the height of the top of casing above ground surface.

Note that it is imperative that any liquid level measuring devices used in LFG extraction wells or any portion of the GCCS must be dedicated to leachate and LFG well monitoring. To avoid potentially cross-contaminating soils and groundwater, they must never be used for groundwater well or perimeter gas migration monitoring probe measurements.

9.4 PREPARATION

In preparation of performing liquid level measurements and the related evaluation, the OM&M Provider shall compile as-built information for the wells and current ground surface elevations for all wells (or approximate ground surface elevations based on interpolation of the most recent survey data or field observations if waste filling or other activities have altered ground surface elevations since the date of the most recent survey).

The OM&M Provider shall document field measurements electronically (e.g., web form) or in a log book from which data will be copied to the LFG database at the completion of the field work.

9.5 LIQUID MEASUREMENT PROCEDURE

When preparing to take a liquid level, the technician should:

1. Measure the static pressure in the well and record it so the well can be returned to its prior state after completing the liquid level measurements.
2. Close the wellhead valve. This is particularly important for landfills with an LFGE project.
3. Remove the wellhead or open the access port.
4. Measure and record the depth to liquid from TOC using the liquid level indicator.
    a. Problems that may be encountered:
        i. Foam in the well may cause inaccurate measurements
            1. Mark in field notes "Foam present, liquid level will have to be visually verified using other method" (down well camera).
5. Obtain and record the depth to bottom of well measurements
    a. Measurements are to be made from the TOC to the point where the probe will not progress any farther.
    b. Problems that may be encountered:
        i. Well has soft bottom due to silt or other material.
            1. Record in field book "soft or silty bottom, depth cannot be verified and is estimated".
            2. A down well camera can be used to attempt to verify well bottom. This activity must be approved by WPWMA before proceeding (non-routine work item).
        ii. Probe may not extend to anticipated well casing depth.

1. Well may be deflected underground so much that indicator probe cannot reach bottom of well casing.
2. Well may be pinched.
3. Probe may be hung up on weld or coupling.
4. Probe may be snagged on a pump component.
5. A down well camera can be used to identify what is holding up the indicator probe. This activity must be approved by WPWMA before proceeding (non-routine work item).

iii. Well appears to be deeper than anticipated.

1. This may be because the well was extended to accommodate additional waste filling.
2. A down-well camera can be used to determine actual depth of well and how much solid pipe was installed to accommodate landfill operations. These activities must be approved by WPWMA before proceeding (non-routine work item).

6. If it was removed, reinstall the wellhead, open the wellhead valve back to pre-measurement static pressure, and record the stabilized static pressure in the log book.

9.6 DATA MANAGEMENT

Liquid level data will be managed by WPWMA and must be compiled within one month of completing liquid level measurements. As described below, two sets of data are required to be uploaded and maintained by the OM&M Provider (As an extra non routine service) unless WPWMA assigns the responsibility to the LFG design consultant or other consultant.

9.6.1 Site Build/As-Built Data

As-Built data that must be entered into the system (or related spreadsheets) includes:

- Well Name (e.g., W-104)
- Well ID (e.g., LivW0104)
- Ground surface elevation at time of well installation
- Depth to bottom of casing at time of installation
- Perforated pipe length

9.6.2 Field Measurements and Related Data

Information obtained at the time of liquid level measurements includes:

- Well Name
- Well ID
- Date of measurement
- Name of personnel obtaining measurements
- Ground surface at well at time of measurements
- Measured height of TOC above ground surface
- Depth from TOC to liquid
- Depth from TOC to bottom of well
- Whether a pump is installed in the well
- Depth from TOC to top of pump

SECTION 10
STARTUP PROCEDURES FOR NEW LFG COLLECTORS

10.1 NEW LFG COLLECTOR INSTALLATION AND STARTUP

10.1.1 Replacement Wells/Collectors

During construction of a GCCS expansion, the OM&M Provider shall maintain regular communication with WPWMA so that valuable information can be shared between all parties, and so that all required wellhead readings are obtained.

During some GCCS construction projects, wells may be abandoned or decommissioned. This communication and coordination is particularly important when an existing LFG collector is slated to be abandoned and a replacement collector will be installed. To avoid potentially missing monitoring for a well that is to be abandoned or decommissioned, the OM&M Provider shall communicate with WPWMA, air compliance consultant, and CQA Consultant during any construction project so that all parties are aware of the monitoring schedule. Only after the OM&M Provider and air compliance consultant have confirmed that the well no longer needs to be monitored may it be abandoned or decommissioned. The current well status shall be updated in the LFG database.

In this situation, it is imperative that initial readings and rechecks are performed before a well is abandoned. Once the required readings and rechecks are obtained, the OM&M Provider shall notify WPWMA, who in turn will notify the CQA observer and construction contractor that the well may be taken offline and abandoned and the new well connected to the collection piping.

10.1.2 Startup Procedure for New Collectors

Before bringing a well/collector online, establish its baseline conditions by obtaining the following information:

- Pressure – Wellhead static pressure with wellhead valve closed
- Temperature – in deg. F
- Gas quality – CH_4, CO_2, O_2 and balance gas
- Liquid levels – Depth to liquid and depth to bottom of the well

After recording baseline conditions and coordinating with the LFGE, slowly bring the well on line:

1. Be careful to avoid making aggressive adjustments to new wells/collectors.
2. Bring the collector on line during a scheduled monitoring event unless other conditions such as regulatory deadlines, the need to increase LFG collection for odor control, etc., warrant a sooner startup.
3. Adjust the wellhead valve so that the wellhead static pressure is set at 0.0 in-w.c. This allows gas to flow, but does not exert a vacuum on the well.
    a. If the methane concentration in the new well/collector falls below the WPWMA SOP methane target (see Section 4.3), close the wellhead valve and an investigation shall be performed to determine why poor gas quality is present at such a low flow rate. Items that should be investigated include but are not limited to:
        i. Amount of well screen available (liquid levels),

ii. Well bore seal condition,
iii. Visual inspection of wellhead and sample train for air leaks, etc.

Notify WPWMA of issues that are identified and propose a remedy. Once the issues are corrected, return the well to operation.

4. Allow the well/collector to stabilize for at least 1 hour and conduct other monitoring. Ensure nearby wells are operating in a manner that is consistent with typical or expected conditions.
5. Return to the well/collector after at least 1 hour and adjust the wellhead static pressure to -0.1 in-w.c.
6. During the next monitoring event (at least 1 week later), depending on gas quality, the wellhead static pressure may be adjusted down to -0.5 in-w.c., based on the professional judgment of the OM&M Provider. Recheck the well/collector 1 to 2 hours later to ensure that the reduction in wellhead static pressure has not negatively impacted gas quality.
7. Additional wellhead adjustments can be made in accordance with the procedures outlined in Section 5 during subsequent monitoring events, if necessary.

10.2 NEW GCCS STARTUP

Starting up a new system requires more effort and diligence than maintaining an existing system. During a new system startup the focus must include:

- Comparing the GCCS Record Drawings with the construction plans and permit plans to determine what has been installed and what variations, if any, have been made from the original design intent.
- Inspecting the system for construction issues (hoses tight, couplers tight, sample ports properly installed, wellhead properly installed, boot clamps tight, if equipped, etc.).
- Establishing the wellfield's operating gas composition and baseline flow rate.
- Preparing the system for operation.
- Bringing the system online. This should be done slowly without damaging mechanical components or biological activity within the landfill.
- Determining the capability of the system and defining its operational parameters.

Note that after the initial test of operation, the OM&M Provider shall bring the system back down and check all fittings, joints, and connections, including bolts, nuts, and clamps. Torque all fasteners to the manufacturer's recommendations. Also, inspect all electrical components for proper operation. Check all electrical connections and confirm that all components and connections remain intact and have not worked loose.

10.2.1.1 LFG Collection System Component Inspection

A. Header isolation valves
    a. Exercise valves to verify full range of motion.
    b. Position header valves in 100% open position for startup.
    c. After startup, return to the valves and confirm that the same negative pressure exists on both sides of each open valve. If the pressures differ, determine whether the valve indicator has been installed correctly and perform additional troubleshooting if necessary.

d. Notify WPWMA if any header isolation valves are not labeled so that the construction contractor or others can complete this.

B. Header access risers
   a. Inspect cam-locks, monitoring ports, and fittings and ensure they are securely in place. Tighten any loose fittings or sampling ports.
   b. Notify WPWMA if header access risers are not labeled so that this can be done.

C. Drip legs
   a. Verify that each drip leg has the correct amount of water in the u-trap.
   b. Verify caps and flanges are tight.
   c. Verify that monitoring ports are installed on both legs of the u-trap.

D. Mechanical sumps
   a. Inspect fittings and gaskets. If any are found to be loose or missing coordinate with WPWMA for repairs.
   b. Verify that the condensate force main valve is open and ready to accept liquids.
   c. Verify pump is energized and functional.
   d. Record cycle counts for pneumatic pumps and hour meters for electric pumps.

E. Wellheads
   a. Tuning valve – Exercise valve and verify full range of operation.
   b. Flex hose – Verify length, adjust if needed, and verify that clamps are tight.
   c. Sample ports – Inspect for broken or plugged fittings and replace, if necessary.

F. Well bore seals and liner boots
   a. Notify WPWMA or Landfill Operations Manager if well bore has settled or seal appears to be broken.
   b. Verify that all connections between liner boots and wells/other piping are sealed tight, and notify WPWMA of any deficiencies.

SECTION 11
DATA MANAGEMENT, HANDLING, AND REPORTING

11.1 DATA MANAGEMENT AND HANDLING

Proper management of field data is critically important. Manipulation or misrepresentation of field data is a violation of the Clean Air Act, **will not be tolerated, and may be grounds for contract termination, or subject to addition criminal investigation.**

The OM&M Provider's data management team and/or project manager (or WPWMA if OM&M work is performed by internal WPWMA technicians) are required to review, approve, and analyze all collected data in order to bring to the attention of WPWMA any issues of concern and to identify areas where improvements are needed. Issues and updates shall be communicated verbally, by e-mail, and in monthly meetings and reports. The OM&M Provider is also responsible for certain data management administrative tasks, which are outlined below. The following text outlines WPWMA's expectations regarding data management and reporting.

11.1.1 Data Management Responsibilities

The OM&M Provider is responsible for the following data management tasks to the extent it collected that data. If the APCD or WPWMA collected the data or a portion of it, that entity shall be responsible for managing and reporting that data unless other arrangements are made.

- Updating Site Build information, including well construction details, monitoring point coordinates, etc.
- Maintaining Point IDs
- Reviewing data
- Revising erroneous data within the database
- Approving data to lock data from additional editing
- Maintaining, updating, and tracking alternative operating values and alternate compliance timelines within WPWMA's LFG database.
- Administering user permissions within WPWMA's database for users that have access to a facility's data and periodically checking to ensure that all users with access are appropriate. If users are found to no longer require access (e.g., they are no longer employed by the firm, no longer perform work at the site, etc.), the responsible individual must remove those privileges.
- Adding new users with the appropriate level of user access according to the requirements established by WPWMA. User information must include the following, at a minimum:
    - Name
    - Company
    - Position/Title
    - Email address (A company email address is required. No user may have, for example, a gmail.com, yahoo.com, or similar email address.)
    - Telephone number

11.1.2 Data Handling

Each day's monitoring data shall be uploaded to the database within 48 hours of collection. Data files from the monitoring instrument or data recorders (e.g., flare station electronic chart recorders) may not be sorted, edited, or otherwise modified before uploading to the database. Data edits must only be made within WPWMA's LFG database.

11.1.3 Electronic Data

Electronic data shall be handled in such a way that data integrity is maintained. The OM&M Provider is responsible for backing up all WPWMA data not entered into WPWMA's LFG database on a regular frequency (minimum monthly back-up). All data and reports are the property of WPWMA and will be relinquished to WPWMA upon request or at the close of the project.

11.1.3.1 Preservation of Raw Data Files

Data files from GCCS monitoring events shall be downloaded from the gas monitoring instrument and then uploaded directly to WPWMA's LFG database. **Raw data files from monitoring equipment shall not be altered in any way.** If there are known errors in the data, they are to be edited within the database so that there is a record of the change and documentation of the reason for the edit(s). Because the database has this feature, there is no reason to view, sort, or modify the raw data file in any way before uploading it to the system. **Failure to follow this directive may be cause for termination of the OM&M Provider's contract.**

OM&M Providers are encouraged to retain copies of unaltered data files for their records.

11.1.3.2 Data Upload

Wellfield monitoring data (including blower/flare station, gas migration monitoring, etc.) shall be uploaded to WPWMA's LFG database within 48 hours of monitoring. If a monitoring event spans multiple days, each day's data shall be uploaded within 48 hours of collection (resulting in multiple uploads).

11.1.3.3 Loss of Data

If all of the data from a monitoring event is corrupted, lost, or is unusable, the OM&M Provider will immediately re-monitor the entire wellfield. If data from certain wells is corrupted, lost, or is unusable, the wells for which data are lost must be re-monitored immediately.

11.1.4 Written Log Book Data

In an effort to record conditions that cannot be stored electronically within the monitoring instrument, field technicians are required to keep a site-specific logbook. This logbook is the property of WPWMA, and will be relinquished to WPWMA upon request. The log book must be accessible to the OM&M Provider and WPWMA at all times, as it may be used as a reference for troubleshooting wellfield issues.

A. Logbook requirements:
    1. Waterproof book,
    2. Record entries in logbook using waterproof ink.

B. Requirements for recording data in log book:
    1. Do not remove pages or portions of pages.
    2. Use one log book
    3. Date each page in the top right hand corner.
    4. Technician recording data shall initial each correction.

5. Cross out blank lines on a page when the page is completed.
6. Do not go back to previous pages and insert comments or additional measurements. Always use a new page for each event.
7. Record the following, at a minimum:
   a.) If maintenance is performed, write a description of maintenance performed.
   b.) Record non-tuning efforts for NSPS/EG 5-day corrective actions. Examples include: tighten flex hose, replace sample port, call contractor to regrade header, increase flare vacuum to field, etc.
   c.) Date, time on- and time off-site
   d.) Unusual conditions
   e.) Erosion areas
   f.) Surface depressions
   g.) Document damage to wellheads and/or surrounding surface area discovered during monitoring event or repairs completed during event;
      i. Take photographs of damage and repairs,
      ii. Describe damage,
      iii. Forward photographs of any well that appears to have been damaged by landfill operations to WPWMA within 48 hours.
   h.) Pump cycle counts, if not recorded otherwise in the gas monitoring instrument or other device.
   i.) Summary of discussions with site personnel
   j.) Other pertinent information that in the technician's judgment may be useful at a later date
   k.) Recommendations for non-routine system repairs or upgrades to the GCCS
   l.) Hand drawings that identify specific locations or distances from wellfield components.
8. When the book is full, submit it to WPWMA and start a new logbook.

11.1.5 Data Review

Both the technician and project manager (or WPWMA manager if work is performed by WPWMA personnel) are required to review the data for completeness and accuracy, to identify erroneous or questionable data that may require further action, and to identify exceedances that require corrective action. The technician shall review the data upon upload (i.e., within 48 hours of taking the readings) and the OM&M project manager shall review the data within 120 hours of upload.

If any erroneous data are identified, such as incorrectly typed readings or comments (such as flow rate or temperatures that are entered manually while storing the data), the erroneous readings must be edited within WPWMA's LFG database so that there is a record of the change. The database will prompt the user for a brief explanation of the reason for the edit, and then both the explanation and revised data will be stored.

11.1.6 Data Approval

The technician shall check the uploaded data for correctness and completeness. The designated Data Approver shall then review and approve or take other appropriate actions related to the data within 120 hours of data upload. All data handling, approval, etc., shall be in accordance with WPWMA's Standards and other WPWMA policies that may be implemented in the future. The OM&M Provider shall coordinate with the air compliance consultant, as required, to ensure compliance dates are not missed.

- Coordinating with the LFG database support staff, as necessary to meet WPWMA's requirements.

- Ensuring that the OM&M Provider's staff participates in training sessions that will periodically be required by WPWMA.

11.2 REPORTING AND MEETINGS

All data and monthly and quarterly reports are to be submitted to WPWMA electronically. Hardcopies may also be required at the discretion of WPWMA or to satisfy regulatory agency requirements. The OM&M Provider's technicians, project manager, and other pertinent team members will be provided access and log-in information for the database.

Monthly reports generated as part of this work are to be submitted to WPWMA personnel only, unless otherwise directed by WPWMA. These reports are intended to keep WPWMA personnel informed about the current condition of the GCCS. These documents will be retained for historical reference, and placed in the site's operating record to comply with regulatory requirements.

11.2.1 Daily Logs

The OM&M Provider shall submit Daily Logs of completed activities to WPWMA Landfill Operations Manager at the end of each day or each work week if performing multiple days of work at the site.

11.2.2 Monthly Reports

The OM&M Provider is required to submit a monthly report to WPWMA by the 20th of every month, unless WPWMA requests the report by a different date, for data collected and routine and non-routine work performed during the prior month. At a minimum, reports must include the following:

- General summary of operations of the previous month. Report text shall not include editorializing; the focus shall be on the data, observations, and recommendations.

- Wellfield data
  - Data table for the most recent monitoring, highlighting any NSPS/EG and SOP exceedances. Data table shall include the following:
    - Gas quality data (CH_4, CO_2, O_2, and balance gas)
    - Gas pressures (static, differential, system)
    - Gas temperature in degrees Fahrenheit
    - Flow rate in scfm
    - Comments stored in the instrument for the reading
  - Monitoring summary addressing NSPS/EG thresholds and any surface emissions and gas migration monitoring conducted.
    - List of wells/collectors with NSPS/EG/LMR exceedances

- Liquid level data (if measurements taken that month)
- SEM data and/or gas migration monitoring data (if monitoring was performed that month)
- Blower/flare station
  - Gas composition and flow rates overall and for each control device

  - General operational issues
  - Maintenance activities performed
  - Maintenance activities planned or needed in upcoming month

- SSM forms
- Changes in wellfield conditions that are significant or of concern. This includes an evaluation of trends and variations in data over time.

- Logs and equipment checklists
- Recommended repairs

The report shall include all the monitoring data, checklists, logs, SSM forms, and other supporting information regarding GCCS operations and maintenance. Wellfield monitoring data shall be tabulated and presented in the same general format as output from WPWMA's LFG database.

These reports shall be submitted to WPWMA and other designated parties (air compliance consultant, design engineers, etc., as directed by WPWMA) by the 20th of the following month, unless an alternate schedule is requested by WPWMA. Timeliness of the data is paramount, as WPWMA and other team members will use this data to identify trends and to recognize operational adjustments needed to optimize system performance. In addition, the data may be necessary to satisfy NSPS reporting requirements that have firm deadlines.

11.2.3 Quarterly Reports

The OM&M Provider shall also prepare and submit to WPWMA quarterly gas migration and SEM monitoring reports as detailed in Sections 8 and 9, respectively.

11.2.4 Monthly SOP Meetings

A monthly meeting is required. At a minimum, WPWMA and OM&M Provider's project manager and technicians shall attend. Except for extenuating circumstances, the lead technician shall attend the meeting at the site in person unless directed otherwise by WPWMA. Others who may be invited by WPWMA and whose attendance may be beneficial include:

- WPWMA's Landfill Operations Manager
- Air compliance consultant
- Landfill gas energy project developer (for sites that have a LFGE project in operation)
- Design consultant (if issues related to design or construction are to be discussed)

WPWMA shall:

1. Determine the meeting location and whether the meeting will be held in person or via a conference call with a web-based presentation by the OM&M Provider.
2. Either set the meeting agenda or have input on what topics and the depth of content that will be covered during the meeting. Topics of discussion may include:
    a. <u>Most recent</u> monitoring results and rechecks or corrective actions planned or taken.
    b. NSPS compliance and status relative to operational goals.
    c. Wellfield maintenance recommendations/status, including pump maintenance
    d. Well raisings
    e. SSM summary

f. Blower/flare operation
g. Cover integrity inspections
h. Surface emissions monitoring
i. Gas migration monitoring (probes and on-site structures)

This list is provided for illustrative purposes only. WPWMA and OM&M Provider are free to develop an agenda that is site-specific or most appropriate for the site's needs.

The OM&M Provider shall:

1. Prepare graphs, maps, and tables as needed for use during the meeting, the content of which shall be discussed with and approved in advance by WPWMA.
2. Take notes summarizing the meeting and distribute to the group.

Meeting attendees will review recent and historical data, database maps and graphs of interest, and other pertinent metrics, data, schematics, etc., that may be necessary to describe and evaluate the data and system operation.

11.3 SSM DOCUMENTATION

Startup, Shutdown, and Malfunction (SSM) Plans are required for all NSPS/EG sites under the NESHAP (National Emission Standards for Hazardous Air Pollutants) regulations.

The OM&M Provider shall be familiar with the requirements of the SSM Plan and shall complete the required SSM forms for SSM events that occur when its OM&M technicians are on site. This includes any forced shutdowns performed in order to check fail-safe operation of the blower/flare system or to perform maintenance on the blower or flare system. Forms shall be prepared and submitted to WPWMA and air compliance consultant with the monthly monitoring report or more frequently if requested. The OM&M Provider shall note on the appropriate form whether any actions were taken that were not consistent with the SSM Plan.

For SSM events that occur when the OM&M Provider is not on site, WPWMA and site personnel will ensure the proper forms are filled out. Any questions related to SSM requirements should be directed to WPWMA.

SECTION 12
SUBSURFACE OXIDATION EVENTS

Because subsurface oxidation (SSO) events are serious situations that could potentially damage large areas of the landfill, generate odors, and create community concern, discovery of an SSO must be immediately reported to WPWMA and the Landfill Operations Manager and immediate steps must be taken to remediate it and minimize its impact on the GCCS and landfill.

12.1 SYMPTOMS

The following symptoms are indicative of an SSO:

- Dramatic localized landfill settlement
- Charred or cracked surface cover
- Stressed or dead vegetation in an area that is otherwise properly vegetated
- Smoke or smoky odor emanating from the landfill surface or wellhead
- Drastic or unusual increase in flowing gas temperature
- Significant drop in methane content in the gas
- Abnormal discoloration of wellhead/riser assembly
- Abnormally high CO and ammonia (NH_3) concentration in LFG
- Deformed riser pipes

12.2 NOTIFICATION

If any of the signs of a potential SSO are detected, WPWMA and Landfill Operations Manager shall be immediately notified.

12.3 INITIAL INVESTIGATION

An initial investigation of the situation should include the following:

1. Health and Safety

    a. The first step in investigating a suspected SSO must be to ensure the proper health and safety measures are in place.
    b. A number of additional hazards may be present when an SSO occurs, including exposure to hazardous compounds in smoke or fugitive gas emissions, unstable ground surface due to subsurface subsidence or collapse, potential flames, and others.

2. <u>Do not attempt to douse or flood the wells or area of the suspected SSO with water.</u>

3. Individuals responding to or investigating an SSO should take the following safety precautions, at a minimum:

    a. Consult the site (or project) health and safety plan (HASP) for procedures related to landfill fires and SSOs.
    b. Under no circumstances shall an initial investigation be conducted without first consulting the HASP and implementing appropriate controls and procedures.
    c. Do not breathe landfill gas or smoke. Stand upwind of any emissions.

d. Wear appropriate PPE. Burns may be caused by hot PVC/HDPE/steel.
e. **Do not walk or drive heavy equipment or vehicles near wells or any surface depressions until ground stability has been verified.** If necessary, position deck boards near the well to maintain surface stability if it is questionable. The burned waste mass may give way and equipment/personnel may fall into the sinkhole.

4. Do not change the condition of the LFG extraction wells/collectors.

5. Personnel shall conduct a physical inspection that includes the following:

    a. Inspect the nearest extraction well to the suspected SSO location.
    b. Inspect all wells within 500 feet of the nearest extraction well to the suspected SSO location.
    c. Inspect the landfill surface within 500 feet of the nearest extraction well to the suspected SSO location.
    d. Visually inspect for large localized settlement, cracks, holes, collapse, missing components, or areas that could be sources of air intrusion into the waste mass:

        i. Monitoring ports
        ii. Well casing
        iii. Geomembrane boots at wells or other components
        iv. Hoses
        v. Erosion ruts/rills
        vi. Dry soil cracks
        vii. Manways
        viii. Lift stations
        ix. Sumps
        x. Leachate cleanout risers

6. Measure gas quality, pressure and temperature at all wells within 500 feet of the nearest extraction well to the suspected SSO location. Special precautions may be necessary to address high gas temperatures.

7. Measure CO concentrations with colorimetric tubes (Draeger tubes) at all wells within 500 feet of the nearest extraction well to the suspected SSO location.

    a. Gas temperature and interference gases can affect the accuracy of the measurement; therefore, the results of any CO monitoring should be expressed qualitatively only.
    b. Follow tube manufacturer's instruction on the use of pre-filters and/or carbon pre-tubes to minimize the impact of potential interference gases.

8. Infrared Thermometer Survey – Use an IR laser thermometer to measure the temperature of the ground surface in the area of the suspected SSO. Shallow fires or fires that have consumed large amounts of trash will produce elevated surface temperatures. Extreme caution must be taken in these areas due to the potential for the ground to give way.

12.4 DATA ANALYSIS

In order to determine the state of the SSO, the following should be performed or evaluated:

1. Obtain carbon monoxide samples using colorimetric tubes.
2. Temperature gradient between monitored wells.
3. Oxygen gradient between monitored wells.
4. Balance gas (or nitrogen if measured directly) to oxygen ratio gradient between monitored wells.
5. Pressure gradient between monitored wells.
6. Methane to CO_2 ratio gradient between monitored wells.

Analytical data on the gas in the wells in the vicinity shall also be collected using either Tedlar bags or pre-evacuated SUMMA canisters. The analysis shall include fixed gases (CH_4, CO_2, O2, and N_2), CO, and ammonia. Other compounds may be added if necessary. ***Take samples of flowing gas, not stagnant gas.***

12.5 REMOVING SOURCES OF OXYGEN

The key to stopping an SSO once it has begun is to completely restrict oxygen from entering the smoldering waste mass (i.e., snuff it out). Once the initial investigation has been performed and a general sense of the extent of the SSO has been determined, safely begin to restrict further oxygen intrusion using the following method:

A. Shut down any wells that are believed to have been the cause of the SSO. Complete SSM forms as necessary.

B. Shut down all wells within the perceived area of influence (often within approximately 300-500 feet of the suspect well(s)). Complete SSM forms as necessary.

C. Cap or repair any item identified during the physical inspection that may be contributing to oxygen intrusion.

D. Carefully add additional cover soil to areas that show cap integrity issues, if necessary. Work slowly and pay special attention to the ground surface as material placement commences.

    1. During cover placement activities there should be a minimum of two people available: the equipment operator and a line-of-sight person on the ground that is responsible for watching the ground surface as the equipment operator places the soil.

    2. Slowly push soil into the area and compact with the bucket or tracks of the equipment.

E. Verify the air-tightness of all pneumatic devices within 1000’ of the suspected SSO area and verify system air consumption is consistent with times prior to the event and during.

12.6 THINGS TO AVOID

1. Flushing the well with water. Flushing the well with water can potentially clog the well. It will also generate steam, pressure, and odor when water hits the SSO area.

2. Excavating soil in the SSO area. Excavation will allow additional oxygen to enter the already smoldering waste mass and can potentially cause it to auto-ignite.

3. Venting. Do not remove the wellhead to vent the well. Wellfields are typically under negative pressure. Residual vacuum may exist in the waste mass for a period of time when wells are closed. If the wellhead is removed to vent, it is highly possible that the residual vacuum in the area will pull ambient air into the waste mass, adding oxygen to the SSO.

4. Dry ice application. While dry ice may have a temporary cooling effect on the physical well casing, it will have little to no effect extinguishing the SSO

5. Introduction of water into open landfill cap or cover soil fissures. Applying water to open fissures in the cap where an SSO exists can create a plume of highly odorous steam and could potentially impact slope stability. It is also dangerous to bring a heavy, rubber tired water truck to the area to apply water. The steam created can be dangerous to workers in the immediate area. If an open cap fissure exists in an SSO area, follow the procedure for placing cover soil described above. Removing the pathway for oxygen intrusion is the most effective way to extinguish the SSO.

12.7 CONTINUED MONITORING

Site personnel or the OM&M Provider should visually monitor the area of the suspected SSO at least three times a week until the SSO has been fully remediated. In addition, the wells closest to the SSO area and adjacent wells should be monitored three times a week for two weeks. The wells should be monitored for gas quality, temperature, and CO.

As the SSO subsides, residual CO will remain in the waste mass for weeks and possibly months. Elevated CO levels are not a reliable indicator that an SSO is still in progress. However, CO levels should generally decline with time if the oxidation has been terminated.

Once SSO indicators are no longer noted, the wells in the SSO area and the adjacent wells should be monitored once per week for at least 4 months before returning to a normal monitoring schedule.

12.8 REPAIRS

Repairs should be made to the SSO area, as necessary. The OM&M Provider shall visually inspect the following:

- Wellheads and lateral piping
- Cover soil and geosynthetics
- Other items within the SSO area

Findings and repair options shall be forwarded to WPWMA and Landfill Operations Manager who will facilitate repairs, as appropriate.

12.9 TIMELINE

It is important that a structured SSO monitoring plan and diligent adherence to the plan be carried out to return the wellfield to SOP operations as soon as possible. However, it is advisable to take time and slowly ensure the SSO is fully extinguished, and that the anaerobic bacteria population in the area has recovered and is consistently producing gas.

The severity of the SSO, the age of the waste, moisture content, and a number of other variables will all determine how long it takes the wellfield to regain compliance with the SOP. Experience has shown that the timeline from the point when the SSO is identified and extinguished to the point when the wellfield resumes normal operations can vary from 2 to 3 weeks up to (in some serious SSO situations) 1 year or more.

SECTION 13
GCCS INSPECTION AND MAINTENANCE

Regular inspection and maintenance of GCCS components is critical to the consistent and reliable operation of the system. Maintenance procedures are intended to be preventative in nature and to identify problems before they impact the performance of the GCCS or its components. Failure to perform proper inspections and maintenance may result in failure of critical components that could render the GCCS inoperable or reduced operational life. Failure to perform proper inspections may also cause permit and/or air compliance violations.

13.1 COMPONENT INTEGRITY CHECKS

Inspections are intended to identify conditions that impact the effectiveness or efficiency of the GCCS. Inspection data will be used by WPWMA to identify possible system improvements and to schedule repairs.

A. Record issues found during inspections in the monthly O and M reports.

B. Notify WPWMA immediately if an identified problem could cause a GGCS emergency, regulatory exceedance, or non-compliance with site-specific permit requirements or federal, state, or local regulations.

13.2 TEMPORARY REPAIRS

The application of duct tape and/or silicone to malfunctioning joints is considered a short term (15-days or less) “quick fix” and is not an acceptable long-term repair option. Once a joint malfunction is identified, notify WPWMA of the situation and install a permanent replacement immediately. If duct tape is used to temporarily repair a joint, the duct tape will be dated with a permanent marker to verify the duration the tape has been in place.

13.3 COVER INTEGRITY AND WELL INSPECTION (MONTHLY)

WPWMA requires all sites to perform monthly cover integrity inspections, regardless of whether they are subject to the NSPS/EG requirements listed in 40 CFR 60.755(c)(5).

The OM&M Provider shall conduct these inspections during routine OM&M activities and report any findings immediately following the event to the Landfill Operations Manager or WPWMA so that the appropriate repairs can be performed. The verbal report shall include an accurate description and location of the repair needed. The OM&M personnel shall also make notes of the repairs needed within the log book.

13.3.1 Cover Integrity

Visually inspect the surrounding cover surface integrity:

- Pay special attention to the cover located directly around each well casing, noting signs that the soil is desiccating or pulling away from the well casing.

- Note surface water erosion, ponding, leachate breakouts, or staining.

- Note any settlement around the well casing. Immediately report settlement to the Landfill Operations Manager or WPWMA. Soil should be immediately applied to the area by site personnel or a contractor to match the surrounding grade.

13.3.2 Well Casings

- Visually inspect above grade well casings and surrounding areas for signs of damage, deterioration, or potential problems.

- Use below grade inspection techniques when GCCS monitoring data indicates it is appropriate. (This type of non-routine work must be approved by WPWMA in advance.)

13.4 CONTROL DEVICE SYSTEM OPERATION

GCCS control devices (blower/flare, compression skids, etc.) all have safety features built into the system that insure proper operation of components at tolerances supplied by the manufacturers. These safety features (presence of flame, bearing temperature, flashback monitoring, flame temperature, louver control, fail-safe valve operation, etc.) may individually or wholly be compromised if the flare is not operated in automatic mode. Automatic mode ensures that the flare is operating safely, and the system will properly go through a shutdown procedure if tolerances do not meet programmed set points. **Operation of the flare in manual mode bypasses most, if not all, of these safety features and is not allowed except for the following situations:**

A. If the system will not operate in automatic mode, stop the system, and begin troubleshooting to determine the cause.
    1. If a cause cannot be readily found, immediately notify WPWMA or Landfill Operations Manager of the situation. Do not restart the system.
    2. Contact the flare manufacturer to perform troubleshooting and/or to begin repair of the system.
    3. Prepare an SSM form, if applicable.

   To perform other tests or purposefully operate the system in limp mode for greater compliance reasons. This type of operation may only start after WPWMA LFG Operations Manager has agreed to the non-standard operation.

13.5 MONTHLY INSPECTION AND MAINTENANCE

The following work is required to be performed as part of the routine OM&M work on a monthly basis. Issues observed during monthly inspections shall be documented and included in the monthly report or communicated to WPWMA otherwise as requested. Repairs shall be made as expeditiously as possible, and in some cases, if possible, shall be performed during the routine monitoring event. All data collected (e.g., pump cycle counts, force main pressures, condensate knockout pot pressures, blower operating parameters, etc.) shall be recorded, tabulated, and graphed (if appropriate) and included in the monthly report for record keeping and future troubleshooting purposes.

1. <u>LFG Wells/Collectors:</u> Inspect and repair wells/collectors, wellheads, and related components as detailed in Section 5.7. Items to be inspected include:
    a. Wellhead valve
    b. Flexible hose

c. Sample ports, thermometer (if permanently installed), and related components
d. Well casing
e. Mechanical joints and fittings
f. Flow measurement devices
g. Well ID label

2. Dewatering Pumps
    a. Record cycle counter readings, tabulate, and chart historical cycle counts for inclusion in the monthly report to be submitted to WPWMA.
    b. Note and repair kinked discharge hoses, leaking discharge hoses and fittings, leaking air supply components (regulators, fittings, valves), etc.
    c. Identify if pump is working. If stalled, attempt to return it to operation. If it is necessary to pull the pump for inspection or cleaning, coordinate that work with WPWMA so that it can be performed according to the OM&M Provider's contract.

3. Condensate/LFG Well Dewatering Lines
    a. Inspect air and force mains/gravity lines for proper operation.
    b. Open air supply line isolation valves monthly to remove any built-up condensation. Use caution as this line will have significant pressure.
    c. PVC pipe, fittings, and valves may not be used on air supply lines due to safety concerns. If PVC pipe, fittings, or valves are installed on any air supply systems, notify WPWMA so that they can be replaced with metal or HDPE components.

4. Condensate Sumps/Pump Stations
    a. Inspect all sumps and traps to confirm that vacuum is present at expected and appropriate values.
    b. Confirm that sump components (gaskets, lids, bolts, etc.) are tight and not leaking.
    c. Check pump to confirm proper operation. If the pump is pneumatic, confirm that adequate air pressure is available to the pump. If the pump is electric, check the control panel to ensure the pump is properly functioning.
    d. Record pump cycle counts or hour meter measurements and verify that the pump is advancing liquid.
        i. If no liquid advancement is found where it normally exists, investigate to determine if pump is operational.
        ii. Pull and inspect pumps for damage/wear when problems are suspected or as part of the routine pump cleaning service for the site.
    e. Check that all valves are operational. This can only be accomplished by regular exercise of the valve.
    f. No PVC or CPVC fittings or valves may be used on any air supply lines. The OM&M Provider shall bring to the attention of WPWMA if PVC or CPVC components are installed on compressed air systems and coordinate replacing those components as soon as possible.

5. Air Compressor
    a. The OM&M Provider shall check the air compressor when doing blower/flare monitoring or maintenance:
        i. Manually bleed liquid from the system components
        ii. Notify WPWMA if it appears service is warranted or there are operational issues that need to be addressed.
    b. Other service that may be required and performed by either site personnel or others include:

i. Check oil level
ii. Clean all filters
iii. Inspect and adjust belts
iv. Record hour meter information, if equipped
v. Inspect air dryer for proper operation (if installed). If a desiccant dryer is being used, check the date of the last media change. If new media is needed or service is due, notify WPWMA or Landfill Operations Manager.

6. <u>Blower Station and Related Piping</u>

a. Automatic Mode: Ensure the blowers and flare are operating in "Auto" mode. (See Section 7.2)
   i. Never allow the system to operate in "Hand" or "Manual" mode, except during short-duration testing. Operation in anything other than Auto mode is against WPWMA policy.
   ii. Failure to comply with this will be cause to immediately terminate the OM&M Provider's contract.
b. Condensate knockout pot (KOP)
   i. See Section 7.2.
c. General blower station operation
   i. Check blower/flare station operation in accordance with the manufacturer's requirements.
   ii. Troubleshoot or coordinate with WPWMA to troubleshoot any recurring alarms, shutdown conditions, or fluctuating flow or vacuum conditions.
   iii. Notify WPWMA of any required maintenance or preventative maintenance needed on the system.
   iv. Inspect for proper operation during each monitoring event.
   v. Ensure that all moving parts are properly lubricated per manufacturer recommendations.
d. Control Panel
   i. Verify all indicator lights, gauges, and other components are operational during monthly monitoring.
   ii. Check for and remove debris, rodents, and insects that may have entered the panel.
e. Blower Rotation and Usage
   i. Rotate which blowers are being used so that the primary and backup blowers are in use approximately the same amount of time and are kept in good working order.
f. Blower Greasing
   i. The OM&M Provider shall know the requirements for greasing the particular blower in use, and shall consult with the blower manufacturer to confirm the requirements based on the unit's Shop Order No., if necessary.
   ii. In accordance with blower manufacturer's instructions, ensure blower bearings are properly lubricated with the appropriate grease/oil.

g. Blower Bearing Temperature
   i. Inspect for excessive bearing temperature (relative to design or manufacturer's suggested operating temperature) during each monitoring event.
      1. If bearing thermocouples are installed, record the temperature displayed on the control panel touchscreen.

2. If bearing thermocouples are not installed, collect a temperature reading using an infrared laser thermometer at a consistent location on the bearing cap.

ii. Tabulate and plot historical temperature trends in an Excel spreadsheet to be maintained on WPWMA's LFG database.

h. Blower Vibration

i. Inspect for excessive vibration relative to normal operations.

ii. If excessive vibration occurs, switch to the other blower and notify WPWMA of the need for repairs.

i. Blower/Motor Safety Devices

i. Ensure safety devices (belt shrouds, cages, shields, etc.) are installed and functioning properly on a monthly basis.

ii. If safety devices are not installed or are not functioning properly, notify WPWMA and Landfill Operations Manager immediately so that repairs can be performed.

iii. Document and repair/replace, as necessary.

j. Chart Recorder (See Section 7.2)

k. Flow Meter (See Section 7.2)

l. Flame Arrestor (See Section 7.2)

m. Thermocouples

i. Inspect for indication of thermocouple failure monthly.

ii. If erratic operation, check tightness of wiring.

iii. Replace if necessary.

n. Valves

i. Exercise all valves monthly, and during each forced shutdown.

ii. Exercise valves across the complete operational range of the valve.

7. <u>Enclosed Flares</u> (See Section 7.2 for detailed requirements.) The OM&M Provider's personnel shall be thoroughly trained in the operating principles and troubleshooting of enclosed flares. Demonstration of competency and training certification is required by WPWMA.

a. Operating Data Review

i. Review the recent flow rate, pressure, and other data via the remote data acquisition system or the digital chart recorder.

ii. Identify shutdowns and the cause of the shutdowns in order to determine if additional troubleshooting is necessary. Discuss any findings with WPWMA and include a brief summary in the monthly report.

b. Thermocouple Selection

i. Enclosed flares have multiple thermocouples located at different elevations. Systems controlled by a PLC will automatically choose the appropriate thermocouple based on the flow rate of LFG to the flare. The upper thermocouple is reserved for the highest flow rates and the lowest thermocouple is used for the lowest flow rate range.

ii. Confirm that that thermocouple selection is set to "Auto".

iii. If a thermocouple is being manually selected, WPWMA requires the OM&M Provider to confirm this approach with the flare manufacturer and to provide a written explanation to WPWMA and WPWMA's Manager, Landfill Gas Operations as to why this is the preferred mode of operation and why the Auto selection mode cannot be used.

c. Pilot System
   i. Verify supply of pilot gas during each monitoring event.
   ii. Coordinate with WPWMA or Landfill Operations Manager if the propane tank needs to be refilled.

d. Flare Tips: Visually inspect flare tips monthly to ensure they are operating properly and are not obstructed with debris.

e. UV Scanner
   i. Verify proper operation during each monitoring event and forced shutdown.
   ii. Clean bulb and sight tube, where applicable, annually.

f. Dampers
   i. Verify proper set points
   ii. Observe operation of flare for proper damper (louver) operation. Harmonic vibration, "popping" sounds, or flames emanating from the top of an enclosed flare are obvious signs of improper damper operation or settings. If these are observed, contact the flare manufacturer for troubleshooting assistance.

g. Monthly Testing for Backup Devices:
   If an enclosed flare is used as a backup control device to an LFGE plant, the flare must be operated monthly for a period of time to ensure proper operation, remove moisture from the shell insulation, lubricate blower bearings (for the rare situation in which a separate blower is used for the flare system), and drive out animals and birds that will nest in and damage the unit.

   i. Contact LFGE plant operations personnel to schedule the startup of the enclosed flare. This procedure may require the plant operator to reduce plant output for a period of time to ensure vacuum set point is unaffected.
   ii. Start the flare. Pay close attention to startup procedure, and ensure flare has ignited.
   iii. Allow flare to run for a minimum of 1-hour.
   iv. Shut down flare, and alert LFGE plant operator to resume prior plant output. Ensure vacuum set point is unaffected.
   v. Prepare SSM form, if applicable.

8. Spare Parts Inventory: Update the flare station and wellfield spare parts inventory and provide it to WPWMA or Landfill Operations Manager, along with recommendations for additional parts or materials that should be ordered and kept on site.

13.6 QUARTERLY INSPECTION AND MAINTENANCE

1. Belt Drive Blowers
   a. Inspect and adjust drive belts quarterly.
   b. Document the condition of the belts and replace as necessary.

2. Direct Drive Blowers
   a. Inspect for wear or damage quarterly.
   b. Document conditions and replace parts as necessary.

3. Combustible Gas Monitoring Systems in On-Site Structures

a. Stand-alone system
   i. Inspect and test for proper operation.
   ii. Inspect and test quarterly.
      1. Apply a span gas to activate alarm and adjust the activation set point, if applicable.
      2. Calibrate according to the manufacturer's recommendations.
   iii. If units fail to calibrate or are non-functional, notify WPWMA and Landfill Operations Manager immediately so that units can be replaced and alternate safety measures may be implemented, if necessary.
b. Alarm monitoring system
   i. Inspect quarterly.
   ii. Test annually for proper operation.
   iii. Calibrate according to the manufacturer's recommendations.
b. If units fail to calibrate or are non-functional, notify WPWMA and Landfill Operations Manager immediately so that the units can be replaced and alternate safety measures may be implemented, if necessary.
c. If units are not installed, notify WPWMA immediately.

4. Flow Meter
   a. Remove the flow meter element and clean it quarterly per manufacturer recommendations. Ensure that the probe is properly aligned when reinstalling it.

5. Access Points: Inspect quarterly, at a minimum.
   a. Inspect collection piping access points (sumps, access risers, manholes, etc.) for integrity (gaskets, flanges, piping, etc.).
   b. Inspect leachate clean-out risers, manholes, tanks, etc. for gas leaks or possible points of air intrusion.
   c. Any areas of apparent gas leaks or air intrusion should be noted and brought to the immediate attention of WPWMA and/or Landfill Operations Manager.

13.7 SEMI-ANNUAL INSPECTION AND MAINTENANCE

1. Control Panel: Check for loose wires and tighten, as necessary, taking care to not over-tighten any connections.
2. Flare Thermocouples
   a. Confirm proper operation of thermocouples.
   b. Check for heat damage.
   c. Check thermocouple wiring and terminal connections.
3. Valves (Header, Condensate System, Flare Station)
   a. Exercise valves through their full range of motion to ensure proper operation.
      i. Perform semi-annually
      ii. During this task, monitor system pressure on both sides of the valve to verify that the valve is operating as intended.

13.8 ANNUAL MAINTENANCE

1. Open Flare Pilot System
   a. Inspect and clean pilot. Remove debris, spider webs, etc.
2. Flow Meter
   a. Flow meters are maintenance items that need to be serviced and calibrated at regular frequencies. Proper flow meter performance is imperative in order to properly

report emissions (GHG, Title V, etc.), gauge system performance against expectations (metrics), and for LFGE purposes. Without proper maintenance, flow measurement accuracy declines over time.

b. Calibration requirements
   i. Flow meters shall be calibrated per manufacturer's recommendations, or annually at a minimum.
   ii. Calibration usually requires removal of the flow measuring device from the gas conveyance pipe.
   iii. Only qualified individuals may perform field calibrations.
   iv. A calibration certificate shall be issued for all calibrations.
c. Insertion type meters (heat probe)
   i. Pull and clean the probe quarterly according to manufacturer recommendations.
   ii. Verify proper position and orientation prior to removal and following replacement.
   iii. Verify meter is properly zeroed by forcing shutdown and observing the recorded flow. Flow should be zero during a forced shutdown.
d. Pressure transmitter type
   i. Verify consistent measurements and that the meter zeroes properly when system is down or during forced shutdowns.

13.9 SPARE PARTS

The OM&M Provider shall keep an inventory of spare parts on site for the GCCS and shall consult the site-specific OM&M manual(s) for each system component to ensure that the recommended spare parts are included in the inventory. When parts are used from the inventory, the OM&M Provider shall reorder those parts as soon as possible and after confirming with WPWMA whether parts are to be purchased directly through WPWMA vendors. The OM&M Provider is required to always keep WPWMA informed of any spare part orders.

The OM&M Provider shall prepare and submit to WPWMA on a quarterly basis report identifying the type and number of spare parts on-hand.

At a minimum the spare parts inventory shall include, but is not limited to:

13.9.1 Control System

1. Drive belts
2. UV scanner/bulb (where installed)
3. One thermocouple of each type/size present on control device
4. Propane for pilot system
5. Compressed gas (nitrogen or compressed air) for pneumatic valve operation
6. Flexible shaft coupler
7. Blower bearing set (front and back) for each blower on-site
8. Indicator light bulbs
9. Media for recording device

13.9.2 Collection System

1. Wellhead flex hoses
2. Flex hose clamps

3. Sample ports (brass hose barbs or plastic quick connect fittings)
4. Sample port stoppers (silicone plugs) if using hose barb equipped wellheads
5. Thermometer (where installed)
6. Wellheads
7. Elastomeric (Fernco) couplers
8. Band clamps
9. Gaskets
10. HDPE pipe/fittings
11. Bolt kits

SECTION 14

LEACHATE COLLECTION SYSTEM OPERATIONS

The Leachate Collection and Recovery System (LCRS) has been installed at the WPWMA Landfill in order to comply with the requirements of Title 27 of the California Code of Regulations. This requires that owners/operator of landfills remove leachate from the landfill in order to maintain liquid levels on the subliner to no more than 1 foot of liquid (for Modules 1, 2, 10, 11-15) and 3 inches (for Modules 16, 5 and future modules). The below procedures have been developed to maintain proper operation of the LCRS to meet the requirement.

14.1.1 Pump Operation

14.1.1.1 In order to maintain proper liquid levels the pumps (pneumatic or electric) must be monitored and inspected on a weekly basis for proper operation. These inspections should include the following: individual pump station inspection, gallons removed since previous visit, electronic liquid level data (if applicable), and amperage while in operation and operating hours.

14.1.1.2 Maintenance of the pumps shall be performed in accordance with the manufacturer's specifications and repaired if the pumps appear to be malfunctioning.

14.1.1.3 Until such a time as dedicated power is available to all locations, the pumps shall be operated at the frequency required to maintain proper liquid levels using portable generators.

14.1.2 Liquid level monitoring

14.1.2.1 Liquid level monitoring at the leachate sumps shall be performed on a monthly basis unless liquid level sensors with direct level readouts are present. This will verify that the liquid levels are being maintained at the required regulatory level.

14.1.2.2 Liquids levels shall be verified using a sound actuated liquid level meter which shall be lowered into the casing of the leachate riser until liquids are observed by an audible tone. If a different manual level meter is to be used, it must be approved by the WPWMA manager.

14.1.2.3 Liquid level on the liner shall be determined by comparing the level observed to the bottom depth and calculating the level based on the following calculation: measured bottom depth minus observed liquid level divided by the slope of the module's side slope. For a 3:1 side slope, the calculation looks like this:

(BD-LD)/3=liquid on liner.

14.1.2.4 If liquid level monitoring results indicate an elevated liquid level (greater than the allowable depths noted above) the pump operational frequency (if site power is not yet available) shall be re-evaluated by WPWMA and the operator in order to increase liquid removal.

14.1.3 Force Main Inspections

14.1.3.1 On a weekly basis the force main shall be inspected for leaks or damage, which if any is noted the system will be shut-down and the WPWMA manager shall be immediately notified. It is the responsibility of OM&M Provider or WPWMA manager to determine if repairs can be performed or if the system will need to remain off line. If the system cannot be repaired within 48 hours, WPWMA will notify the appropriate regulatory agencies if needed.

14.1.3.2 On a weekly basis, OM&M Provider shall obtain total gallons removed from the landfill at the outfall location. This data is required for reporting purposes and shall be submitted to WPWMA on a monthly basis for inclusion in the semiannual reports.

14.1.3.3 On a monthly basis OM&M Provider shall perform collection of pipeline back pressure readings from the force main at selected locations to determine if fouling/plugging of the pipeline is occurring. If needed, additional pressure gauges shall be installed by OM&M Provider upon approval from the WPWMA manager. This data is critical in maintaining and verifying proper system operation. The OM&M Provider shall develop a system curve based on pipe throughput and measured pressure levels along the pipeline, and chart the current period's readings against that system curve. If pressure levels indicate greater than 10% deviation from the system curve, the OM&M Provider shall notify the WPWMA LFG Operations Manager and the WPWMA may request additional investigation or cleaning of the force main.

14.1.3.4 If cleaning of the force main is indicated based on pressures, OM&M Provider or WPWMA will choose the locations for performing the cleaning using high pressure water, snaking or other approved method. This work will be coordinated through WPWMA and is performed as needed.

14.1.4 Flow meter monitoring and inspections

14.1.4.1 On a weekly basis all flow meters shall be inspected and total gallons removed will be recorded. If the meter indicates a low flow condition the meter will be cleaned and tested.

14.1.4.2 On an annual basis, or more frequently if warranted, the flow meters will be tested for accuracy. This will be done by performing a bucket test and comparing the volume pumped into a graduated cylinder or drum and comparing the value on the meter to the level in the drum. This work will be coordinated with the WPWMA manager and is performed by OM&M Provider as part of the annual system performance test and is not considered routine maintenance.

14.1.5 Monthly Monitoring of Leachate Water Quality

14.1.5.1 On a monthly basis, the WPWMA will sample each location for the following water quality parameters in accordance with the requirements of the site Waste Discharge Requirements (WDR) by grab sample method from the pumping system: pH, Electric Conductivity (EC), Turbidity and Temperature. This information shall be reported to the Water Board, retained and sent to the others as required.

14.1.6 Annual LCRS Performance Testing

14.1.6.1 In accordance with the requirements of Title 27 of the CCR, on an annual basis the system will be tested for proper operation. This test shall be performed to verify that the system is operating normally and no fouling/plugging of the LCRS is occurring in the individual modules. The test shall be performed by installing dye, salts or other additive into the cleanouts on the opposite side of the landfill from the pumping stations, or into the extraction wells on the module where a liner system is present and then observing the discharge from the pumps for evidence of the injected material. OM&M Provider will record the time necessary for the test additive to transit the waste mass. The actual procedures for this work will be agreed upon by WPWMA, site personnel and the contractor performing the test.

Appendix A – Landfill GCCS Design Plan

cornerstone
A TETRA TECH COMPANY

Building lifetime relationships with our clients and employees.

Landfill Gas Collection and Control System Design Plan

Western Regional Sanitary Landfill

October 2016

Prepared for:
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REPORT CERTIFICATION

Landfill Gas Collection and Control System Design Plan

Western Regional Sanitary Landfill
Lincoln, California

The material and data in this report were prepared under the supervision and direction of the undersigned.

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1 INTRODUCTION

1.1 Purpose of Report

This Landfill Gas Collection and Control System (GCCS) Design Plan update was prepared by Cornerstone Environmental Group, LLC (Cornerstone) on behalf of the Western Placer Waste Management Authority (WPWMA). This Plan update follows the requirements of the New Source Performance Standards (NSPS) for the GCCS at the Western Regional Sanitary Landfill (Landfill) located in Lincoln, California and was prepared pursuant to 40 Code of Federal Regulations (CFR) Part 60, Subpart A (General Provisions), and Subpart WWW (Standards of Performance for Municipal Solid Waste Landfills). This GCCS Design Plan supersedes all other previously prepared submittals pertaining to the GCCS design and is the document that will govern the operating, monitoring, and recordkeeping standards for the GCCS at the Landfill.

1.2 Compliance Summary Tables

A summary of the pertinent NSPS regulations and implementation of these regulations at the Landfill is presented in Table 1 of this Plan. Additionally, location references of the regulations in this Plan and in Appendix E of the NSPS enabling documents are presented in Table 1.

A Design Review Checklist from *Training Course for Landfill Gas NSPS/EG Regulatory Personnel to Review GCCS Design Submittals*, *North Carolina State University, September 1998* is provided as Table 2.

2 EXISTING SITE CONDITIONS

2.1 Landfill Description

The Landfill, owned by WPWMA and operated by a third party, is located off Athens Avenue in Lincoln, California. The Landfill opened in October of 1979 and accepts municipal solid waste (MSW). The final footprint will comprise approximately 231 acres. The site is permitted to contain a total of approximately 36.35 million tons of waste at closure. The Landfill operates under Solid Waste Facility Permit (SWFP) Number 31-AA-0210, issued by the California Integrated Waste Management Board (CIWMB).

The Landfill is a mound-over-excavation type fill. The Landfill currently consists of 16 modules for MSW placement. Module Numbers 1, 2, 10 and approximately 55 percent of Module Number 11 are identified as pre-Subtitle D, Class III, and were constructed without a geomembrane base liner. Module Number 2 has a single leachate sump and Module Numbers 10 and a portion of Module 11 have a gravel layer leachate control and recovery system (LCRS) constructed over native subgrade. The native soil subgrade was recompacted in areas where permeable soil was encountered. Module Numbers 12, and 45 percent of Module Number 11, are geomembrane-lined and have LCRSs, but are also classified as pre-Subtitle D, Class III. These modules were constructed by placing flexible member liner (FML) and a gravel LCRS layer over the native subgrade. The Module Number 13 base liner was constructed per Subtitle D requirements (FML and LCRS over two (2)-feet of compacted clay), and is also classified as Class III.

The remaining Module Numbers 14 through 16, and 5 through 9 have been redesignated as Subtitle D, Class II. The modules designated as Class II have been, or will be, constructed with a certified low permeability soil layer, a secondary geomembrane liner, and LCRS, as required. Module designation Numbers 3 and 4 have been removed from the MSW landfill design to provide area for the materials recovery facility (MRF).

The Landfill is regulated by the California Department of Resources Recycling and Recovery (CalRecycle), the Central Valley Regional Water Quality Control Board (RWQCB), Placer County Department of Health and Human Services (PCDHHS), and the Placer County Air Pollution Control District (PCAPCD). PCDHHS is the local enforcement agency (LEA) for the CalRecycle regulations. The Landfill is operated under a Title V Permit (Facility Identification WR-01) under the Federal Clean Air Act, as implemented by PCAPCD, with an expiration date of July 6, 2021.

2.2 Landfill Gas Collection and Control System

2.2.1 Existing Gas Collection and Control System

At the time of this plan, an active GCCS has been constructed and is operating at the Landfill. This section identifies both existing and proposed components of the GCCS at the Landfill. In conjunction with this plan, a GCCS design will be implemented to comply with the NSPS regulations.

The Landfill has installed and currently operates a GCCS with control devices including an enclosed flare (WPWMA flare), one (1) primary and two (2) standby landfill gas (LFG) transmission blowers, associated piping and controls. The WPWMA flare is operated under PCAPCD Permit Number PLWR-01-01. In addition, a third party LFG-to-energy (LFGTE) facility is operated on the Landfill which consists of internal combustion engines with generators and a small enclosed LFG flare for combusting excess LFG. The small enclosed flare at the LFGTE facility is operated under PCAPCD Permit Number PLWR-05-01.

The existing GCCS wellfield consists of approximately 63 vertical LFG extraction wells (interior wells), 27 perimeter wells, and 13 horizontal collectors. The existing infill (interior) LFG extraction wells are spaced between 150 and 300 feet on center and are perforated in ranges from approximately 35 feet to 85 feet below ground surface. Interior wells are typically constructed with six (6)-inch polyvinyl chloride (PVC) or high density polyethylene (HDPE) pipe and are completed with wellheads that are above the ground surface, with an approximate 36-inch bore diameter.

The perimeter wells are typically located in native soil within five (5) to 15 feet of the edge of the landfilled waste. The perimeter wells have an average well spacing of approximately 100 feet on center and are perforated in ranges from approximately 42 feet to 50 feet below ground surface, with an approximate 16-inch bore diameter. The well casings are constructed of two (2)-inch PVC pipe for the older perimeter wells with buried well heads, and four (4)-inch pipe for newer perimeter wells (GW-35 and up). The top of each casing is completed with a wellhead which is approximately one and a half feet below the ground surface and contained within a concrete vault. These perimeter wells are not considered "interior wells" and are therefore exempt from the NSPS wellhead monitoring criteria.

LFG collection piping consists of a combination of below grade and above grade PVC and HDPE pipe. Most of the currently active pipeline is above grade HDPE. The primary header pipe originates from the WPWMA flare station and consists of a 12-inch and eight (8)-inch diameter HDPE header loop that extends from the WPWMA flare station along the west and east sides of the landfill and around Module 15. Various lateral piping sections extend from the main header connecting the vertical LFG extraction wells to the GCCS. The perimeter wells are on separate six (6)-inch diameter PVC and HDPE headers connected to the primary header.

The LFG is conveyed through the pipe network to the WPWMA flare station located at the northern edge of the landfill adjacent to the northern landfill access road. From the WPWMA flare and blower station, LFG is routed to a combination of the WPWMA flare the LFGTE facility, and the small flare at the LFGTE facility.

The GCCS also includes a condensate collection and handling system composed of collection sumps, above ground condensate storage tank, transfer piping, pneumatic pumps and a compressed air system, and force mains that terminate at an existing sewer manhole near the WPWMA flare,. The condensate formed in the GCCS drains into perimeter condensate sumps with pneumatic pumps. Condensate is automatically pumped from these sumps to the sanitary sewer system.

2.2.2 Proposed Gas Collection and Control System Improvements

WPWMA has prepared a design to construct GCCS improvements both at the flare station and in the wellfield in 2016. Wellfield improvement plans include the installation of approximately 19 new vertical LFG extraction wells with associated four (4)- and six (6)-inch and eight (8) inch HDPE lateral piping. New eight (8)-inch HDPE header piping will be installed to connect the new wells to the perimeter header system. One (1) horizontal collector is also planned for installation.

Improvements for the flare station include the installation of a new blower skid and enclosed flare with associated interconnected piping. Various existing components at the flare station will either be removed or relocated for the new equipment.

Additional information and drawings of the GCCS are included in Appendix A.

3 FUTURE SITE DEVELOPMENT

3.1 GCCS Development Plan

Installation of additional GCCS components is anticipated to be coordinated with fill development and following NSPS regulations regarding installation of GCCS components stipulated in §60.752(b)(2)(ii)(A)(2). Due to any future operational changes, the GCCS design presented in Appendix A may be altered to follow the provisions of the NSPS and to accommodate actual field conditions at the time of construction.

3.2 Landfill Gas Control System Expansion Capabilities

The GCCS is designed to be readily expanded as waste fill operations proceed. Vertical or horizontal extraction wells will typically be installed in areas that have received waste for five (5) years and will be installed within two (2) years in areas that have reached final grade. However, extraction wells may be installed as a temporary control measure in disposal areas that have been in place for less than five (5) years and are not yet at final refuse grades.

Vertical extraction wells installed prior to reaching final grade will either be extended to the final grade level or abandoned and replaced. This determination will be made based upon the physical condition of the wells, their ability to provide effective LFG extraction, and field conditions at the time of final cap installation.

Proposed LFG headers are sized to accommodate the maximum expected LFG flow (refer to Section 4.5.2), and are fitted with flanged tees for expansion as new wells and piping are installed, following NSPS requirements. Additionally, the use of HDPE header piping provides for flexible and efficient connections for future expansion of the header piping system.

Additional information and drawings of the GCCS are included in Appendix A.

3.3 Interim Landfill Gas Control System Design Considerations

The purpose of this section is to address interim GCCS design following NSPS installation schedules in fill areas that are actively accepting waste, prior to achieving final fill grades.

3.3.1 Gas Collection System Expansion During Interim Conditions

NSPS requirements that specify additional LFG collection devices and the corresponding expansion of the overall GCCS will be followed. Furthermore, the expansions made to the GCCS during interim conditions will ensure that LFG will be collected at sufficient rates that may change over the interim time frame, and will be designed and installed properly to minimize the potential for off-site subsurface LFG migration. Some of these requirements are specifically stated below:

> **§60.751** Sufficient density means any number, spacing, and combination of collection system components, including vertical wells, horizontal collectors, and surface collectors, necessary to maintain emission and migration control as determined by measures of performance set forth in this part.
>
> **§60.755(b)** For purposes of compliance with § 60.753(a), each owner or operator of a controlled landfill shall place each well or design component as specified in the approved design plan…..Each well shall be installed no later than 60 days after the date on which the initial solid waste has been in place for a period of:
>
> > **§60.755(b) (1)** 5 years or more if active; or
> >
> > **§60.755(b) (2)** 2 years or more if closed or at final grade.
>
> **§60.759(a)(2)** The sufficient density of gas collection devices determined in paragraph (a)(1) of this section shall address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.
>
> **§60.759(a)(3)** The placement of gas collection devices determined in paragraph (a)(1) of this section shall control all gas producing areas, except as provided by paragraphs (a)(3)(i) and (a)(3)(ii) of this section.
>
> **§60.759(c)** Each owner or operator seeking to comply with §60.752(b)(2)(i)(A) shall convey the landfill gas to a control system in compliance with §60.752(b)(2)(iii) through the collection header pipe(s). The gas mover equipment shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the gas moving equipment…

Following these regulations, the GCCS has been designed and will be further expanded as necessary during interim conditions, to extract LFG at a sufficient rate to minimize the potential for off-site subsurface LFG migration and surface emissions of LFG.

Per the definition stated in §60.751, "sufficient density" means "any number, spacing, and combination of collection system components necessary to maintain emission and migration control as determined by measures of performance set forth in this part." Well spacing is established based on surface emissions monitoring (SEM) results, site-specific conditions (waste age, waste density, moisture content, etc.), well radius of influence (ROI) estimates, past operational experience, and engineering judgment. This is consistent with spacing criteria used at other landfills and limits the potential for surface emissions and off-site subsurface migration of LFG.

Per the NSPS requirements, a GCCS must be installed in all areas with waste that is five (5) years or older if active; and two (2) years or more if closed or at final grade. The interim placement of wells at the site will occur in a manner per the NSPS requirements.

In the event that the actual LFG extraction rate exceeds the capacity of the system, additional GCCS components will be designed and installed following NSPS requirements as dictated by actual site conditions at the time of construction. Therefore, actual operating parameters may dictate changes in the system flow characteristics and process equipment as the GCCS is expanded.

GCCS design for the Landfill will appropriately size sufficient collection elements, LFG mover equipment, and control device(s) for the estimated maximum flow rate of LFG. Furthermore, the header and lateral systems will be sized to accommodate the peak flows depending on the planned life of the pipe. If the Landfill plans to operate the header/lateral only during interim conditions, and then dismantle/replace prior to final build out of the GCCS, then it will be sized for the anticipated LFG flows equating to the period of time it is planned to be operational. The portions of the pipe network that the Landfill plans to use as part of the final design will be appropriately sized to handle the anticipated LFG flows in the portion of the Landfill at final build-out.

3.3.2 Compatibility with Refuse Filling Operations

One of the key factors in constructing and operating a GCCS during interim conditions, is to design and install the collectors to be compatible with the refuse filling operations of an active landfill. As refuse filling operations proceed and portions of the site reach final or near final grades, additional GCCS components may be installed to follow the five (5)-year/two (2)-year requirements of NSPS. Using this method allows GCCS components to be installed following §60.752(b)(2)(ii)(A)(2)(i) and (ii) while minimizing interference of the GCCS with ongoing filling operations.

During the process of refuse filling operations, periodically, vertical LFG extraction wells may be “raised” so the new refuse is not placed over the top of an existing well in a manner that covers the wellhead with refuse, thereby preventing access to the well. Vertical LFG extraction wells are raised in anticipation of a new lift of refuse, or in advance of the refuse being added to the area in order to maintain worker safety in the active area during these well raising construction activities. A variance request for monitoring these raised wells is contained in Appendix B of this Plan.

4 COMPLIANCE REVIEW AND EVALUATION

4.1 Compliance with §60.759(a)(1)

> **§60.759(a)(1)** The collection devices within the interior and along the perimeter areas shall be certified to achieve comprehensive control of surface gas emissions by a professional engineer. The following issues shall be addressed in the design: depths of refuse, refuse gas generation rates and flow characteristics, cover properties, gas system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end use, air intrusion control, corrosion resistance, fill settlement, and resistance to the refuse decomposition heat.

The Landfill's GCCS has been designed to be consistent with NSPS requirements to achieve comprehensive control of both potential for off-site subsurface LFG migration and surface emissions of LFG. The GCCS is an existing system which is continued to be expanded upon to comply with NSPS regulations. Additional information on the compliance of the GCCS with 60.759(a)(1) is presented in the sections below.

Applicable information used in the design of the GCCS is included in Appendix A (GCCS Design Drawings), Appendix B (Alternatives to the NSPS), Appendix C (Landfill Gas Generation Rate Modeling), and Appendix D (Surface Emissions Monitoring Plan).

4.1.1 Control Surface Emissions

The GCCS was designed to minimize the potential for both off-site subsurface LFG migration and surface emissions of LFG from the Landfill. System performance depends upon the installation of a satisfactory GCCS system, its proper management, and maintenance of a suitable final refuse cover. If there is a temporary exceedance in emissions it will be addressed by appropriate response, evaluating both the GCCS and final cover systems. Appropriate action will then be taken to correct the exceedance as required by NSPS.

4.1.2 Depths of Refuse

Depths of refuse were calculated, at the time of the design of the GCCS, based upon existing topography, permit plan, and record documentation of landfill liner or bottom elevations. The landfill surface elevation was determined from aerial and/or ground survey data available at the time of the design.

4.1.3 Landfill Gas Generation Rates and Flow Characteristics

In compliance with §60.752(b)(2)(ii)(A), the maximum expected LFG generation rate was estimated as 4,060 standard cubic feet per minute (scfm) in the year 2056 based on LFG generation modeling done in 2015 utilizing the United States Environmental Protection Agency (USEPA) Landfill Gas Emissions Mode, Version 3.02. In accordance with §60.755 (a)(1)(iii), following the installation of the initial GCCS, actual flow data has been used to project the maximum expected LFG generation flow rate instead of, or in conjunction with, the equations in paragraphs (a)(1)(i) and (ii) of this regulation.

As specified in 40 CFR 60.759(c)(1), the LFG mover equipment has been sized to handle the maximum LFG generation rate expected over the intended use period of the LFG moving equipment. Additional control device capacity will be installed if warranted in accordance with the NSPS.

LFG generation projections are provided in Appendix C.

4.1.4 Landfill Cover Properties

Modules 1, 2, and the eastern side slope and top deck portions of Modules 10 and 11 are closed. The final cover system for the closed portion of these modules consists of two (2) feet of foundation soils, one (1) foot of clay, and one (1) foot of vegetative support layer. The western portions of Modules 10 and 11 have interim cover consisting of onsite soils.

The final cover for active and future modules is prescribed in the Waste Discharge Requirements but not fully designed. It will likely consist of a low permeable soil layer, geomembrane, or other approved final cover system in accordance with California Code of Regulations (CCR) Title 27 regulations. The primary purpose of the final cover system is to preclude precipitation infiltration that would generate additional leachate. However, the final cover system design also provides a significant barrier to LFG emissions and air infiltration when combined with an active LFG extraction system. The GCCS will provide components for collecting LFG from beneath the final cover system.

4.1.5 Landfill Gas Control System Expandability

Expandability of the GCCS is achieved by installing tees with blind flanges along the transmission piping within the wellfield and at the control facility(s). These flanges provide planned access for expansion of the LFG transmission piping and LFG control devices in the future. In the event that actual LFG flow rates do exceed the capacity of the system, additional GCCS components will be designed and installed in accordance with NSPS requirements.

4.1.6 Condensate Management

Pipelines and wells will be designed to manage condensate and leachate intrusion. This may require the use of in-well condensate/leachate pumping facilities, routing liquid flow into the leachate collection and recovery system (LCRS), temporary pumping of wells if feasible, or abandonment and replacement of wells whose flow rates are insufficient due to condensate/leachate inundation. Whenever feasible, wells will be designed to drain into the LCRS. Wells installed in new waste or active filling areas may need to be larger diameter (i.e. 8″ or more) to accommodate in-well pumping systems while, based on site experience, allowing for greater bending of the well casing as it is extended or affected by the waste load around it. Condensate collected in perimeter sumps at low points along the LFG header system is pumped to the WPWMA flare station area by pneumatic pumps. The pumps' discharge is connected to an HDPE force main which discharges condensate to the sanitary sewer system immediately north of the WPWMA flare station.

4.1.7 Accessibility

Accessibility to the GCCS components is achieved by installing commonly accessed components (such as wellheads and monitoring ports) on relatively flat surfaces of the Landfill or near the Landfill's road network. Wellheads, piping risers, valves and monitoring ports will be installed above grade to maintain accessibility and will include valve handle extensions should piping and valves be buried in the future to accommodate fill operations.

4.1.8 Compatibility with Refuse Filling Operations

At the time of this report, an active GCCS has been constructed and is operating at the Landfill. Future additions or expansions of the GCCS will be considered when planning waste filling operations and will be designed to integrate the existing GCCS, to the extent practical.

As refuse filling operations proceed and portions of the site reach final or near-final grades, additional GCCS components will be installed. This method of installation allows GCCS components to be constructed in accordance §60.752(b)(2)(ii)(A)(2)(i) and (ii) while minimizing interference of the GCCS with ongoing filling operations.

4.1.9 Integration with Closure End Use

Currently, the post-closure end-use for the site is unspecified. Future closure end-use must be approved by Landfill personnel to evaluate compatibility with the GCCS. Any items of concern related to maintaining and operating the GCCS will be mitigated by either altering the proposed post-closure end-use or by adjusting or modifying the GCCS in accordance with Landfill and NSPS requirements.

4.1.10 Air Intrusion Control

Potential air intrusion and LFG emissions through the cover system will be controlled through adequate cover system design, cover system pipe penetration design, periodic monitoring and adjustment of the GCCS, and appropriate maintenance of the landfill cover system.

Air intrusion around LFG wells will be minimized by placing a bentonite seal above the screened (perforated) portion of the well and at the landfill surface surrounding the well casing. Pipe boots may also be used to further decrease the likelihood for air intrusion at points where pipes penetrate the cover system. Air intrusion in horizontal collectors will be accomplished by burying horizontal collection trenches under subsequent lifts of refuse and by offsetting the start of perforated piping from side slopes. Based on site experience with pipes breaking in the shallow cover soil, only resilient pipes (i.e. not PVC) will be allowed to extend through the cover system.

Furthermore, air intrusion will be controlled through periodic monitoring for nitrogen or oxygen at each wellhead and conducting adjustments to the GCCS in accordance with the NSPS requirements.

4.1.11 Corrosion Resistance

Corrosion resistance of the GCCS is achieved through the use of corrosion resistant materials or materials that have a corrosion resistant coating, in accordance with 40 CFR §60.759(b)(1). The GCCS components will be constructed of PVC, HDPE, fiberglass, corrosion-resistant steel, neoprene (gaskets and seals) and other non-porous corrosion resistant materials.

Components will be inspected during routine GCCS monitoring for abrasion, chipping, or other potential deterioration of the components. If damage to the materials is observed that may be detrimental to the performance of the GCCS, the components will be replaced or repaired.

4.1.12 Fill Settlement

Settlement will occur due to decomposition and consolidation of the refuse. To accommodate refuse settlement, the GCCS components were designed and installed with several features to account for this settlement including:

- LFG extraction wellheads connected to the LFG transmission piping by a flexible pipe or hose connection. This allows the LFG piping to accommodate some changes in the orientation of the LFG transmission piping or LFG extraction well;

- HDPE piping will be used for the construction of the header piping and transmission system. HDPE piping is flexible and absorbs differential settlement without breaking or cracking; and

- LFG transmission piping will be sloped at sufficient grades so that reasonable amounts of differential and total settlement may occur without causing pipe breakage, or disrupting the overall flow gradient of the LFG transmission piping, with the following minimum slopes unless infeasible;
  - Above ground pipe within the limit of landfilled waste, with LFG flow in same direction as condensate flow – approximately 2%
  - Above ground pipe within the limit of landfilled waste, with LFG flow against the condensate flow direction – approximately 3%
  - Buried pipe within the limit of landfilled waste (seldom used) – approximately 4%
  - Buried pipe within the limit of landfilled waste in actively filling or road crossing areas (seldom used) – approximately 6%
  - Buried pipe outside the limit of landfilled waste in engineered fill or undisturbed soil (seldom used) – approximately 1%

4.1.13 Resistance to Decomposition Heat

Resistance of the GCCS to the heat generated as a result of refuse decomposition is achieved through the use of materials tested and proven to withstand temperatures well above those typically found in landfills. The GCCS will be inspected during routine LFG system monitoring for heat damage. If heat damage of the GCCS components is observed and is believed to be detrimental to the operation of the GCCS, the cause of the elevated landfill temperature will be investigated and the GCCS will be adjusted or modified to mitigate the effects of the elevated temperatures.

The primary point of observation during routine LFG system monitoring will be at the individual wellheads. Each wellhead will possess either an integral thermometer or a connection for the use of portable thermometer. The extraction wells will generally be operated at temperatures of less than 131 degrees Fahrenheit (°F), unless an alternative temperature parameter is approved for an individual monitoring point.

Wellhead components are visually inspected and the control valve and monitoring connection physically exercised during each monitoring event, to ensure correct operation of the components.

4.1.14 Restraint of Pipe in Temperature Fluctuations and UV Protection

Resistance of the GCCS pipeline components to heat generated expansion and contraction is achieved through the use of earth berms, concrete anchors and other materials designed to restrain the pipe, combined with areas designed to allow for pipe expansion. The areas for pipe expansion may include flexible restraint systems (concrete ties with straps oriented perpendicular to the passing pipeline) or flattened areas of land to allow for pipe movement without creating a sag.

UV protection is a concern for the PVC pipelines and PVC based flexible hoses used at each well head. Permanent PVC pipe may be coated with a protective coating of paint. Future permanent piping will be constructed of HDPE instead of PVC.

The GCCS will be inspected during routine LFG system monitoring for UV, heat or expansion/contraction damage, excessive abrasion, collapse or excessive sagging. If damage is observed and is believed to be detrimental to the reliable operation of the GCCS, the cause will be investigated and the GCCS components will be adjusted, modified or replaced to mitigate the effects of the temperature fluctuations.

4.2 Compliance with §60.759(a)(2)

> **§60.759(a)(2)** The sufficient density of gas collection devices determined in paragraph (a)(1) of this section shall address landfill gas migration issues and augmentation of the collection system through the use of active or passive systems at the landfill perimeter or exterior.

Per the definition stated in §60.751, "sufficient density" means "any number, spacing, and combination of collection system components. . . necessary to maintain emission and migration control as determined by measures of performance set forth in this part."

The GCCS consists of vertical wells installed within the waste footprint and just outside the waste footprint, and horizontal collection wells buried within the waste mass. The adequacy of the well density will be confirmed with SEM. Quarterly SEM will be performed using a flame ionization detector (FID), as required under §60.754(c)(3). All exceedances will be properly mitigated and re-tested in accordance with the NSPS. Monitoring of perimeter LFG probes is also conducted and will help determine the GCCS effectiveness to control potential for off-site subsurface LFG migration. All findings are submitted to the facility's operating record.

If the GCCS does not meet the measures of performance set forth in the NSPS, the GCCS will be adjusted or modified in accordance with the NSPS requirements. These adjustments or modifications may include the installation of additional LFG collection elements, cap repairs or other actions defined by field conditions at the time of monitoring.

4.3 Compliance with §60.759(a)(3)

> **§60.759(a)(3)** The placement of gas collection devices determined in paragraph (a)(1) of this section shall control all gas producing areas, except as provided by paragraphs (a)(3)(i) and (a)(3)(ii) of this section.

Compliance related to §60.759(a)(3) are discussed in the following sections.

4.3.1 Asbestos and Non-degradable Materials

> **§60.759(a)(3)(i)** Any segregated area of asbestos or non-degradable material may be excluded from collection if documented as provided under §60.758(d). The documentation shall provide the nature, date of deposition, location and amount of asbestos or non-degradable material deposited in the area, and shall be provided to the Administrator upon request.

The Landfill was previously permitted to accept asbestos but currently does not.

4.3.2 Nonproductive Areas

> **§60.759(a)(3)(ii)** Any nonproductive area of the landfill may be excluded from control, provided that the total of all excluded areas can be shown to contribute less than 1 percent of the total amount of NMOC emissions from the landfill. The amount, location, and age of the material shall be documented and provided to the Administrator upon request. A separate NMOC emissions estimate shall be made for each section proposed for exclusion, and the sum of all such sections shall be compared to the NMOC emissions estimate for the entire landfill.

There are currently no non-productive areas at the Landfill.

4.4 Compliance with §60.759(b)(1), (2), and (3)

> **§60.759(b)** Each owner or operator seeking to comply with §60.752(b)(2)(i)(A) shall construct the gas collection devices using the following equipment or procedures:

4.4.1 Landfill Gas Extraction Component Construction

> **§60.759(b)(1)** The landfill gas extraction components shall be constructed of PVC, HDPE pipe, fiberglass, stainless steel, or other non-porous corrosion resistant material of suitable dimensions to: convey projected amounts of gases; withstand installation, static, and settlement forces; and withstand planned overburden or traffic loads. The collection system shall extend as necessary to comply with

emission and migration standards. Collection devices such as wells and horizontal collectors shall be perforated to allow gas entry without head loss sufficient to impair performance across the intended extent of control. Perforations shall be situated with regard to the need to prevent excessive air infiltration

Compliance with §60.759(b)(1) is discussed in the following sections.

4.4.1.1 Materials

The GCCS components will be constructed of PVC, HDPE, fiberglass, corrosion-resistant steel, neoprene (gaskets and seals) and other non-porous corrosion resistant materials. Pipelines that penetrate the landfill cover will only be constructed of resilient materials such as HDPE, not of PVC due to site experience with PVC breakage.

4.4.1.2 Component Sizing

The piping network, blowers, and flare are sized for the current anticipated LFG flow rates for the facility. The GCCS is installed with expansion capabilities and the capacity of the extraction and treatment system components may be phased in as LFG generation and extraction rates increase.

4.4.1.3 Component Loading

The GCCS components were designed to withstand the estimated installation, static, settlement, overburden, and traffic loads. The GCCS components that will be installed at the Landfill are consistent with those at other landfills which have been in-place for extended periods of time (in excess of 15 years) and verified to be withstanding applied static and settlement forces. Overburden and traffic loads for the proposed LFG transmission piping are less than the allowable loads recommended by the piping manufacturer. Foundations used for GCCS components were designed to handle the applied loads.

4.4.1.4 System Expansion

The GCCS shall be expanded as necessary to comply with NSPS requirements. Expansion of the GCCS will be certified by a professional engineer and the measures of performance of the LFG system verified as set forth in the NSPS. The Landfill will continue to conduct monitoring and document compliance of the GCCS in accordance with NSPS requirements. If the GCCS at the Landfill does not meet the measures of performance set forth in the NSPS, the GCCS will be adjusted or modified in accordance with NSPS requirements.

4.4.1.5 Component Perforation

The vertical well elements will be perforated similar to those shown on the design drawings (Appendix A), or as approved by the design engineer at the time of installation, to allow LFG entry without inducing head losses sufficient to impair performance across the intended extent of control. The perforation patterns used for the GCCS design have been successfully used in previous LFG control applications.

4.4.1.6 Air Infiltration

The LFG collection elements were designed to prevent excessive air infiltration through the use of solid pipe and solid backfill near the ground surface for vertical extraction wells. Hydrated bentonite clay chips, and/or geomembrane seals will be provided around the vertical extraction well casings where they penetrate the landfill final cover systems. Further, air intrusion control will be accomplished through monitoring of the operational monitoring standards for the LFG collection elements in accordance with NSPS requirements. If the GCCS does not meet the operational monitoring standards, it will be adjusted or modified in accordance with NSPS requirements.

4.4.2 Landfill Gas Extraction Component Installation

> **§60.759(b)(2)** Vertical wells shall be placed so as not to endanger underlying liners and shall address the occurrence of water within the landfill. Holes and trenches constructed for piped wells and horizontal collectors shall be of sufficient cross-section so as to allow for their proper construction and completion including, for example, centering of pipes and placement of gravel backfill. Collection devices shall be designed so as not to allow indirect short circuiting of air into the cover or refuse into the collection system or gas into the air. Any gravel used around pipe perforations should be of a dimension so as not to penetrate or block perforations.

Compliance with §60.759(b)(2) is discussed in the following sections.

4.4.2.1 Component Placement

Depths of refuse were calculated, at the time of the design of the GCCS, based upon existing topography and permit plan and record documentation of Landfill liner grades. The Landfill surface elevations are determined from aerial survey data at the time of design.

4.4.2.2 Leachate

The occurrence of leachate within the Landfill is addressed by the leachate management system. Leachate management is accomplished through the use of a leachate drainage layer, perforated collection piping, liquid pumping and discharge to the sanitary sewer system.

For this reason, it is not expected that free liquids will be encountered during the drilling of the vertical extraction wells. If free liquids are encountered, the drilling contractor will attempt to drill through the perched zone of liquids allowing drainage into the underlying waste mass and the leachate collection system. In the event that the zone of perched liquids cannot be penetrated, the well installation may be terminated and relocated. If necessary, appropriate measures will be taken to complete the well installation procedure at a nearby location.

If perched liquids are observed within the vertical extraction wells after installation and it is determined that the liquid level is restrictive to efficient LFG extraction, the leachate level will be reduced. This is typically accomplished by periodic pumping of the liquids using either electric or pneumatic pumping systems. Liquids removed from the well casings will be discharged to the sanitary sewer system in accordance with applicable permits.

4.4.2.3 Vertical Wells

Vertical extraction wells constructed for LFG collection are of sufficient cross-section to allow for their proper construction and completion, including centering of the pipes and placement of gravel backfill. The vertical wells will be constructed under supervision of a construction quality assurance program implemented by the Landfill and verified to be properly constructed.

4.4.2.4 Horizontal Wells

Horizontal LFG collection wells are also used to control LFG emissions and are typically buried in 50 to 100 feet of waste as waste lifts are constructed vertically. Horizontal LFG collection trenches are installed across active areas and tied into adjacent GCCS piping with solid pipe or risers. Due to the propensity for air intrusion since the horizontal trenches are normally completed in shallow trenches across new waste, the horizontal wells are typically operated after placement of at least one to two subsequent lifts of refuse. In addition, the perforated piping portion of the horizontal collectors are normally offset from side slopes to prevent air intrusion from the side slope.

4.4.2.5 Component Short Circuiting

Air intrusion control will be verified through monitoring of LFG quality at the extraction components, monitoring of surface emission levels and maintenance of the landfill cover in accordance with NSPS requirements. Separation of the collection elements from the refuse is accomplished by placing gravel backfill in the annular borehole space around extraction well casings, providing a filter pack between the refuse and the LFG collection elements.

The potential for direct venting of the LFG to the atmosphere is limited by operating the GCCS under a controlled application of vacuum and is monitored by quarterly monitoring of surface emissions (see Section 4.2).

4.4.2.6 Gravel Backfill

Gravel of sufficient size is specified to prevent penetration or blockages of the LFG collector pipe perforations. Gravel (non-calcareous) to be utilized will be typically nominal one-inch to three-inch particle size.

4.4.3 Landfill Gas Extraction Component Connections to LFG Transmission Piping

> **§60.759(b)(3)** Collection devices may be connected to the collection header pipes below or above the landfill surface. The connector assembly shall include a positive closing throttle valve, any necessary seals and couplings, access couplings and at least one sampling port. The collection devices shall be constructed of PVC, HDPE, fiberglass, stainless steel, or other non-porous material of suitable thickness.

The collection devices are connected to the collection header pipes using lateral piping. The lateral piping is connected to the header piping either above or below the landfill surface, as required by field conditions at the time of installation. The connector assemblies (vertical extraction wellheads) are located above grade. These assemblies include a positive closing throttle valve, necessary seals and couplings, access ports and couplings, and a minimum of two sampling ports. The collection devices are constructed of PVC, HDPE, fiberglass, corrosion-resistant steel, and other non-porous materials of suitable thickness. The GCCS components are designed to withstand anticipated installation, static, settlement, overburden, and traffic loads.

4.5 Compliance with §60.759(c)(1) or (2)

> **§60.759(c)** Each owner or operator seeking to comply with §60.752(b)(2)(i)(A) shall convey the landfill gas to a control system in compliance with §60.752(b)(2)(iii) through the collection header pipe(s). The gas mover equipment shall be sized to handle the maximum gas generation flow rate expected over the intended use period of the gas moving equipment using the following procedures:

Compliance with §60.759(c) is discussed in the following sections.

4.5.1 Existing Landfill Gas Flow Rate Data

> **§60.759(c)(1)** For existing collection systems, the flow data shall be used to project the maximum flow rate. If no flow data exists, the procedures in paragraph (c)(2) of this section shall be used.

At the time of this report, an active GCCS has been constructed and is operating at the Landfill. The LFG mover equipment has been sized to handle the LFG flow rate expected over the intended use period of the LFG moving equipment.

LFG generation projections are provided in Appendix C.

4.5.2 Future Landfill Gas Flow Rate Estimates

> **§60.759(c)(2)** For new collection systems, the maximum flow rate shall be in accordance with §60.755(a)(1).

In compliance with §60.752(b)(2)(ii)(A), the maximum expected LFG flow rate for the GCCS is based on LFG modeling and site specific LFG flow data. As specified in 40 CFR 60.759(c)(1), the LFG mover equipment has been sized to handle the maximum LFG generation rate expected over the intended use period of the LFG moving equipment. Additional control device capacity will be installed if warranted in accordance with the NSPS.

LFG generation projections are provided in Appendix C.

4.6 Alternatives and Compliance with §60.752(b)(2)

> **§60.752(b)(2)** If the calculated NMOC emission rate is equal to or greater than 50 megagrams per year, the owner or operator shall:

4.6.1 Submit a Design Plan

> **§60.752(b)(2)(i)** Submit a collection and control system design plan prepared by a professional engineer to the Administrator within 1 year:

A Tier 1 analysis conducted in 1997 indicated the Landfill exceeded the 50 megagrams per year (Mg/yr) threshold. A Design Plan was prepared in 1998 within one year of the Tier 1 analysis which indicated the Landfill exceeded 50 Mg/yr of NMOCs.

On behalf of WPWMA, Cornerstone prepared this GCCS Design Plan to update and replace the most recent version of the GCCS Design Plan. WPWMA is submitting this Design Plan update to the PCAPCD, with a copy sent to the USEPA Region IX office consistent with NSPS requirements. Refer to Table 2 for further details.

4.6.2 Alternatives to the NSPS

> **§60.752(b)(2)(i)(B)** The collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance

measures, monitoring, record keeping or reporting provisions of §60.753 through §60.758 proposed by the owner or operator.

A number of alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, record keeping or reporting provisions of §60.753 through §60.758 of the NSPS are proposed at this time. These alternatives are discussed in Appendix B of this document.

4.6.3 Specifications for Active Collection Systems

As stated in Sections 4.1 through 4.5 of this Design Plan, the GCCS proposed at the Landfill complies with the specifications for active collection systems as stipulated in §60.759 of the NSPS. If future expansions of the GCCS are necessary, they will be designed to comply with the NSPS requirements or any approved alternatives.

4.6.4 Installation of Landfill Gas Collection and Control System

§60.752(b)(2)(ii) Install a collection and control system within 18 months of the submittal of the design plan under paragraph (b)(2)(i) of this section that effectively captures the gas generated within the landfill.

§60.752(b)(2)(ii)(A)(2) Collect gas from each area, cell, or group of cells in the landfill in which the initial solid waste has been placed for a period of:

§60.752(b)(2)(ii)(A)(2)(i) 5 years or more if active; or

§60.752(b)(2)(ii)(A)(2)(ii) 2 years or more if closed or at final grade;

Refer to Table 2 for further details regarding §60.752(b)(2)(ii). Future expansions to the GCCS will proceed in accordance with the schedules under paragraphs (i) and (ii) of this section.

§60.752(b)(2)(ii)(A)(3) Collect gas at a sufficient extraction rate;

§60.752(b)(2)(ii)(A)(4) Be designed to minimize off-site migration of gas.

In compliance with §60.752(b)(2)(ii)(A)(3) and (4), the GCCS is designed to extract LFG at a sufficient rate to minimize the potential for off-site subsurface LFG migration and surface emissions of LFG. This is achieved by sizing and installing sufficient collection elements, transmission piping, blower(s), and flare for the estimated maximum flow rate of LFG.

The GCCS is designed to collect LFG at a sufficient rate, which per the definition in §60.751 means to maintain a negative [gage] pressure (vacuum) at the wellheads without causing air infiltration. Application of a negative gage pressure and minimization of air infiltration will be verified by monitoring the static pressure and nitrogen or oxygen concentrations of the LFG at the extraction points.

Each extraction point will be monitored on a minimum of a monthly basis in accordance with 40 CFR §60.753 (b) and (c). Monitoring will be performed for pressure, temperature, oxygen and/or nitrogen, at a minimum.

Verification of the GCCS's ability to minimize the potential for off-site subsurface LFG migration will be achieved through the routine monitoring of perimeter LFG monitoring probes installed around the Landfill.

The Landfill will monitor the GCCS extraction points, after installation, for static pressure and for LFG quality in accordance with NSPS requirements and will continue to monitor the perimeter LFG monitoring locations to detect potential for off-site subsurface LFG migration. If off-site LFG migration is detected, the Landfill will take the necessary actions in accordance with NSPS requirements.

4.6.5 Control Systems

> **§60.752(b)(2)(iii)** Route all the collected gas to a control system that complies with the requirements in either paragraph (b)(2)(iii)(A), (B) or (C) of this section.

The control systems have the ability to utilize the LFG collected as part of the GCCS. The required operational performance of these components is stipulated by §60.752(b)(2)(iii) which states:

> **§60.752(b)(2)(iii)(A)** An open flare designed and operated in accordance with §60.1

> **§60.752(b)(2)(iii)(B)** A control system designed and operated to reduce NMOC by 98 weight-percent, or, when an enclosed combustion device is used for control, to either reduce NMOC by 98 weight percent or reduce the outlet NMOC concentration to less than 20 parts per million by volume, dry basis as hexane at 3 percent oxygen. The reduction efficiency or parts per million by volume shall be established by an initial performance test, required under §60.8 using the test methods specified in §60.754(d).

> **§60.752(b)(2)(iii)(C)** Route all collected gas to a treatment system that processes the collected gas for subsequent sale or use. All emissions from any atmospheric vent from the gas treatment system shall be subject to the requirements of paragraph (b)(2)(iii)(A) or (B) of this section.

LFG collected at the Landfill is routed to a 75.9 Million British Thermal Units per hour (MMBTU/hr) (2,500 scfm at 55 percent methane) capacity enclosed flare with a destruction efficiency of at least 98 percent. A new proposed 90 MMBTU/hr (3,000 scfm at 50 percent methane) capacity enclosed flare with a destruction efficiency of at least 99 percent is to be installed at the site in 2016.

The flare operating temperature and LFG flow rate is monitored and recorded a minimum of every 15 minutes with a paperless recorder in accordance with §60.756(b). The flare exhaust temperature is monitored using thermocouples installed within the flare stack. The LFG flow rate is measured by a continuous flow metering device installed along the LFG piping, downstream of the blowers. There are no bypass valves or other conveyances that will allow untreated LFG to be discharged to the atmosphere.

The flare is monitored for the presence of a flame, indicating that combustion is occurring. Monitoring for the presence of a flame is accomplished by an ultraviolet (UV) flame scanner, thermocouple, or comparable device. In the event that a flame is not detected, indicating that the combustion process has been disrupted, the monitoring system will automatically:

a) Eliminate power to the LFG blowers; and
b) Initiate the closure of a pneumatic-activated valve at the inlet to the flare (there is no bypass around the control device).

Stopping the blowers will cause the LFG extraction process to cease. Closing the inlet valve to the flare will eliminate the potential for direct venting of LFG through the control device system.

A small enclosed flare at the LFGTE facility is operated under PCAPCD Permit Number PLWR-05-01. The small flare has a capacity of 13.9 MMBTU/hr (450 scfm at 55 percent methane) and is not permitted to operate at the same time as the large flare, except for a one (1)-hour transition time when switching from operation of one flare to the other. The small flare has a destruction efficiency of at least 98 percent, and is equipped with an alarm and automatic blower and LFG supply shutoff valve system to isolate the flare from the landfill gas supply line in the event of a failure.

A portion of the LFG from the Landfill is processed by the LFGTE facility. The LFGTE facility is capable of processing the maximum flow of LFG from the landfill, around 3,300 scfm. LFG that is not utilized by the power plant is routed to the WPWMA flare or small flare control devices.

In the event that LFG extracted from the landfill exceeds the capacity of the control systems, additional control mechanisms will be installed. These additional control mechanisms may include, but are not limited to, installing additional or upgraded control devices or installation of beneficial-use facilities.

LIMITATIONS

The work product included in the attached was undertaken in full conformity with generally accepted professional consulting principles and practices and to the fullest extent as allowed by law we expressly disclaim all warranties, express or implied, including warranties of merchantability or fitness for a particular purpose. The work product was completed in full conformity with the contract with our client and this document is solely for the use and reliance of our client (unless previously agreed upon that a third party could rely on the work product) and any reliance on this work product by an unapproved outside party is at such party's risk.

The work product herein (including opinions, conclusions, suggestions, etc.) was prepared based on the situations and circumstances as found at the time, location, scope and goal of our performance and thus should be relied upon and used by our client recognizing these considerations and limitations. Cornerstone shall not be liable for the consequences of any change in environmental standards, practices, or regulations following the completion of our work and there is no warrant to the veracity of information provided by third parties, or the partial utilization of this work product.

The modeling techniques used by Cornerstone and the LFG industry are, by definition, hypothetical, and can only be used as a very general tool for producing a range of estimates to aid in determining the direction of further investigations. Actual LFG generation and collection rates are dependent on many variables, including: refuse composition, moisture, pH, cover soil permeability, well spacing, continuing fill rates, etc. Typically these parameters are not well defined at the time of modeling and/or differ somewhat from those actually experienced during future site operation.

The modeling provided herein was performed with today's current standards of practice and no warranty or representation, expressed or implied, is made, as to the actual LFG production that will occur in the future. Opinions and recommendations contained in this report are based on the information available and certain assumptions that were deemed reasonable when our services were performed. We are not responsible for the impacts of any changes in information, site operations or methods that may change in the future.

TABLES

TABLE 1 – SUMMARY OF LANDFILL GAS COLLECTION AND CONTROL SYSTEM DESIGN PLAN

Regulatory Citation	Report Reference	Appendix E Reference[1]	Regulatory Requirement	Implementation of Regulatory Requirement
60.759 (a)(1)	Section 4.1	Page E-3, Section 3	Design Plan must address depth of refuse, refuse LFG generation rates and flow characteristics, cover properties, LFG system expandability, leachate and condensate management, accessibility, compatibility with filling operations, integration with closure end-use, air intrusion control, corrosion resistance, fill settlement, resistance to the refuse decomposition heat.	The Landfill Design Plan addresses all of the requirements listed under §60.759 (a)(1).
§60.759 (a)(2)	Section 4.2	Page E-3, Section 4	LFG collection devices shall be installed at a sufficient density to control surface emissions and subsurface migration of LFG.	The LFG collection devices have been designed to control surface emissions and subsurface migration of LFG.
§60.759 (a)(3)(i)	Section 4.3.1	Page E-3, Section 5	Areas containing asbestos or other non-degradable materials may be excluded from coverage by the LFG collection and control system (GCCS).	The Landfill does not accept asbestos.
§60.759 (a)(3)(ii)	Section 4.3.2	Page E-3, Section 6	Areas considered to be non-productive (contributing less than one percent of the total non-methane organic compounds (NMOC) from the landfill) may be excluded from coverage of the landfill GCCS.	There are currently no non-productive areas at the Landfill.
§60.759 (b)(1)	Section 4.4.1	Page E-5, Section 7	Landfill GCCS components shall be constructed of PVC, HDPE or other non-porous corrosion resistant materials.	Landfill GCCS components shall be constructed of PVC, HDPE or other non-porous corrosion resistant materials.

Regulatory Citation	Report Reference	Appendix E Reference[1]	Regulatory Requirement	Implementation of Regulatory Requirement
	Section 4.4.1	Page E-5, Section 8	Landfill GCCS components shall have suitable dimensions to convey the maximum LFG flow rate and withstand future settlement, overburden and traffic loads.	Landfill GCCS components were designed to accommodate the maximum LFG flow rate and withstand future settlement, overburden and traffic loads.
	Section 4.4.1	Page E-5, Section 9	Expansion of the landfill GCCS will occur as needed to meet LFG emissions and migration standards.	Expansion of the landfill GCCS will occur as needed following LFG emissions and migration standards.
	Section 4.4.1	Page E-5, Section 10	Extraction well perforations will control head loss and air infiltration throughout the system,	The LFG collection elements shall be constructed to minimize head loss and prevent excessive air infiltration into the system.
§60.759 (b)(2)	Section 4.4.2	Page E-5, Section 11	Extraction wells must not endanger the landfill base liner and must address the occurrence of water in the landfill.	The extraction wells are designed based on depths of refuse which are calculated at the time of the design of the GCCS based upon existing topography and permit plan and record documentation of Landfill liner grades. The Landfill surface elevations are determined from survey data at the time of design. Liquids in the refuse are addressed by the leachate and condensate management systems.
	Section 4.4.2	Page E-6, Section 12	Suitable cross-section of the well holes and trenches is required for construction and completion of the collection elements.	The vertical boreholes will be constructed with sufficient cross section to allow for the proper construction of the collection elements.

Regulatory Citation	Report Reference	Appendix E Reference[1]	Regulatory Requirement	Implementation of Regulatory Requirement
	Section 4.4.2	Page E-6, Section 13	Landfill GCCS components must be designed to control air intrusion, prevent LFG from escaping the GCCS, and prohibit refuse from entering the GCCS.	Control of air intrusion and the escape of LFG from the system will be accomplished through the monitoring of the landfill GCCS, operating the system under vacuum and continued maintenance of the landfill cover. The refuse is prohibited from entering the collection devices by gravel backfill or other approved materials placed in the hole or trench separating the refuse from the LFG collection elements.
	Section 4.4.2	Page E-6, Section 14	Gravel backfill in the extraction wells and trenches shall not obstruct pipe perforations.	Backfill of sufficient size will be used to prohibit entry or blockage of the collector perforations.
§60.759 (b)(3)	Section 4.4.3	Page E-6, Section 15	Collection device connections may be above or below ground, must include a positive closing throttling valve, necessary seals, access couplings, and at least one monitoring point.	The collection devices shall be connected to the collection header pipe and will include a positive closing throttling valve, necessary seals, access couplings, and at least one monitoring point.
§60.759 (c)	Section 4.5	Page E-6, Section 16	The collection header pipes must be adequate to handle the maximum LFG flow rate.	The collection header pipes are adequate to handle the current maximum LFG flow rate.
§60.752 (b)(2)(i)	Section 4.6.1	Page E-3, Section 2	Submit a collection and control system design plan prepared by a professional engineer to the Administrator within 1 year. Landfill GCCS Design Plan must be certified, sealed and signed by a professional engineer.	The GCCS Design Plan has been certified, sealed and signed by a professional engineer. See Table 2, below, for further details.

Regulatory Citation	Report Reference	Appendix E Reference[1]	Regulatory Requirement	Implementation of Regulatory Requirement
§60.752 (b)(2)(i)(B)	Section 4.6.2		The GCCS Design Plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, record keeping or reporting provisions of §60.753 through §60.758 proposed by the owner or operator.	The GCCS Design Plan includes alternatives per the requirements by the owner or operator in Appendix B.
§60.752 (b)(2)(ii)(A)(2)	Section 4.6.4	Page E-2, Section 2	LFG collection shall occur in active cells with waste in place for five years or more; in closed cells with waste at final grade for two years or more.	The landfill GCCS components will be installed following NSPS schedule requirements.
§60.752 (b)(2)(ii)(A)(3)	Section 4.6.4	Page E-2, Section 3	LFG extraction wells shall apply a negative gage pressure to maintain a sufficient extraction rate of LFG without causing air infiltration.	A negative gage pressure shall be applied to the LFG collection elements via a blower. The Landfill will monitor the landfill GCCS wellheads for static pressure and indications of air infiltration following NSPS operating standards.
§60.752 (b)(2)(ii)(A)(4)	Section 4.6.4	Page E-2, Section 4	Subsurface migration of LFG will be controlled.	The landfill GCCS shall control potential off-site subsurface migration through proper operation of the GCCS and control will be verified by the monitoring of perimeter monitoring probes installed at the site.
§60.752 (b)(2)(iii)	Section 4.6.5		Route all the collected LFG to a control system.	The landfill GCCS shall route the collected LFG to a control system that complies with the requirements §60.752 (b)(2)(iii)(A), (B), or (C).

Regulatory Citation	Report Reference	Appendix E Reference[1]	Regulatory Requirement	Implementation of Regulatory Requirement
§60.753(a)	Section 4.1		Operate the collection system such that LFG is collected from each area, cell, or group of cells in the MSW landfill in which solid waste has been in place for: (1) 5 years or more if active; or (2) 2 years or more if closed or at final grade.	The GCCS is and will be installed to collect LFG from all areas of the landfill that conform to this requirement. Since the Landfill is active, expansion of the GCCS will be as required and in accordance with this requirement.
§60.753(b)	Section 5.1 Section 6		Operate the collection system with negative pressure at each well head.	Extraction wells shall operate under a negative pressure, except for any approved exemptions and alternatives.
§60.753(c)	Section 6.1.3		Operate each interior well head in the collection system with a LFG temperature of less than 55° C and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent. The owner or operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens.	Extraction wells will operate under these conditions, except for any approved exemptions and alternatives.
§60.755(a)(1)(iii)	Section 2.1.4 Section 3.3 Section 4.1	Page E-6, Section 17	§60.755 (a)(1) For purposes of calculating the maximum expected LFG generation flow rate from the landfill to determine compliance with §60.752 (b)(2)(iii)(1), one of the following equations shall be used. The k and L_o factors should be those published in the most recent Compilation of Air Pollutant Emission Factors (AP-42) or other site-specific values demonstrated to be appropriate and approved by the Administrator.	The maximum flow for evaluating the initial enclosed flare for the GCCS was derived from the USEPA NSPS-based model using site specific data in accordance with §60.755 (a)(1)(iii). Following installation of the initial GCCS, subsequent GCCS expansion

Regulatory Citation	Report Reference	Appendix E Reference[1]	Regulatory Requirement	Implementation of Regulatory Requirement
			§60.755 (a)(1)(iii) If a collection and control system has been installed, actual flow data may be used to project the maximum expected LFG generation flow rate instead of, or in conjunction with, the equations in paragraphs (a)(1)(i) and (ii) of this section.	sizing was based on actual flow data and was used to project future flows.
§60.756	Section 6.2.5		Monitoring of Operations	The WPWMA will comply with the provisions of this rule.
§60.757	Section 5.1.4		Reporting Requirements	The WPWMA will comply with the provisions of this rule.
§60.758	Section 6		Recordkeeping Requirements	The WPWMA will comply with the provisions of this rule.

(1) From Appendix E ("Collection System Design Plans") of the NSPS Enabling Documents ("Municipal Solid Waste Landfills, Volume 1: Summary of the Requirements for the New Source Performance Standards and Emission Guidelines for Municipal Solid Waste Landfills", EPA-453R/96-004).

TABLE 2 - LANDFILL GAS COLLECTION AND CONTROL SYSTEM DESIGN REVIEW CHECKLIST

Landfill Site Name: *Western Regional Sanitary Landfill*
Location of Landfill: *3195 Athens Avenue, Lincoln, California*
Landfill Owner: *County of Placer*
Date of Submittal: *May 2016*

Goals for the GCCS: control migration control emissions safety
(circle all that apply, add more as appropriate)

Is the GCCS proposed to be active or passive? (circle one)

The proposed GCCS is active in nature and should serve to mitigate the potential for both subsurface and airborne migration, as well as the potential for accumulation in occupied structures.

---

1. Was the design certified by a PE? **60.752(b)(2)(i)** Yes No
(circle one)

   Maura Dougherty is a Registered Professional Engineer in California and has certified this Gas Collection and Control System (GCCS) Design Plan as the design engineer.

2. Was the design submitted within 12 months of the first report of the site exceeding 50 Mg/yr. of NMOC's? **60.752(b)(2)(i)** Yes No
(circle one)

   If no, describe circumstances: *On behalf of the Western Placer Waste Management Authority, Cornerstone Environmental Group, LLC has prepared this landfill gas collection and control system (GCCS) Design Plan to update and replace the existing GCCS Design Plan submitted in 2012. The facility's initial GCCS Design Plan (1998) was submitted in accordance with the NSPS compliance schedule and or local PCAPCD rules and regulations.*

3. Is the GCCS planned to be operational within 30 months of the first report of the site exceeding 50 MG/yr of NMOC's? **60.752(b)(2)(ii)** Yes No
(circle one)

   If no, describe circumstances: *At the time of this report, an active GCCS has been constructed and is operating at WSRL.*

4. Does the GCCS comply with the 2 year/5 year rule? **60.752(b)(2)(ii)(A)(2)**
   Yes No
   (circle one)

   If no, describe circumstances: *Please reference Section 4.6.4 of the Design Plan.*

5. What is the design life of the GCCS? **60.752(b)(2)(v)**
   (If less than 15 years describe why) *The design life of the GCCS includes the operational period of the facility up to 20 years. The system has been designed to accommodate expansion as needed in the future. Individual components of the GCCS will be replaced or repaired as age and usage reduce their efficiency.*

6. Is the GCCS design for the maximum expected flow rates during its design life? **60.752(b)(2)(ii)(A)(1)** Yes No
   (circle one)

   If no, describe circumstances: *Please reference Section 4.5 of the Design Plan.*

7. Describe the measures taken to control lateral LFG migration in the design. If no measures were taken, describe why? **60.752(b)(2)(ii)(A)(4)** *The design of the GCCS uses active extraction to mitigate the potential for lateral landfill gas (LFG) migration. This process is enhanced by the presence of a low-permeability soil and/or flexible membrane liner (FML) base liner system as well as a low-permeability soil and/or FML final cap system where applicable. Please reference Section 4.1 of the Design Plan.*

8. If a passive system is planned, are the necessary liners in place? **60.752(b)(2)(ii)(B)(2)**
   Yes No
   (circle one)
   If no, describe circumstances:
   Not Applicable – an active system is installed and operating.

9. Is adequate density of collectors planned? Refer to Section 5.1 Yes No
   (circle one)

   If no, describe circumstances:
   Please reference Section 4.2 of the Design Plan.

10. Is the LFG Conveyance System sized properly? Refer to Section 5.2
    Yes No
    (circle one)

    The LFG conveyance system is adequately sized to handle the future peak LFG generation rate calculated using the United States Environmental Protection Agency

(USEPA) LandGEM V3.02, and is expandable. The LFG conveyance system may be expanded to handle future LFG generation rates in accordance with the New Source Performance Standards (NSPS) to mitigate surface and lateral LFG migration. Please reference Sections 4.4.1.2 and 4.6.5 of the Design Plan.

11. Is the LFG planned to be routed to a control device? **60.752(b)(2)(iii)**
Yes No
(circle one)

Please reference Section 4.6.5 of the Design Plan.

12. Describe the control device utility flare enclosed flare other
(circle one)

The control devices installed consist of two enclosed LFG flares rated for 2,500 and 450 standard cubic feet per minute (scfm) of LFG at 50 percent methane, respectively. The flares are operated in accordance with §60.752(b)(2). The Landfill also provides LFG to an onsite Third Part Power Plant operated under a separate permit. A proposed 3,000 scfm enclosed flare has been proposed for installation in 2017. Please reference Section 4.6.5 of the Design Plan.

13. If the control device is a flare, does it include continuous temperature monitoring and a flow measurement device? **60.756(b) and (c)** Yes No
(circle one)

If no, describe circumstances: *The WPWMA flare and the small flare at the LFGTE facility have paperless recorders which monitor and record data, including both the flares' operating temperatures and flow rates to demonstrate combustion and the inlet LFG flow rate, in accordance with §60.756. Please reference Section 4.6.5 of the Design Plan.*

14. Is the flare sized properly? Refer to section 5.3 of the student manual.
Yes No
(circle one)

The flares are adequately sized to accommodate the predicted flow rate in accordance with §60.752(b)(2)(iii)(B). Please reference Section 4.6.5 of the Design Plan.

15. If a control device other than a flare is planned, describe the estimated hours and duration it will be down for maintenance per year:

The WPWMA flare will act as the primary control device. The small flare at the LFGTE facility is used for handling excess LFG not utilized by the power plant if the excess LFG is of insufficient quantity for operating the WPWMA flare.

16. Operational Issues **60.753(b), (c), (d), (e), (f)**
Will the GCCS be operated with a vacuum at every well? Yes No
(circle one)

The GCCS will be operated with a vacuum at each extraction point, with the exception of mitigating circumstances under §60.753(b)(1).

17. Will the GCCS be operated at the appropriate LFG temps? Yes No
(circle one)

The GCCS is intended to operate at LFG temperatures below 55ºC (131ºF). Please see Section 4.1.14 for details.

18. Will the GCCS be operated with minimal amounts of air? Yes No
(circle one)

The GCCS is designed to prevent excessive air infiltration. Please reference Section 4.1.10 of the Design Plan.

19. Will monitoring be done monthly to confirm these operational issues?
Yes No
(circle one)

Monitoring will be conducted in accordance with NSPS requirements. Please reference Section 4.6.4 of the Design Plan.

20. Will surface emissions monitoring be completed? Yes No
(circle one)

Monitoring will be conducted in accordance with NSPS requirements. Please reference Section 4.2 of the Design Plan.

21. Will the blower automatically be shutdown if the control device is inoperable?
Yes No
(circle one)

The blower system will automatically be shut down if the control device becomes inoperable. Please reference Section 4.6.5 of the Design Plan.

22. Does the GCCS include fittings to allow connection of additional collectors if necessary in the future? **60.756(2)** Yes No
(circle one)

If no, describe circumstances: *The header system incorporates tees with blind flanges along the transmission piping to facilitate expansion of the system, including additional collectors and control devices. Additionally, high density polyethylene*

(HDPE) piping can be readily modified to accept tees or other fittings necessary for system expansion.

23. Does the wellhead for all collectors include at least one sample port and one thermometer port? **60.756(2)** Yes No
(circle one)

If no, describe circumstances: *The wellheads for all collectors include at least one sample port and one thermometer port. Please reference Section 4.6.4 and Appendix A of the Design Plan.*

APPENDIX A
2016 GCCS DESIGN DRAWINGS

CONSTRUCTION P□ANS
FOR □□1□ GCCS E□PANSION

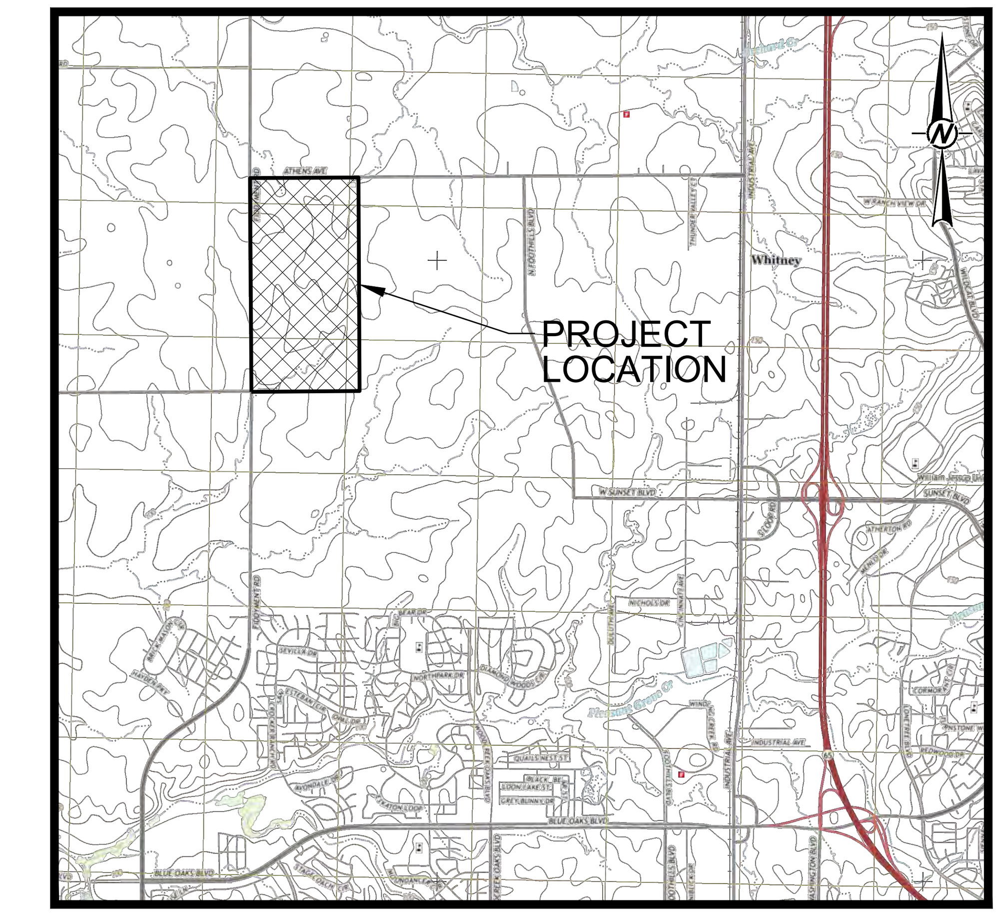
WESTERN PLACER WASTE MANAGEMENT AUTHORITY
WESTERN REGIONAL SANITARY LANDFILL
PLACER COUNTY, CALIFORNIA

AUGUST 2016

PREPARED FOR:
WESTERN PLACER WASTE MANAGEMENT AUTHORITY

PREPARED BY:
GOLDER ASSOCIATES INC.
425 LAKESIDE DRIVE
SUNNYVALE, CA 94085
(408) 220-9223

REGIONA□ MAP



□OCATION MAP

0 4000 8000
1" = 4000' FEET

GENERAL NOTES

SCOPE OF WORK

GENERAL

THE PROPOSED PROJECT IS THE CONSTRUCTION OF EXPANSIONS AND UPGRADES TO THE LANDFILL GAS COLLECTION AND CONTROL SYSTEM (GCCS) AT THE WESTERN REGIONAL SANITARY LANDFILL (WRSL). THESE PLANS SHALL BE USED WITH THE TECHNICAL SPECIFICATIONS AND THE COUNTY OF PLACER STANDARD SPECIFICATIONS AND STANDARD DRAWINGS. THE PROJECT INCLUDES FOUR MAJOR ELEMENTS OF WORK: 1) PROVIDING UPGRADES AND REPLACEMENT OF LANDFILL GAS (LFG) BLOWER AND FLARE EQUIPMENT, INCLUDING MODIFICATIONS TO THE EXISTING CIVIL, MECHANICAL, ELECTRICAL SYSTEMS; 2) EXPANDING THE LFG COLLECTION WELL AND PIPING SYSTEM; 3) PROVIDING AND ERECTING NEW PRE-ENGINEERED METAL BUILDINGS IN THE BLOWER FLARE STATION (BFS); 4) PROVIDING AND INTEGRATING NEW BLOWER/FLARE SYSTEM CONTROLS AND A NEW SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM FOR COMPREHENSIVE BFS AND SITE REMOTE MONITORING AND CONTROL.

SITE INFORMATION AND DESIGNS IN THESE DRAWINGS ARE DEPICTED SCHEMATICALLY. A BASE CONCEPTUAL PLAN IS SHOWN IN DRAWING 7A. THE PLAN INCLUDES NEW 480VAC ELECTRICAL SERVICE AND EQUIPMENT, A SECOND NEW LFG BLOWER, AND ADDITIONAL SITE PREPARATION AND DECOMMISSIONING WORK AS SHOWN IN THE DRAWINGS OR DESCRIBED IN THE CONTRACT DOCUMENTS. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AS OUTLINED IN GENERAL CONDITIONS C-2. THE CONTRACTOR MAY SUBMIT ALTERNATIVE LAYOUTS AND/OR OTHER VALUE ENGINEERING CHANGE PROPOSALS FOR THE AUTHORITY'S CONSIDERATION. THE FINAL SHOP DRAWINGS SHALL REFLECT THE ALTERNATIVE LAYOUTS AND VALUE ENGINEERING CHANGE PROPOSALS ACCEPTED BY THE AUTHORITY AND SHALL BE FULLY INTEGRATED WITH ACTUAL SITE CONDITIONS AT THE TIME OF CONSTRUCTION. THE FINAL SHOP DRAWINGS AND LAYOUTS MUST COMPLY WITH ALL PERFORMANCE REQUIREMENTS AND FUNCTIONAL INTENTS AS SHOWN OR DESCRIBED IN THESE CONTRACT DOCUMENTS. CONTRACTOR SHALL PROVIDE, INSTALL AND DEMONSTRATE PROPER OPERATION OF ALL EQUIPMENT AND COMPONENTS SHOWN IN THE CONTRACT DRAWINGS AND FINAL SHOP DRAWINGS OR DESCRIBED IN THE CONTRACT SPECIFICATIONS. THE CONTRACTOR SHALL ALSO MAINTAIN THE GCCS AND LFG DELIVERY PROCESS IN CONTINUOUSLY ACTIVE AND COMPLIANT OPERATION AT ALL TIMES THROUGHOUT THE DURATION OF THE PROJECT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, AND DECOMMISSION REPLACED AND UNNECESSARY COMPONENTS AS DESIGNATED BY THE WPWMA. THESE DESCRIPTIONS ARE FOR GENERAL INFORMATION ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETING THE WORK IN ACCORDANCE WITH THE ENTIRETY OF THE CONTRACT DOCUMENTS.

LFG BLOWER FLARE STATION:

THE CONTRACTOR SHALL PROCURE, CONSTRUCT, CONNECT, START-UP, AND SUCCESSFULLY TEST AN APPROVED ENCLOSED LFG FLARE, BLOWERS, AND APPURTENANT CONTROL SYSTEMS AND COMPONENTS FOR THE BFS. THE CONTRACTOR SHALL INSTALL THE NEW GAS BLOWERS IN PARALLEL SO THAT EACH CAN PROVIDE CONSISTENT VACUUM TO THE LANDFILL FOR EXTRACTION OF THE LFG FLOWS REQUIRED FOR REGULATORY COMPLIANCE. THE WELLFIELD HEADER VACUUM SHALL BE CONTROLLED BY ADJUSTING FLOW TO THE FLARE AND DIRECT BLOWER SPEED CONTROL. THE BLOWER DISCHARGE FLOW SHALL BE CONTROLLED TO CONVEY THE LFG AT CONSISTENT PRESSURE TO FUEL THE ADJACENT E2001 POWER GENERATION FACILITY (PGF), WITH AUTOMATIC DIVERSION OF EXCESS LFG TO THE NEW FLARE FOR THERMAL OXIDATION. THE NEW FLARE CONTROLS SHALL INCLUDE AUTOMATED FLOW, COMBUSTION AND EMISSION CONTROLS. THE NEW FLARE SHALL HAVE HIGH OPERATIONAL TURNDOWN CHARACTERISTICS TO ACCOMMODATE LFG FLOWS FROM 2% TO 100% OF ITS MAXIMUM DESIGN CAPACITY. CONTRACTOR SHALL:

- PROVIDE SUBGRADE PREPARATION, ENGINEERED FILL, AND CONCRETE FOUNDATIONS FOR PROPER PLACEMENT AND ANCHORING OF ALL EQUIPMENT AND STRUCTURES.
- PROVIDE THE NEW EQUIPMENT AS PRE-ASSEMBLED AND PRE-WIRED, SKID-MOUNTED, FULLY-INTEGRATED PROCESS PACKAGES.
- EXTEND AND CONNECT NEW AND EXISTING PIPING AND UTILITIES (LFG, PROPANE, COMPRESSED AIR, CONDENSATE, LEACHATE, ETC.)
- COMPLETE ELECTRICAL POWER, CONTROL AND COMMUNICATION CONNECTIONS BETWEEN EXISTING SERVICE PANEL, EXISTING AND NEW CONTROL PANELS, AND FIELD COMPONENTS, A 480VAC 3 PHASE POWER SYSTEM.
- SUCCESSFULLY START-UP, TEST AND OPERATE ALL NEW EQUIPMENT AND CONTROLS.

THE CONTRACTOR SHALL PROVIDE DECOMMISSIONING, DEMOLITION, AND REMOVAL OF THE EXISTING FLARE, 25HP BLOWERS, PIPING AND COMPONENTS, PHASED TO ENABLE INSTALLATION OF THE NEW EQUIPMENT AND STRUCTURES. THE CONTRACTOR SHALL RELOCATE AND REINSTALL EXISTING EQUIPMENT AND EXTEND CONNECTIONS AS SHOWN IN THE PLANS, INCLUDING TWO AIR COMPRESSORS AND A PROPANE STORAGE TANK, TO ENABLE INSTALLATION OF THE NEW EQUIPMENT AND STRUCTURES. THE CONTRACTOR SHALL PROVIDE TEMPORARY POWER, PIPING AND CONTROLS AS NEEDED TO MAINTAIN CONTINUOUS LFG CONVEYANCE TO THE PGF AND EXISTING FLARE FOR THE PROJECT DURATION THROUGH SUCCESSFUL COMPLETION, START-UP, SUSTAINED OPERATION, AND ACCEPTANCE OF THE NEW EQUIPMENT BY THE OWNER.

- IDENTIFY, LOCATE, POTHOLE AND PROTECT ALL EXISTING UNDERGROUND FACILITIES AND UTILITIES IN THE AREAS OF WORK.
- INSTALL TEMPORARY PIPING AND CONTROLS NECESSARY TO PROVIDE CONTINUOUS AND SAFE LFG CONVEYANCE TO THE PGF AND EXISTING FLARE DURING THE ENTIRE PROJECT.
- DECOMMISSION EXISTING FLARE, BLOWERS, APPURTENANT PIPING AND EQUIPMENT AS DESIGNATED BY WPWMA.
- RESTORE AND CLEAN-UP ALL WORK AREAS FOR PROJECT CLOSE-OUT.

LFG COLLECTION SYSTEM:

CONTRACTOR SHALL PROVIDE MATERIALS, LABOR AND EQUIPMENT TO CONSTRUCT NEW LFG EXTRACTION WELLS AND COLLECTORS AND ALL PIPING COMPONENTS AND APPURTENANCES REQUIRED FOR CONNECTION TO EXISTING OPERATIONAL FACILITIES. CONTRACTOR SHALL SUPPLY AND INSTALL LFG EXTRACTION WELLS, COLLECTORS, CONDENSATE DRAINS/SUMPS, CONVEYANCE PIPING, VALVES, FITTINGS AND APPURTENANCES.

SYSTEM CONTROLS AND INTEGRATION:

THE CONTRACTOR SHALL PROVIDE A COMPREHENSIVE CONTROL SYSTEM FOR BOTH AUTOMATED AND MANUAL OPERATION OF THE NEW BLOWER AND FLARE EQUIPMENT. THE FLARE CONTROLS SHALL INCLUDE A PROGRAMMABLE LOGIC CONTROLLER (PLC) THAT COORDINATES AUTOMATIC OPERATION OF THE BLOWERS AND FLARE FOR CONSISTENT CONTROL AND STABILIZATION OF LFG PRESSURES AND FLOWS TO THE PGF AND THE FLARE. THE BLOWER CONTROLS SHALL INCLUDE VARIABLE FREQUENCY DRIVE AND NECESSARY MONITORING AND CONTROL DEVICES TO FACILITATE ACCURATE SETTING AND CONTROL OF BLOWER INLET AND DISCHARGE PRESSURES AND FLOW RATES.

THE CONTRACTOR SHALL PROVIDE A NEW SCADA SYSTEM AND INTEGRATION OF SPECIFIED SIGNALS AND DATA STREAMS FROM BOTH NEW AND EXISTING EQUIPMENT CONTROLS. SCADA SYSTEM SHALL INCLUDE ALL REQUIRED TELEMETRY, CONNECTIONS AND COMPREHENSIVE INTEGRATION WITH EXISTING AND NEW BFS AND SITE EQUIPMENT FOR GRAPHICAL COMMUNICATION OF MONITORING DATA, ALARMS AND OTHER SIGNALS FOR VIEWING, ACCESS AND ADJUSTMENTS BY AUTHORIZED REMOTE SYSTEM OPERATORS.

REGULATORY COMPLIANCE:

THE PLACER COUNTY AIR POLLUTION CONTROL DISTRICT (PCAPCD) WILL ISSUE AN AUTHORITY TO CONSTRUCT (ATC) PERMIT FOR THE NEW FLARE EQUIPMENT. THE CONTRACTOR SHALL PROCURE AND INSTALL THE NEW EQUIPMENT TO OPERATE IN CONTINUOUS COMPLIANCE WITH ALL PERMIT CONDITIONS, PCAPCD REGULATIONS, AND OPERATIONAL REQUIREMENTS AS MAY BE FURTHER DESCRIBED IN THE CONTRACT DOCUMENTS.

THE CONTRACTOR SHALL PROVIDE ALL CONSTRUCTION AND PRODUCTS IN STRICT ACCORDANCE WITH APPLICABLE CODES AND ORDINANCES OF THE COUNTY OF PLACER, INCLUDING ALL APPLICABLE STATE AND FEDERAL REGULATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND EACH SUBCONTRACTOR TO BE IN FULL COMPLIANCE, REGARDLESS OF ANY DISCREPANCIES THAT MAY EXIST WITHIN THE DRAWINGS OR SPECIFICATIONS. IT SHALL BE THE RESPONSIBILITY OF EACH SUBCONTRACTOR TO NOTIFY THE CONTRACTOR, WHO IN TURN SHALL NOTIFY THE OWNER/ENGINEER PRIOR TO PERFORMANCE, IF A CONFLICT EXISTS BETWEEN ANY PORTION OF THE CONTRACT DOCUMENTS OR WORK AND APPLICABLE CODES OR ORDINANCES, OR FOR ANY OTHER APPARENT CONFLICT OR DISCREPANCY OF THE CONTRACT DRAWINGS OR SPECIFICATIONS.

BASIS OF EQUIPMENT DESIGN AND MANUFACTURE: THE CONTRACTOR SHALL PROVIDE EQUIPMENT DESIGNED AND MANUFACTURED TO COMPLY WITH THE REQUIREMENTS OF CURRENT NATIONAL, STATE AND LOCAL CODES AND STANDARDS FOR WASTE GAS PROCESSING EQUIPMENT, INCLUDING BUT NOT LIMITED TO:

- STRUCTURAL DESIGN AISC
- SHOP AND RECORD DRAWINGS ANSI S5.1
- FABRICATION (WELDING) AWS
- ELECTRICAL (COMPONENTS) UL
- ELECTRICAL (WIRING) NEC
- PAINTING, SANDBLAST SSPL, SP-6

IF REQUIRED FOR APPROVED SUBSTITUTIONS, THE CONTRACTOR SHALL PROVIDE ADDITIONAL FOUNDATION OR STRUCTURAL ENGINEERING IN ACCORDANCE WITH THE CALIFORNIA BUILDING CODE (CBC, INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS [ICBO], 2013 EDITION).

INDEX OF DRAWINGS

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

ABBREVIATIONS

A	COMPRESSED AIR
AB	AGGREGATE BASE
AMP	AMPERE
ASS'Y	ASSEMBLY
B.P.	BRASS PIPE
BTU/HR	BRITISH THERMAL UNITS PER HOUR
CLR	CLEARANCE
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMP	CORRUGATED METAL PIPE
C	CONDENSATE
CO	CLEAN OUT
CS	CONDENSATE SUMP
DI	DUCTILE IRON
DIA	DIAMETER
DISC	DISCONNECT
E	EASTING OR ELECTRIC
(E)	EXISTING
ELEV.	ELEVATION
ET	COMMUNICATION
E.W.	EACH WAY
F	FAHRENHEIT
FT-MSL	FEET- MEAN SEA LEVEL
FPT	FEMALE PIPE THREAD
GPM	GALLON PER MINUTE
HDG	HOT DIPPED GALVANIZED
HDPE	HIGH DENSITY POLYETHYLENE
I.D.	INSIDE DIAMETER
IN.W.C.	INCH WATER COLUMN (GAUGE)
KOP	KNOCK-OUT-POT
KVA	KILOVOLT-AMP
LFG	LANDFILL GAS
MAX	MAXIMUM
MIN	MINIMUM
MPT	MALE PIPE THREAD
N	NORTHING
N.I.C.	NOT IN CONTRACT
NTS	NOT TO SCALE
NPT	NATIONAL PIPE THREAD
Ø	DIAMETER OR PHASE
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
P&ID	PIPING AND INTRUMENTATION DIAGRAM
PSI, PSIG	POUND PER SQUARE INCH, GAUGE
PVC	POLYVINYL CHLORIDE
REF.	REFERENCE
REQ'D	REQUIRED
SCFM	STANDARD CUBIC FEET PER MINUTE
SCH	SCHEDULE
SDR	STANDARD DIMENSION RATIO
SS/SSTL	STAINLESS STEEL
T/C	THERMOCOUPLE
TYP.	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VAC	VOLTS, ALTERNATING CURRENT

REV.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGNED	REVIEWED	APPROVED
0	2016-08-19	ISSUED FOR BIDDING	MAL	APW	APW	RVW

SEAL

CLIENT
WESTERN PLACER WASTE MANAGEMENT AUTHORITY
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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
TIT□E S□EET

PROJECT NO. 1420152 | REV. 0 | 1 of 58 | DRAWING T1

LEGEND

	PROPERTY BOUNDARY		(E) LEACHATE COLLECTION SUMP		CONSTRUCT LFG/LEACHATE WELLHEAD (3/2.5)
	MODULE LIMITS		(E) PIPE REDUCER		DECOMMISSION (E) LFG COLLECTION WELL (3/2.5)
LG	(E) LANDFILL GAS PIPE		(E) LFG PIPE MANIFOLD		CONSTRUCT BUTTERFLY VALVE (5/2.4)
LFG–A5	(E) LFG COLLECTION WELL (INFILL)		(E) ROAD CROSSING		CONSTRUCT PIPE REDUCER(S)
EW–	(E) LFG COLLECTION WELL (PERIMETER)		(E) ISOLATION VALVE		CONSTRUCT ROAD CROSSING (4/2.4)
GW–7W	(E) LFG COLLECTION WELL (PERIMETER)		CONSTRUCT LFG HORIZONTAL COLLECTOR		CONSTRUCT REMOTE MONITORING STATION (LEACHATE) (SEE NOTE 5)
GM–14X	(E) GAS PROBE		CONSTRUCT LFG CONVEYANCE PIPE (ON GRADE)		
MW–11	GROUNDWATER MONITORING WELL		CONSTRUCT CONDENSATE DRAIN TO LCRS (1/1.5)		CONSTRUCT REMOTE MONITORING STATION (LFG) (SEE NOTE 5)
			CONSTRUCT SINGLE CASING LFG EXTRACTION WELL (2/1.3)		CONSTRUCT AIR SUPPLY/ CONDENSATE PIPES (ON GRADE)

NOTES

1. THE LOCATIONS OF THE UTILITIES AND OTHER FACILITIES SHOWN IN THESE DRAWINGS WERE ESTIMATED FROM SITE INFORMATION PROVIDED BY THE OWNER AND ARE SCHEMATIC ONLY. BEFORE STARTING SITE WORK, THE CONTRACTOR SHALL COORDINATE WITH THE OWNER TO DETERMINE, VERIFY AND PROTECT THE ACTUAL LOCATIONS OF ALL UTILITIES AND FACILITIES THAT MAY BE USED OR AFFECTED BY THE WORK (WHETHER SHOWN OR NOT). CONTRACTOR TO CONTACT UNDERGROUND SERVICES ALERT (USA) WITH SUFFICIENT NOTICE TO LOCATE AND PROTECT ALL UTILITIES.
2. CONTRACTOR TO SURVEY AND MARK ALL EXISTING PIPE AND UTILITIES INDICATED ON THE DRAWINGS IN ALL WORK AREAS. CONTRACTOR TO POTHOLE PROPOSED EXCAVATION AREAS TO VERIFY THE LOCATION AND DEPTH OF IDENTIFIED SUBSURFACE FACILITIES. CONTRACTOR SHALL PROTECT ALL FACILITIES FROM DAMAGE AND SHALL REPAIR ALL DAMAGE AT NO COST TO THE OWNER.
3. THE DRAWING SCALES SHOWN ARE FOR GENERAL REFERENCE ONLY. DISTANCES, DIMENSIONS AND OTHER QUANTITIES SHALL NOT BE SCALED OFF THIS DRAWING.
4. THE CONTRACTOR SHALL COORDINATE REQUIREMENTS FOR PERSONNEL ACCESS AND EQUIPMENT STAGING AREAS WITH THE OWNER BEFORE STARTING SITE WORK.
5. SEE SPECIFICATION SECTION 13430 FOR REMOTE MONITORING STATION DETAILS. THE 2 LFG MONITORING STATIONS ARE CONCEPTUAL ONLY, AND WILL BE REVISED BY THE AUTHORITY BEFORE INSTALLATION.

REFERENCE

1. TOPOGRAPHIC SURVEY PROVIDED BY WPWMA, AERIAL PHOTOGRAPHY FLOWN 6-30-2015 BY AMERICAN AERIAL MAPPING, INC.

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2016-08-19	ISSUED FOR BIDDING	MAL	APW	APW	RVW

CLIENT
WESTERN PLACER WASTE MANAGEMENT AUTHORITY
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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
LANDFILL SITE PLAN

PROJECT No. 1420152 | Rev. 0 | 2 of 58 | DRAWING 1

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

TABLE 1
[illegible]
[illegible]

Well ID	Coordinates (1) Northing	Coordinates (1) Easting	Casing Notes	Topo Grade Elevation	Survey Grade Elevation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Screen [illegible] (C)	[illegible] Gr[illegible]	Gr[illegible]
Proposed LFG Extraction Wells													
LFG-A64	423149.6	187893.5	S	163.5		92.2	94	69	52	54	24	25	27
LFG-A65	422924.4	187929.5	S	159.7		90.4	92	67	50	52	22	25	25
LFG-A66	422970.6	187754.6	S	164.1		97.4	99	65	49	51	26	20	29
LFG-A67	422856.1	187602.0	S	168.7		92.3	94	74	56	58	33	20	36
LFG-A68	423251.0	187355.1	S	178.1		95.6	98	80	60	62	37	20	40
LFG-A69	423368.6	187061.6	S	139.6		98.0	100	40	25	27	17	5	20
LFG-A70	423173.3	187162.6	S	178.0		99.1	101	77	58	60	35	20	38
LFG-A71	422846.8	187338.9	S	183.5		94.8	97	87	65	67	32	30	35
LFG-A72	422793.2	187427.8	S	160.8		92.8	95	66	50	52	27	20	30
LFG-A73	422975.6	187320.0	S	187.7		101.4	103	84	63	65	40	20	43
LFG-A74	422768.3	187223.5	S	183.2		94.4	96	87	65	67	27	35	30
LFG-A75	422999.2	187083.8	S	180.4		103.3	105	75	56	58	33	20	36
LFG-A76	422792.5	187053.5	S	177.4		96.5	99	79	59	61	21	35	24
LFG-A77	422943.3	186898.6	S,L	177.7		69.9	72	106	79	81	36	40	39
LFG-A78	423129.5	186943.8	S,L	174.0		70.8	73	101	76	78	43	30	46
LFG-A79	423145.9	186740.9	S,L	171.5		75.1	77	94	71	73	38	30	41
LFG-A80	423027.3	186682.8	S,L	164.6		75.1	77	88	66	68	23	40	26
LFG-A81	423369.1	186542.1	S,L	132.0		76.5	78	54	39	41	21	15	24
LFG-A82	423344.3	186839.3	S,L	140.9		75.2	77	64	48	50	30	15	33
Proposed 19 LFG Extraction Wells								Totals:	1086	1124	564	465	621

ft. bgs = feet below ground surface
ft. msl = feet above mean sea level
(1) Well locations subject to change to accommodate pre-construction field conditions. Well locations shall not be adjusted without approval of Owner/Engineer.
(2) Topo Grade Elevation based on site aerial topography flown 6-30-2015 by American Aerial Mapping. Horizontal coordinate system: NAD 29, MDBM; Elevation datum is Mean Sea Level. Survey Grade Elevation and Coordinates of well locations shall be acquired by Contractor pre-construction field survey for approval of Owner/Engineer.
(3) The Target Boring Depth is 15 feet, or 25% of Estimated Waste Depth, above the Estimated Bottom of Waste in lined modules, whichever is greater. Under no circumstances drill deeper than the Target Boring Depths shown in this Table. Target Boring Depths and well construction dimensions shall not be adjusted without approval of Owner/Engineer.
(4) Total Casing Length includes 3 ft. of solid pipe above ground surface.
(5) Estimated Bottom of Waste Elevation is assumed to be 2 feet above estimated liner elevation.
(6) Estimated Liner Elevations are interpolated from base grade drawings for Modules 14, 15 and 16 provided by WPWMA.
(7) Casing Construction Notes (preliminary for estimate of bid quantities): S=single casing, L=leachate wellhead
(8) Contractor shall provide and install a cover or steel safety grate over all wellbores when not actively drilling and at the time of construction. The grate must span the borehole to prevent entry and falls, and be capable of supporting a person without any additional support. Wood materials are not acceptable.
Minimum Grate Design Criteria:
-Minimum Grate Size: 60" x 60", or wider than maximum diameter of boring, whichever is greater.
-Form the grate using a single panel of Welded Wire Reinforcement (WWR), or approved equal. Field fabricated WWR panels (tied or welded) are not acceptable.
-Cut a hole in the center of the grate for the well casing. Do not remove more wire segments than necessary. Cut wire close to welds and remove protrusions.
-Allowable sizes of WWR:
·4" x 4" with min. wire diameter of 0.299" (WWR Panel Designation: 4x4 – W7 x W7)
·4" x 6" with min. wire diameter of 0.309" (WWR Panel Designation: 4x6 – W7.5 x W7.5)
·6" x 6" with min. wire diameter of 0.309" (WWR Panel Designation: 6x6 – W7.5 xW7.5)
-Bury the grate edges below the ground surface to minimize trip hazard. The grate shall become a permanent part of the well and should not be removed.

LEGEND

- PROPERTY BOUNDARY
- MODULE LIMITS
- LG — (E) LANDFILL GAS PIPE
- LFG–A5 — (E) LFG COLLECTION WELL (INFILL)
- EW– — (E) LFG COLLECTION WELL (PERIMETER)
- GW–7W — (E) LFG COLLECTION WELL (PERIMETER)
- GM–14X — (E) GAS PROBE
- MW–11 — GROUNDWATER MONITORING WELL
- (E) LEACHATE COLLECTION SUMP
- (E) PIPE REDUCER
- (E) LFG PIPE MANIFOLD
- (E) ROAD CROSSING
- (E) ISOLATION VALVE
- CONSTRUCT LFG HORIZONTAL COLLECTOR (1/2|5)
- CONSTRUCT LFG CONVEYANCE PIPE (ON GRADE)
- CONSTRUCT CONDENSATE DRAIN TO LCRS (1/2|5)
- CONSTRUCT SINGLE CASING LFG EXTRACTION WELL (2/2|3)
- CONSTRUCT LFG/LEACHATE WELLHEAD (3/2|5)
- DECOMMISSION (E) LFG COLLECTION WELL (3/2|3)
- CONSTRUCT BUTTERFLY VALVE (5/2|4)
- CONSTRUCT PIPE REDUCER(S)
- CONSTRUCT ROAD CROSSING (4/2|4)
- CONSTRUCT REMOTE MONITORING STATION (LEACHATE) (SEE NOTE 7)
- CONSTRUCT REMOTE MONITORING STATION (LFG) (SEE NOTE 7)
- CONSTRUCT AIR SUPPLY/ CONDENSATE PIPES (ON GRADE)

NOTES

1. CONTRACTOR SHALL CAREFULLY INSPECT THE SITE AND VERIFY ALL DIMENSIONS AND GRADES BEFORE PROCEEDING WITH THE WORK. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER/ENGINEER OF ANY FOUND DISCREPANCIES.
2. PIPE ALIGNMENTS SHOWN IN THE DRAWINGS ARE INTENDED TO BE A DEPICTION AND NOT AN EXACT OR COMPLETE REPRESENTATION OF THE FINISHED WORK. THE CONTRACTOR SHALL FIELD FIT PIPING TO ACCOMMODATE SITE CONDITIONS THAT VARY FROM THE CONTRACT DOCUMENTS AND/OR HAVE CHANGED OVER TIME. IN ACCORDANCE WITH THE SPECIFICATIONS, THE CONTRACTOR SHALL PROVIDE MINOR ADDITIONAL PIPE, FITTINGS AND OTHER ACCESSORIES REQUIRED TO COMPLETE A PROPERLY FUNCTIONING PIPING ALIGNMENT, EVEN THOUGH SUCH ITEMS AND/OR ALIGNMENTS MAY NOT BE SPECIFICALLY SHOWN IN THE DRAWINGS.
3. ALL EXCAVATIONS SHALL COMPLY WITH APPLICABLE TRENCH SAFETY AND CONFINED SPACE ENTRY REQUIREMENTS.
4. UNLESS NOTED OTHERWISE, CONTRACTOR SHALL INSTALL AND GRADE ALL LFG PIPES TO DRAIN CONTINUOUSLY TO CONDENSATE COLLECTION SUMPS WITH THE FOLLOWING BASIC GRADES AS A MINIMUM:
   - ABOVE GROUND LFG PIPE WITHIN THE LIMIT OF LANDFILLED WASTE: 2.0%
   - BURIED LFG PIPE WITHIN THE LIMIT OF LANDFILLED WASTE: 4.0%
   - BURIED LFG PIPE BELOW ROAD CROSSINGS WITHIN THE LIMIT OF LANDFILLED WASTE: 6%
   - BURIED LFG PIPE IN UNDISTURBED SOIL OR ENGINEERED FILL OUTSIDE THE LIMIT OF LANDFILLED WASTE: 1%
5. IF NEITHER THE SPECIFIED GRADE, NOR THE APPLICABLE BASIC MINIMUM GRADE, CAN BE ACHIEVED FOR A SPECIFIC PIPE SECTION, CONTRACTOR SHALL SUBMIT AN ALTERNATIVE GRADE FOR OWNER/ENGINEER REVIEW AND APPROVAL.
6. ANY SURVEY CONTROL POINT OR ESTABLISHED MONUMENT THAT IS DISTURBED OR COMPROMISED DURING CONTRACTOR'S WORK SHALL BE REPLACED AT NO COST TO THE OWNER.
7. SEE SPECIFICATION SECTION 13430 FOR REMOTE MONITORING STATION DETAILS. THE 2 LFG MONITORING STATIONS ARE CONCEPTUAL ONLY, AND WILL BE REVISED BY THE AUTHORITY BEFORE INSTALLATION.

REFERENCE

1. TOPOGRAPHIC SURVEY PROVIDED BY WPWMA, AERIAL PHOTOGRAPHY FLOWN 6-30-2015 BY AMERICAN AERIAL MAPPING, INC.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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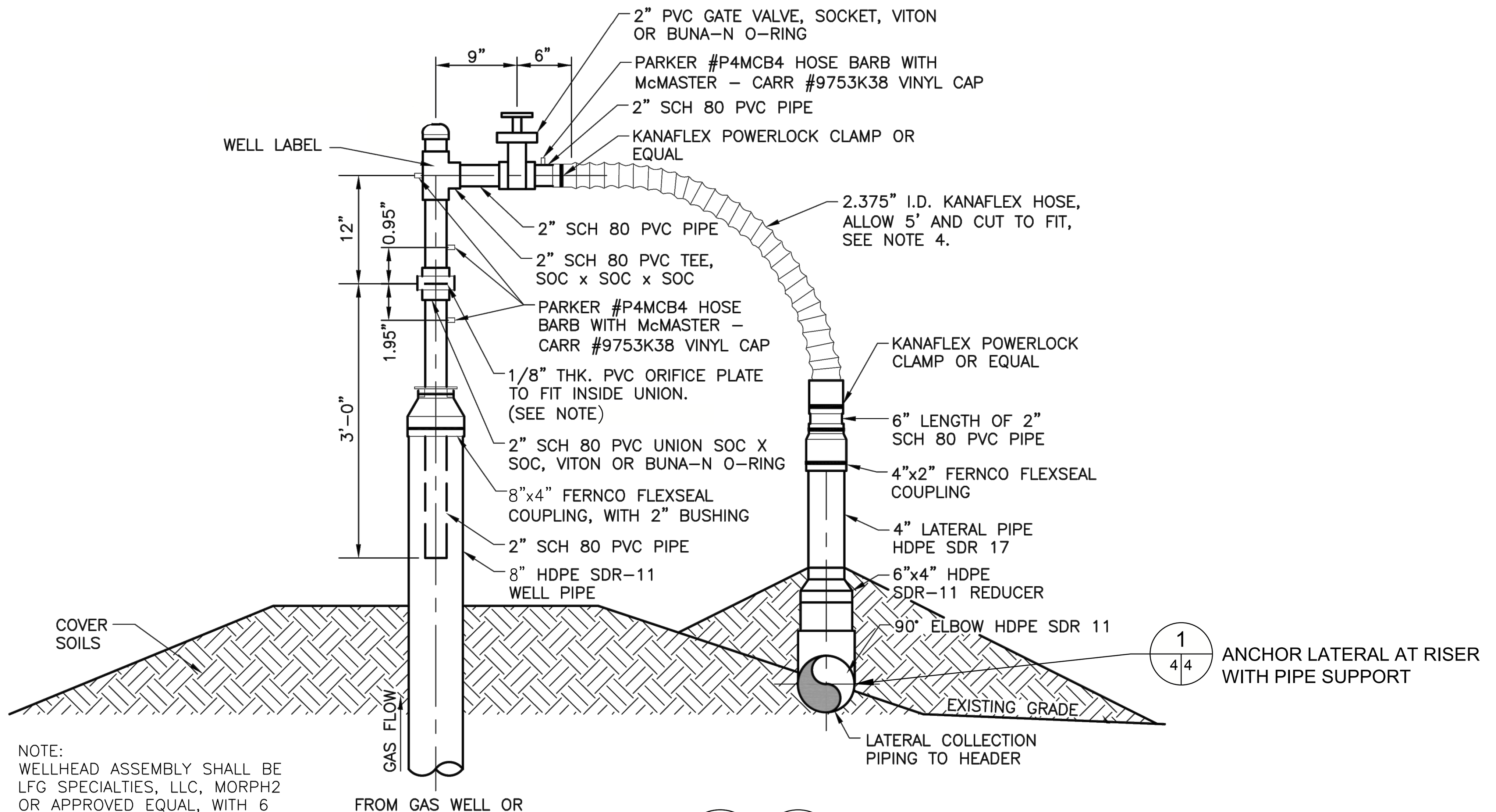
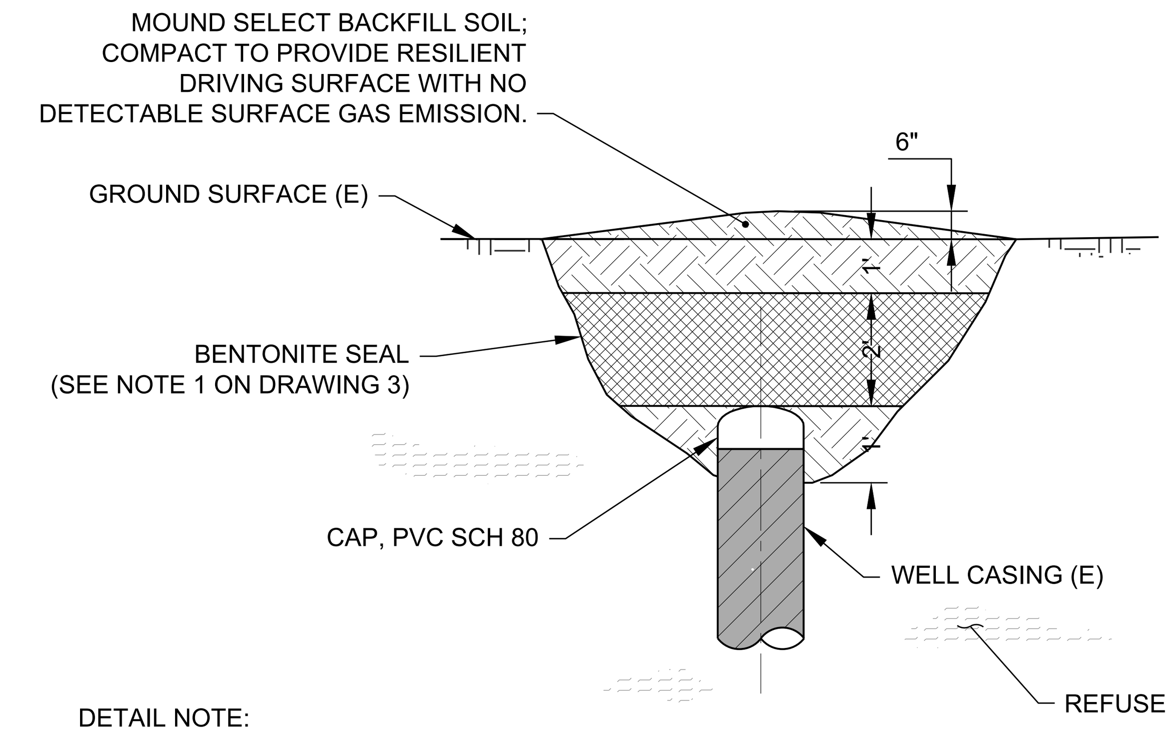
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
LFG COLLECTION SYSTEM PLAN SOUTHERN AREA

PROJECT No. 1420152 | Rev. 0 | 3 of 58 | DRAWING 2

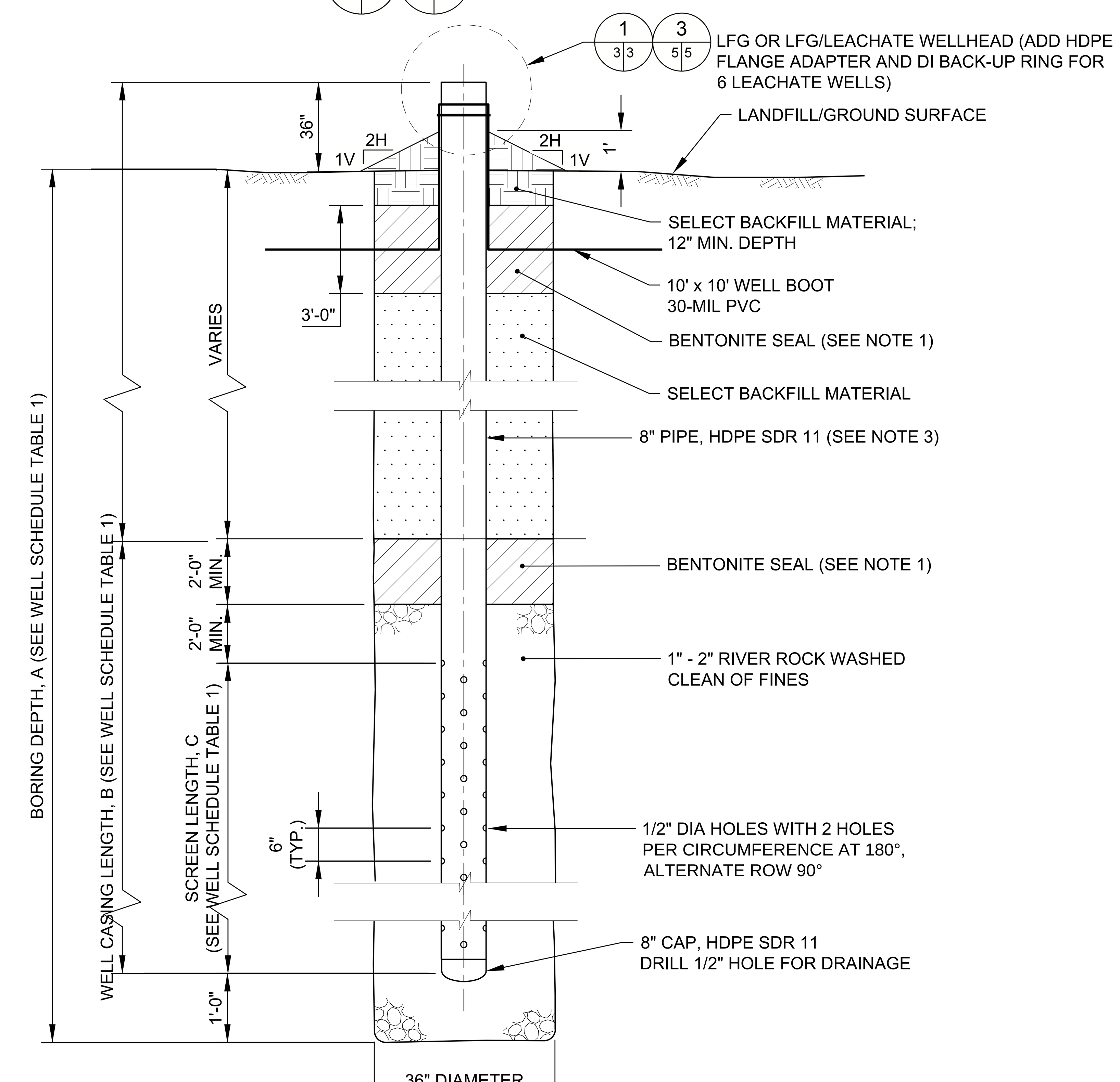


SCALE: N.T.S. 1 (1|3) 1 (2|3) LFG WELLHEAD DETAIL



DETAIL NOTE:
CONTRACTOR SHALL FUSE HDPE CAP TO SEAL DECOMMISSIONED LATERAL AT EACH DECOMMISSIONED WELL (IF NOT IMMEDIATELY CONNECTED TO NEW WELL).

SCALE: N.T.S. 3 (1|3) 3 (2|3) WELL DECOMISSIONING DETAIL



SCALE: N.T.S. 2 (1|3) 2 (2|3) SINGLE LFG EXTRACTION WELL DETAIL

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

NOTES

1. HYDRATED BENTONITE SEAL SHALL INCLUDE COARSE GRANULAR BENTONITE CHIPS (3/8" TO 3/4") AND FINE GRANULAR BENTONITE (8-MESH BAROID BENSEAL) PRE-MIXED AT RATIO 2:1 OR APPROVED EQUAL.

MINIMUM 60% BENTONITE TO MAXIMUM 40% WATER (BY VOLUME) AND POLYMER (CETCO INSTA-VIS PLUS OR APPROVED EQUAL) SHALL BE MIXED TO THICK SLURRY CONSISTENCY BEFORE PLACEMENT. DO NOT HYDRATE BENTONITE IN PLACE BY ADDING WATER DOWN THE BOREHOLE.

2. INSTALLED HDPE FITTINGS SHALL BE FULL PRESSURE RATED OR ONE SDR LOWER THAN HDPE PIPE SDR.
3. INSTALL ALL WELL CASINGS VERTICALLY PLUMB. USE SPRING CENTRALIZERS EVERY 20 FEET TO CENTER SINGLE WELL CASINGS IN THE BORE.
4. ALL LFG WELL LATERAL PIPES SHALL BE MINIMUM 6" DIAMETER, UNLESS NOTED OTHERWISE. CONTRACTOR SHALL PROVIDE ALL FITTINGS AND OTHER ACCESSORIES REQUIRED FOR PROPER CONNECTION OF ALL LATERALS TO WELLHEADS AND OTHER SYSTEM PIPING AS SHOWN ON THE PLAN DRAWINGS.

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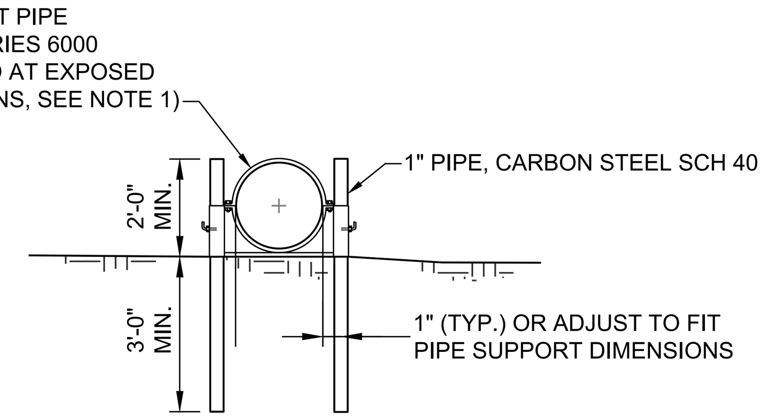
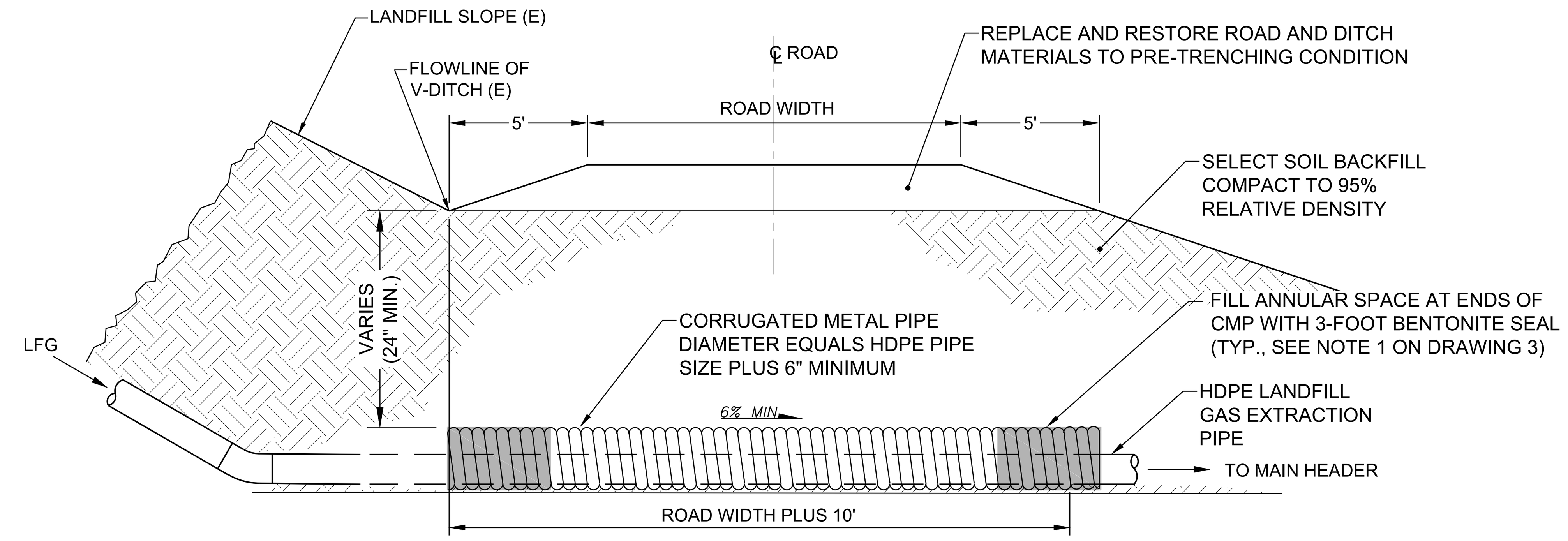
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
VERTICAL LFG EXTRACTION WELL DETAILS

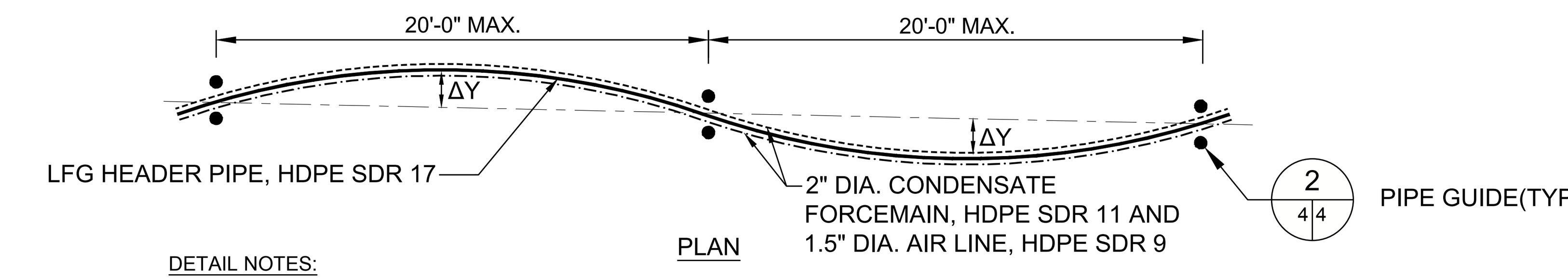
PROJECT No. 1420152 | Rev. 0 | 4 of 58 | DRAWING 3



SCALE: N.T.S. 1 5|4 1 6|4 1 7|4 PIPE SUPPORT DETAIL



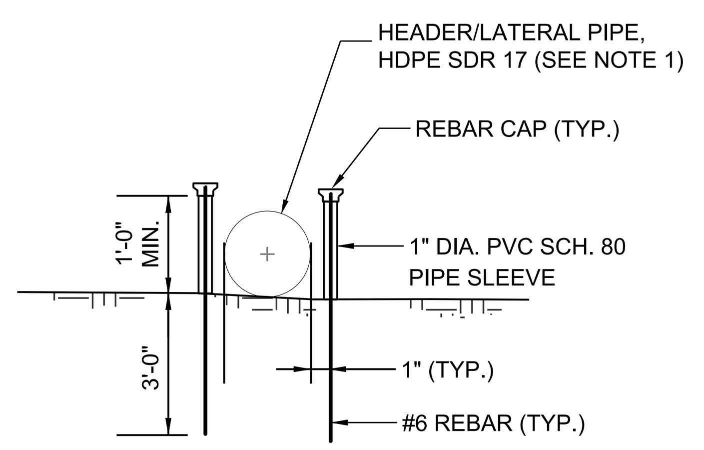
SCALE: N.T.S. 4 1|4 4 2|4 ROAD CROSSING DETAIL



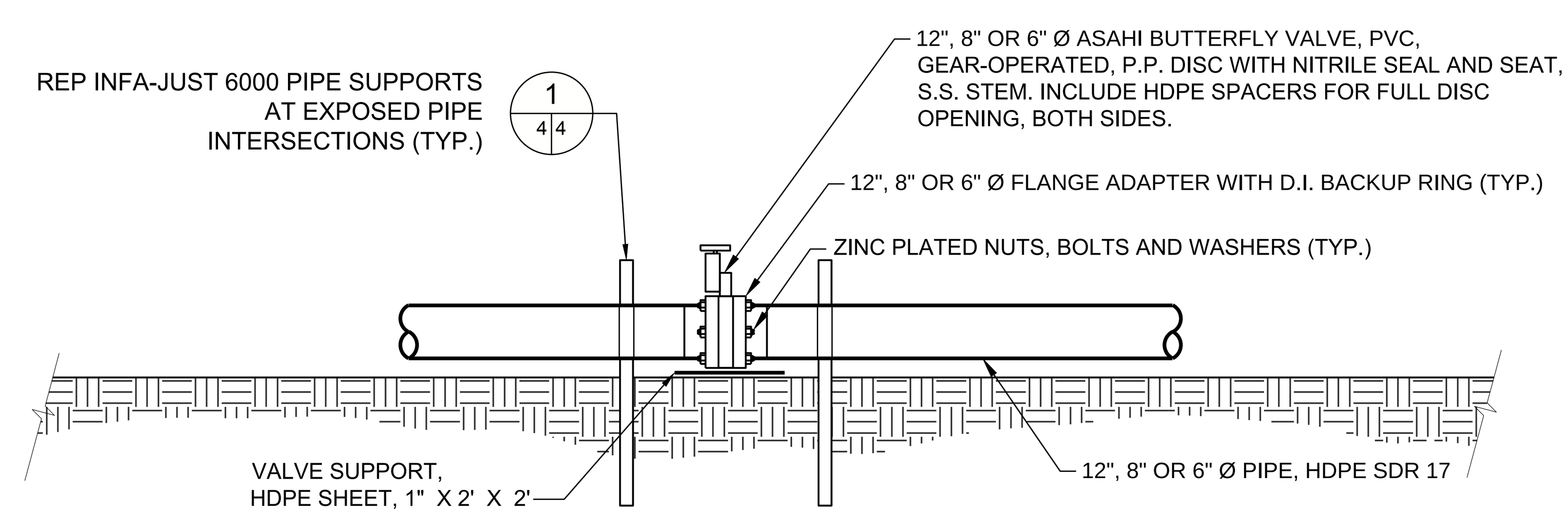
DETAIL NOTES:

1. ΔY VARIES LINEARLY BETWEEN 0" TO 18" DEPENDING ON THE OUTSIDE TEMPERATURE (0" @ 60°F AND 18" @ 110°F).
2. DUE TO THERMAL EXPANSION AND CONTRACTION OF HDPE PIPE, LFG PIPE SHALL BE INSTALLED IN A SNAKED POSITION. CONTRACTOR SHALL MAKE ALLOWANCE FOR EXTRA LENGTH OF PIPE.
3. DO NOT INSTALL PIPE GUIDES, ANCHORS, SUPPORTS OR OTHER SURFACE PENETRATIONS IN FINAL COVER AREAS.

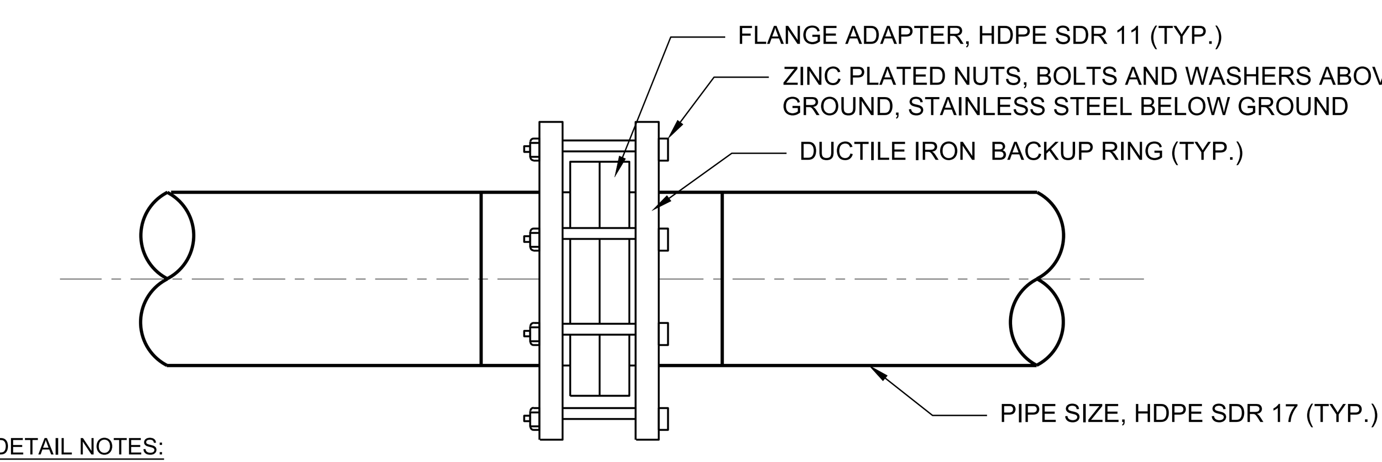
SCALE: N.T.S. 7 4|4 HDPE PIPE SNAKING DETAIL



SCALE: N.T.S. 2 6|4 2 7|4 PIPE GUIDE DETAIL



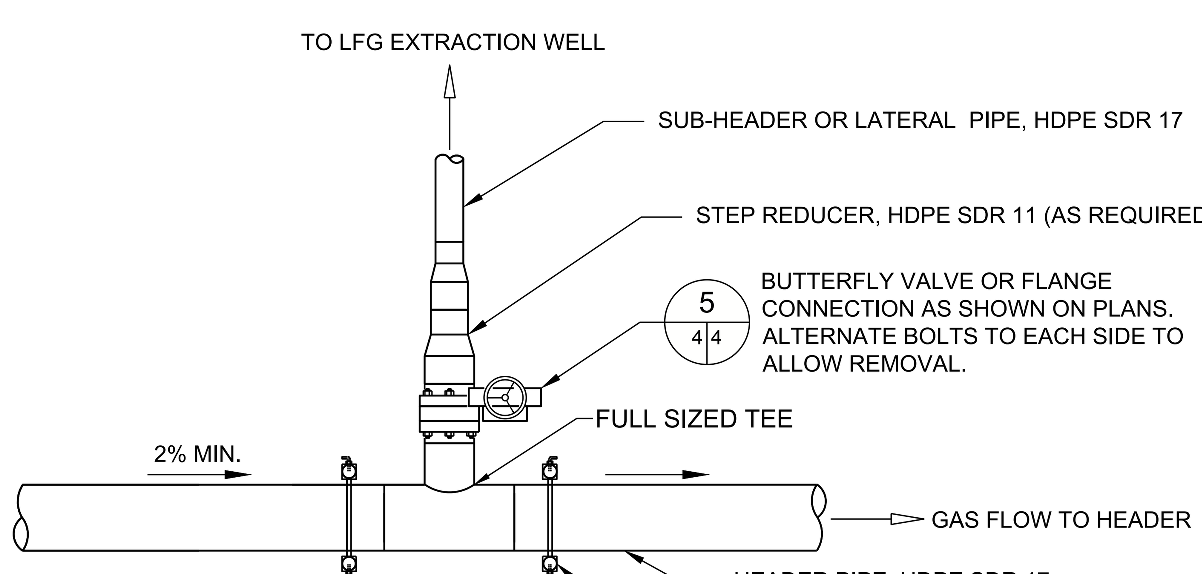
SCALE: N.T.S. 5 1|4 5 2|4 5 4|4 BUTTERFLY VALVE ABOVE GROUND DETAIL



DETAIL NOTES:

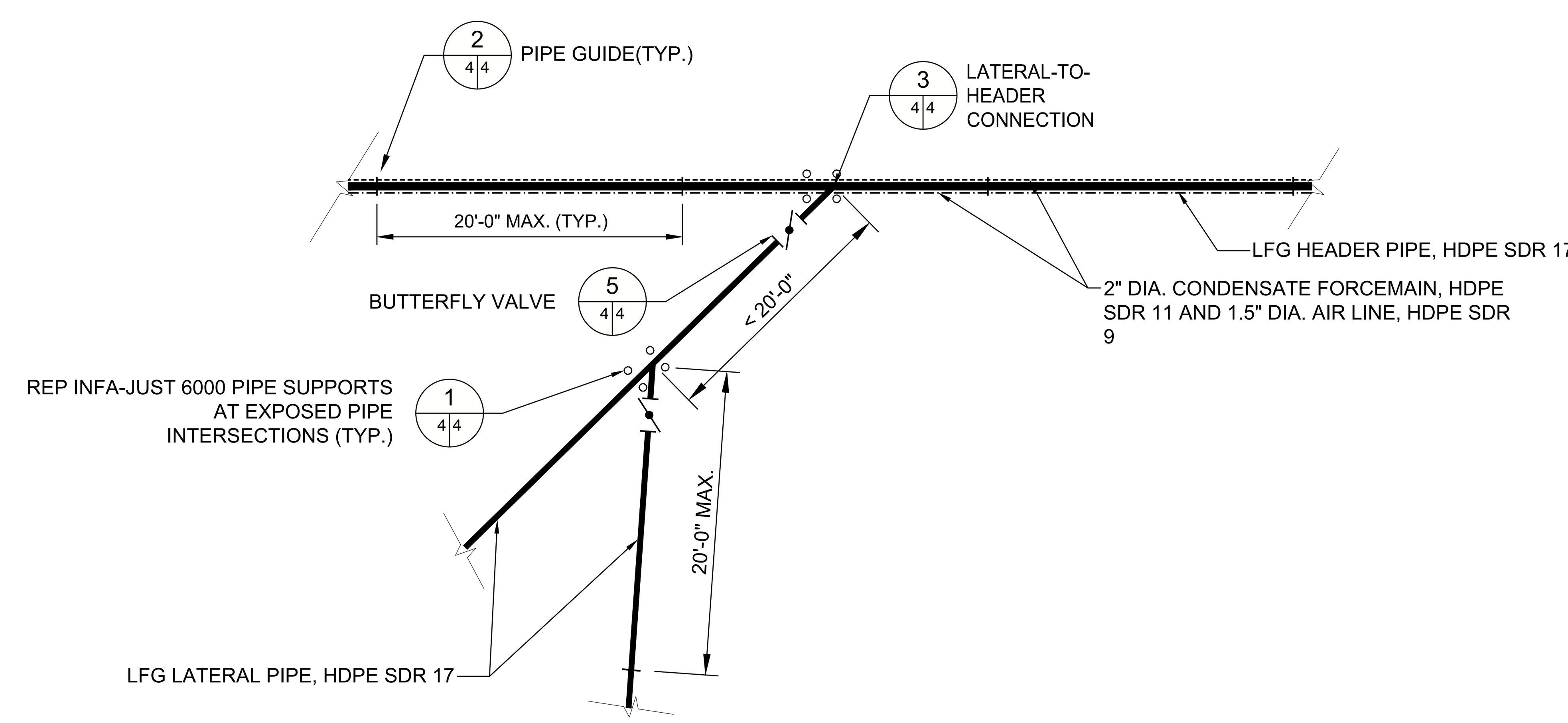
1. COAT BOLT THREADS WITH BOSTIK NEVER-SEEZ.
2. TAPE 5 MIL PE AROUND ALL BURIED FLANGE CONNECTIONS.
3. BLIND FLANGE CONNECTION IS SIMILAR, WITH ONE SIDE AS DUCTILE IRON BLIND FLANGE.

SCALE: N.T.S. 8 4|4 TYPICAL FLANGE CONNECTION



DETAIL NOTE:
PROVIDE ALL LATERAL PIPES WITH MAXIMUM ACHIEVABLE SLOPE TOWARDS HEADER.

SCALE: N.T.S. 3 4|4 TYPICAL SUB-HEADER/LATERAL TO ABOVE-GROUND HEADER CONNECTION DETAIL



SCALE: N.T.S. 6 4|4 HDPE PIPE GUIDE AND PIPE SUPPORT SPACING

NOTE S

1. CONTRACTOR TO SNAKE PIPE AND INSTALL PIPE GUIDES AT 20' SPACING ALONG ALL EXPOSED PIPE. CONTRACTOR TO INSTALL REP INFA-JUST PIPE ANCHORS AT WELLHEAD AND ON ALL PIPES >20' LONG AT EXPOSED PIPE JUNCTIONS. DO NOT INSTALL PIPE GUIDES, ANCHORS, SUPPORTS OR OTHER SURFACE PENETRATIONS IN FINAL COVER AREAS.
2. COORDINATE ALL TIE-INS TO EXISTING PIPING SYSTEMS WITH OWNER AND LFG SYSTEM OPERATOR TO MAINTAIN PERSONNEL SAFETY AND FACILITY REGULATORY COMPLIANCE, AND MINIMIZE OPERATIONAL DOWNTIME.
3. INSTALLED HDPE FITTINGS SHALL BE FULL PRESSURE RATED OR ONE SDR LOWER THAN HDPE PIPE SDR. NO SADDLE TEES ALLOWED FOR ABOVE GROUND HEADER/LATERAL CONNECTIONS. ELECTROFUSION SADDLE REDUCER TEE MAY BE PROPOSED FOR SUBSTITUTE TIE-IN TO EXISTING HEADER IF FULL SIZE TEE CANNOT BE INSTALLED. CONTRACTOR SHALL REQUEST PRIOR ENGINEER/OWNER APPROVAL FOR ALL PROPOSED ELECTROFUSION LOCATIONS.

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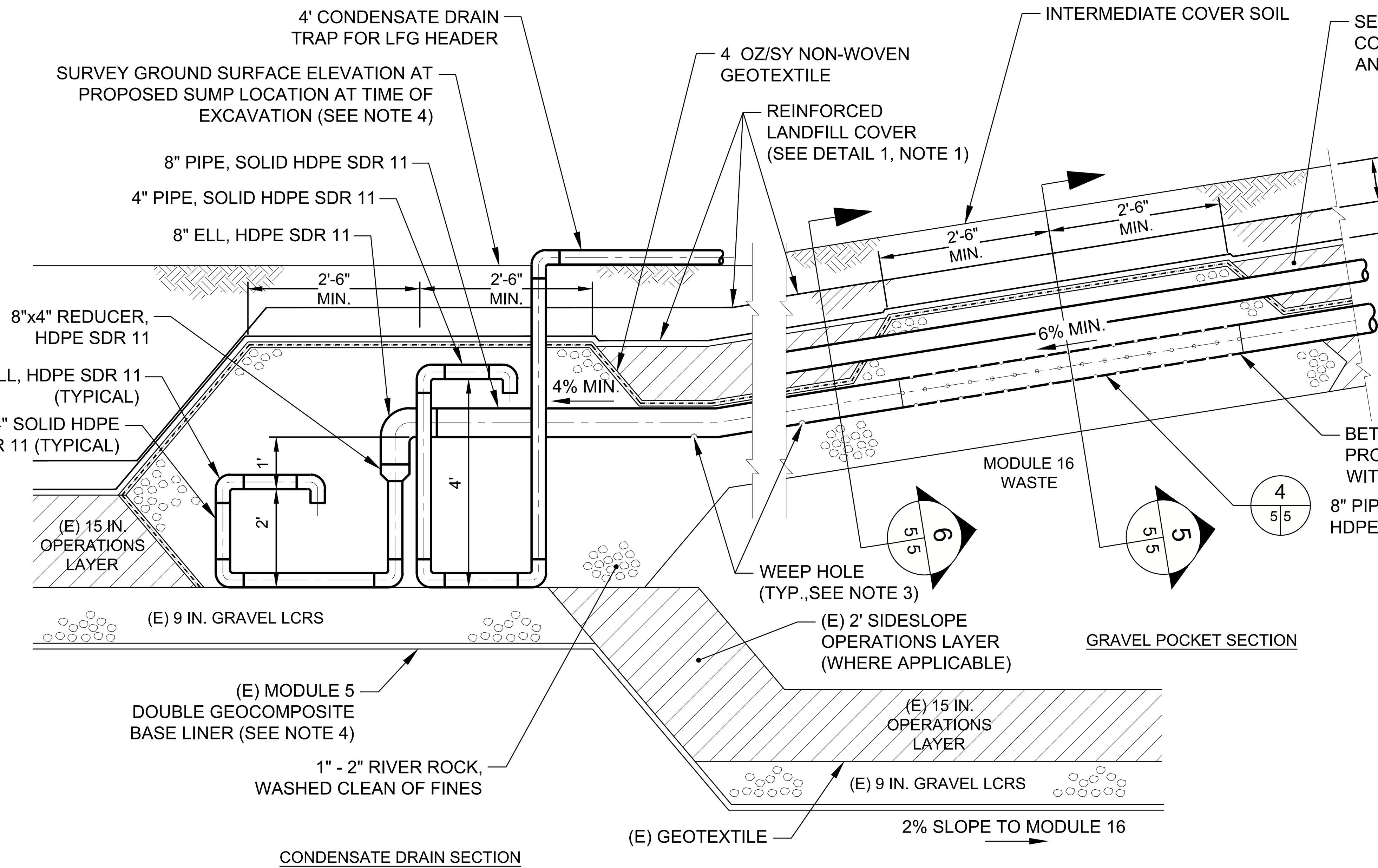
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
LFG PIPING DETAILS

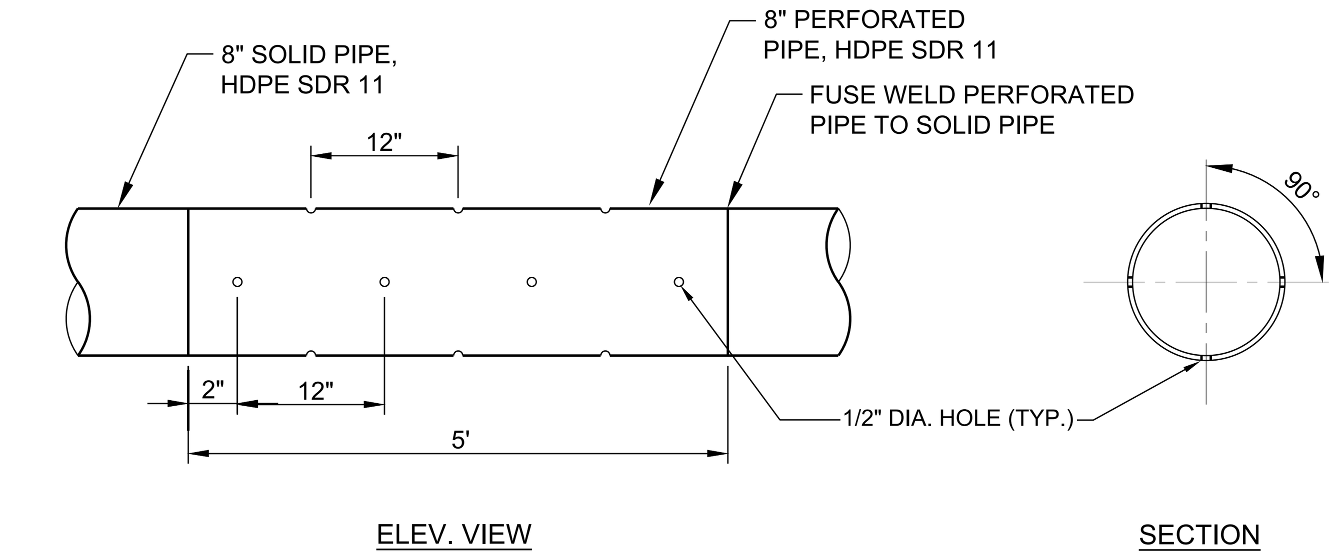
PROJECT No. 1420152 Rev. 0 5 of 58 DRAWING 4



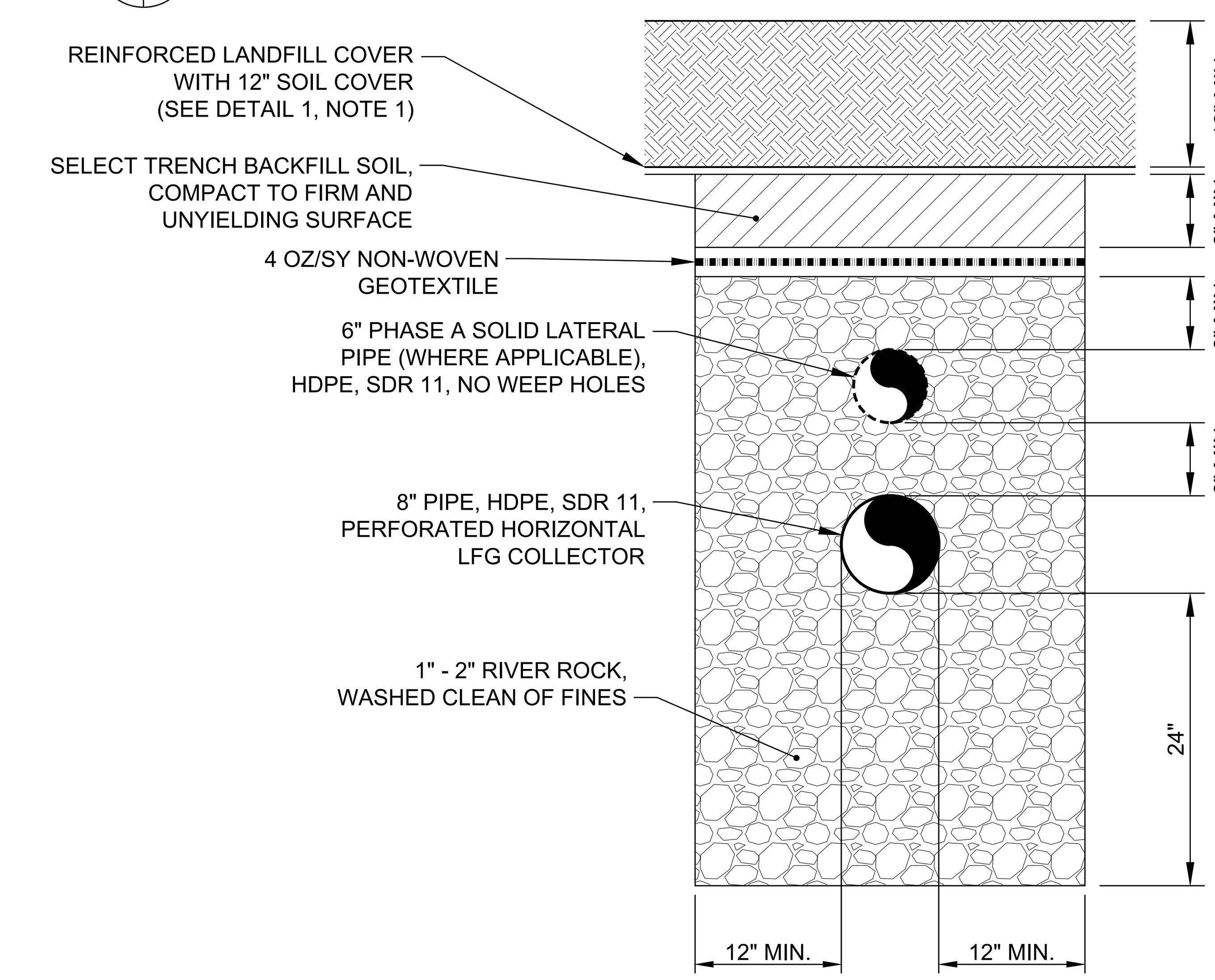
SCALE: N.T.S. 1 1/5 1 2/5 LONGITUDINAL SECTION THROUGH HORIZONTAL LFG COLLECTOR DETAIL

DETAIL NOTES:

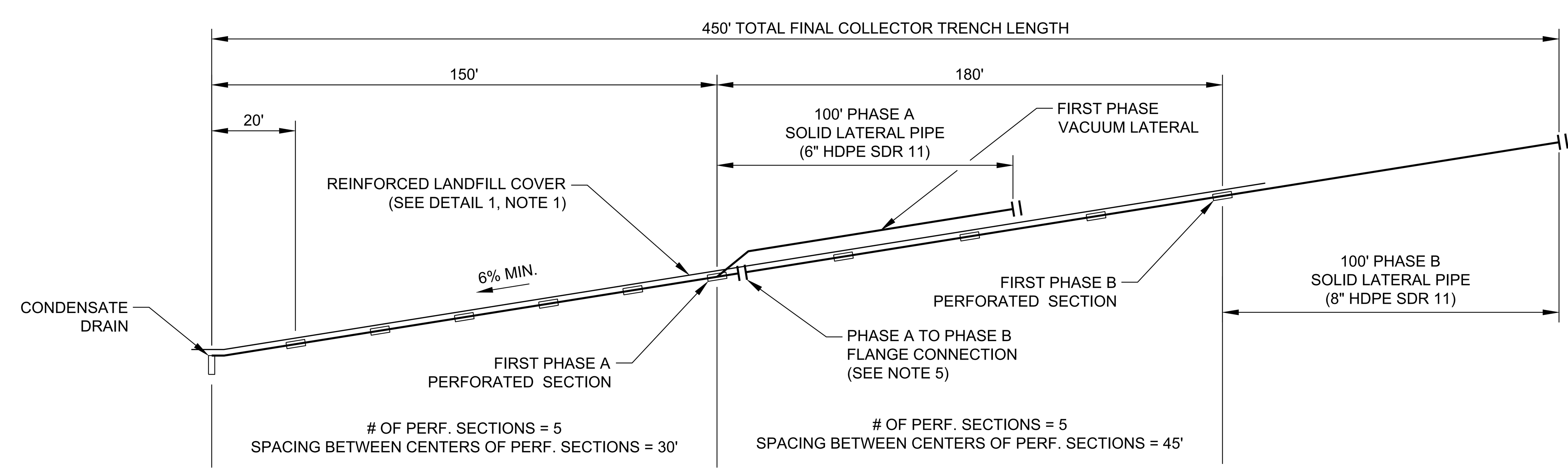
1. REINFORCED LANDFILL COVER SHALL BE 12 MIL RAVEN INDUSTRIES DURA-SKRIM 12BV OR APPROVED EQUAL. CENTER 24' WIDTH OVER COLLECTOR TRENCH, EXTEND 20' BEYOND UPPER END OF TRENCH GRAVEL BACKFILL. ANCHOR ALL EDGES IN 12" DEEP ANCHOR TRENCH AND COVER SURFACE WITH 1' LAYER OF SELECT SOIL.
2. PRIOR TO STARTING ANY EXCAVATION, CONFIRM THE EXACT LOCATION AND DEPTH OF LANDFILL LINER WITH THE OWNER/ENGINEER AND CONTRACTOR-PROVIDED SURVEYOR AS NECESSARY.
3. PROVIDE ONE 1/2" DIAMETER HOLE EVERY 5 FT O.C. AT PIPE INVERT FOR CONDENSATE DRAINAGE BETWEEN PERFORATED PIPE SECTIONS.
4. POTHOLE UNDER SUPERVISION OF OWNER / ENGINEER TO LOCATE BASE OF WASTE IN MODULE 5. (ESTIMATED DESIGN ELEVATION ~85' MSL). HAND EXCAVATE OPERATIONS LAYER SOIL TO LOCATE TOP OF LCRS GRAVEL. DO NOT EXCAVATE BELOW TOP OF LCRS GRAVEL. (ESTIMATED DESIGN ELEVATION OF PRIMARY GEOMEMBRANE LINER IS ~83' MSL).
5. PROVIDE FLANGE JOINT WITH BLIND FLANGE AT PHASE A PIPE TERMINATION (FOR CONNECTING TO FUTURE PHASE B EXTENSION). WHEN PHASE B IS CONSTRUCTED, PROVIDE AND INSTALL A PIPE ISOLATION PIG IMMEDIATELY UPSTREAM OF FLANGE JOINT (TO ALLOW CONTINUOUS LFG COLLECTION FROM PHASE A). PROVIDE PIG WITH 300 FT OF RETRIEVAL CABLE PASSING THROUGH PHASE B PIPE. DEMONSTRATE SUCCESSFUL PIG RETRIEVAL THROUGH PHASE B PIPE AND REPLACE PIG AT FLANGE JOINT BEFORE BACKFILLING TRENCH.



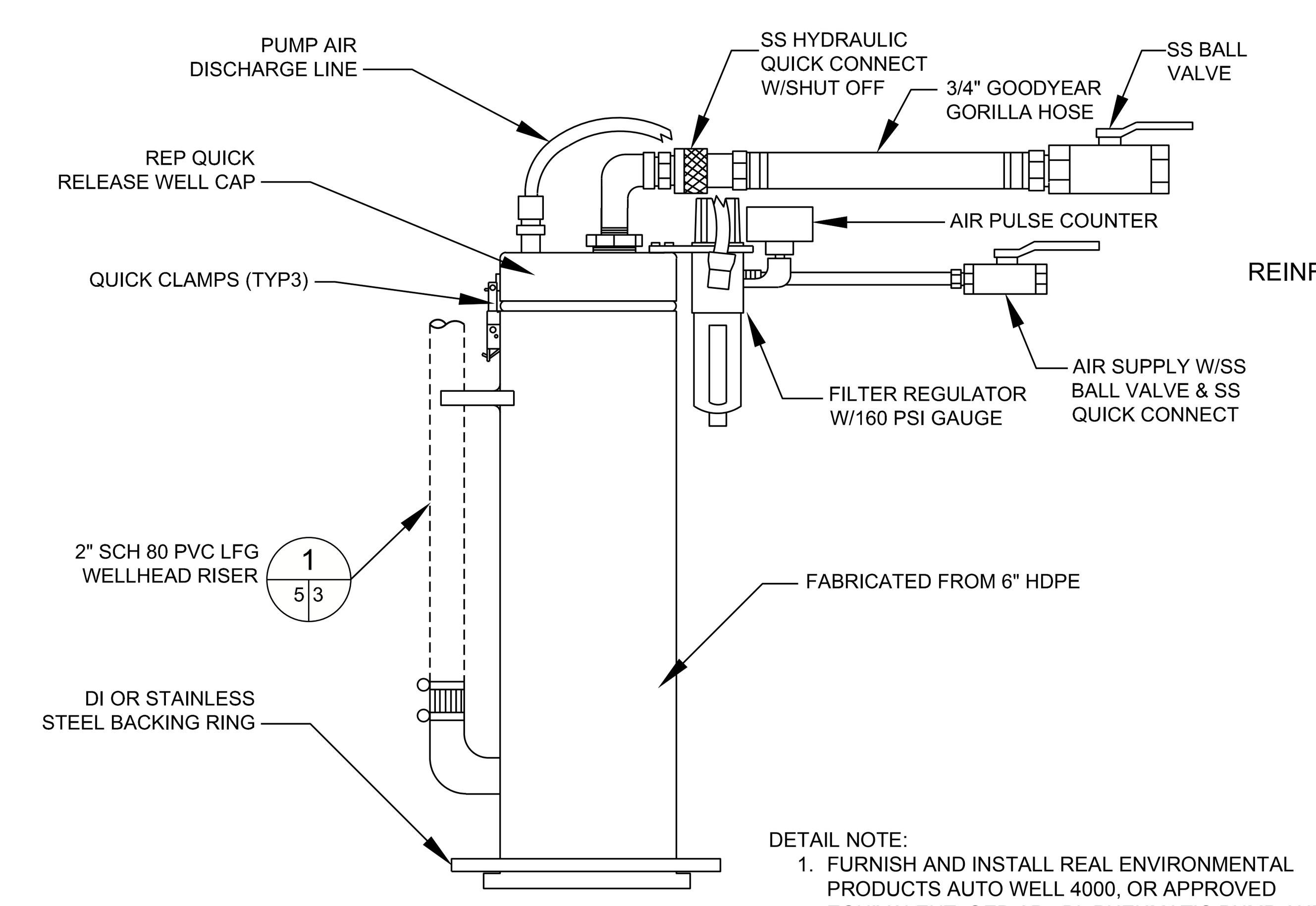
SCALE: N.T.S. 4 5/5 PERFORATED HORIZONTAL LFG COLLECTOR PIPING DETAIL



SCALE: N.T.S. 5 5/5 HORIZONTAL GAS COLLECTOR AT GRAVEL POCKET SECTION



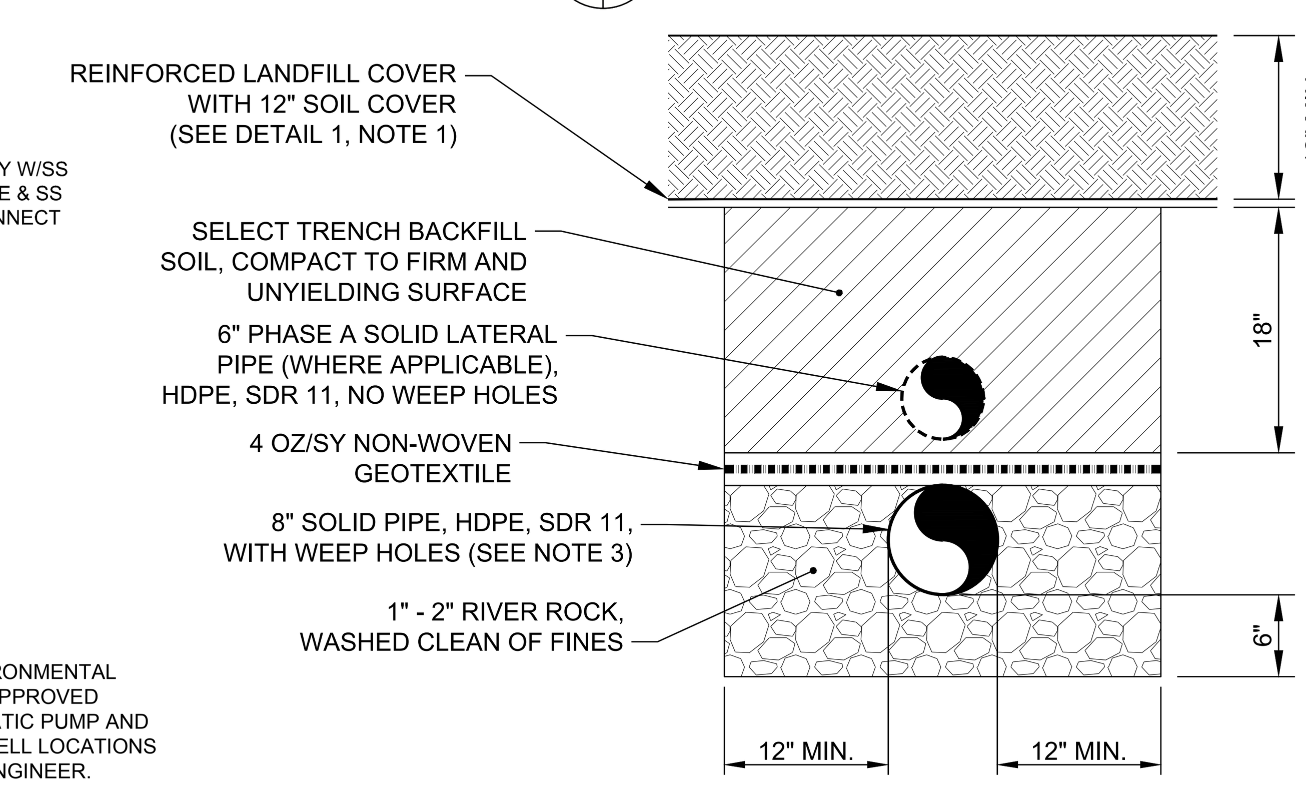
SCALE: N.T.S. 2 5/5 HORIZONTAL LFG COLLECTOR PERFORATION SPACING SCHEMATIC



DETAIL NOTE:

1. FURNISH AND INSTALL REAL ENVIRONMENTAL PRODUCTS AUTO WELL 4000, OR APPROVED EQUIVALENT, QED AP-4BL PNEUMATIC PUMP AND REQUIRED HOSES AT UP TO SIX WELL LOCATIONS TO BE DETERMINED BY OWNER/ ENGINEER.

SCALE: N.T.S. 3 2/5 3 4/5 LFG/ LEACHATE WELLHEAD DETAIL



SCALE: N.T.S. 6 5/5 HORIZONTAL GAS COLLECTOR AT SOLID PIPE SECTION BETWEEN GRAVEL POCKETS

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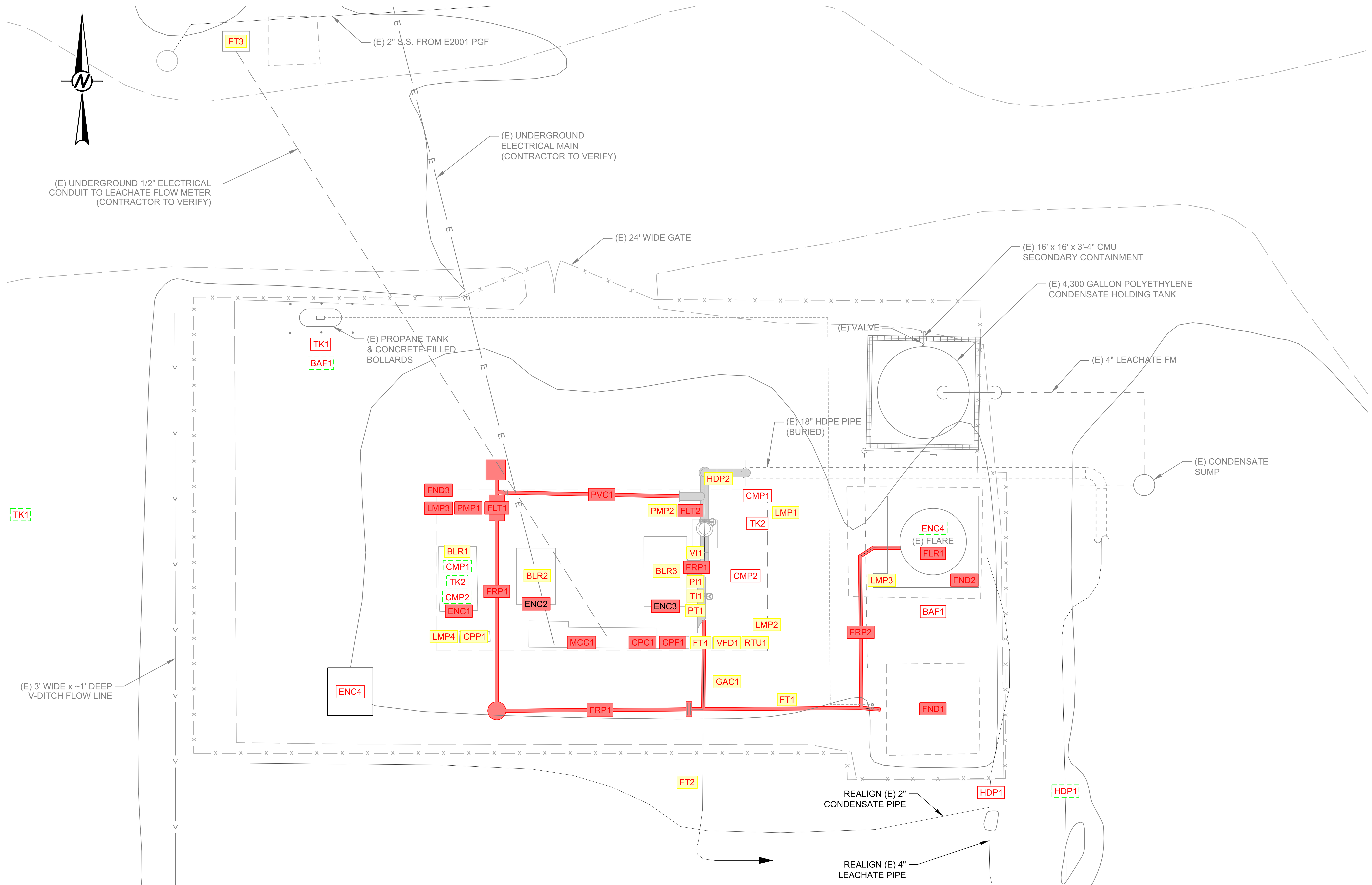
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
HORIZONTAL LFG COLLECTION DETAILS

PROJECT No. 1420152 | Rev. 0 | 6 of 58 | DRAWING 5



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EGEN

- RETAIN IN-PLACE
- RE-LOCATE
- REMOVE AND PROVIDE TO OWNER
- REMOVE AND DISPOSE/ RECYCLE
- RELOCATION SITE

PROPOSED PROJECT DISPOSITION FOR SELECTED BLOWER FLARE STATION EQUIPMENT AND ITEMS

ITEM NO.	SIZE	DESCRIPTION	MEDIA	DISPOSITION WORK	FINAL LOCATION/ CONDITION
BAF1	4' SQ	Flare Air Inlet Baffle	n.a.	Relocate	East side air inlet of new flare
BLR1	25 HP	Perimeter blower #1	LFG	Remove and provide to Owner	
BLR2	25 HP	Perimeter blower #2	LFG	Remove and provide to Owner	
BLR3	75 HP	Infill blower #3	LFG	Remove and provide to Owner	
CMP1	15 HP	Air compressor #1	Air	Relocate	East side of new canopy area
CMP2	15 HP	Air compressor #2	Air	Relocate	East side of new canopy area
CPC1	n.a.	Condensate control panel	Elec.	Remove and dispose / recycle	
CPF1	n.a.	Flare control panel	Elec.	Remove and dispose / recycle	
CPP1	n.a.	Perimeter instrument control panel	Elec.	Remove and provide to Owner	
ENC1	n.a.	Blower #1 enclosure	n.a.	Remove and provide to Owner	
ENC2	n.a.	Blower #2 enclosure	n.a.	Remove and provide to Owner	
ENC3	n.a.	Blower #3 enclosure	n.a.	Remove and provide to Owner	
ENC4	n.a.	Tuff-Shed storage	n.a.	Relocate	South of condensate tank (door facing west)
FLR1	2,500 cfm	Enclosed flare	LFG	Remove and provide to Owner	Cut into 10' tall sections
FLT1	2,500 cfm	Perimeter entrainment filter	LFG	Remove and dispose / recycle	
FLT2	2,500 cfm	Infill entrainment filter	LFG	Remove and dispose / recycle	
FND1	13' x 13'	Flare foundation (south)	LFG	Remove and dispose / recycle	Backfill, regrade and re-pave
FND2	13' x 13'	Flare foundation (north)	LFG	Remove and dispose / recycle	Backfill, regrade and re-pave
FND3	23' x 50'	LFG equipment slab-on-grade	LFG	Remove and dispose / recycle	Backfill, regrade and re-pave
FRP1	12"	Pipe, perimeter, fiberglass reinforced	LFG	Remove and dispose / recycle	
FRP2	12"	Pipe, infill, fiberglass reinforced	LFG	Remove and dispose / recycle	
FT1	12"	Flare flow meter / transmitter	LFG	Remove and provide to Owner	
FT2	12"	PGF flow meter / transmitter	LFG	Remove and provide to Owner	
FT3	n.a.	Wastewater discharge flow meter	Leachate	Remove and provide to Owner	
FT4	12"	GCCS flow meter / transmitter	LFG	Remove and provide to Owner	
GAC1	n.a.	Gas analyzer	LFG	Remove and provide to Owner	
HDP1	4"	Pipe, HDPE	Cond.	Relocate	Align with BFS LFG infill headers
HDP2	12"	Pipe, infill, HDPE	LFG	Remove and provide to Owner	
LMP1	12'	Yard light	n.a.	Remove and provide to Owner	
LMP2	12'	Yard light	n.a.	Remove and provide to Owner	
LMP3	12'	Yard light	n.a.	Remove and provide to Owner	
LMP4	12'	Yard light	n.a.	Remove and provide to Owner	
LMP5	12'	Yard light	n.a.	Remove and provide to Owner	
MCC1	n.a.	Motor control center	Elec.	Remove and dispose / recycle	
PI1	n.a.	Pressure gauge	LFG	Remove and provide to Owner	
PMP1	n.a.	Perimeter filter pump, electric	Cond.	Remove and dispose / recycle	
PMP2	n.a.	Infill filter pump, diaphragm	Cond.	Remove and provide to Owner	
PT1	n.a.	Pressure sensor / transmitter	LFG	Remove and provide to Owner	
PVC1	12"	Pipe, crossover, polyvinyl chloride	LFG	Remove and dispose / recycle	
RTU1	n.a.	SCADA PLC panel	Elec.	Remove and provide to Owner	
TI1	n.a.	Temperature gauge	LFG	Remove and provide to Owner	
TK1	500 gal	Propane tank	Propane	Relocate	South of new electrical service
TK2	120 gal	Compressed air receiver	Air	Relocate	East side of new canopy area
VFD1	n.a.	Infill blower #3 variable drive	Elec.	Remove and provide to Owner	
VI1	n.a.	Vacuum gauge	LFG	Remove and provide to Owner	

NOTES

1. BASE PLANS ARE FROM "BLOWER FLARE STATION LFG PIPING MODIFICATION PLAN", 6-18-09, GOLDER ASSOCIATES; AND "FLARE MODIFICATIONS", 5-09-05, SCS ENGINEERS (ORIGINAL CONDITIONS IN LAWRENCE AND ASSOCIATES, "GAS-EXTRACTION SYSTEM AS-BUILT PLANS", 1996).
2. P&ID 'TAGS' ARE ONLY USED FOR GENERAL ITEM IDENTIFICATION (AS REFERENCED IN THE TABLE ON DRAWING 11)
3. EQUIPMENT TYPE, LOCATIONS AND DIMENSIONS ARE BASED ON AVAILABLE INFORMATION PROVIDED TO THE ENGINEER. CONTRACTOR SHALL FIELD-VERIFY ALL APPLICABLE DATA AND DIMENSIONS BEFORE STARTING WORK.
4. THE ORDERS OF THE WORK ITEMS IN THESE TABLES OR DRAWINGS DO NOT IMPLY PRIORITY OR CHRONOLOGY. THE CONTRACTOR IS RESPONSIBLE FOR ASSESSING, EXECUTING AND COMPLETING THE SEQUENCE OF WORK SAFELY, EFFICIENTLY, AND IN COMPLIANCE WITH ALL REGULATORY AND OWNER REQUIREMENTS.
5. CONTRACTOR SHALL REMOVE, MODIFY OR RESTORE ALL EXISTING ITEMS REQUIRED FOR COMPLETION AND PROPER FUNCTIONING OF THE NEW EQUIPMENT IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS.
6. DISPOSITION OF MINOR INDIVIDUAL ITEMS (INCLUDING APPURTENANT CONDUIT, WIRING, VALVES AND FITTINGS) MAY NOT BE SPECIFICALLY LISTED OR SHOWN ON DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR SAFE AND PROPER REMOVAL AND DISPOSITION OF ALL ITEMS NO LONGER REQUIRED AT THE COMPLETION OF THE PROJECT.
7. COORDINATE WITH THE OWNER WHO WILL FIELD MARK ALL ITEMS (BOTH LISTED ITEMS AND UNLISTED OR MINOR ITEMS) REQUIRED TO BE PROVIDED TO THE WPWMA UPON REMOVAL.
8. THE CONTRACTOR SHALL COORDINATE ALL SYSTEM INTERRUPTIONS WITH THE OWNER AND THE PGF, AND COMPLY WITH SYSTEM DOWNTIME RESTRICTIONS IN THE SPECIFICATIONS. THE CONTRACTOR SHALL IMPLEMENT ALL NECESSARY PROCEDURES FOR SAFE AND COMPLIANT SHUT-DOWN, MODIFICATION, AND START-UP, INCLUDING EQUIPMENT LOCK-OUT / TAG-OUT AND PIPING BLOCK / BLEED.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
BLOWER/FLARE STATION EXISTING CONDITIONS/ DECOMMISSION PLAN

PROJECT No. 1420152 | Rev. 0 | 8 of 58 | DRAWING 6A

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

NOTES

1. INFORMATION SHOWN IN THESE DRAWINGS IS DEPICTED SCHEMATICALLY. THE EQUIPMENT AND LAYOUT DESIGNS ARE PROVIDED COURTESY OF PERENNIAL ENERGY, INC. FINAL SHOP DRAWINGS SHALL BE FULLY INTEGRATED WITH ACTUAL SITE CONDITIONS AND SUBMITTED BY THE CONTRACTOR FOR AUTHORITY APPROVAL. FINAL DESIGNS SHALL COMPLY WITH ALL PERFORMANCE REQUIREMENTS AND FUNCTIONAL INTENTS AS SHOWN OR DESCRIBED IN THESE CONTRACT DOCUMENTS. CONTRACTOR SHALL PROVIDE AND INSTALL NEW GAS BLOWER SKID, ENCLOSED FLARE, INTEGRATED CONTROLS AND ALL OTHER EQUIPMENT SHOWN IN THE CONTRACT DRAWINGS, THE FINAL SHOP DRAWINGS, AND DESCRIBED IN THE CONTRACT SPECIFICATIONS.
2. CONTRACTOR SHALL PROVIDE AND FIELD-FIT ALL PIPE, FITTINGS AND SUPPORTS REQUIRED TO PROPERLY CONNECT VENDOR EQUIPMENT TO EXISTING PIPING.
3. CONTRACTOR SHALL INSTALL NEW PIPE SUPPORTS AT THE LOCATIONS SHOWN (AS A MINIMUM) AND ADDITIONAL SUPPORTS AS MAY BE REQUIRED FOR PROPER INSTALLATION (AS DETERMINED BY THE OWNER).
4. THE LOCATIONS AND DIMENSIONS OF BOTH EXISTING AND NEW FACILITIES SHOWN IN THESE PLANS ARE APPROXIMATE. BEFORE PREPARING SHOP DRAWINGS OR STARTING WORK, CONTRACTOR SHALL COORDINATE WITH THE OWNER TO FIELD-VERIFY THE ACTUAL LOCATIONS AND DIMENSIONS OF ALL FACILITIES (WHETHER SHOWN OR NOT). THE CONTRACTOR SHALL PROTECT FROM DAMAGE ALL FACILITIES REQUIRED FOR COMPLETION OF THE WORK, INTERIM OPERATIONS, AND FINAL OPERATIONS.
5. COORDINATE ALL INTERRUPTIONS OF GAS SYSTEM OPERATIONS WITH OWNER AND OPERATOR IN ACCORDANCE WITH SPECIFICATIONS.
6. PAVEMENT EXTENSION AND REPLACEMENT SHALL BE 2" AC ON 6" COMPACTED CL. II AB. AC SHALL BE IN ACCORDANCE WITH CALTRANS STANDARD SPECIFICATIONS SECTION 39-2.01B(11), MISCELLANEOUS AREAS AND DIKES.

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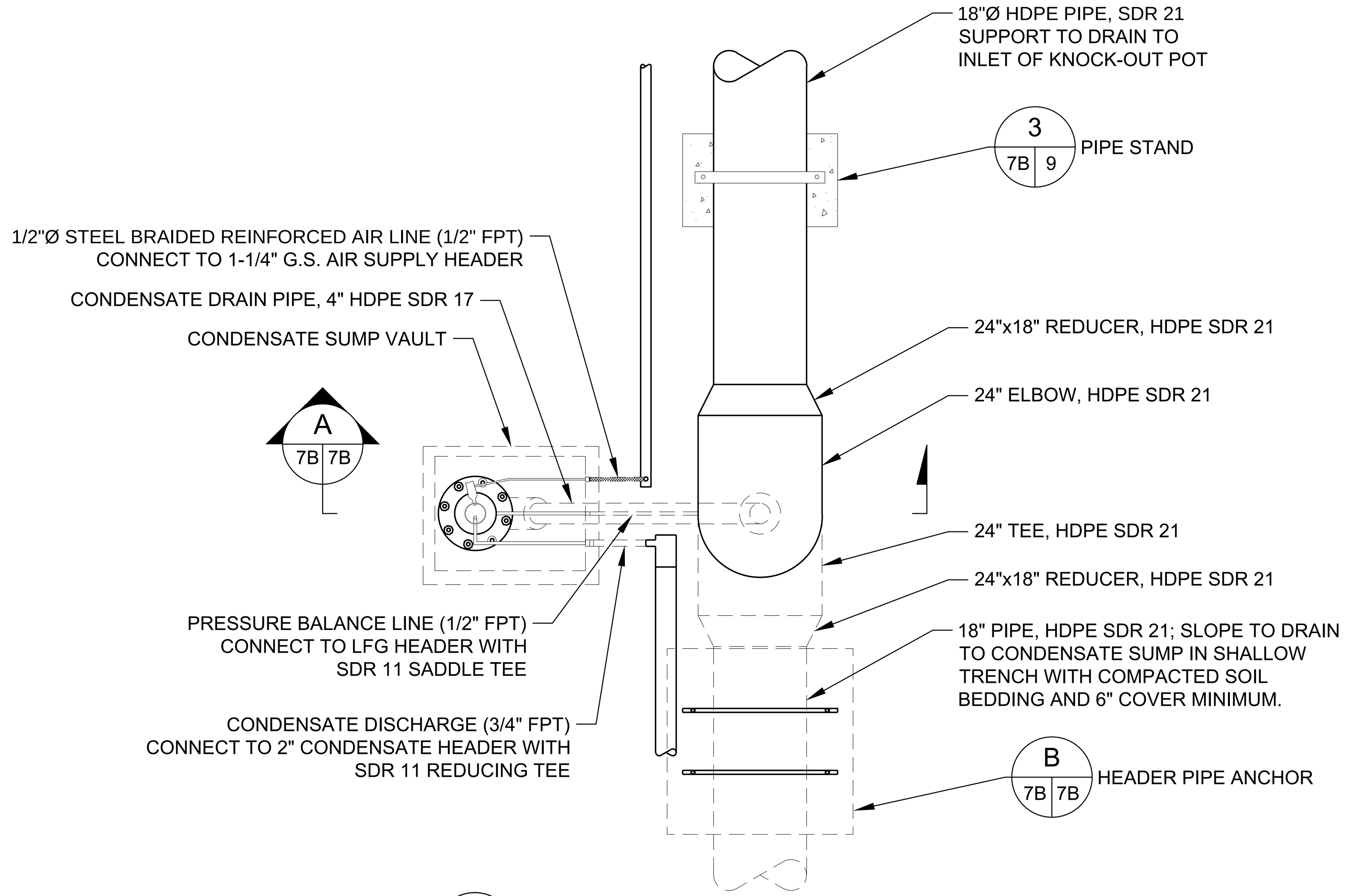
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

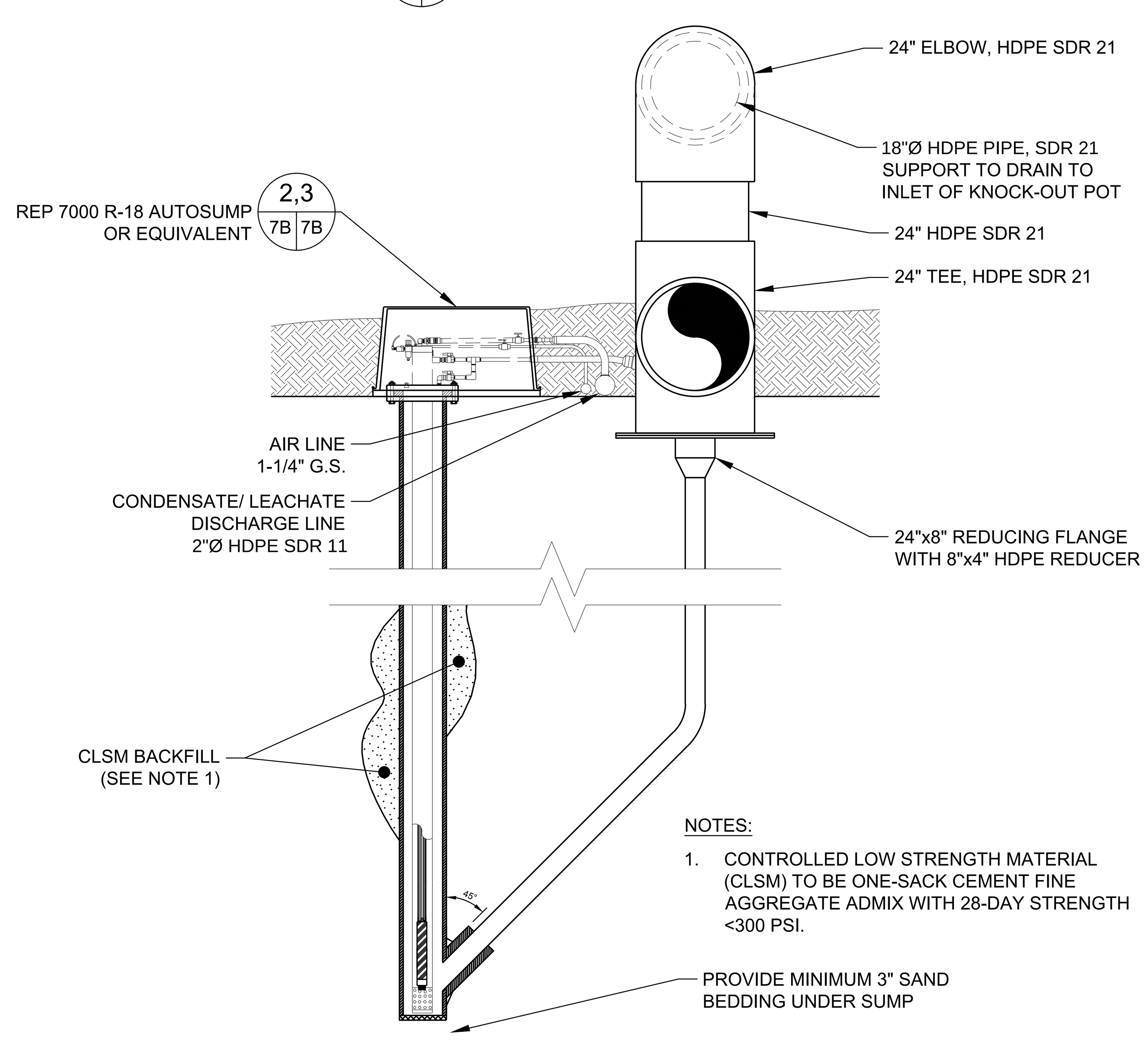
TITLE
BLOWER/ FLARE
STATION CONCEPTUAL SITE PLAN

PROJECT No. 1420152
Rev. 0

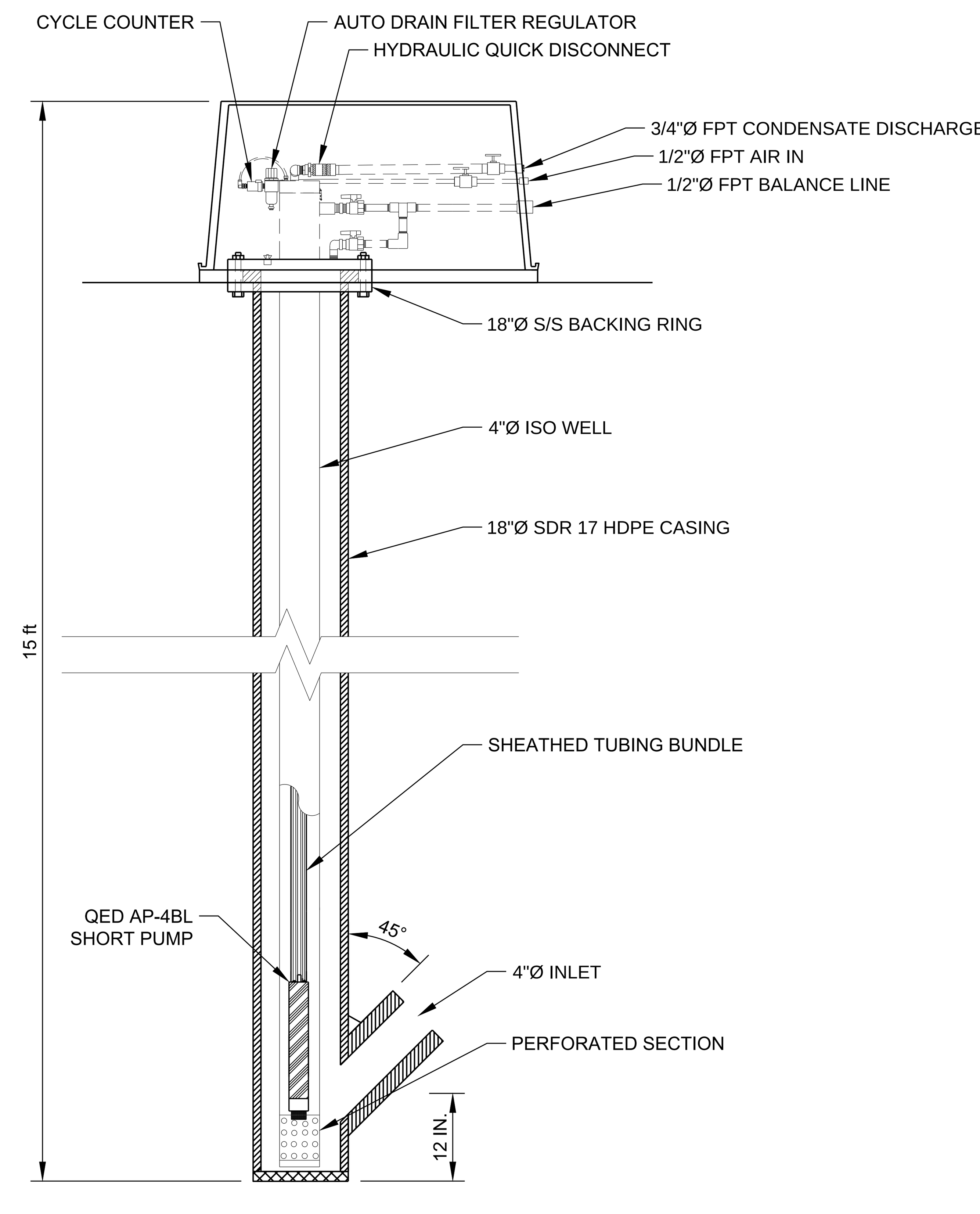
DRAWING 7A



N.T.S. 1 7A 7B CONDENSATE SUMP INSTALLATION



N.T.S. A 7B 7B CONDENSATE SUMP SECTION



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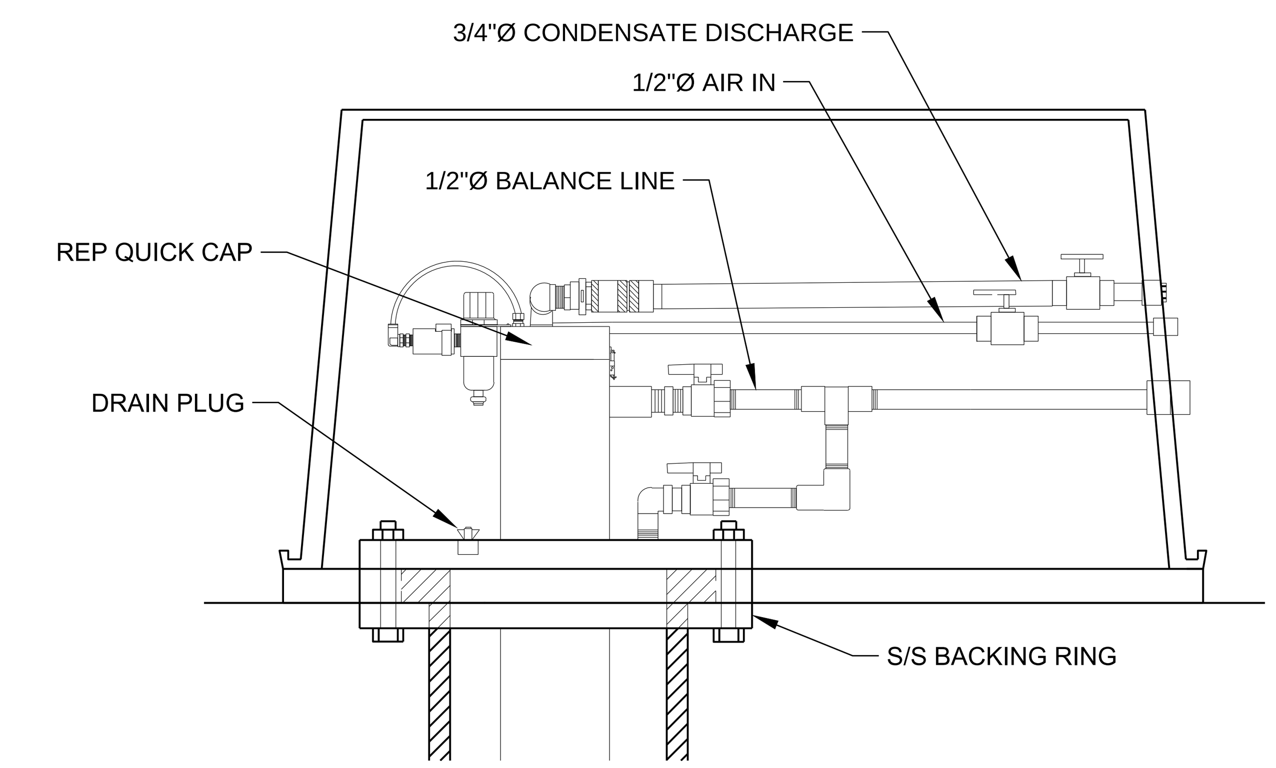
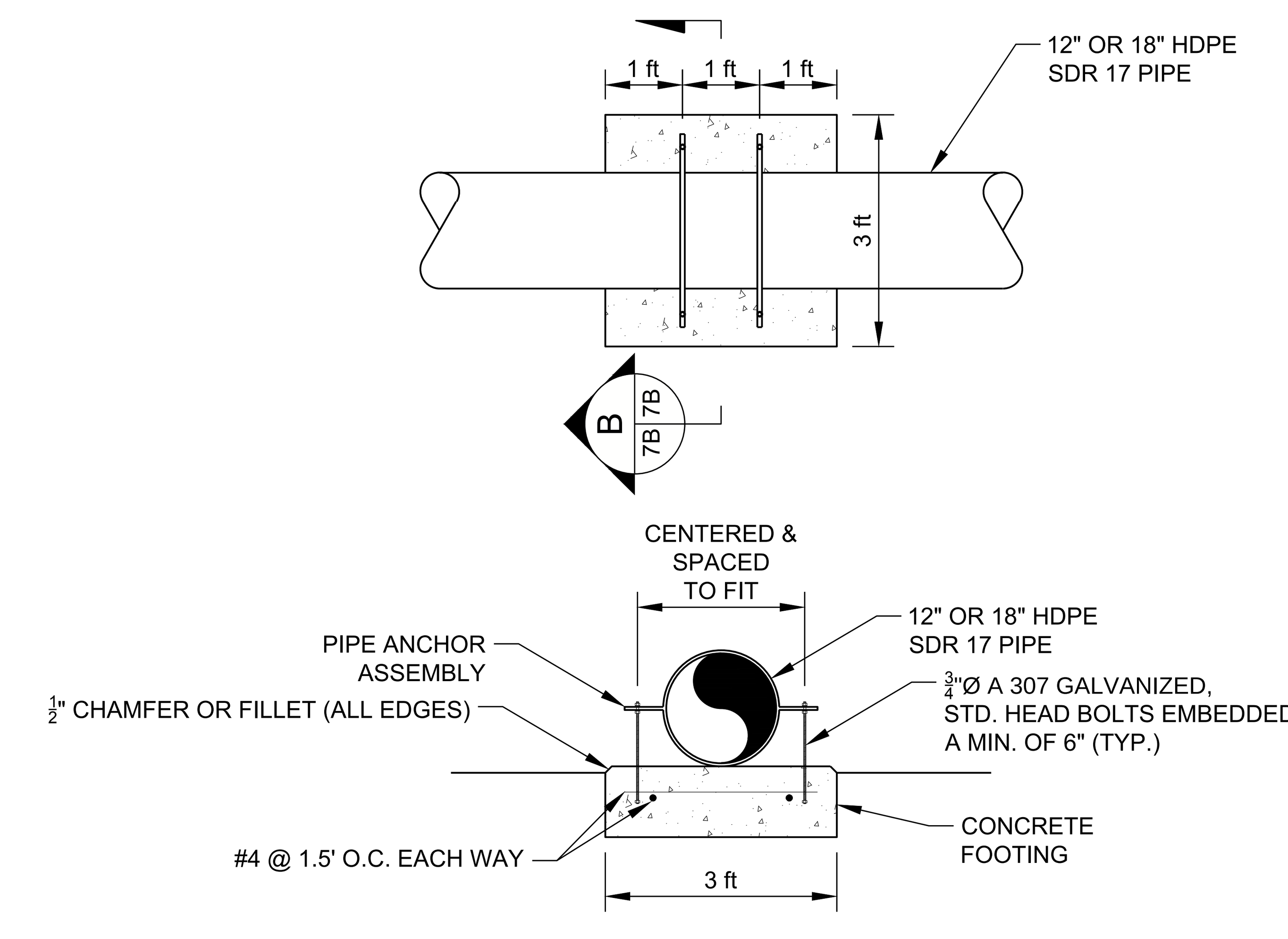


N.T.S. 3 7B 7B CONDENSATE SUMP



N.T.S. B 7B 7B HEADER PIPE ANCHOR BLOCK DETAIL

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
CONDENSATE DETAILS

PROJECT No. 1420152
Rev. 0
11 of 58
DRAWING 7B

GENERAL NOTES

G1. THE CONTRACT CONCRETE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OR SEQUENCES OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY MEASURES TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING AND SHORING OF LOADS DUE TO CONSTRUCTION EQUIPMENT, BACKFILL AND WIND.

G2. THE CONTRACTOR SHALL ALSO ASSUME RESPONSIBILITY AND PROVIDE ALL NECESSARY SAFETY PRECAUTIONS METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES REQUIRED TO PERFORM THE WORK IN ACCORDANCE WITH OSHA, OWNER AND OTHER AGENCY REGULATIONS.

G3. IMMEDIATELY NOTIFY THE ENGINEER WHEN EMBEDDED ITEMS ARE FOUND TO CONFLICT WITH FORM FRAMEWORK, REINFORCING STEEL, OR OTHER EMBEDMENTS. THE ENGINEER SHALL SPECIFY MEASURES TO CORRECT THE CONFLICT.

G4. ANY FABRICATION OR CONSTRUCTION DONE PRIOR TO APPROVAL OF DRAWINGS WILL BE DONE AT THE CONTRACTORS RISK AND ANY REMEDIES TO CORRECT ANY WORK DONE PRIOR TO APPROVAL WILL BE AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING LAYOUT OF STEEL REINFORCEMENT, ANCHORAGE AND EMBEDMENTS FOR ALL DEVIATIONS FROM CONTRACT DRAWINGS.

EXISTING CONDITIONS: CONTRACTOR SHALL EXAMINE ALL ELEVATIONS AND DIMENSIONS FOR EXISTING CONDITIONS IN THE FIELD BEFORE PROCEEDING. CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY DISCREPANCIES OR FIELD CHANGES PRIOR TO INSTALLATION OR FABRICATION. IN CASE OF DISCREPANCIES BETWEEN THE EXISTING CONDITIONS AND THE DRAWINGS, THE CONTRACTOR SHALL OBTAIN DIRECTIONS FROM THE CONSTRUCTION MANAGER BEFORE PRECEDING. DIMENSIONS NOTED AS PLUS OR MINUS (±) INDICATE UNVERIFIED DIMENSIONS AND ARE APPROXIMATE. NOTIFY CONSTRUCTION MANAGER IMMEDIATELY OF CONFLICT OR EXCESSIVE VARIATIONS FORM INDICATED DIMENSIONS. DO NOT SCALE DRAWINGS.

FOUNDATION GENERAL NOTES

F1. FOUNDATIONS SHALL BE CONSTRUCTED TO THE DIMENSIONS AS SHOWN ON THE STRUCTURAL DRAWINGS.

F2. NO STRUCTURAL CONCRETE SHALL BE POURED IN THE FOOTING OR SLAB EXCAVATIONS CONTAINING WATER.

F3. FLOW FILL CONCRETE (3000 PSI MINIMUM) MAY BE USED TO LEVEL GRADE BELOW FOOTINGS AND SLABS UPON APPROVAL OF THE DESIGN ENGINEER.

F3. EXCAVATION SHALL NOT ENCROACH BEYOND A 45° LINE EXTENDING FROM THE TOE OF AN EXISTING STRUCTURE/EQUIPMENT FOOTING.

CONCRETE GENERAL NOTES

C1. PRIOR TO PLACING CONCRETE, CONTRACTOR SHALL VERIFY THE REQUIREMENTS FOR ALL MECHANICAL AND ELECTRICAL SERVICES FOR THE LOCATION OF EMBEDDED ITEMS: (HOLES, UTILITIES, AND OTHERS).

C2. MATERIAL FORMING, PLACING, FINISHING AND CURING SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF ACI 318 SPECIFICATION.

C3. ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f'c) OF 4000 PSI AT THE AGE OF 28 DAYS.

C4. REINFORCING BARS SHALL BE DEFORMED BARS AND SHALL CONFORM TO ASTM A615, GRADE 60, EXCEPT AS NOTED.

C5. PROVIDE BAR SUPPORTS AND SPACERS TO PLACE ALL BARS IN PROPER LOCATION, AND WIRE ADEQUATELY AT INTERSECTIONS TO HOLD BARS FIRMLY IN POSITION WHILE CONCRETE IS PLACED.

C6. CONTINUOUS BARS SHALL LAP AND DOWELS SHALL PROJECT ADEQUATELY TO PROVIDE A CLASS B SPLICE IN ACCORDANCE WITH ACI 318 CHAPTER 12.

C7. FOR REINFORCED CONCRETE, UNLESS NOTED OTHERWISE ON THE DESIGN DRAWINGS CLASS B SPLICE IS DEFINED AS 1.3 Ld.
ALL LAPS ARE TENSION SPLICES, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
"TOP BARS" ARE HORIZONTAL BARS WITH MORE THAN 12" OF FRESH CONCRETE CAST BELOW THE BARS.

REINFORCING BAR SPLICE LENGTH SCHEDULE FOR GRADE 60, UNCOATED, AND FOR (f'c) OF 4000 PSI

BAR SIZE	TENSION SPLICE LENGTH=1.3ld		COMPRESSION SPLICE LENGTH
	TOP BARS	OTHER BARS	
#4	32"	25"	15"
#5	40"	31"	19"
#6	48"	37"	23"

C8. DO NOT SPLICE AT MAXIMUM STRESS LOCATIONS.

C9. THE CONCRETE MIX DESIGN SHALL BE AS FOLLOWS UNLESS OTHERWISE SHOWN ON THE DESIGN DRAWINGS:

f'c-28 DAY DESIGN COMPRESSION STRENGTH	MAXIMUM AGGREGATE SIZE	SLUMP AT POINT OF PLACEMENT	AIR ENTRAINED PERCENT (±1%)	MAXIMUM WATER/CEMENT RATIO
4000 psi	3/4"	4"	4-6.0	0.5

C10. CONCRETE COVER FOR REINFORCEMENT (UNLESS OTHERWISE NOTED):
A. CONCRETE POURED AGAINST EARTH .... 3"
B. CONCRETE POURED IN FORMS BUT EXPOSED TO WEATHER OR EARTH
(1.) #5 BARS OR SMALLER........................... 1 1/2"
(2.) BARS LARGER THAN #5......................... 2"

C11. ALL REINFORCING BAR HOOKS SHALL BE STANDARD HOOKS, UNLESS NOTED OTHERWISE.

GENERAL STRUCTURAL STEEL NOTES

SI1. THIS SPECIAL INSPECTION PROGRAM IS PROVIDED IN CONFORMANCE WITH CBC SECTION 1704.

SI2. THE ITEMS CHECKED WITH AN "X" IN THE "SPECIAL INSPECTION SCHEDULE" SHALL BE INSPECTED IN ACCORDANCE WITH CBC CHAPTER 17 BY A CERTIFIED SPECIAL INSPECTOR. A CERTIFIED TESTING AGENCY SHALL COMPLETE MATERIAL SAMPLING AND TESTING REQUIREMENTS. THE SPECIAL INSPECTOR AND TESTING AGENCY SHALL FURNISH REPORTS TO THE ENGINEER OF RECORD AND CONTRACTOR, FOR EACH TEST OR REPORT. ALL DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE CONTRACTOR FOR CORRECTION. IF DISCREPANCIES ARE NOT CORRECTED, ALL REMANDING DISCREPANCIES SHALL BE CLEARLY SHOWN ON THE REPORT, WITH A RECORD OF THE UNCORRECTED ITEMS. THE REPORT SHALL BE IMMEDIATELY FURNISHED TO THE ENGINEER OF RECORD AND CONTRACTOR AFTER EACH TEST RESULT OR INSPECTION. SPECIAL INSPECTION TESTING REQUIREMENTS APPLY EQUALLY TO ALL BIDDER DESIGNED COMPONENTS. THE SPECIAL INSPECTOR SHALL BE EMPLOYED BY THE OWNER, ENGINEER OF RECORD, OR THE AGENT OF THE OWNER, BUT NOT CONTRACTOR OR ANY OTHER PERSON RESPONSIBLE FOR THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE SPECIAL INSPECTOR AND SCHEDULING ANY SPECIAL INSPECTION, WITHIN THE SCHEDULING REQUIREMENTS OF THE TESTING AGENCY OR SPECIAL INSPECTOR.

SI3. CONTINUOUS SPECIAL INSPECTION MEANS THAT THE SPECIAL INSPECTOR IS ON THE SITE AT ALL THE TIMES OBSERVING THE WORK REQUIRING INSPECTION. PERIODIC SPECIAL INSPECTION MEANS THAT THE SPECIAL INSPECTOR IS ON THE SITE AT THE TIME INTERVALS NECESSARY TO CONFORM THAT ALL WORK REQUIRING SPECIAL INSPECTION IS IN COMPLIANCE.

SI4. INSPECTION OF CONCRETE SHALL BE IN ACCORDANCE WITH CBC SECTION 1705.3. THE CONCRETE CONSTRUCTION SHALL BE INSPECTED FOR COMPLIANCE WITH APPROVED CONSTRUCTION DOCUMENTS.

SI5 CONCRETE: MAKE ONE SET OF FOUR CYLINDERS OF MIXED AND PLACED CONCRETE. AS A MINIMUM, ONE SET SHALL BE TAKEN AT LEAST ONCE IN THE FIELD FOR EACH DAY, FOR EVERY 150 CUBIC YARDS OF CONCRETE, OR FOR EVERY 5000 FT2 OF SURFACE AREA OF SLABS AND WALLS.
CURE THE CYLINDERS IN THE FIELD FOR THREE DAYS IN THE SAME MANNER AS THE PLACED CONCRETE. AFTER THREE DAYS, TRANSPORT TO THE TESTING LABORATORY FOR COMPRESSIVE STRENGTH TESTING. PER SET, TEST ONE CYLINDER AT SEVEN DAYS AND TWO AT TWENTY-EIGHT DAYS. THE FINAL CYLINDER SHALL BE TESTED AT DISCRETION OF THE CONTRACTOR.

SPECIAL INSPECTION SCHEDULE AS PER 2013 CBC CHAPTER 17

ITEM	CONTINUOUS INSPECTION	PERIODIC INSPECTION	COMMENTS
INSPECTION OF REINFORCING STEEL AND PLACEMENT		X	REF. NOTE SI2 AND SI3
VERIFYING USE OF DESIGN MIX		X	REF. NOTE SI2 AND SI3
AT THE TIME OF FRESH CONCRETE SAMPLING TO FABRICATE TEST SPECIMENTS	X		REF. NOTE SI2 AND SI3
INSPECTION OF CONCRETE PLACEMENT	X		REF. NOTE SI2, SI3 AND SI5

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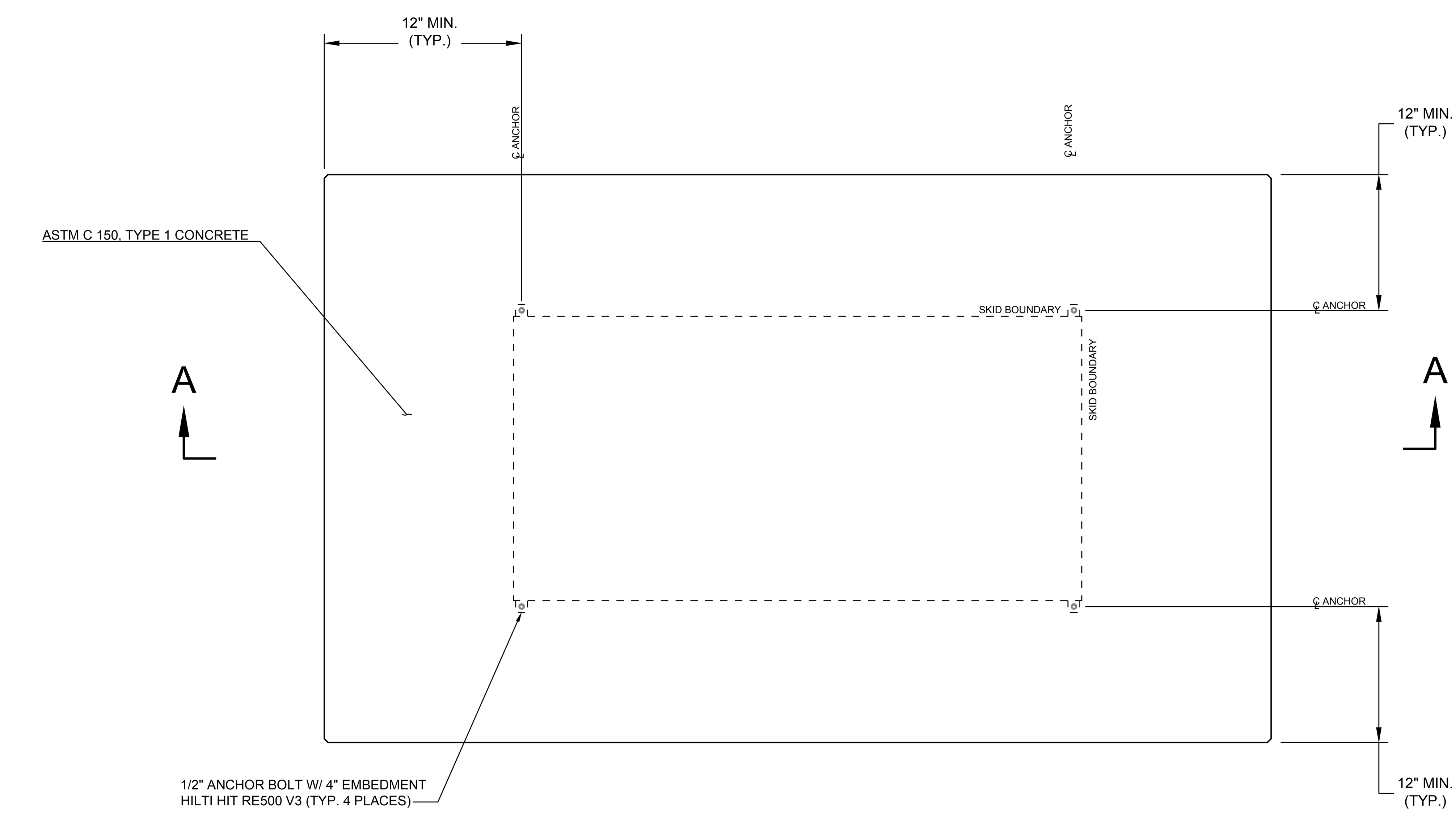
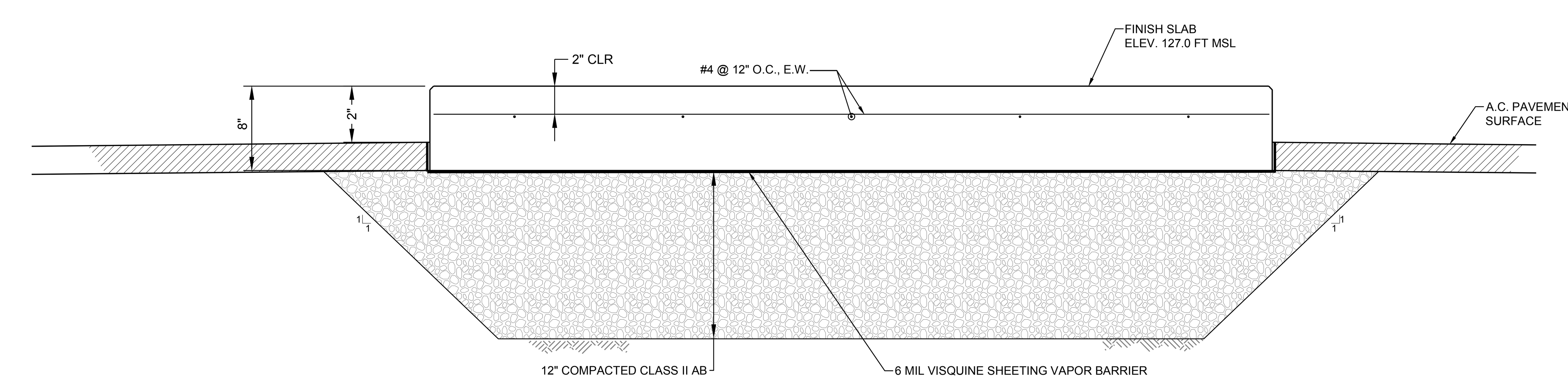


PLAN



SECTION A-A

N.T.S. 1 7A 8 EQUIPMENT PAD

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2016-08-19	ISSUED FOR BIDDING	MAL	APW	APW	RVW

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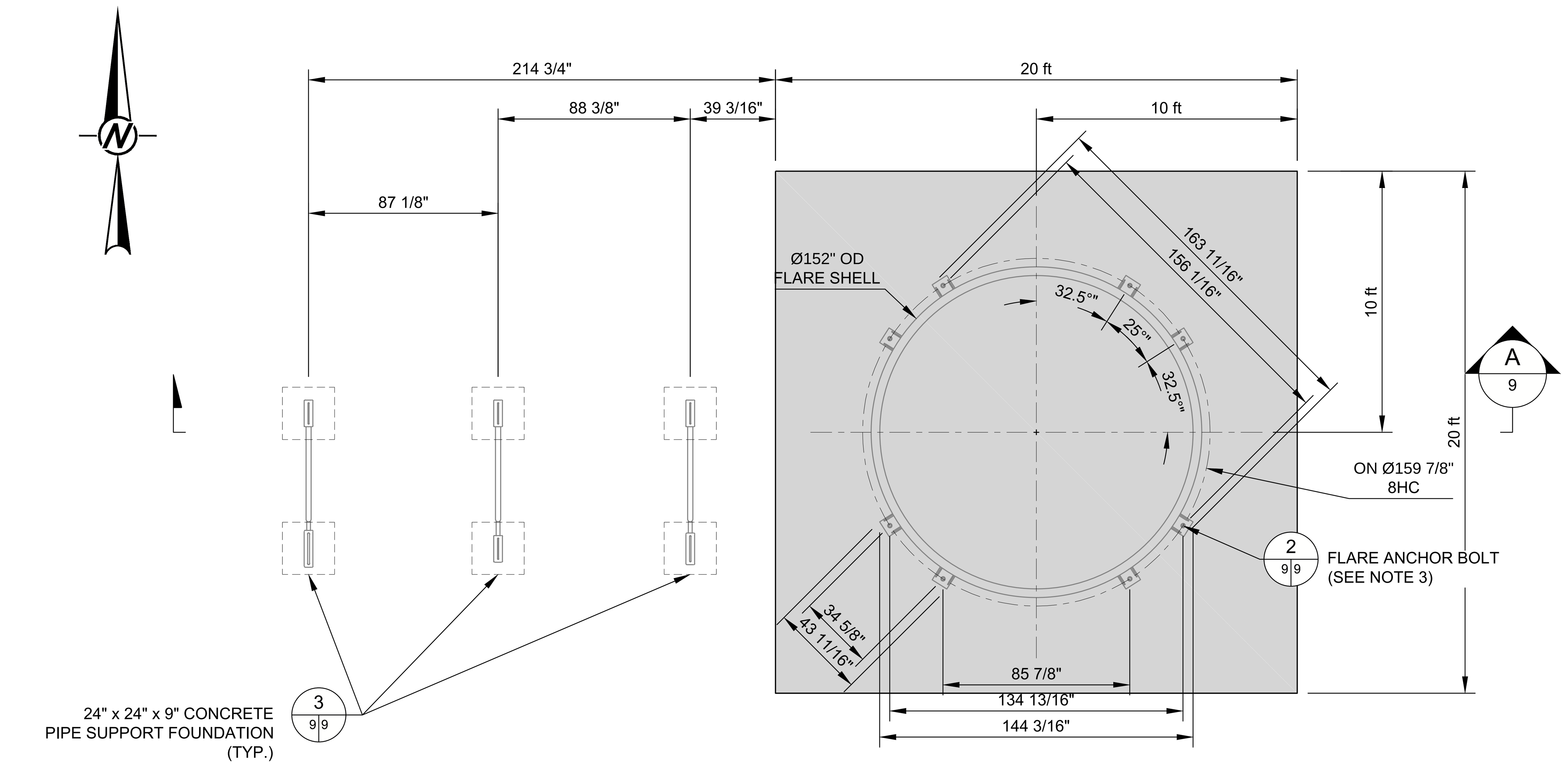
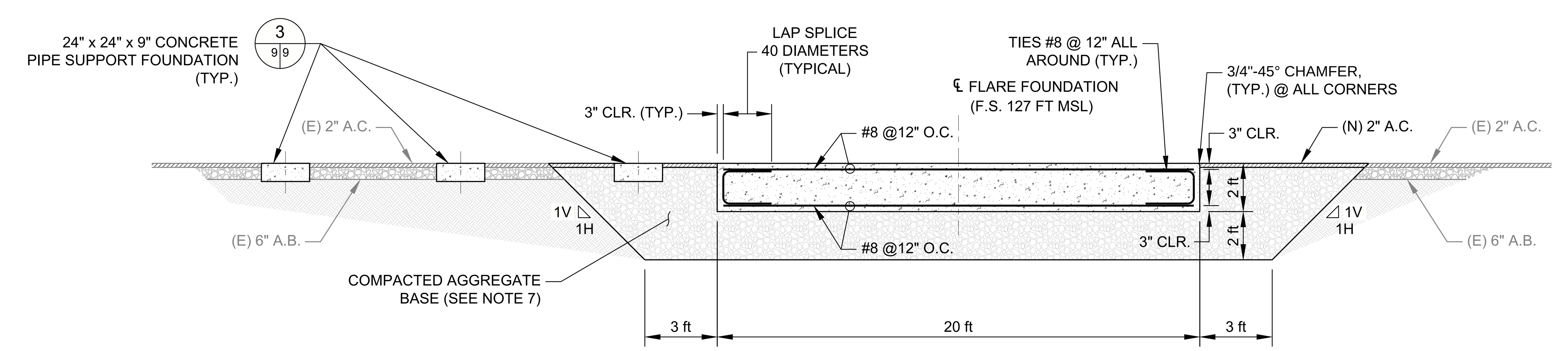
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
STRUCTURA□ NOTES AN□ □ETAI□S

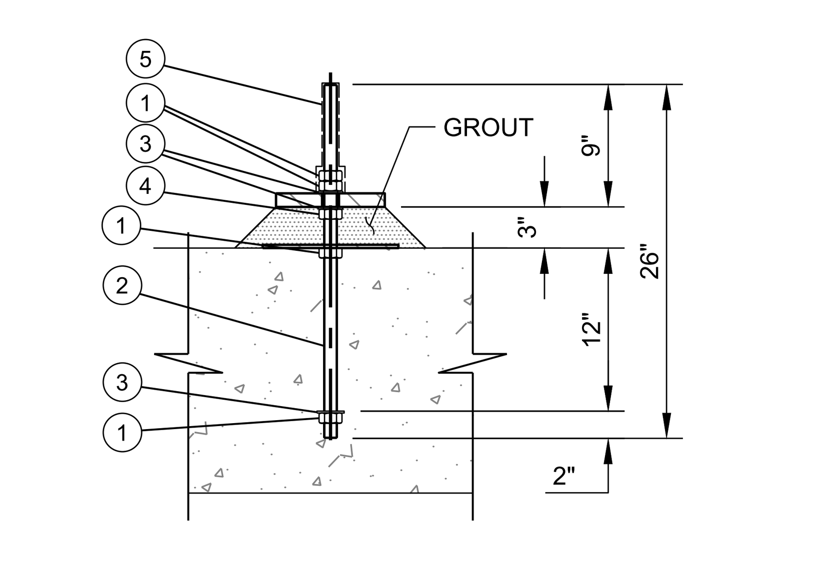
PROJECT No. 1420152
Rev. 0
12 of 58
DRAWING 8



SCALE: 1"=4' 1 7|9 FLARE FOUNDATION PLAN VIEW

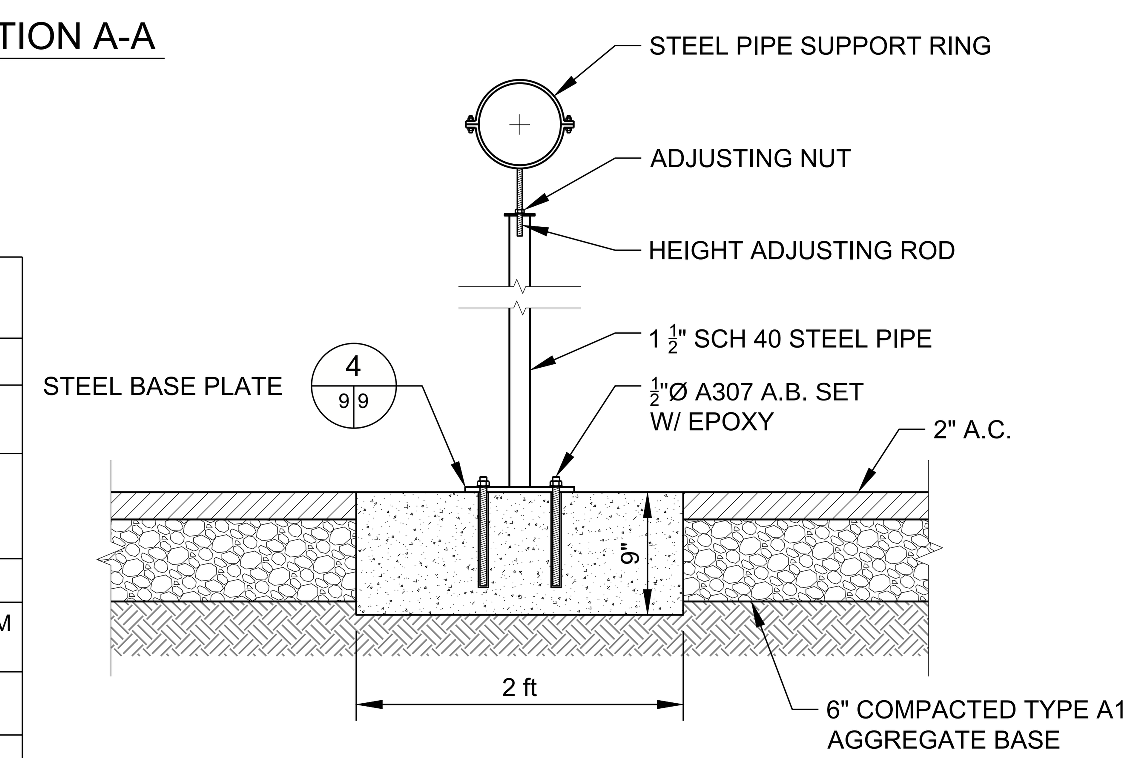


SCALE: 1"=4' A 9|9 SECTION A-A

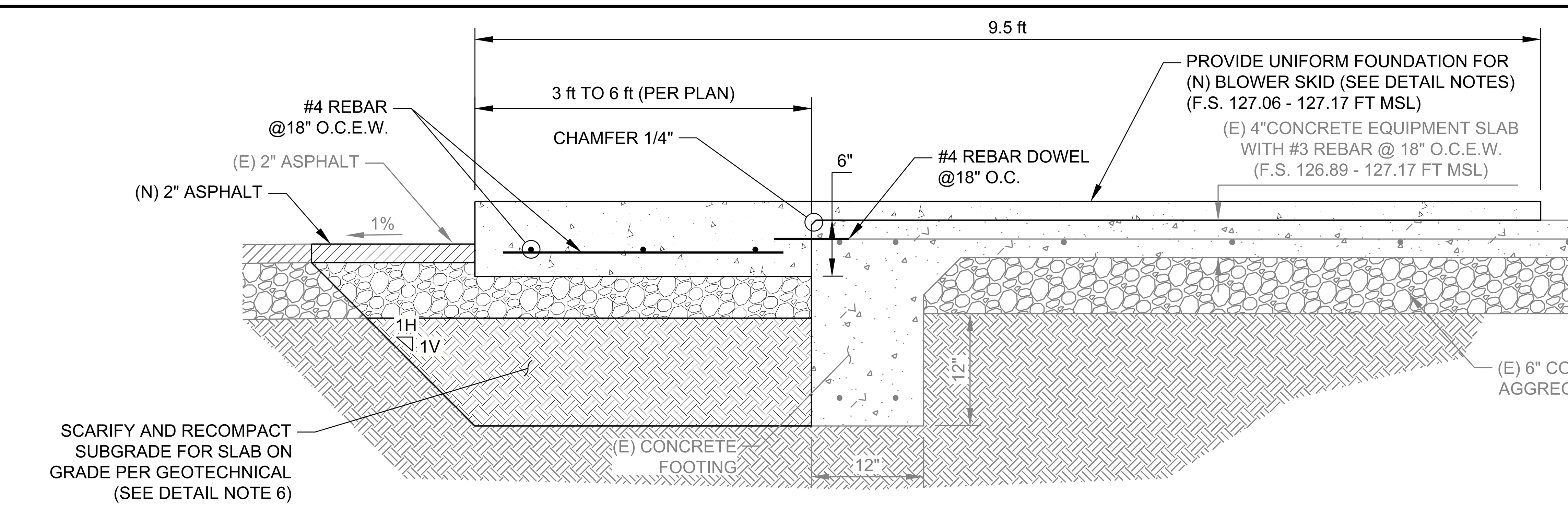


SCALE: 1"=1' 2 9|9 FLARE ANCHOR BOLT DETAIL

ANCHOR BOLT ASSEMBLY BILL OF MATERIAL (SEE NOTE 10)		
ITEM	QTY	DESCRIPTION
1	40	1-1/4" DIA HEAVY HEX NUT ASTM A563A
2	8	1-1/4" DIA ANCHOR ROD ASTM F1554 GRADE 36, 2'-2" LONG
3	16	1-1/4" DIA WASHER, ASTM F436
4	8	1-1/4" DIA LEVELING NUT, HEX JAM NUT OR APPROVED EQUAL
5	8	ANCHOR BOLT CAP
6	1	FLARE TEMPLATE (SEE NOTE 3)



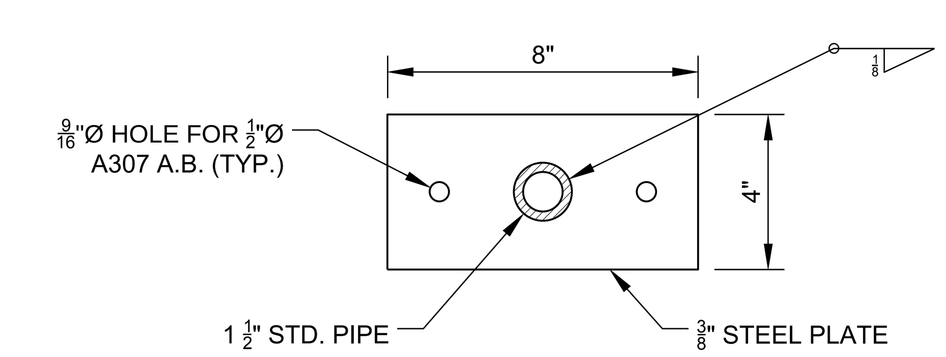
N.T.S. 3 9|9 PIPE STAND DETAIL (TYP.)



SCALE: 1"=1' 5 7|9 EQUIPMENT PAD EXTENSION DETAIL

DETAIL NOTES:

1. LOCATE EXISTING SLAB REINFORCEMENT TO MINIMIZE ENCOUNTERS DURING DRILLING.
2. ROUGHEN EXISTING CONCRETE CONTACT SURFACES TO FULL AMPLITUDE OF APPROXIMATELY ¼" AND REMOVE ALL LOOSE MATERIAL.
3. DRILL 5/8" DIAMETER HOLE, 8" DEEP HOLE FOR ADHESIVE ANCHORING OF #4 REBAR DOWEL (ASTM A615 GRADE 60).
4. CLEAN HOLE OF ALL LOOSE MATERIALS, DUST AND MOISTURE IN CONFORMANCE WITH ANCHOR ADHESIVE SYSTEM MANUFACTURER'S REQUIREMENTS, USING MATCHED-TOLERANCE STEEL BRUSH, FOLLOWED BY COMPRESSED AIR.
5. PREPARE AND INJECT ANCHOR ADHESIVE SYSTEM (HILTY HIT-HY 200-R OR APPROVED EQUAL) IN CONFORMANCE WITH MANUFACTURER'S REQUIREMENTS.
6. CONSTRUCT LEVEL AND FLAT STRUCTURAL SURFACE FOR SUPPORT OF (N) BLOWER SKID, USING BONDED CONCRETE OVERLAYS BETWEEN EXISTING RAISED EQUIPMENT PADS. SEE EXISTING FINISH SLAB ELEVATION AND CONDITIONS IN LAWRENCE AND ASSOCIATES, "GAS-EXTRACTION SYSTEM AS-BUILT PLANS, 1996.



N.T.S. 4 9|9 STEEL PLATE DETAIL

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

GEOTECHNICAL NOTES:

1. FOR DETAILS ON SUBSURFACE CONDITIONS, RECOMMENDED SOIL BEARING PRESSURE, SITE GRADING, AND SUBGRADE PREPARATION REQUIREMENTS, REFER TO "GEOTECHNICAL INVESTIGATIONS REPORT" BY BROWN & MILLS, INC. DATED FEBRUARY 28, 1995.
2. FOUNDATION EXCAVATION AND FILL SHALL BE OBSERVED AND APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF REINFORCEMENT AND CONCRETE.
3. ALL FOUNDATIONS SHALL BE FOUNDED AT LEAST 3 FEET BELOW EXISTING GRADES AFTER REMOVING THE EXISTING FILL SOILS.
4. THE SUBGRADE BELOW THE FOUNDATIONS SHALL BE SCARIFIED AND RE-COMPACTED TO 95% RELATIVE COMPACTION (RELATIVE TO THE MODIFIED PROCTOR TEST; I.E., ASTM D1557) TO A MINIMUM DEPTH OF 12 INCHES. THE PROJECT GEOTECHNICAL ENGINEER MAY WAIVE THIS REQUIREMENT IF DENSE NATIVE SOIL IS ENCOUNTERED AT OR ABOVE THE 3 FEET EXCAVATION DEPTH.
5. ALL FILL AND BACKFILL MATERIALS SHALL BE APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER BEFORE PLACEMENT. ALL BACKFILL SHALL CONSIST OF GRANULAR MATERIAL WITH A PLASTICITY INDEX OF LESS THAN 10 AND PLACED IN 8-INCH LOOSE LIFTS AND COMPACTED TO MINIMUM 90 PERCENT RELATIVE COMPACTION (ASTM D1557) AT A MOISTURE CONTENT OF BETWEEN -3 AND +3% OF THE OPTIMUM DETERMINED FROM ASTM D1557. BACKFILL NEXT TO FOUNDATIONS AND PEDESTALS SHALL BE DONE USING A HAND-OPERATED COMPACTOR IN 4-INCH LOOSE LIFTS.
6. THE EXISTING SUBGRADE BELOW THE DRAIN ROCK UNDERLYING THE SLAB-ON-GRADE SHALL BE SCARIFIED AND RE-COMPACTED TO 90 PERCENT RELATIVE COMPACTION (ASTM D1557) AT A MOISTURE CONTENT OF BETWEEN +2 AND +5% OF THE OPTIMUM DETERMINED FROM ASTM D1557, TO A MINIMUM DEPTH OF 12 INCHES BELOW THE BOTTOM OF DRAIN ROCK. THE SUBGRADE PREPARATION SHALL BE OBSERVED BY A QUALIFIED GEOTECHNICAL ENGINEER. IF UNACCEPTABLE SOILS ARE ENCOUNTERED, SUCH SOILS SHALL BE REMOVED AND REPLACED WITH BACKFILL AS NOTED IN NO. 5 ABOVE.

NOTES:

1. DIMENSIONS ARE IN FEET AND INCHES.
2. FLARE FOUNDATION DESIGN CRITERIA

   WIND DESIGN:
   WIND SPEED: 110 MPH (3-SEC PEAK GUST), EXPOSURE CATEGORY C

   ALLOWABLE SOIL BEARING:
   2000 PSF (FOR ENGINEERED FILL)
   PER GEOTECHNICAL REPORT, REMOVE (E) FILL SOILS TO (E) CEMENTED SILTSTONE SURFACE (HARDPAN), PLUS EXCAVATE AN ADDITIONAL 3 INCHES. CONSTRUCT ENGINEERED FILL (OR PLACE LEAN CONCRETE) TO FOUNDATION SUBGRADE. ENGINEER SHALL VERIFY THAT ALL FOUNDATIONS FULLY PENETRATE EXISTING FILL SOILS.

   CONCRETE STRENGTH:
   F'C= 3000 PSI @ 28 DAYS

   CEMENT:
   ASTM C150 TYPE I

   REINFORCING STEEL:
   ASTM A615 GRADE 60 DEFORMED BAR

   SUBGRADE COMPACTION FOR ENGINEERED FILL:
   95 PERCENT MODIFIED PROCTOR MAXIMUM DENSITY

   EARTHQUAKE LOADS:

   FLARE WEIGHT: 70 KIPS
   BASE SHEAR: 21 KIPS
   MOMENT: 420 FT-KIPS

   WIND LOADS:

   FLARE
   BASE SHEAR: 27.4 KIPS
   MOMENT: 731 FT-KIPS

3. ANCHOR BOLT TEMPLATE SHALL BE PROVIDED BY FLARE MANUFACTURER. ANCHOR BOLT SIZE AND PATTERN SHALL BE VERIFIED WITH MANUFACTURER'S SHOP DRAWINGS PRIOR TO CONSTRUCTION.
4. FOUR (4) CONCRETE TEST CYLINDERS SHALL BE TAKEN BY THE CONTRACTOR AND DELIVERED TO THE TESTING LAB APPROVED BY OWNER. ONE TEST CYLINDER SHALL BE TESTED AT 7 DAYS FOR 70 PERCENT OF DESIGN STRENGTH. TWO SHALL BE TESTED AT 28 DAYS FOR FULL DESIGN STRENGTH, AND ONE SHALL BE HELD UNTIL THE FINAL ACCEPTANCE OF THE PROJECT.
5. FINISH GRADE TO DRAIN. PLACE EARTH FILL PER SPECIFICATION.
6. CONTRACTOR SHALL POTHOLE, LOCATE AND PROTECT ALL EXISTING UNDERGROUND UTILITIES.
7. THE AGGREGATE BASE SHOULD BE COMPACTED TO 95 PERCENT RELATIVE COMPACTION (ASTM D 1557) USING A VIBRATORY ROLLER. AGGREGATE BASE SHALL HAVE LESS THAN 6 PERCENT OF MASS PASSING #200 MESH SIEVE IN ACCORDANCE WITH ASTM D422.
8. FOUNDATION AND ANCHOR BOLT DIMENSIONS MAY VARY BASED ON FINAL EQUIPMENT SHOP DRAWINGS.
9. FOR BLOWER SKID, USE 3/4" ANCHOR BOLT W/ 4 3/4" EMBEDMENT HILTI EXP ANCHOR KB-TZ SS 304 OR APPROVED EQUAL.
10. ANCHOR BOLT ASSEMBLY SHALL HAVE A GALVANIZED FINISH.
11. GROUT BY "MASTERFLOW 928". NON-SHRINK GROUT SHALL BE MANUFACTURED BY MASTER-BUILDERS OR APPROVED EQUAL.
12. DO NOT USE FLARE UNTIL CONCRETE HAS CURED 28 DAYS.

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
BLOWER/FLARE STATION FOUNDATION DETAILS

PROJECT No. 1420152 | Rev. 0 | 13 of 58 | DRAWING 9

Path: \\sacramento\acad\Sites\Western Regional LF\CIVIL 3D\1420152_GCCS Expansion\Concept 2 (IFB Rev0)\ | File Name: 1418421_Flare Foundation.dwg

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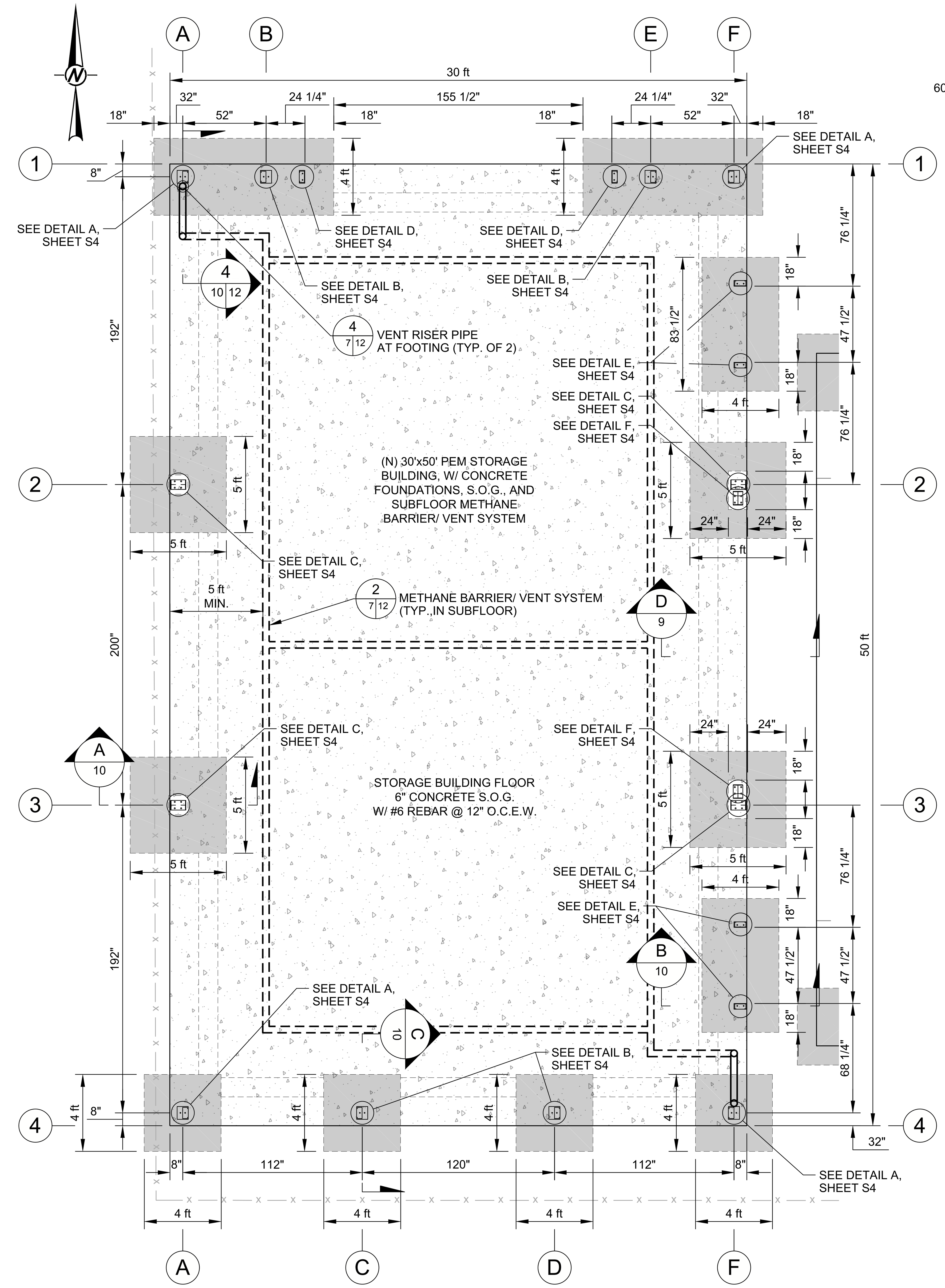
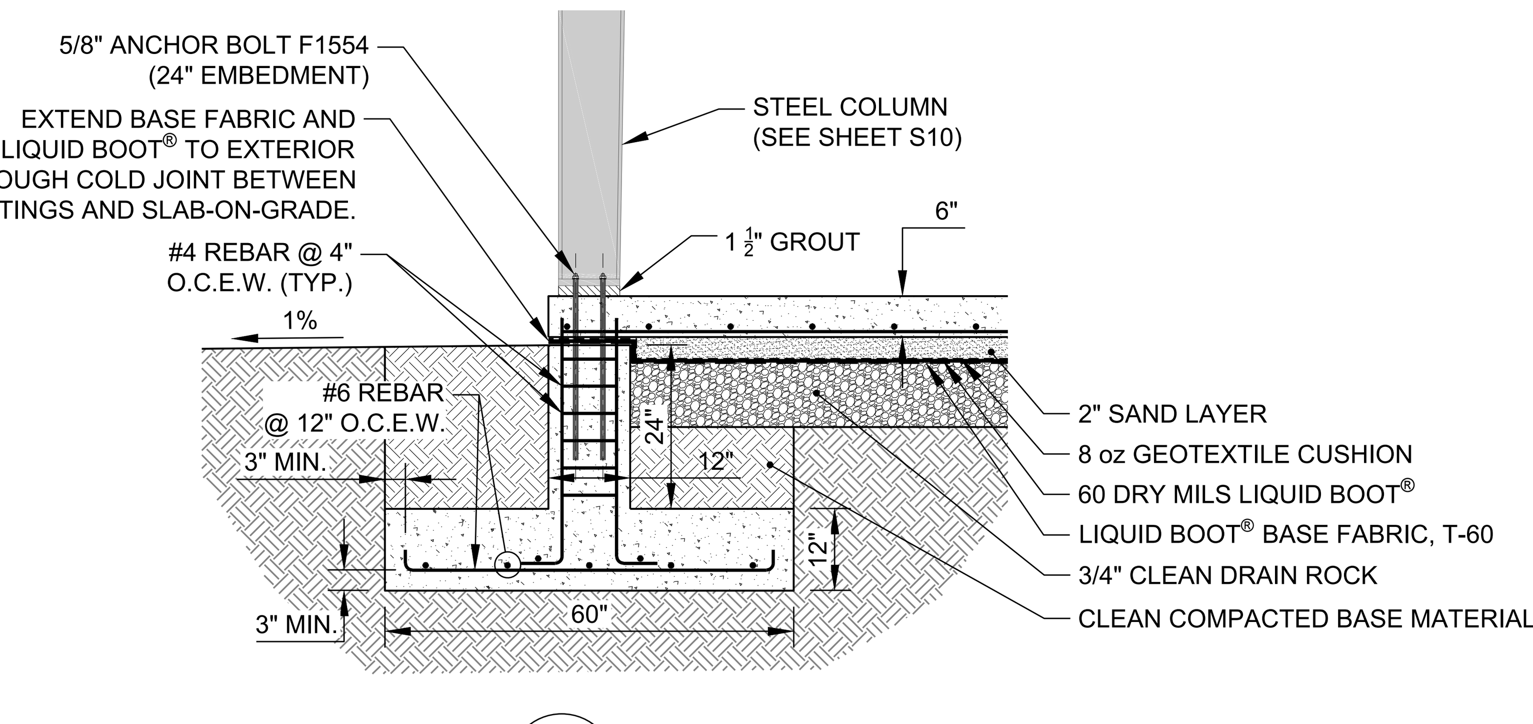
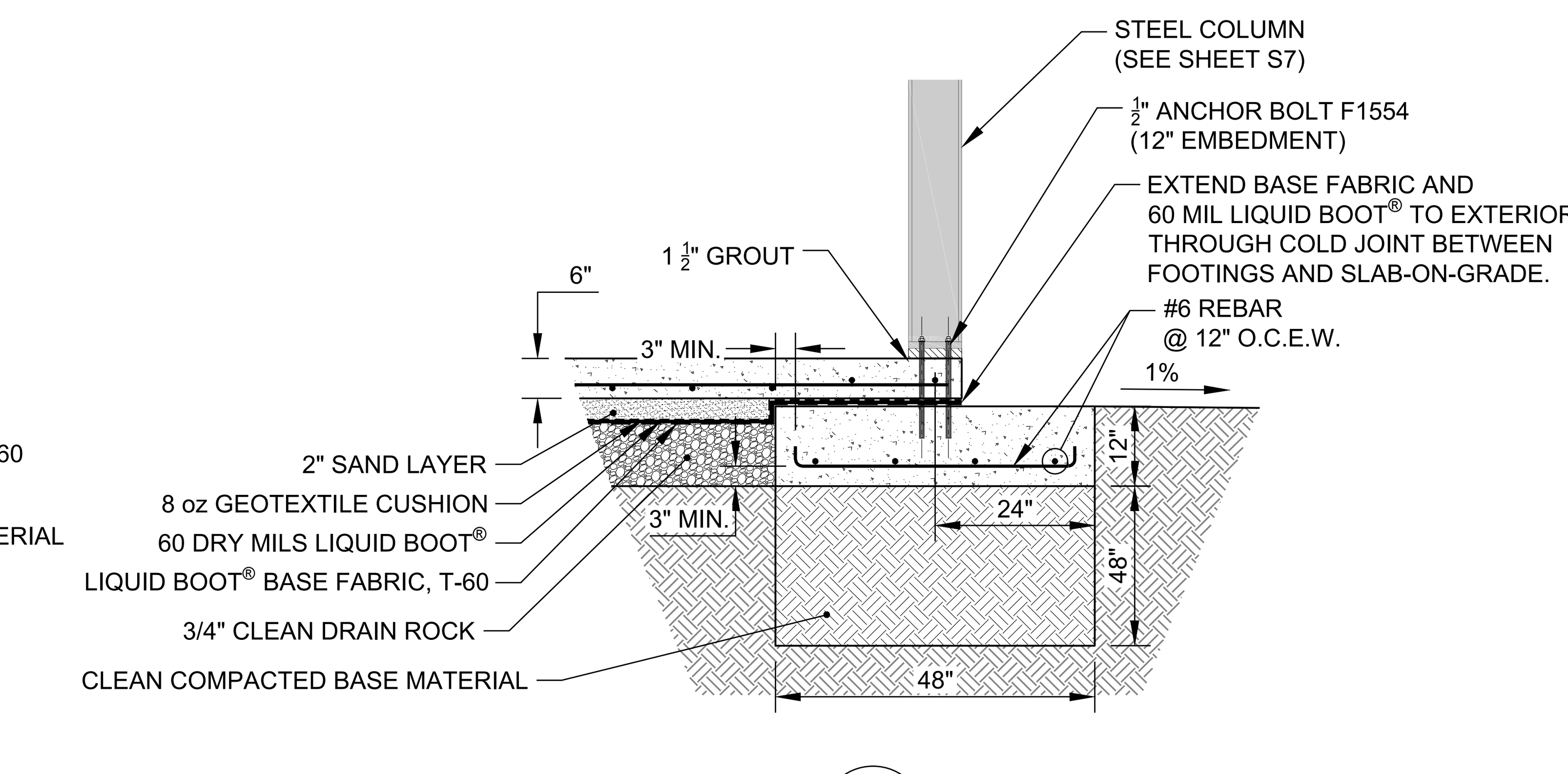


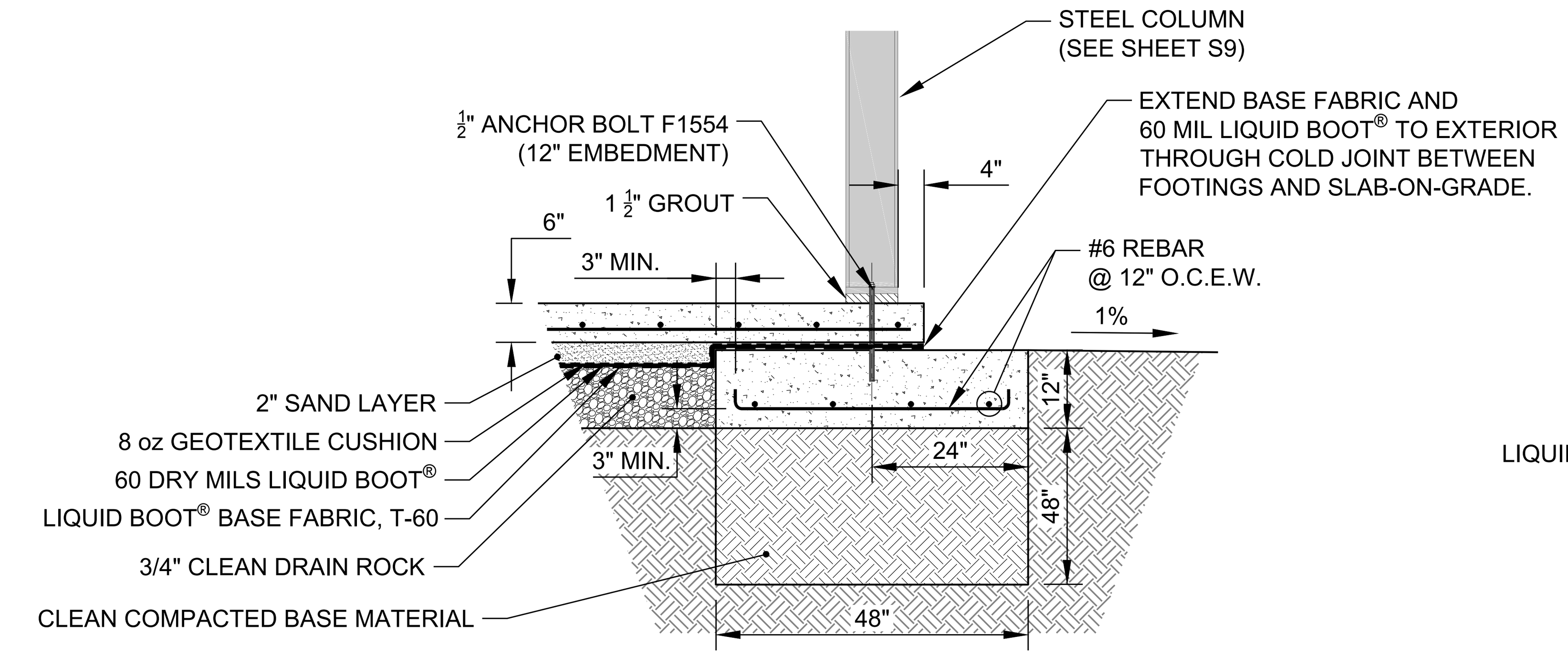
SCALE: 1"=4' 1 7|10 PEM STORAGE BUILDING FOUNDATION PLAN VIEW



SCALE: 1"=2' A 10 SECTION A



SCALE: 1"=2' B 10 SECTION B



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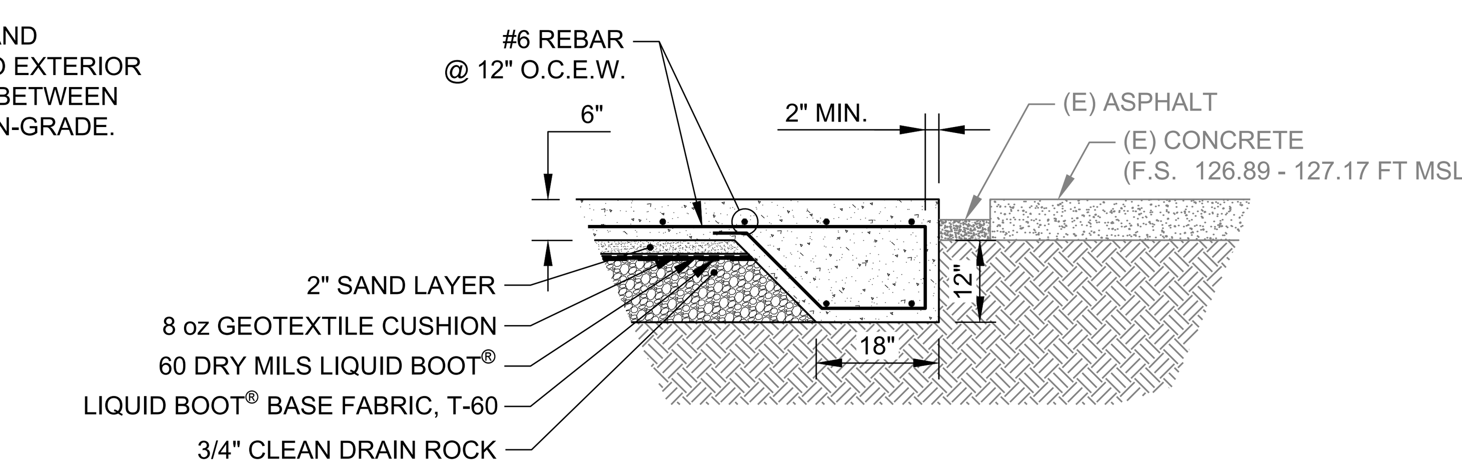

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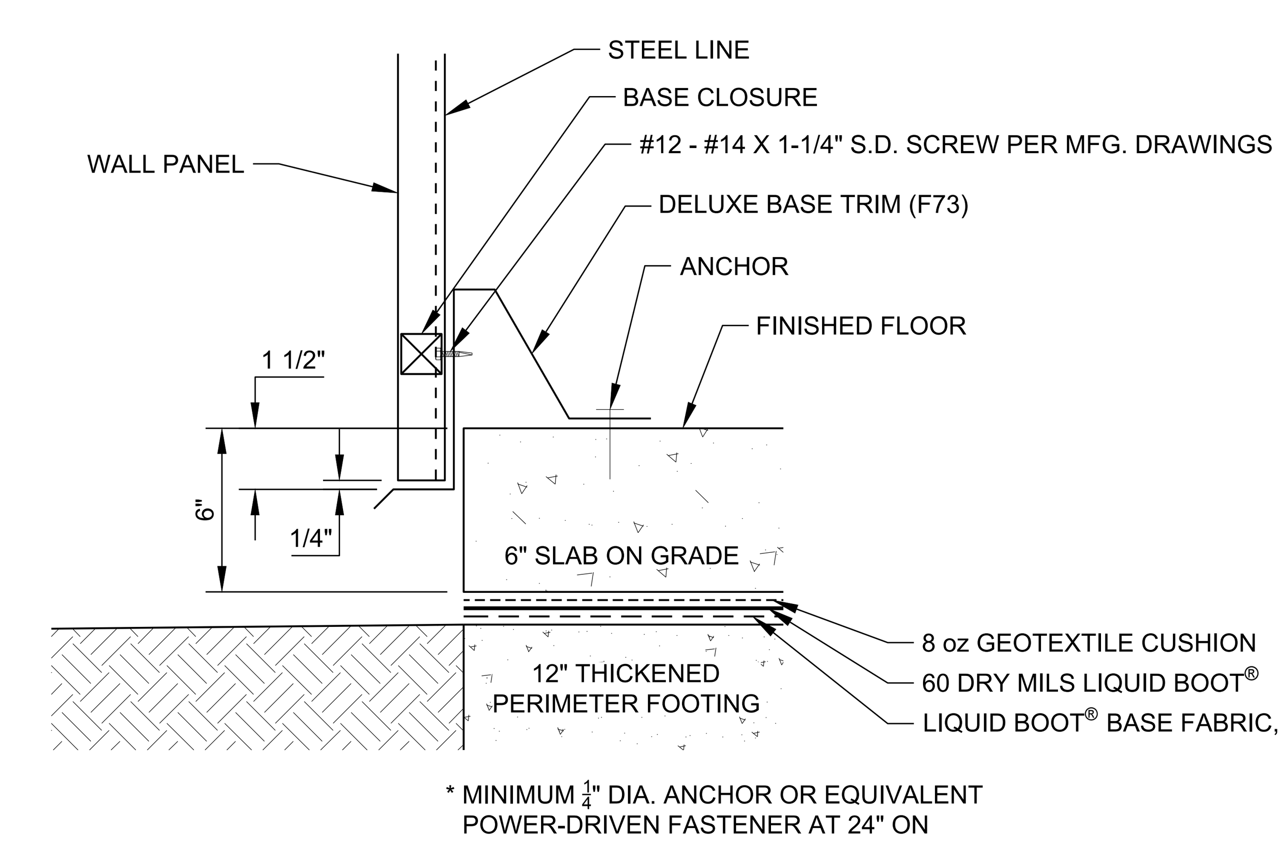

* MINIMUM 1/4" DIA. ANCHOR OR EQUIVALENT POWER-DRIVEN FASTENER AT 24" ON CENTER MAXIMUM.

SCALE: NTS 2 10|10 SECTION THRU WALL PANEL AND CONCRETE FOUNDATION WITH DELUXE BASE TRIM

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GEOTECHNICAL NOTES:

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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
PEM STORAGE BUILDING FOUNDATION DETAILS

PROJECT No. 1420152 Rev. 0 14 of 58 DRAWING 10

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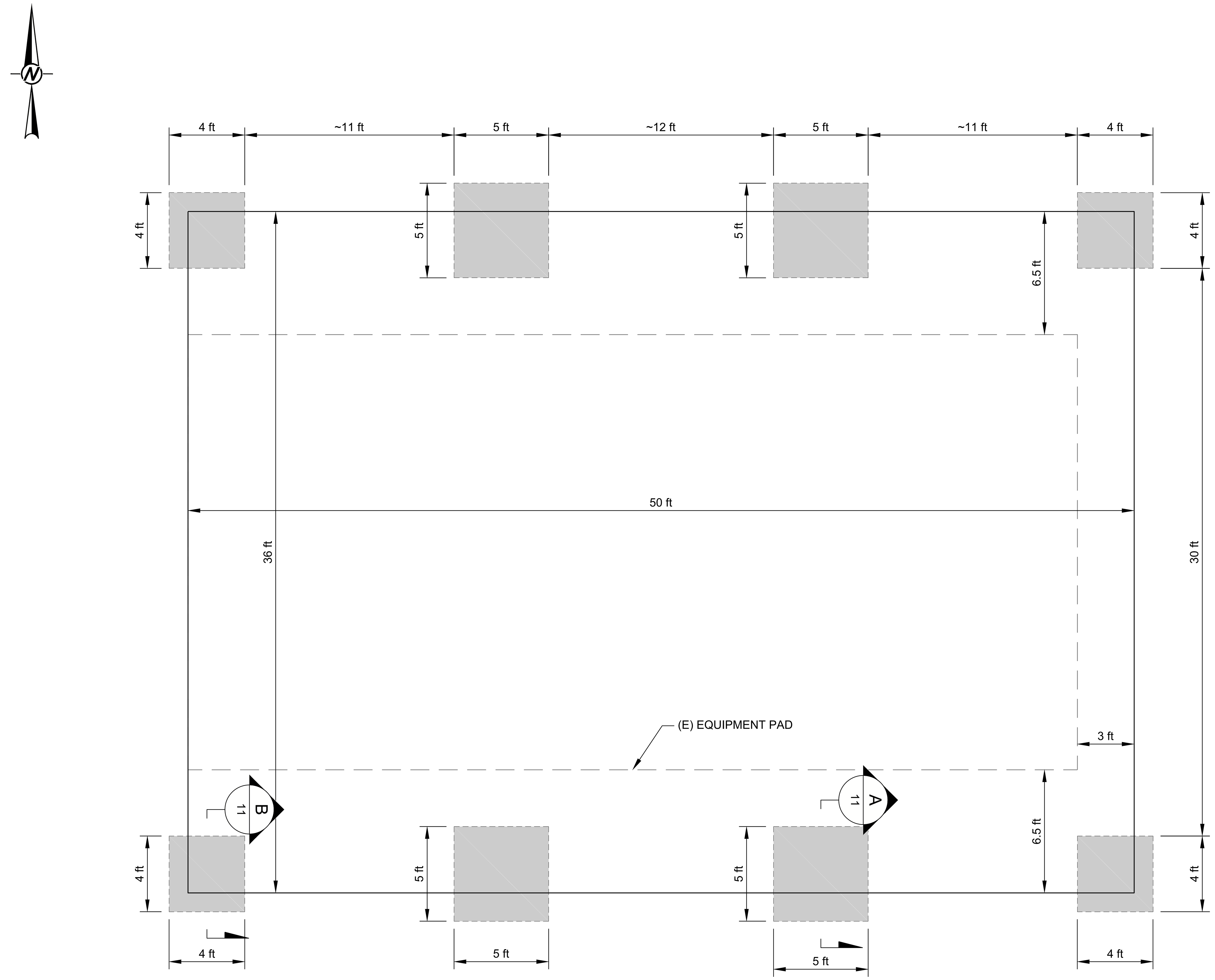
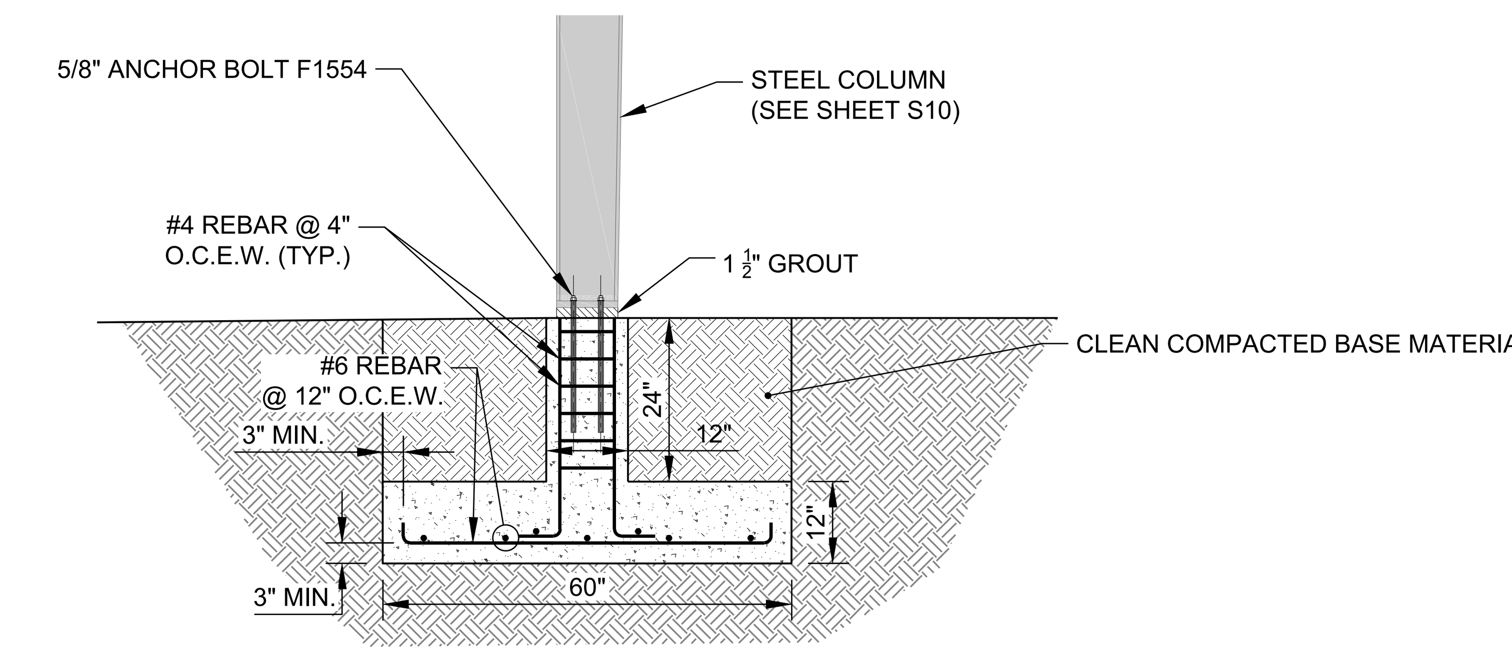
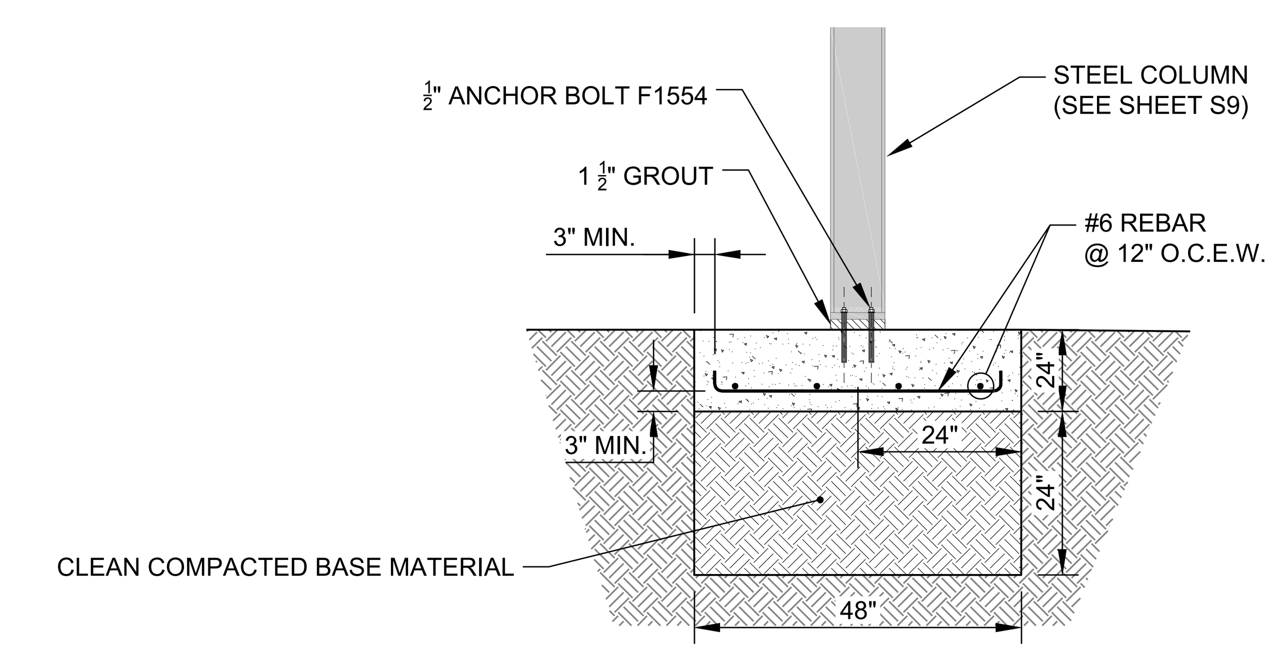


SCALE: 1"=4' 1 7|11 EQUIPMENT CANOPY FOUNDATION PLAN VIEW



SCALE: 1"=2' A 11 SECTION A



SCALE: 1"=2' B 11 SECTION B

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

NOTE(S) (SEE GEOTECHNICAL NOTES ON SHEET 1)

1. CANOPY FOUNDATION LOCATIONS AND DIMENSIONS ARE ESTIMATES FOR BIDDING PURPOSES ONLY. FINAL LOCATIONS AND DIMENSIONS WILL BE PROVIDED FOR CONSTRUCTION, BASED ON CANOPY VENDOR FINAL CALCULATIONS AND DRAWINGS.

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PROJECT
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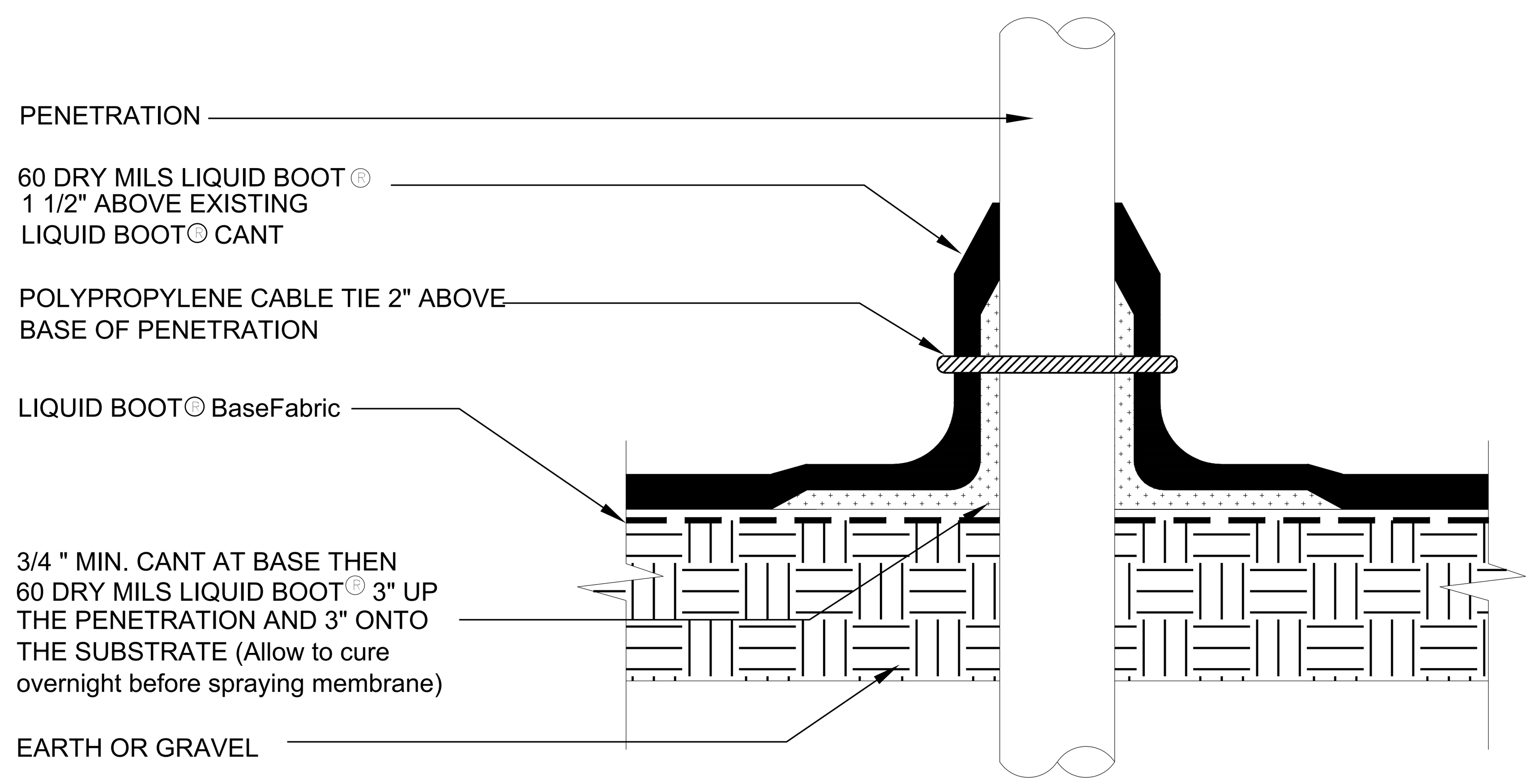
2016 GCCS EXPANSION

TITLE
EQUIPMENT CANOPY FOUNDATION DETAILS (PRELIMINARY)

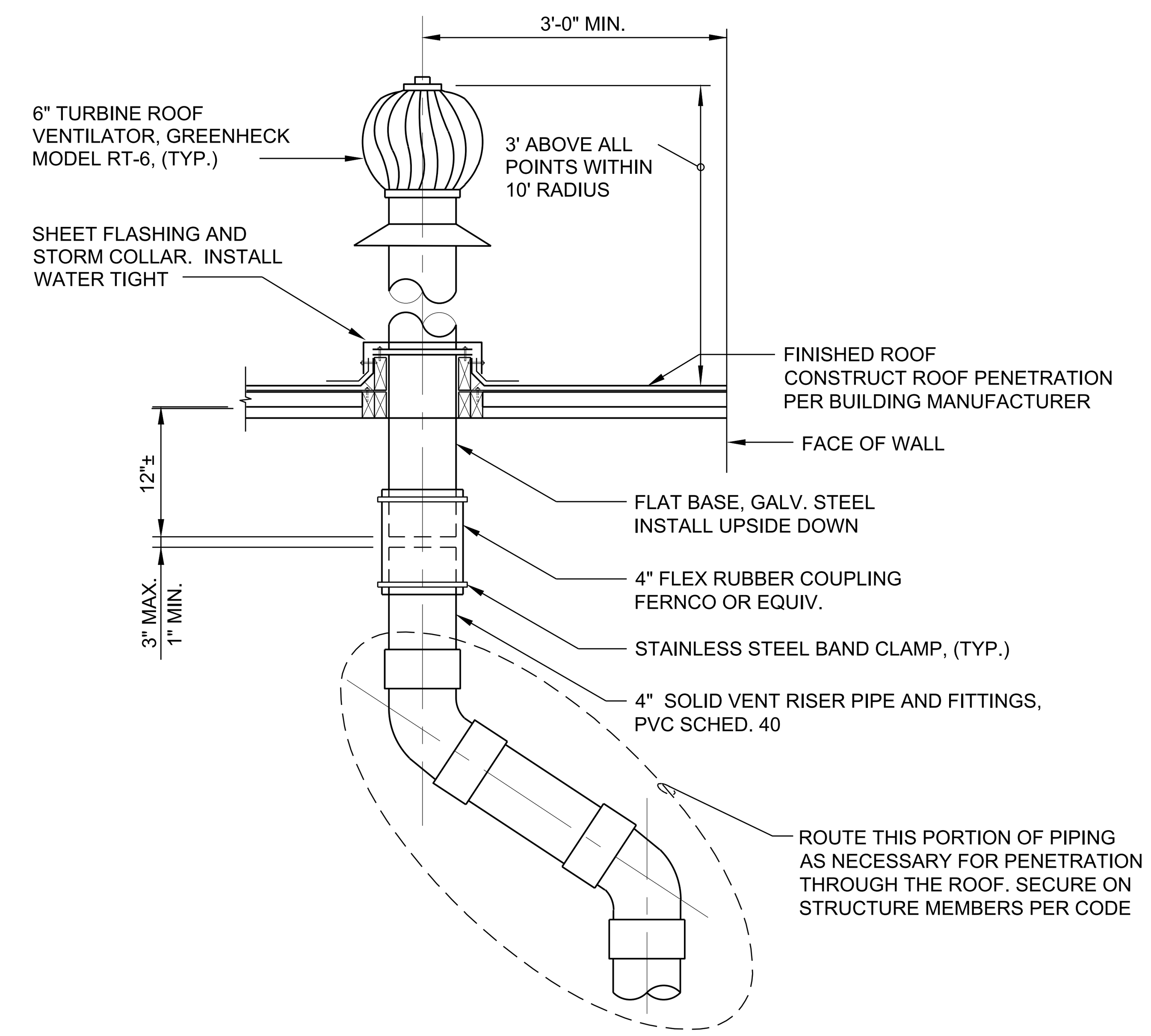
PROJECT No. 1420152 | Rev. 0 | 15 of 58 | DRAWING 11

THE PROJECT WAS ORIGINALLY DESIGNED AND BID AS A REPLACEMENT OF THE BLOWER/FLARE STATION THAT INCLUDED REUSING SEVERAL COMPONENTS OF THE EXISTING FACILITIES AND 240 VAC MAIN POWER SUPPLY. THE CURRENT PROJECT, BIDDING PROCESS AND BID FORM IS BASED ON UPGRADING THE FACILITY TO USE 480 VAC POWER, REUSING VERY FEW AND SELECTED FACILITIES, AND USING A REVISED LAYOUT SHOWN ON SHEET 7A. ANY REFERENCES TO NEW 240 VAC EQUIPMENT IN THE PLANS OR SPECIFICATIONS ARE INTENDED TO BE 480 VAC.

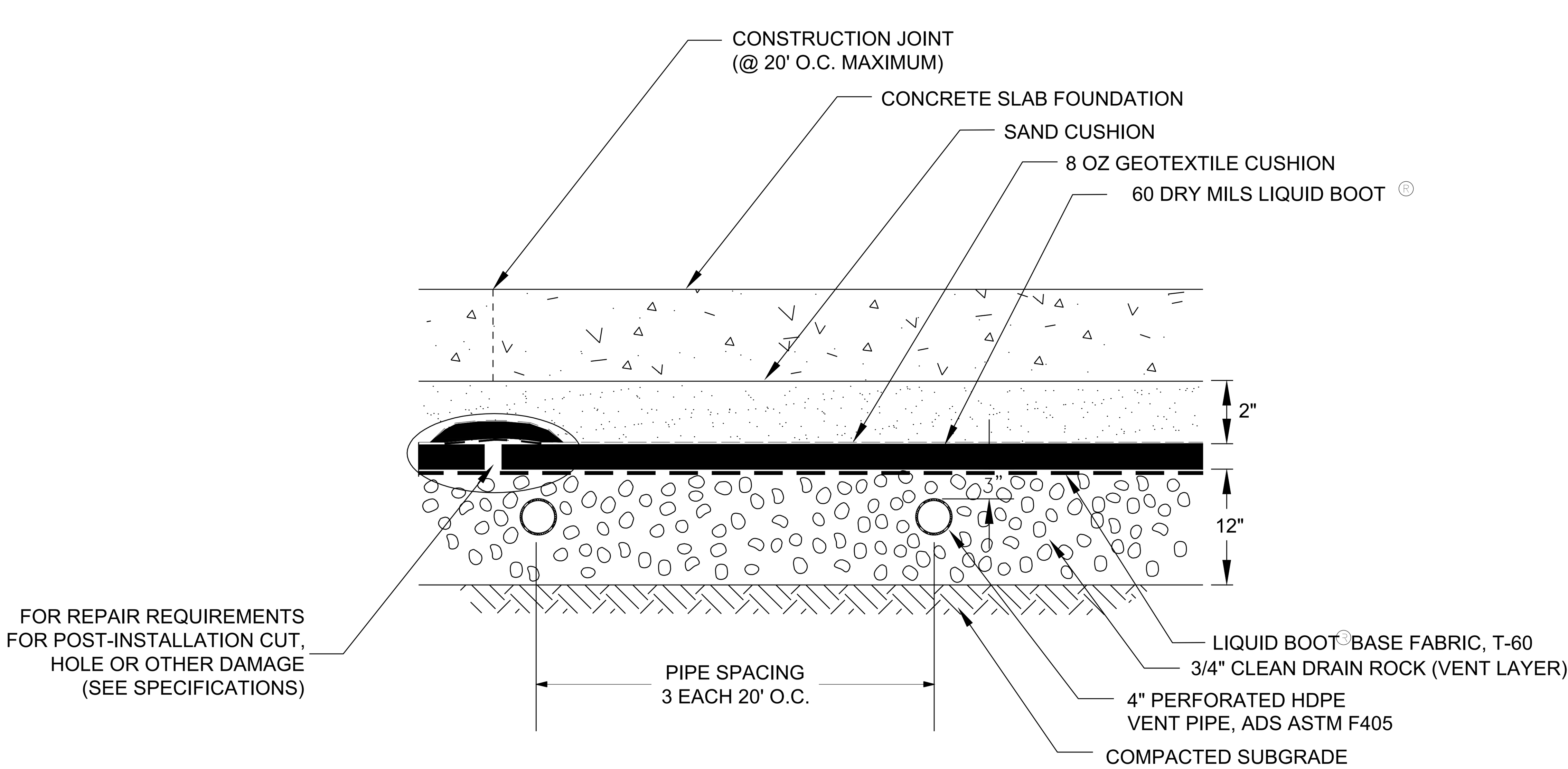


NOTE:
All penetrations shall be cleaned per specifications before LIQUID BOOT® is applied.

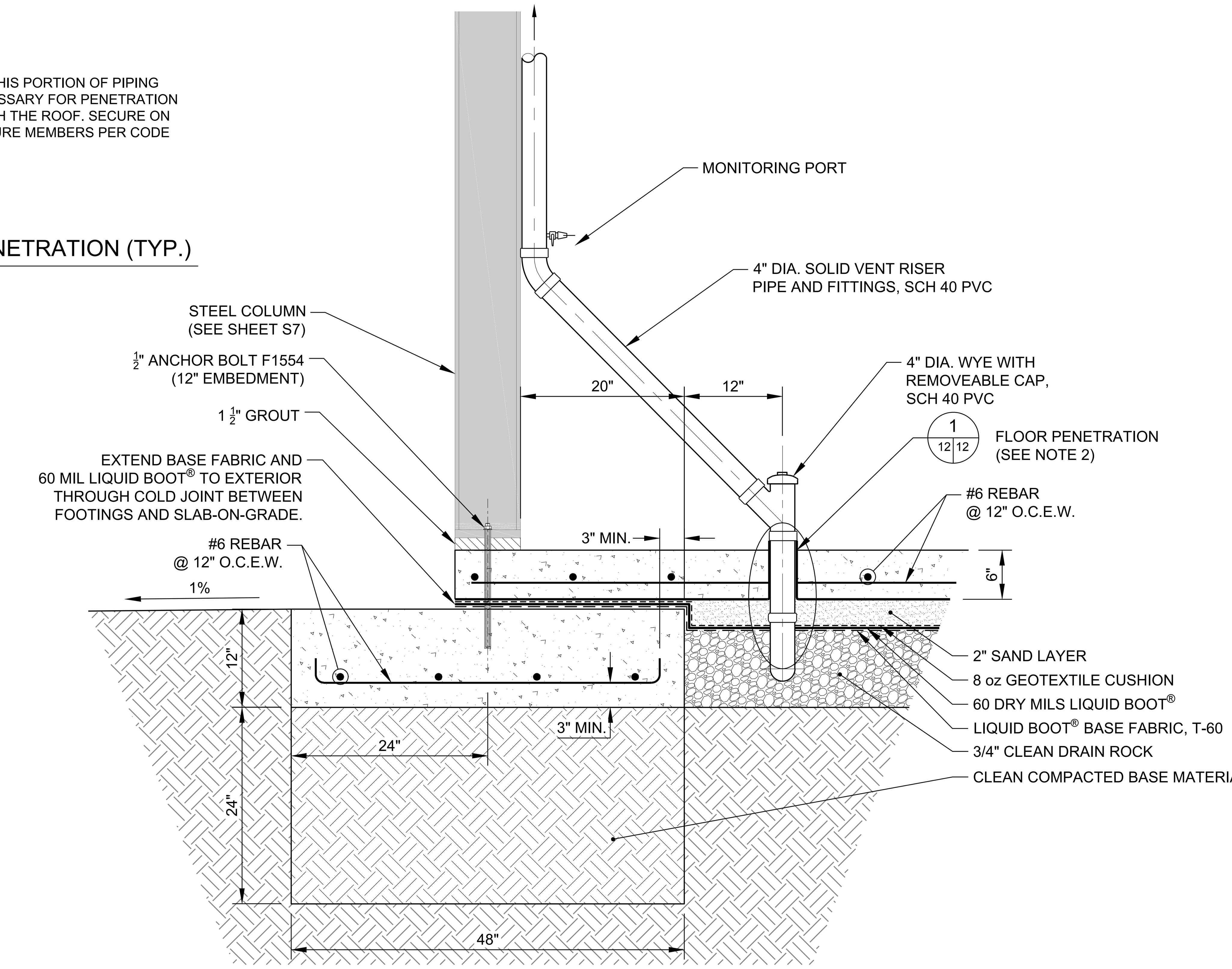
SCALE: N.T.S. 1 12|12 METHANE BARRIER PENETRATIONS ON EARTH OR GRAVEL SUBGRADE TYPICAL DETAIL



SCALE: N.T.S. 3 7|12 VENT RISER PIPE ROOF PENETRATION (TYP.)



SCALE: N.T.S. 2 7|12 METHANE BARRIER/ VENT SYSTEM TYPICAL SECTION



DETAIL NOTE(S)

1. STRUCTURAL ELEMENTS SHOWN ON THIS DRAWING ARE SCHEMATIC ONLY. SEE DRAWING 10 FOR SLAB-ON-GRADE AND STRUCTURAL FOUNDATION PLAN AND DETAILS.
2. PIPING SHOWN OFFSET TO INTERIOR FOR CLARITY. ALIGN SUBFLOOR RISER THROUGH PERIMETER FOOTING CLOSE TO FACE OF WALL. MAINTAIN 1.5" CLEAR TO CONCRETE REINFORCEMENT.

SCALE: N.T.S. 4 7|12 VENT RISER PIPE AT FOOTING

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
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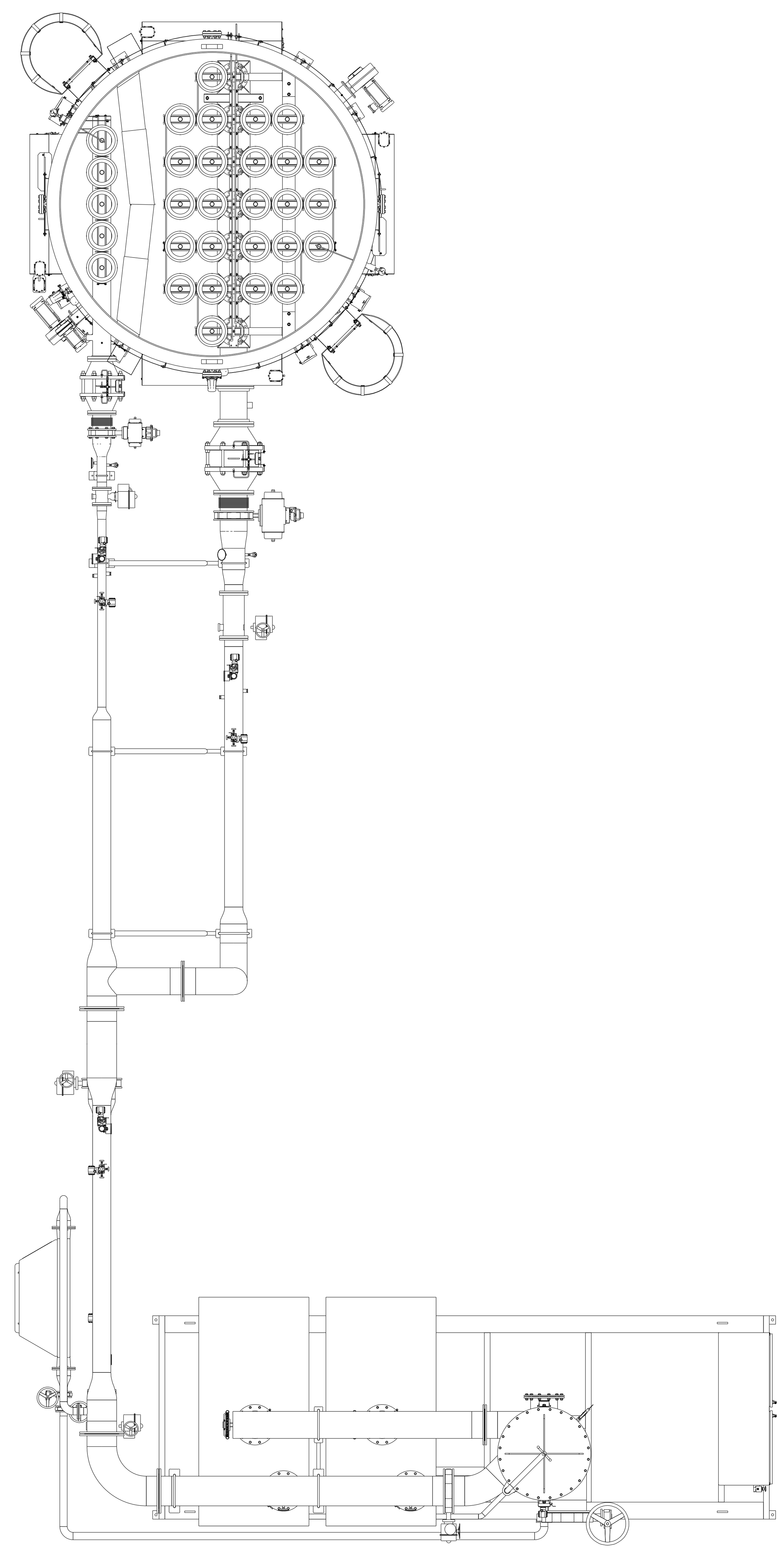
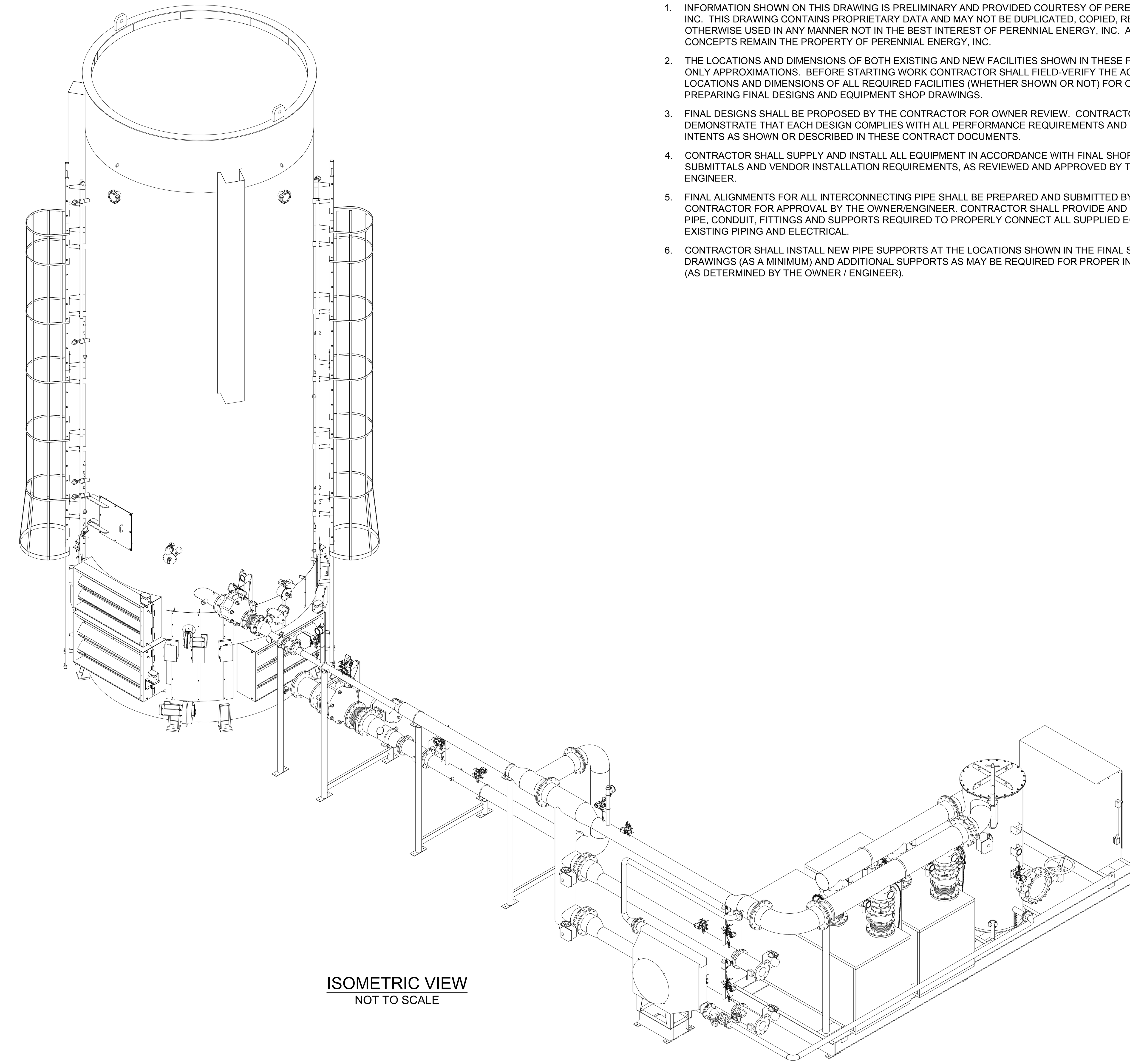
TITLE
METHANE PROTECTION DETAILS

PROJECT No. 1420152 | Rev. 0 | 16 of 58 | DRAWING 12



PLAN VIEW
NOT TO SCALE



ISOMETRIC VIEW
NOT TO SCALE

NOTES

1. INFORMATION SHOWN ON THIS DRAWING IS PRELIMINARY AND PROVIDED COURTESY OF PERENNIAL ENERGY, INC. THIS DRAWING CONTAINS PROPRIETARY DATA AND MAY NOT BE DUPLICATED, COPIED, REPRODUCED OR OTHERWISE USED IN ANY MANNER NOT IN THE BEST INTEREST OF PERENNIAL ENERGY, INC. ALL IDEAS AND CONCEPTS REMAIN THE PROPERTY OF PERENNIAL ENERGY, INC.
2. THE LOCATIONS AND DIMENSIONS OF BOTH EXISTING AND NEW FACILITIES SHOWN IN THESE PLANS ARE ONLY APPROXIMATIONS. BEFORE STARTING WORK CONTRACTOR SHALL FIELD-VERIFY THE ACTUAL LOCATIONS AND DIMENSIONS OF ALL REQUIRED FACILITIES (WHETHER SHOWN OR NOT) FOR ORDERING AND PREPARING FINAL DESIGNS AND EQUIPMENT SHOP DRAWINGS.
3. FINAL DESIGNS SHALL BE PROPOSED BY THE CONTRACTOR FOR OWNER REVIEW. CONTRACTOR SHALL DEMONSTRATE THAT EACH DESIGN COMPLIES WITH ALL PERFORMANCE REQUIREMENTS AND FUNCTIONAL INTENTS AS SHOWN OR DESCRIBED IN THESE CONTRACT DOCUMENTS.
4. CONTRACTOR SHALL SUPPLY AND INSTALL ALL EQUIPMENT IN ACCORDANCE WITH FINAL SHOP DRAWINGS, SUBMITTALS AND VENDOR INSTALLATION REQUIREMENTS, AS REVIEWED AND APPROVED BY THE OWNER / ENGINEER.
5. FINAL ALIGNMENTS FOR ALL INTERCONNECTING PIPE SHALL BE PREPARED AND SUBMITTED BY THE CONTRACTOR FOR APPROVAL BY THE OWNER/ENGINEER. CONTRACTOR SHALL PROVIDE AND FIELD-FIT ALL PIPE, CONDUIT, FITTINGS AND SUPPORTS REQUIRED TO PROPERLY CONNECT ALL SUPPLIED EQUIPMENT TO EXISTING PIPING AND ELECTRICAL.
6. CONTRACTOR SHALL INSTALL NEW PIPE SUPPORTS AT THE LOCATIONS SHOWN IN THE FINAL SHOP DRAWINGS (AS A MINIMUM) AND ADDITIONAL SUPPORTS AS MAY BE REQUIRED FOR PROPER INSTALLATION (AS DETERMINED BY THE OWNER / ENGINEER).

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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
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PROJECT No. 1420152
Rev. 0
19 of 58
DRAWING 14A

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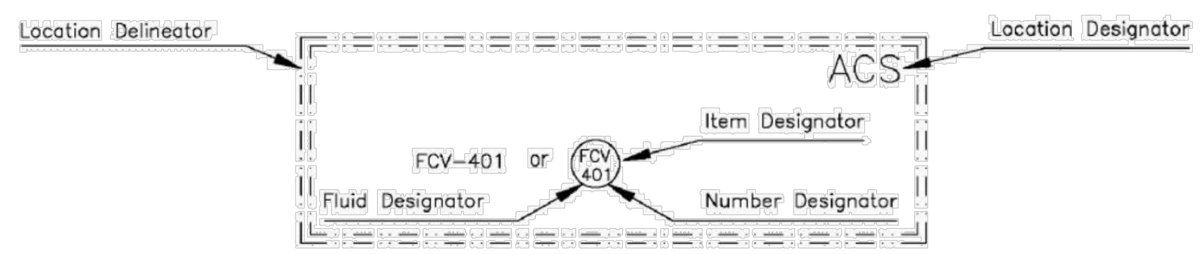
Parts Reference Designators

Location Designators

Ref Des	Location
ACS	Air Compressor Skid
CDS	Condensate Destruction System
COGS	Cogeneration Skid
CP	Control Panel
CST	Condensate Storage Tank
EG	Engine Generator
FLR	Flare
GAC	Gas Analysis Cabinet
GCS	Gas Compression Skid
GHS	Gas Handling Skid
ITC	Ignition Transformer Cabinet
MCC	Motor Control Center
MISC	Loose Parts
PCS	Precooler Skid
PIP	Piping Not On Skid



If the Reference Designator is in a bubble, then the item will be listed on that drawing's material list.
If the Reference Designator is not in a bubble, then it is referring to an item listed on another drawing's material list or it is supplied as an integral part of another item called out by a bubbled reference designator.

Fluid Designators

Ref Des	Fluid
1XX	Fossil Fuels
2XX	Oils
3XX	Biogas
4XX	Air
5XX	Combustion Exhaust
6XX	Coolants
7XX	Condensate
8XX	Inert Gases
9XX	Digester Fluids

Item Designators

Ref Des	Reference Item	Typical Usage/Description
AC	Air Conditioner	Air Conditioner
ACF	Activated Carbon Filter	Condensate Tank Vent Filter
AD	Auto Dialer	Auto Dialer
AI	Analog Input	PLC Analog Input Module
AIO	Analog Input Output	PLC Analog Input Output Module
AO	Analog Output	PLC Analog Output Module
AP	Analysis Port	Gas Sample Ports
BALL	Burner Alarm Low Low	Flame Fail Shutdown
BE	Burner Element	UV Sensor
BG	Burner Glass	View Ports
BLR	Blower	Air or Gas Blower
BN	Burner	Boiler, Hot Water Heater
BS	Burner Switch	Flame Recognition Switch
CBL	Cable	Cables, Specialty Wiring Between Devices
CGT	Combustible Gas Transmitter	LEL Transmitter
CHR	Chart Recorder	Paper or Paperless Chart Recorder
CMP	Compressor	Air or Gas Compressor
D	Diode	Diode
DI	Digital Input	PLC Digital Input Module
EDP	Electrical Distribution Panel	Load Centers, Breaker Panels
E/E	Voltage Transformer	Electrical Transformers, Power Supplies
EI	Voltage Indicator	System Voltage Monitoring
ES	Exhaust Silencer	Muffler
FAH	Flow Alarm High	High Flow Alarm
FAHH	Flow Alarm High High	High Flow Shutdown
FAL	Flow Alarm Low	Low Flow Alarm
FALL	Flow Alarm Low Low	Low Flow Shutdown
FC	Flow Controller	PID Loop Flow Controller, Burner Plug
FCV	Flow Control Valve	Actuated or Hand Modulating Valves, Dampers
FD	Fused Disconnect	Fused Disconnect
FE	Flow Element	Pitot Tube, Hot Wire Anemometer, Orifice Plate
FI	Flow Indicator	Flow Rate Gauge
FIR	Flow Indicating Recorder	Paper or Paperless Chart Recorder
FLT	Filter	Liquid or Gas Filter
FLTP	Port Filter	Unused Port Filter
FO	Flow Orifice	Flow Alarms
FQI	Flow Totalization Indicator	Chart Recorder
FSV	Flow Safety Valve	Check Valve
FT	Flow Transmitter	Flow Transmitter
FU	Fuse	Fuse
FUH	Fuse Holder	Fuse Holder
FV	Flow Valve	Open or Closed Valve not Modulating, Solenoid Valve, Shutdown Valve
FX	Flex	Expansion and Vibration Isolators, Hoses
GBK	Ground Block	Ground Block
HS	Hand Switch	Hand Operated Electrical Switches and Pushbuttons
HT	Heat Trace	Heat Trace
HTR	Heater	Electrical Heaters
HV	Hand Valve	Open or Closed Hand Operated Valve
HVP	Hand Valve Port	Gauge, Manometer and Sample Ports
I/I	Current Transformer	Altrernating Current to Current Transformer
IAH	Current Alarm High	High Current Alarm
IAHH	Current Alarm High High	High Current Shutdown, Blower Overload
IAL	Current Alarm Low	Low Current Alarm, Blower Surge Alarm
IALL	Current Alarm Low Low	Low Current Shutdown, Blower Surge Shutdown
IGN	Ignitor	Spark Plugs, Spark Ignitors
II	Current Indicator	Motor Current
IIR	Current Indicating Recorder	Paper or Paperless Chart Recorder
IT	Current Transmitter	Current Transmitter
ITC	Ignitor Transformer Cabinet	Flare Ignitor
JB-HV	Junction Box-High Voltage	Interconnection Wiring
JB-LV	Junction Box-Low Voltage	Interconnection Wiring
KI	Time Indicator	Hour Meter
LAH	Level Alarm High	High Liquid Level Alarm
LAHH	Level Alarm High High	High Liquid Level Shutdown
LAL	Level Alarm Low	Low Liquid Level Alarm
LALL	Level Alarm Low Low	Low Liquid Level Shutdown
LC	Level Controller	Liquid Level Controller, Drip Trap
LCH	Level Control High	Condensate Pump Control
LCL	Level Control Low	Condensate Pump Control
LE	Level Element	Liquid Level Measuring Element, Capacitance Probe
LI	Level Indicator	Condensate Measurement
LMP	Lamp	Lights, Lamps, Beacons
LS	Level Switch	Liquid Level Switch
LT	Level Transmitter	Liquid Level Measuring Transmitter
LUB	Air Lubricator	Air Lubricator
LZ	Level controller	Air Vent
MAL	Methane Alarm Low	Low Methane Level Alarm
MALL	Methane Alarm Low Low	Low Methane Level Shutdown
MI	Methane Indicator	Methane Level Gauge
MIR	Methane Indicating Recorder	Paper or Paperless Chart Recorder
MOD	Modem	Modem
MV	Mixer Valve	Engine Carburetor
NBK	Neutral Block	Neutral Block
OAH	Oxygen Alarm High	High Oxygen Level Alarm
OAHH	Oxygen Alarm High High	High Oxygen Level shutdown
OE	Oxygen Element	Oxygen Sensor
OI	Oxygen Indicator	Oxygen Level Gauge
OIR	Oxygen Indicating Recorder	Paper or Paperless Chart Recorder
OT	Oxygen Transmitter	Oxygen Level Transmitter
PAH	Pressure Alarm High	High Pressure Alarm
PAHH	Pressure Alarm High High	High Pressure Shutdown
PAL	Pressure Alarm Low	Low Pressure Alarm
PALL	Pressure Alarm Low Low	Low Pressure Shutdown
PC	Pressure Controller	PID Loop Pressure Controller, Valve Operator Logic
PCV	Pressure Control Valve	Regulators, Actuated or Hand Modulating Valves
PDI	Pressure Differential Indicator	Differential Pressure Gauge
PDT	Pressure Differential Transmitter	DP Flow Meter
PH	Phone	Phone
PI	Pressure Indicator	Pressure Gauge
PIA	Pressure Indicator & Alarm	Pressure Gauge w/Switch
PIR	Pressure Indicating Recorder	Paper or Paperless Chart Recorder
PLC	Programmable Logic Controller	Programmable Logic Controller
PLT	Pilot	Pilot Mixing Assembly
PMP	Pump	Liquid Pump
PR	Pressure Recorder	Paper or Paperless Recorder
PS	Pressure Switch	Pressure Switch
PSE	Pressure Safety Element	Rupture Disk
PT	Pressure Transmitter	Pressure Transmitter
R	Relay	Control Relay
RCP	Receptacle	Electrical Receptacle
RES	Resistor	Resistor
RM	Relay Module	PLC Relay Module
SGN	Sign	Sign
SI	Speed Indicator	Speed or Frequency Meter
SSR	Surge Arrestor	Surge Protectors, Lightning Arrestors
TAH	Temperature Alarm High	High Temperature Alarm
TAHH	Temperature Alarm High High	High Temperature Shutdown
TAL	Temperature Alarm Low	Low Temperature Alarm
TALL	Temperature Alarm Low Low	Low Temperature Shutdown
TB	Terminal Block	Terminal Block
TC	Temperature Controller	Thermostat
TCV	Temperature Control Valve	Control Valves
TE	Temperature Element	Thermocouple, RTD, Thermister
TES	Temperature Element Switch	Thermocouple Switch
TEV	Thermostatic Expansion Valve	Thermostatic Expansion Valve
TEW	Temperature Element Well	Port for Thermocouple, RTD or Thermister
TI	Temperature Indicator	Temperature Gauge
TIA	Temperature Indicator & Alarm	Temperature Gauge w/Switch
TIR	Temperature Indicator Recorder	Paper or Paperless Chart Recorder
TK	Tank	Propane Tank, Condensate Storage Tank
TSE	Temperature Safety Element	Flame Arrestor, Flame Check
TSV	Temperature Safety Valve	Valved Fusible Link
TT	Temperature Transmitter	Temperature Transmitter
TX	Heat Exchanger	Heat Exchanger
UPS	Uninterruptable Power Supply	Uninterruptable Power Supply
VAH	Vibration Alarm High	High Vibration Alarm
VAHH	Vibration Alarm High High	High Vibration Shutdown
VFD	Variable Frequency Drive	Variable Frequency Drive
VI	Vibration Indicator	Vibration Gauge
VIR	Vibration Indicating Recorder	Paper or Paperless Chart Recorder
VT	Vibration Transmitter	Vibration Transmitter
YASD	Event Alarm	VFD Faults
YI	Event Indicator	Run Lamps
YIC	Event Indicator Controller	Touch Screens, Setpoint/Display Panels, VFD Keypads, UV Sensor Interface Panels
ZA	Position Alarm	Valve Fail To Open, Close
ZC	Position Controller	PID Loop Position Controller
ZI	Position Indicator	Valve or Damper Position Indicator
ZS	Position Switch	Valve Open, Close Switches

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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
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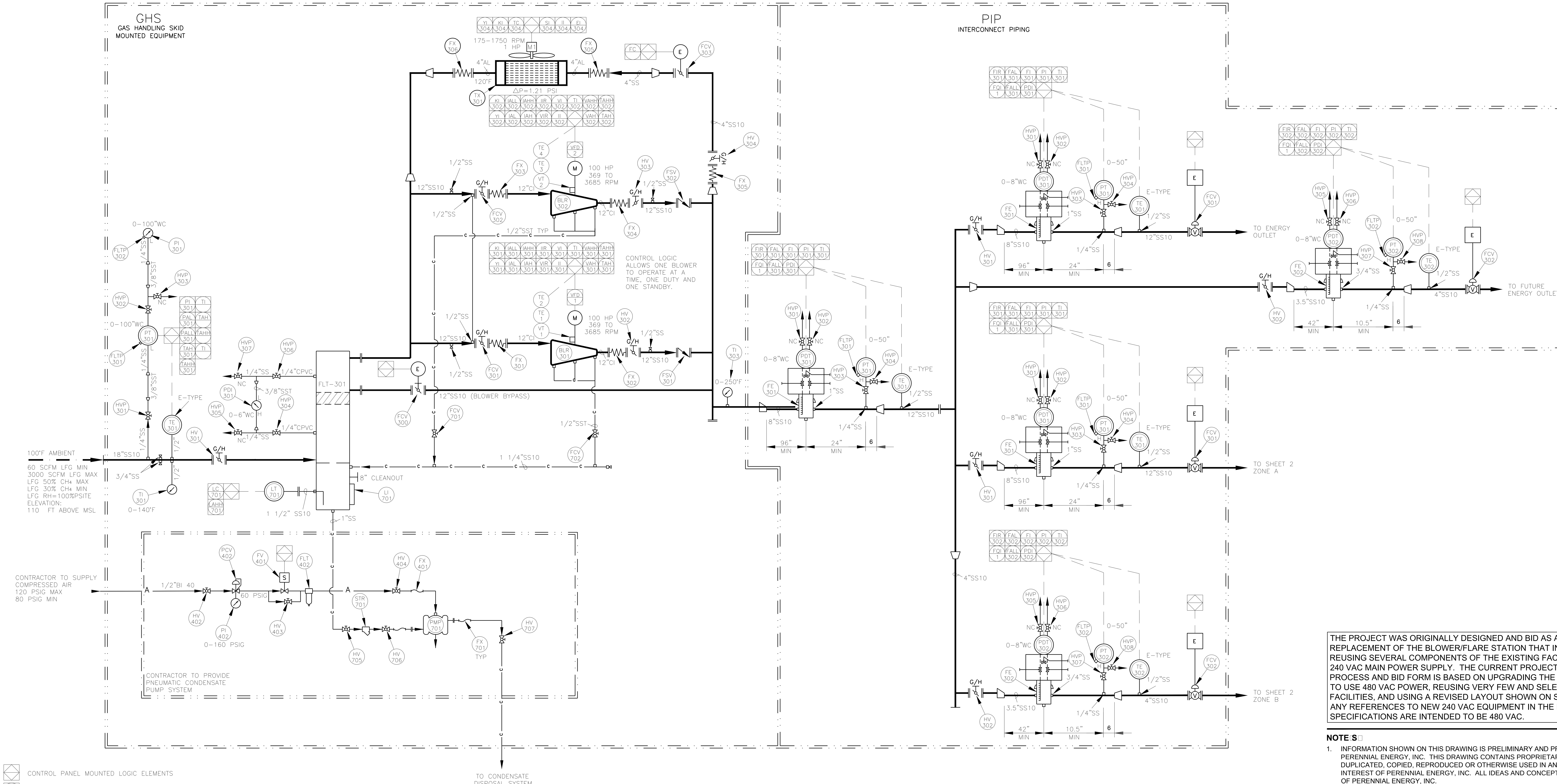
PROJECT No. 1420152 | Rev. 0 | | DRAWING 15



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CONTROL PANEL MOUNTED LOGIC ELEMENTS

REFERENCE DESIGNATORS OF LOGIC OR CONTROL PANEL MOUNTED EQUIPMENT. IDENTIFICATION LETTERS CONFORM TO ISA'S INSTRUMENTATION SYMBOLS AND IDENTIFICATION MANUAL TABLE #1

PIPING MATERIALS LEGEND

AL: ALUMINUM
BI: BLACK IRON
CI: CAST IRON
CPVC: CHLORO POLYVINYL CHLORIDE
CS: CARBON STEEL
EPDM: ETHYLENE PROPYLENE DIENE MONOMER
FB: FIBERGLASS
GS: GALVANIZED STEEL
HDPE: HIGH DENSITY POLYETHYLENE
SS: STAINLESS STEEL
PVC: POLYVINYL CHLORIDE
10: SCH 10 PIPE
40: SCH 40 PIPE
80: SCH 80 PIPE
H: I.D. HOSE
T: O.D. TUBING
(EXAMPLE: 6"AL40 = 6" ALUMINUM SCHEDULE 40 PIPE)

P&ID LINES LEGEND

ELECTRICAL CONNECTIONS
INSULATION
MAIN PIPING
SUB PIPING
CONDENSATE PIPING
COMPRESSED AIR PIPING
CUSTOMER SUPPLIED PIPING
PEI SCOPE OF PROJECT

PID LOOPS

LOOP #	NAME	CONTROLLED ELEMENT	CONTROLLER, OUTPUT ELEMENT	PROCESS VARIABLE, UNITS	PV SENSOR
1	LANDFILL VACUUM CONTROL	FCV-301,2	PLC, AO1-CH?	LANDFILL VACUUM, 0.0 INWC	PT-301
2	LANDFILL FLOW CONTROL	FCV-301,2	PLC, AO1-CH?	LFG FLOWRATE, SCFM	TOTAL MASS FLOW
3	FLARE ZONE A TEMPERATURE CONTROL	FCV-401,2	PLC, AO1-CH?	FLARE ZONE A TEMPERATURE, °F	SELECTED FLARE ZONE A THERMOCOUPLE
4	FLARE ZONE B TEMPERATURE CONTROL	FCV-403,4,5,6	PLC, AO1-CH?	FLARE ZONE B TEMPERATURE, °F	SELECTED FLARE ZONE B THERMOCOUPLE

NOTES

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4. CONTRACTOR SHALL INTEGRATE NEW EQUIPMENT CONTROLS AND DATA OUTPUT WITH EXISTING SCADA SYSTEM, NEW SCADA SYSTEM AND BACK-UP DATA RECORDER AS DESCRIBED IN THESE CONTRACT DOCUMENTS. SEE TECHNICAL SPECIFICATIONS FOR SUMMARY OF SYSTEMS CONTROL LOGIC AND CONTROLS INTEGRATION REQUIREMENTS.
5. CONTRACTOR SHALL PROVIDE AND COORDINATE SCADA PROGRAMMING, INCLUDING PROVIDING HUMAN MACHINE INTERFACE (HMI) FOR REMOTE INTERNET AND MOBILE ACCESS TO SYSTEM FOR TRANSFERRING MONITORING DATA, VIEWING EQUIPMENT AND PROCESS STATUS, AND MAKING PROCESS ADJUSTMENTS.

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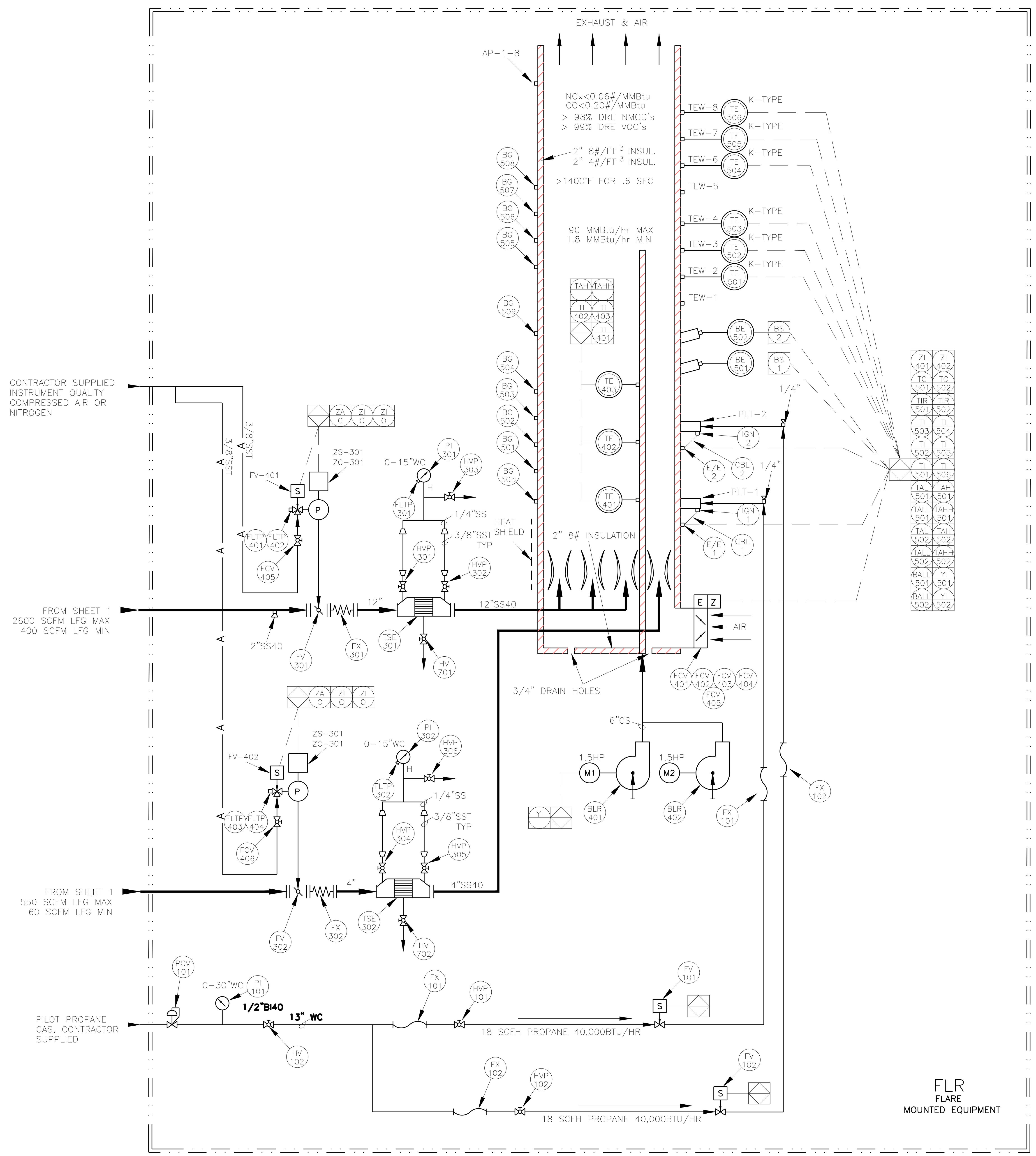
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
BLOWER/ FLARE CONCEPTUAL EQUIPMENT P&ID (1 OF 2)

PROJECT No. 1420152 | Rev. 0 | 22 of 58 | DRAWING 16A



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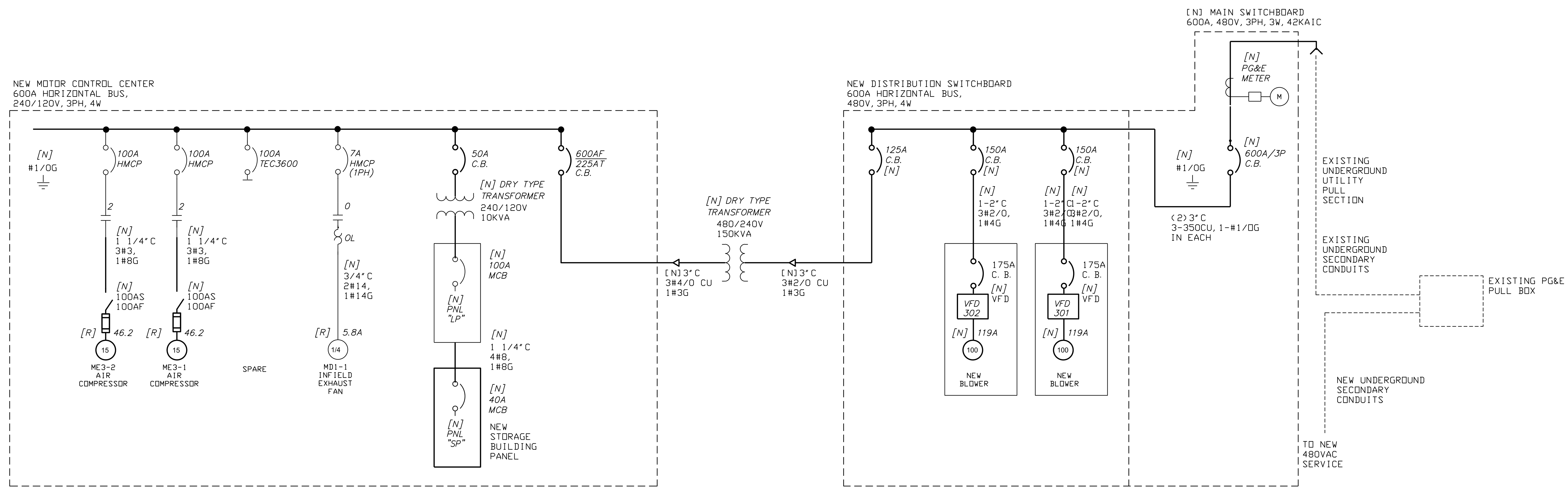
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
O ER F ARE E UIPMENT P I
OF

PROJECT No. 1420152 | Rev. 0 | 23 of 58 | DRAWING 17



ELECTRICAL ONE LINE DIAGRAM

Western Placer Waste Management
Authority Land Fill Gas Flare Load Study
480V

BLR-301	Blower	100 HP	480V, 3PH	130.0 FLA	108.08 KVA
BLR-302	Blower	100 HP	480V, 3PH	130.0 FLA	108.08 KVA
	25% Of Largest Motor			32.5 FLA	27 KVA
				292.5 FLA	243.16 KVA

Western Placer Waste Management
Authority Land Fill Gas Flare Load Study
240/120V

M-E3-2	Air Compressor No. 2	15 HP	240V, 3PH	.0 FLA	.00 KVA
M-E3-1	Air Compressor No. 1	15 HP	240V, 3PH	42.0 FLA	17.43 KVA
M-D1-1	Blower Exhaust Fan	.25 HP	240V, 1PH	2.9 FLA	.67 KVA
M-A2-2	Demister Pump 2	.33 HP	240V, 1PH	3.6 FLA	.83 KVA
M-C2-1	Demister Pump 1	.33 HP	240V, 1PH	3.6 FLA	.83 KVA
BLR-3	Blower	75 HP	240V, 3PH	192.0 FLA	79.68 KVA
	Panel LP		240V 3Ph	25 A	10 KVA
	25% Of Largest Motor			48.0 FLA	20 KVA
				317.1 FLA	129.42 KVA

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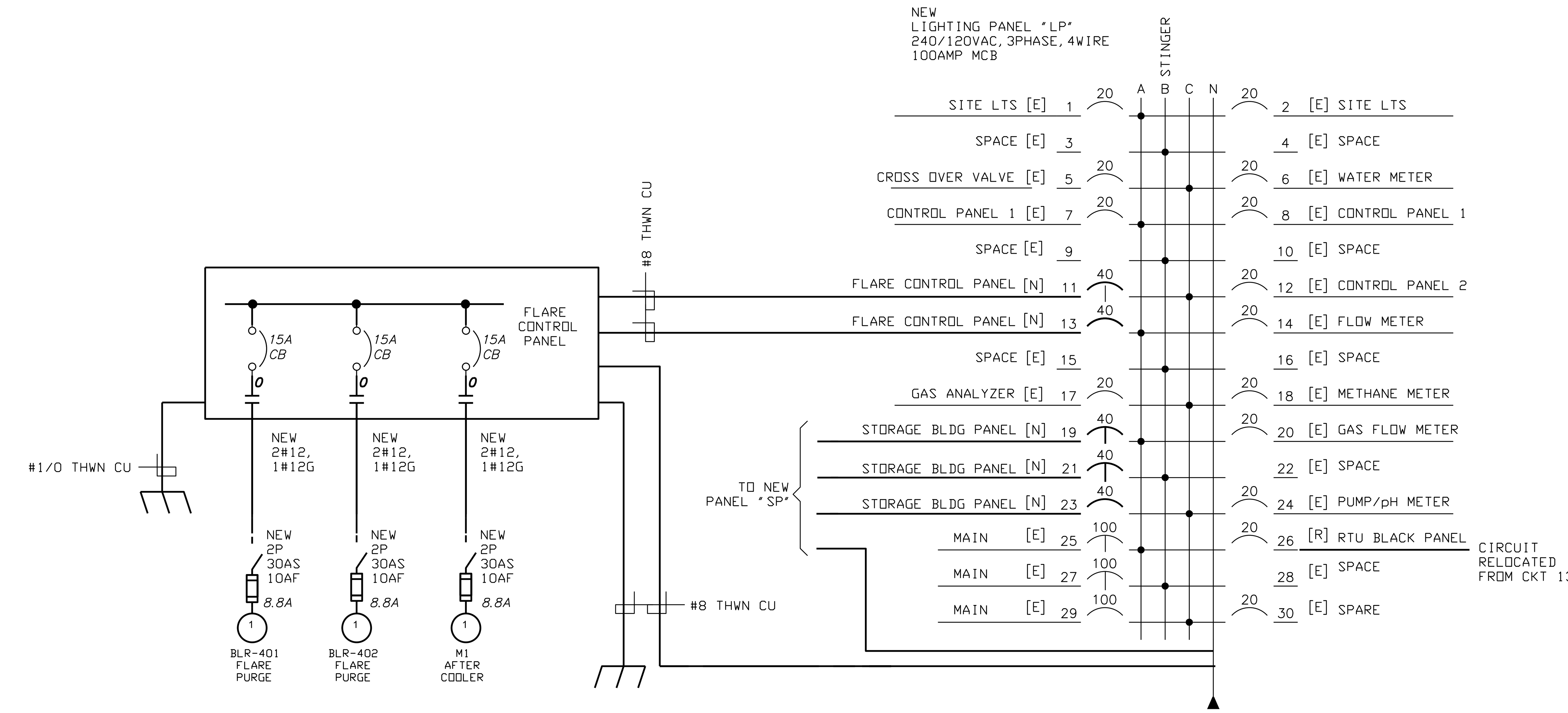

PANEL SCHEDULE

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PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
BLOWER FLARE MODIFICATIONS
ELECTRICAL ONE LINE DIAGRAM

PROJECT No. 1420152 | Rev. 1 | 25 of 48 | DRAWING E1A

GENERAL NOTES

1. EQUIPMENT LAYOUT IS GENERALLY DIAGRAMMATIC, THE SIZE AND LOCATIONS OF DEVICES SHOWN ON THESE DRAWINGS SHALL BE VERIFIED. ROUTING OF WIRING SHALL BE GOVERNED BY ACTUAL CONDITIONS.
2. MOTOR CONTROL CENTER SHALL BE PROVIDED WITH ALL NECESSARY ASSEMBLIES, COMPONENTS, CONTROLLERS, PUSHBUTTONS, NAMEPLATES, TERMINAL BLOCKS AND ASSOCIATED WIRING NECESSARY TO COMPLETE THE PROJECT.
3. MOTOR WIRING AND FIELD CONTROL WIRING SHALL FEED THRU TERMINAL BLOCKS OR MARSHALLING PANELS. MCC WIRING SHALL MEET NEMA TYPE IIC REQUIREMENTS. CONTROL WIRING SHALL BE POWER LIMITED, TYPE MTW, #14AWG CU, 600V, UL1015.
4. ENDS OF CONTROL WIRING SHALL HAVE HEAT-SHRINK TYPE TAGS AT BOTH ENDS. TAGS SHALL DENOTE WIRE DESIGNATIONS.
5. ELECTRICAL CONTRACTOR SHALL ARRANGE WITH PG&E TO LOCK OUT THE INCOMING ELECTRICAL SERVICE DURING MAIN BREAKER CHANGE OVER.
6. [N]COOLING FAN AND [N]FLARE PURGE BLOWERS FED FROM [N] FLARE CONTROL PANEL.
7. PROVIDE AND INSTALL NEW NAMEPLATES AND ATTACH TO FRONT OF CUBICAL DOORS.

NUMBERED NOTES

1. MAIN SWITCHBOARD, 600-AMP, 480V-VOLT, 3-PHASE, 3-WIRE, 42KAIC. DISCONNECT AND REMOVE EXISTING 400 AMP MAIN CIRCUIT BREAKER. PROVIDE AND INSTALL NEW 600 AMP MOLDED CASE G.E. SPECTRA ELECTRONIC TRIP MAIN CIRCUIT BREAKER, 100% CONTINUOUS RATED. RECONNECT TO EXISTING LINE AND LOAD SIDE CIRCUITRY. PROVIDE NEW TRIP PLUG, MOUNTING HARDWARE, LOAD SIDE LUGS AND ENCLOSURE FRONT PANEL AS NECESSARY. PROVIDE AND INSTALL NEW PARALLEL 350KCmil CU. CONDUCTORS FROM NEW BREAKER TO MCC IF REQUIRED.
2. PROVIDE AND INSTALL NEW 600AF 200AT, 3POLE, 480VAC MOLDED CASE CIRCUIT BREAKER IN NEW DISTRIBUTION BOARD. MATCH VFD RECOMMENDATION. PROVIDE NEW DOOR WITH NEW LOCKABLE SWITCH AND HANDLE.
3. DISCONNECT EXISTING AIR COMPRESSOR No. 1 (ME3-1). RECONNECT RELOCATED AIR COMPRESSOR No. 1 (ME3-1).
4. DISCONNECT EXISTING AIR COMPRESSOR No. 2 (ME3-2). RECONNECT RELOCATED AIR COMPRESSOR No. 2 (ME3-2).
5. PROVIDE AND INSTALL #1/0 BARE COPPER GROUND CABLE AND CONNECT EQUIPMENT TOGETHER TO FORM A CONTINUOUS GROUND NETWORK. CONNECT GROUND CABLE TO THE [N]MCC, [N]GROUND RODS, [N]FLR SKID, [N]PIP SKID, AND [N]BLOWER MOTORS. USE [N]NEMA ONE HOLE COMPRESSION LUGS AT EQUIPMENT. USE [N] EXOTHERMIC MOLDS AT TEES. CABLE BENDS SHALL MEET NEC 312.6(b)
6. DISCONNECT EXISTING EXHAUST FAN (MD1-3). RECONNECT RELOCATED EXHAUST FAN RELABELED AS (MD1-1).
7. CORRUGATED METAL ROOF STRUCTURE TO BE 25' LENGHT BY 9' WIDE. ROOF OVERHANGS SHALL HAVE SCREENED GUTTERS AND DOWNSPOUTS AT CORNERS OF ROOF. BUILDINGS CONTRACTOR TO PROVIDE FINAL DETAILS OF GUTTERS DOWNSPOUTS AND OTHER SHEET METAL ACCESSORIES AND METHODS OF JOINING AND ANCHORAGES. ROOF PANELS SHALL BE 24 GAUGE, G-90 ZINC-COATED (GALVANIZED) STEEL, CONFORMING TO ASTM A653, GRADE 50, 24 INCH OR 36 INCH WIDE STANDING SEAM METAL ROOF PANELS ATTACHED WITH CONCEALED SELF-TAPPING FASTENERS AT SUPPORTS AND MECHANICALLY SEAMED SIDE LAP JOINTS.

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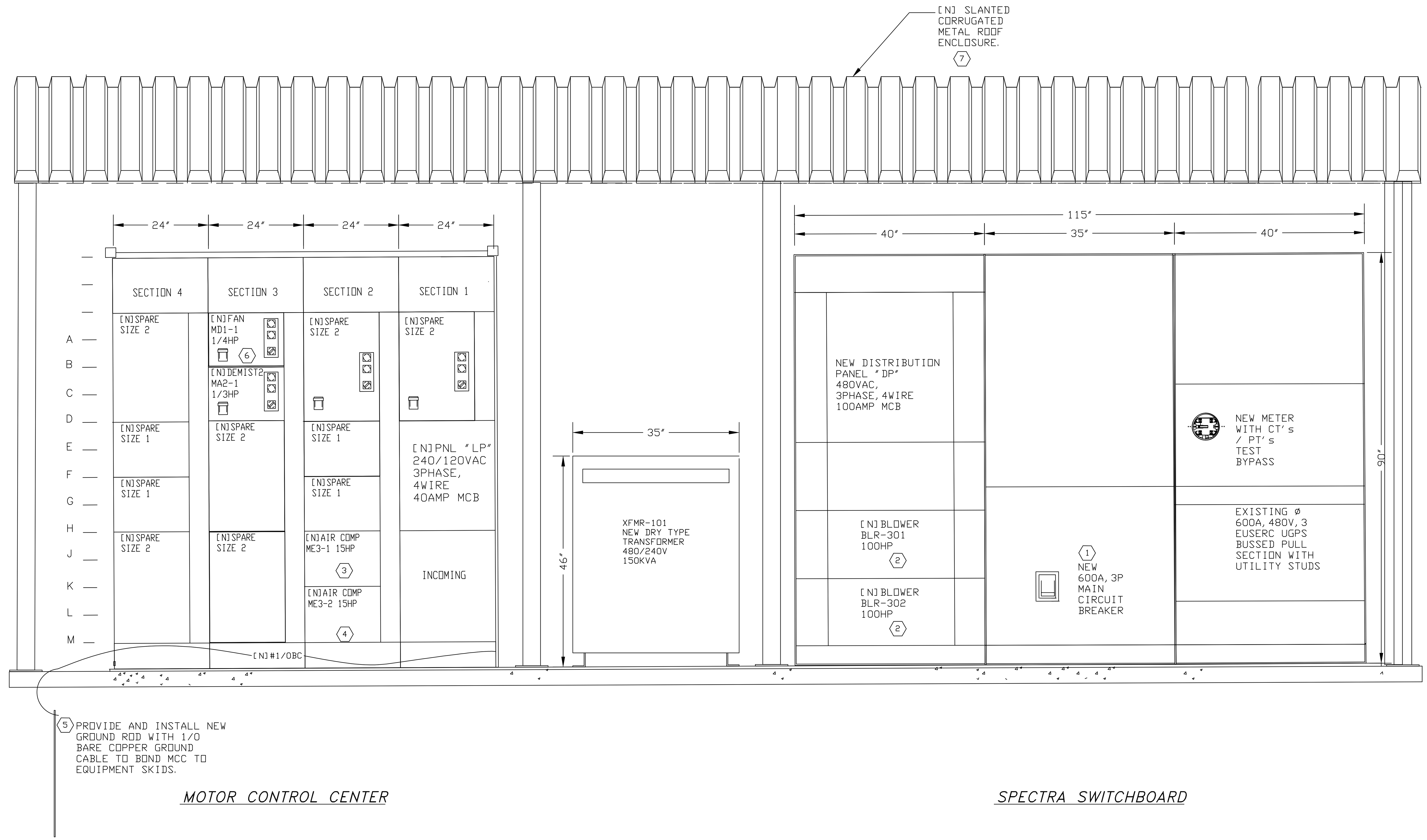

MOTOR CONTROL CENTER

SPECTRA SWITCHBOARD

Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
A	2016-08-11	ISSUED FOR BID	SMA	JR	APW	JR

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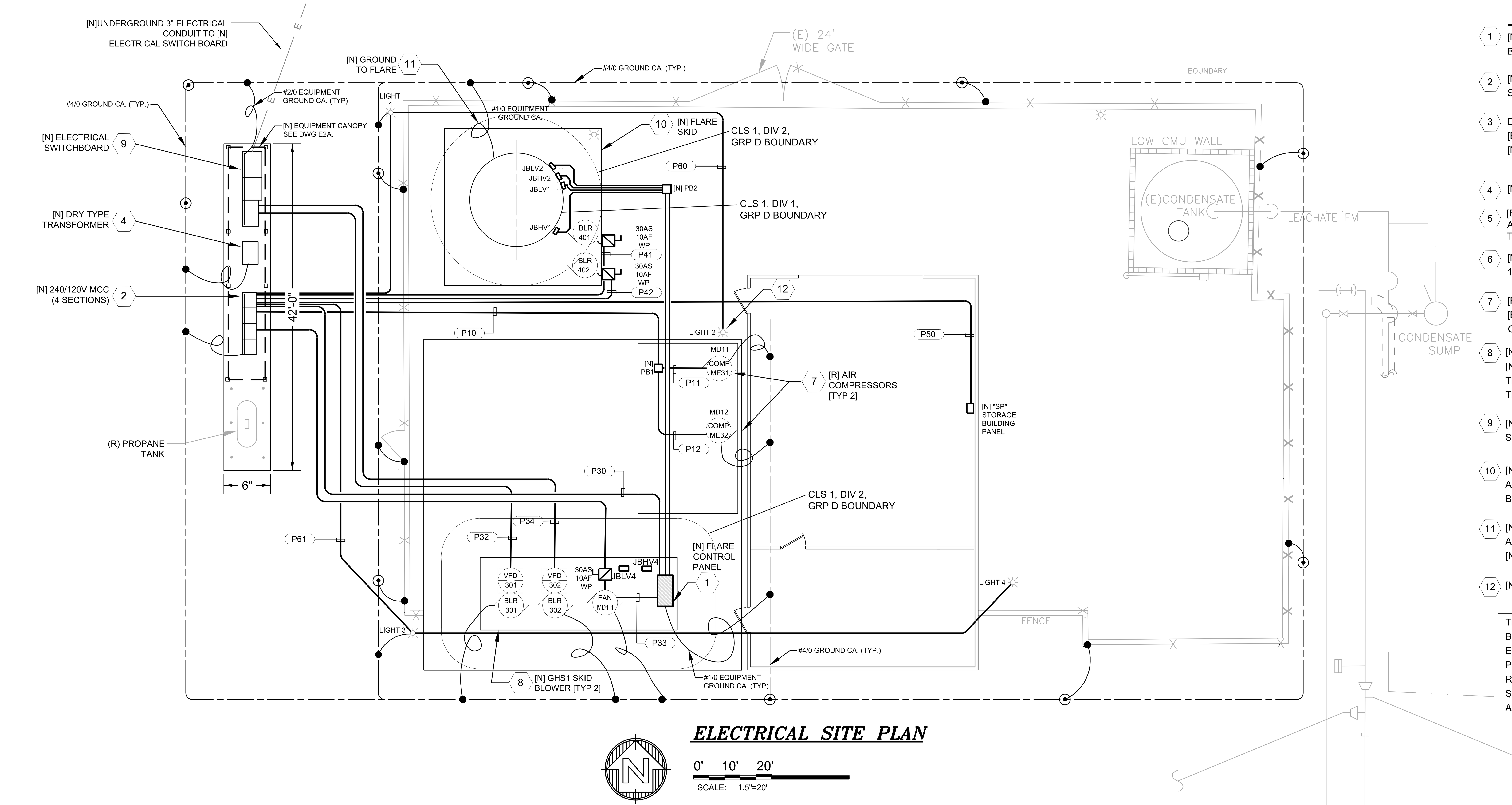
2016 GCCS EXPANSION

TITLE
BLOWER FLARE MODIFICATIONS
ELECTRICAL MOTOR CONTROL CENTER

PROJECT No. 1420152 | Rev. 1 | 27 of 58 | DRAWING E2A



ELECTRICAL SITE PLAN

NUMBERED ELECTRICAL NOTES

1. [N]FLARE CONTROL PANEL PROVIDED BY FLARE VENDOR. INSTALLED BY ELECTRICAL CONTRACTOR. VERIFY EXACT INSTALLATION REQUIREMENTS.
2. [N]MOTOR CONTROL CENTER 600A, 240/120V, 3PH, 4W SEE ELEVATION DETAIL SHEET E2A FOR NEW WORK.
3. DECOMMISSION [E] CONDENSATE CONTROL PANEL. DISCONNECT AND REMOVE [E]CIRCUITRY TO [E] FLARE CONTROL PANEL. PROVIDE AND INSTALL [N]CIRCUITRY AND EXTEND TO [N]FLARE CONTROL PANEL.
4. [N]150 KVA DRY TYPE TRANSFORMER SEE ELEVATION SHEET E2A FOR NEW WORK.
5. [E] AUBURN RTU PANEL: TRANSFER REMAINING ACTIVE SIGNALS FROM [E] RTU AND REWIRE TO NEW FLARE CONTROL PANEL INPUT MODULE FOR TRANSMISSION TO CENTRAL SCADA SERVER (COMMUNICATIONS PROTOCOL T.B.D.)
6. [N]PANEL "SP" INSTALLED IN NEW BUILDING, SEE DRAWING E-6 FOR DETAIL 120/240V,3PH,4W,40A MCB, TYPE 1 SURFACE CABINET.
7. [R]AIR COMPRESSORS. DISCONNECT AND REMOVE [E]CONDUIT AND CIRCUITRY FROM [E]COMPRESSORS. PROVIDE AND INSTALL [N]CONDUIT AND CIRCUITRY TO RELOCATED COMPRESSORS AND CONNECT.
8. [N]125HP BLOWER GAS HANDLING SKID [GHS-1]. PROVIDE AND INSTALL [N]CONDUIT AND CIRCUITRY AND CONNECT TO SKID MOUNTED FIELD WIRING TERMINAL BOXES. SKID MOUNTED PRE-WIRED BOXES BY OTHERS. VERIFY EXACT TERMINATION REQUIREMENTS WITH FLARE EQUIPMENT CONTRACTOR.
9. [N]SWITCHBOARD WITH METERING 600A, 480VAC, 3PHASE, 4 WIRE SEE ELEVATION DETAIL SHEET E2A FOR NEW WORK.
10. [N]GAS FLARE SKID [FLR] PROVIDE AND INSTALL [N]CONDUIT AND CIRCUITRY AND CONNECT TO SKID MOUNTED FIELD WIRING TERMINAL BOXES. SKID PRE-WIRED BY OTHERS. VERIFY EXACT TERMINATION REQUIREMENTS.
11. [N]GROUNDING. PROVIDE AND INSTALL ONE [N]#1/0 BARE COPPER GROUND CABLE AND CONNECT TO FLARE AND PIP SKID STEEL, BLOWER ENCLOSURES, [N]CONTROL PANEL AND [E]MCC GROUNDED BUS BAR.
12. [N] LIGHTING SHOWN PER PLACER COUNTY REGULATIONS.

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ELECTRICAL NOTES

1. ELECTRICAL MATERIALS INSTALLED IN HAZARDOUS LOCATIONS, AS DEFINED BY NFPA 70, SHALL HAVE UTILIZATION LISTING. APPLIES TO NEW CONSTRUCTION ONLY.
   BOUNDARIES AND : THE AREA RADIATING 3' FROM BURNER EXHAUST OPENING - CLASS 1, DIVISION 1, GROUP D,
   CLASSIFICATIONS THE AREA RADIATING 5' FROM BLOWERS, AND BLOWER DISCHARGE VALVES AND FLANGES - CLASS 1, DIVISION 2, GROUP D,
2. PROVIDE CONDUITS WITH UL886 SEALS AND APPROVED SEALING COMPOUND WHEN PENETRATING BOUNDARIES OR WHEN PIERCING GRADE. SEALS SHALL BE WITHIN 18" OF ENCLOSURES OR GRADE. SEALS SHALL BE PACKED AND POURED AFTER COMMISSIONING.
3. COMMON GROUNDING SYSTEM IS REQUIRED. UTILIZE [E]GROUND RODS, REPLACE ANY GROUND CABLE OR GROUND CONNECTORS THAT ARE LOOSE OR WORN, AS REQUIRED. TEST GROUND RESISTANCE. THE SYSTEM SHALL NOT EXCEED 25 OHMS. .
4. PROVIDE AND INSTALL CONDUIT AND WIRE FROM TRAY TO TERMINAL BOXES. CONTROL PANELS, MOTORS, AND INSTRUMENTATION. TERMINAL BOXES PROVIDED AND INSTALLED BY SKID MANUFACTURER. REFER TO VENDOR DRAWINGS FOR TERMINATION REQUIREMENTS..
5. MOTORS, INSTRUMENTS AND THE LIKE THAT ARE NOT PRE-CONNECTED TO A TERMINAL BOXES SHALL BE CONNECTED BY ELECTRICAL CONTRACTOR..COORDINATE WITH VENDOR FOR THE EXACT NUMBER OF DEVICES TO BE FIELD CONNECTED..

ELECTRICAL LEGEND

1	NUMBERED NOTE
C10	CONDUIT TAG
IY 300	INSTRUMENT TAG
	NEW CONDUIT
	CONDUIT BY OTHERS (OR CONDUIT EXISTING)
	GROUND CABLE
	GROUND ELECTRODE
	CONNECTION
	CONDUIT SEAL
	BOX
	NEW PANEL

P - POWER
C - CONTROL
S - SIGNAL

	CIRCUIT BREAKER
	CONTACTOR
	OVERLOAD
BLR 301	MOTOR
[N]	NEW
[E]	EXISTING
[R]	REPLACE OR RELOCATE
	PRIMARY U/G GROUND CABLE, #4/0 STRANDED BARE COPPER
	BRANCH GROUND CABLE TAP, #2/0 STRANDED BARE COPPER
	GROUND CONNECTION OR BOND
	GROUND ROD

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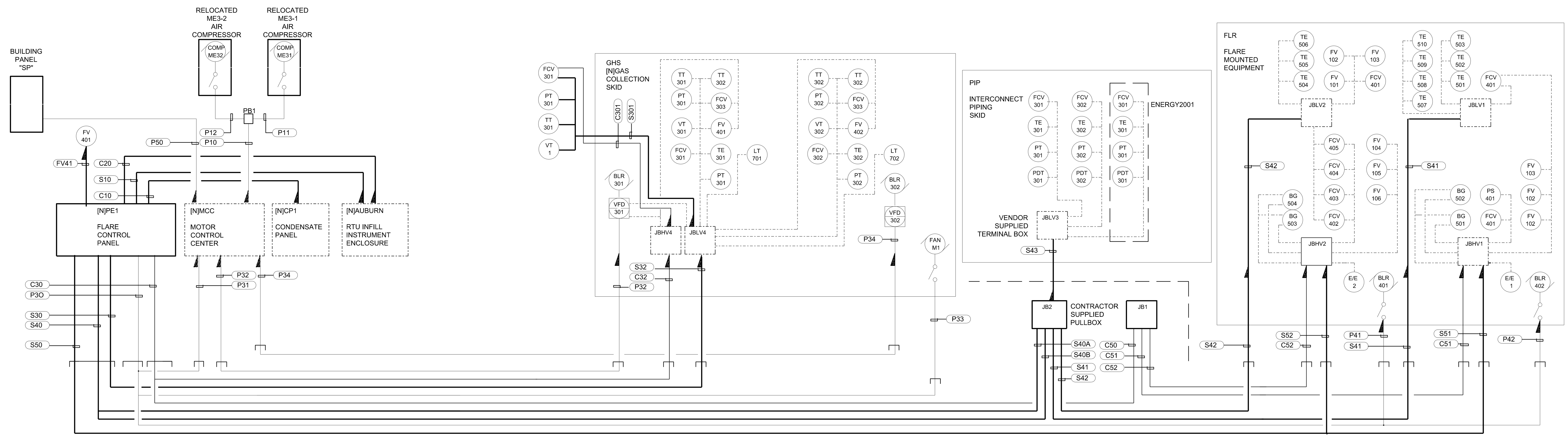
PROJECT
WESTERN REGIONAL SANITARY LANDFILL
2016 GCCS EXPANSION

TITLE
BLOWER FLARE MODIFICATIONS
ELECTRICAL SITE PLAN

PROJECT No. 1420152
Rev. 1
29 of 58
DRAWING E3A



CONDUIT BLOCK DIAGRAM

LINE	TAG	SIZE	TYPE	GRND	FILL	MAT	INSUL	FROM	TO
1	P10	1 1/4"	RMC	1#6g	6#3	CU	THWN	[N]MCC	Compressors JB
2	P11	1'	RMC	1#6g	3#3	CU	THWN	Compressors JB	Compressor ME3-1
3	P12	1'	RMC	1#6g	3#3	CU	THWN	Compressors JB	Compressor ME3-2
4	P30	2"	RMC	2#12G,1#8G	2C#10,2C#12,3C#8	CU	THWN/TC	PE1 Flare Control	M1 Fan/MCC/BLR 401,2
5	P31	1"	RMC	1#8g	3C#8	CU	THWN/TC	PE1 Flare Control	[N]MCC
6	P32	2"	RMC	1#3G	3#4/0	CU	THWN	VFD-301	[N]MCC
7	P33	3/4"	RMC	1#12g	2C#12	CU	THWN/TC	PE1 Flare Control	M1 Fan
8	P40	1 1/2"	RMC	1#10g	2-2C#10	CU	THWN/TC	PE1 Flare Control	BLR 401/402
9	P41	3/4"	RMC	1#10g	2C#10	CU	THWN/TC	PE1	BLR 401
10	P42	3/4"	RMC	1#10g	2C#10	CU	THWN/TC	PE1	BLR 402
11	P50	1"	RMC	1#8G	3#8	C U	THWN	[N]MCC	PANEL SP
12	P32	2"	RMC	1#3G	3#4/0	CU	THWN	VFD-302	[N]MCC
13	C10	1"	RMC	1#14g	8C#14	CU	THWN/TC	PE1 Flare Control	[E]Condensate Panel
14	C20	1"	RMC	1 #14g	2-8C#14 (8rd,8wt)	CU	THWN/TC	PE1 Flare Control	[N]RTU
15	P51	1"	RMC	1 #8g					
16	C30	2"	MC	1#14g	17-2C#14 (16rd,1bl,11wt)	CU	THWN/TC	PE1 Flare Control	[N]VFD-1/GHS1/PIP JB1
17	C31	1 1/2"	RMC	1#14g	6-2C#14 (6rd,6wt)	CU	THWN/TC	PE1	[N]VFD-1
18	C32	1 1/2"	RMC	1#14g	4-2C#14 (3rd,1bl,4wt)	CU	THWN/TC	RE1	HS1 JBHV4
19	C301	1"	RMC	1#14g	2C#14 (1bl,1wt)	CU	THWN/TC	FCV-301	GHS1 JBHV4
20	C50	2"	RMC	1#16g	7-2C#16 (11rd,2wt)	CU	THHN/TC	PE1 Flare Control	PIP JB1
21	C51	1 1/2"	RMC	5#16g	4-2C#16 (6rd,2wt)	CU	THHN/TC	FLR JBHV1	PIP JB1
22	C52	1 1/2"	RMC	5#16g	3-2C#16 (5rd,1wt)	CU	THHN/TC	FLR JBHV2	PIP JB1
23	C60	1"	RMC	1#14g	8C#14	CU	THHN/TC	PE1	[N]FLARE CTRL
24	S10	1"	RMC	_	Empty	_	_	PE1 Flare Control [N]BLDG	
25	S20	3/4"	RMC		1-CAT 5 Cable			PE1 Flare Control	[N]RTU
26	S30	1 1/2"	RMC	1#16g	8-2c#16TSP	_	Belden 8760	PE1 Flare Control	[N]VFD-1/GHS1 JBLV4
27	S31	3/4"	RMC	1#16g	2-2c#16TSP	_	Belden 8760	PE1	[N]VFD-1
28	S32	2"	RMC	1#16g	17-2c#16TSP		Belden 8760	PE1	GHS1 JBLV4
29	S301	1 1/4"	RMC	1#16g	4-2c#16TSP		Belden 8760	FCV-301	GHS1 JBLV4
30	S40A	1 1/2"	RMC	1#16g	17-2c#16TSP	_	Belden 8760	PE1 Flare Control	PIP JB2
31	S40B	1 1/2"	RMC	13#16g	10-2c#18(Type K),3-2c#18		(Type E)	PE1 Flare Control	PIP JB2
32	S41	1 1/2"	RMC	7#16g	7-2c#18(Type K),4-2c#16TSP		Belden 8760	FLR JBLV1	PIP JB2
33	S42	1 1/2"	RMC	3#16g	3-2c#18(Type K),4-2c#16TSP		Belden 8760	FLR JBLV2	PIP JB2

No	TAG	SIZE	TYPE	GRND	FILL	MAT	INSUL	FROM	TO
34	S43	2"	RMC	3#16g	3-2c#18(Type E), 9-2c#16TSP	_	Belden 8760	PIP JBLV3	PIP JB2
35	S50	1 1/4"	RMC	1#16g	4-2c#16TSP	_	Belden 8760	PE1 Flare Control	FLR JBHV1,2
36	S51	3/4"	RMC	1#16g	2-2c#16TSP	_	Belden 8760	PE1	FLR JBHV1
37	S52	3/4"	RMC	1#16g	2-2c#16TSP	_	Belden 8760	PE1	FLR JBHV2
38									
39	VT1	3/4"	RMC/LFMC	1#14g	1-2c#16TSP	CU	Belden 8760	S301	VT1
40	TT301	3/4"	RMC/LFMC	1#16g	1-2c#18(Type E)	_	Omega	S301	TE1
41	PT301	3/4"	RMC/LFMC	1#14g	1-2c#16TSP	CU	Belden 8760	S301	VT2
42	P60	1"	RMC	1#10g	1-2C#10	CU	THWN/TC	"LP" LIGHTING PANEL	LGHT 1, 2
43	P61	1"	RMC	1#10g	1-2C#10	CU	THWN/TC	"LP" LIGHTING PANEL	LGHT 2,3
44	FCV301	3/4"	RMC/LFMC	1#16g	2C#14	_	THWN	C201	TE302
45	FV41	3/4"	RMC/LFMC	1#14g	2-2c#16TSP	CU	Belden 8760	PE1 Flare Control	FCV303
46	S40	2"	RMC	14#16g	17-2c#16TSP,3-2C#18(TYPE E) 10-2c#18(Type K)	_	Belden 8760	PE1 Flare Control	PIP JB2

CONSTRUCTION NOTES

1 WHEN CABLE TRAY IS USED AS A SUBSTITUTE TO CONDUIT REPLACE SINGLE CONDUCTORS FOR MULTI CONDUCTOR CABLE USE UL LISTED TC CABLE. EXAMPLE: 14#14THWN SINGLE CONDUCTORS IS EQUAL TO 7-2C#14THHN TC CABLES.

2 CABLE TYPES AS FOLLOWS:

2C#14 TC	2-Wire THHN in PVC Tray Cable, Include B.C.GROUND
2c#16TSP	2 Insulated Twisted Shield Pair, Belden 8760
2c#18(type E)	E-Type Thermocouple Wire Omega
2c#18(type K)	K-Type Thermocouple Wire Omega XC-K-20

3 BUILDING LIGHTING AND RECEPTACLES NOT INCLUDED IN SCHEDULE. CONDUIT AND CIRCUITRY NOT SHOWN HERE SHALL BE SIZED USING 20160 NATIONAL ELECTRICAL CODE.

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2016 GCCS EXPANSION

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TITLE
BLOWER FLARE MODIFICATIONS
ELECTRICAL CONDUIT BLOCK DIAGRAM

PROJECT No. 1420152 | Rev. 1 | 33 of 58 | DRAWING E4A

REMOTE TELEMETRY UNIT – I/O SCHEDULE

TAG NAME	TYPE DESCRIPTION	CONNECTION	MISC.
EXISTING FLARE SIGNALS TO AUBURN PLC VIA HARD WIRE INPUTS			
LLF11	DA PLC STATUS	RTU DI 3	[No Change]
LLF12	DA FLARE FLAME OUT	RTU DI 4	NOTE 1
LLF13	DA DEMISTER PUMP FAILURE	RTU DI 5	[No Change]
LLF14	DA FAILURE TO RE-START	RTU DI 6	NOTE 1
LLF15	DA PERIMETER BLOWER 1 FAILURE	RTU DI 7	NOTE 2
LLF21	DA GENERAL FLAME FAILURE	RTU DI 8	NOTE 1
LLF22	DA INFILL BLOWER 3 FAILURE	RTU DI 9	NOTE 3
LLF23	DA PERIMETER BLOWER 2 FAILURE	RTU DI 10	NOTE 2
LLF24	DA FLARE TEMPERATURE HIGH	RTU DI 11	NOTE 1
LLF25	DA CONDENSATE TANK 66% FULL	RTU DI 12	[No Change]
LLF26	DA FLARE TEMPERATURE LOW	RTU DI 13	NOTE 1
LLF27	DA CONDENSATE TANK 100% FULL	RTU DI 14	[No Change]
LLF28	DA INFILL DEMISTER TANK LEVEL	RTU DI 15	[No Change]
LLFANALF	DA ANALYZER FAULT	RTU DI 2	[No Change]
LLFANALCLA	DA ANALYZER CALIBRATING	RTU DI 1	[No Change]
LLFCH4	AI GAS ANALYZER METHANE	RTU AI 1	[No Change]
LLF02	AI GAS ANALYZER OXYGEN	RTU AI 2	[No Change]
LLFFLOW3	AI GAS ANALYZER FLOW	RTU AI 3	[No Change]
LLFTVFD	AI VFD SPEED	RTU AI 4	NOTE 3
LLF2001FLOW1	AI ENERGY2001 FLOW	YOKOGAWA 1	[T.B.D.]
LLF2001TEMP	AI ENERGY2001 TEMP	YOKOGAWA 2	[T.B.D.]
LLFWMFLOW 1	AI WPSL INFILL FLOW	YOKOGAWA 3	[T.B.D.]
LLF2001FLOWTOTAL	AI ENERGY2001 FLOW TOTAL	YOKOGAWA 5	[T.B.D.]
LLFWMTEMP	AI WPWM FLARE TEMP	YOKOGAWA 6	NOTE 1

NEW DUAL FLARE SIGNALS TO AUBURN PLC VIA LAN DATA LINK WITH [N]FLARE CONTROL PANEL.

LLF-- DA FAILURE TO RE-START
LLF-- DA GENERAL FLAME FAILURE
LLF-- DA ZONE A FLARE FLAME OUT
LLF-- DA ZONE B FLARE FLAME OUT
LLF-- DA ZONE A FLARE TEMPERATURE HIGH
LLF-- DA ZONE B FLARE TEMPERATURE HIGH
LLF-- DA ZONE A FLARE TEMPERATURE LOW
LLF-- DA ZONE B FLARE TEMPERATURE LOW
LLF-- DA BLOWER 1 FAILURE
LLF-- DA BLOWER 2 FAILURE
LLF-- DA COMPRESSOR STARTS 1 - 2
LLF-- AI VFD 1 SPEED
LLF-- AI VFD 2 SPEED
AI CONDENSATE/LEACHATE METER GPM
AI CONDENSATE/LEACHATE METER TOTAL GALLONS
AI ZONE A FLOW FPM
AI ZONE B FLOW FPM
AI ZONE A TEMPERATURE
AI ZONE B TEMPERATURE
AI PRIMARY BLOWER BEARING TEMPERATURE
AI LFG TEMPERATURE
AI COMPRESSOR AIR PRESSURE
AI REMOTE LEACHATE FLOW METER TOTALS

1. SIGNALS TO REMAIN AS LONG AS EXISTING FLARE CONTINUES TO REMAIN IN SERVICE.
2. BLOWER SHALL BE DECOMMISSIONED AND STATUS SIGNAL SHALL BE ABANDON.
3. BLOWER TO REMAIN IN SERVICE. STATUS SIGNAL TO BE TRANSFERRED OVER TO NEW FLARE CONTROL PANEL.
4. THIS SCHEDULE IS PRELIMINARY AND IS INTENDED TO BE USED AS A REFERENCE ONLY.

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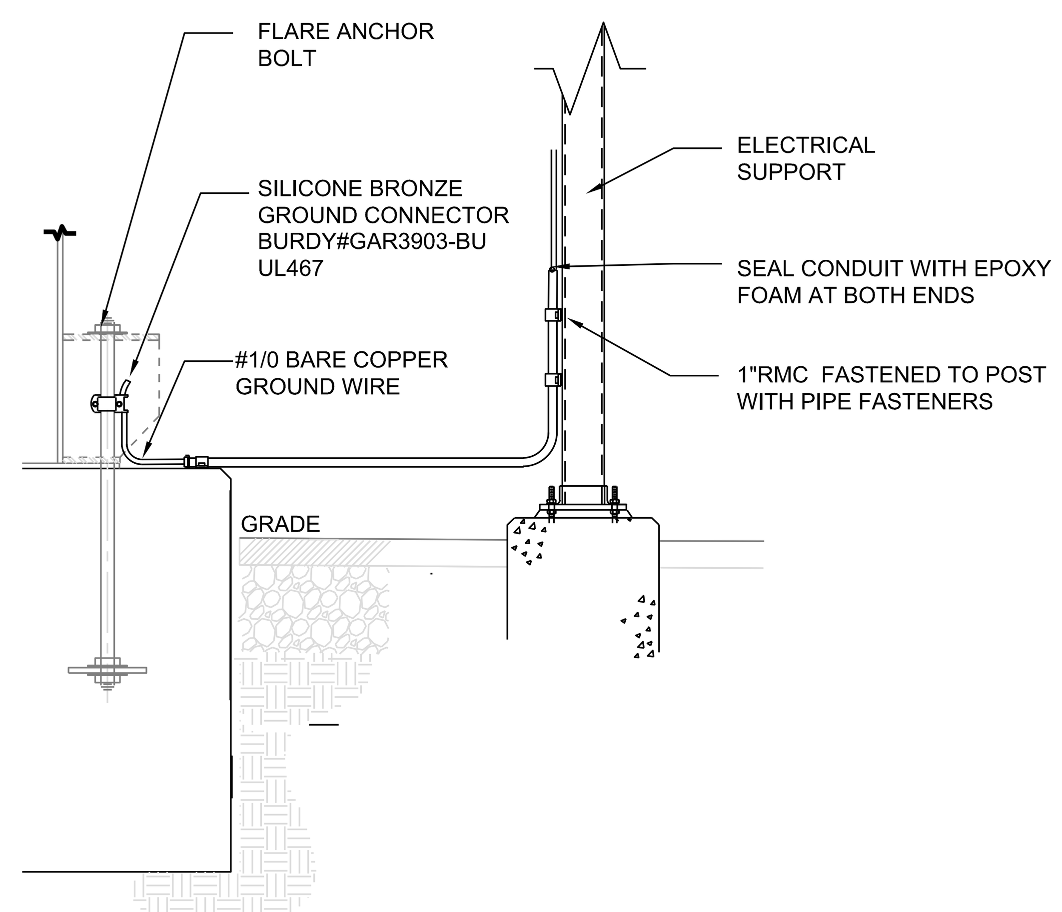
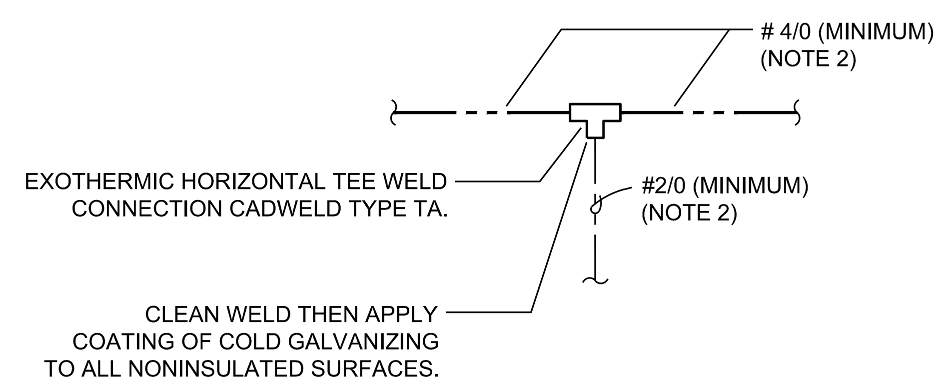
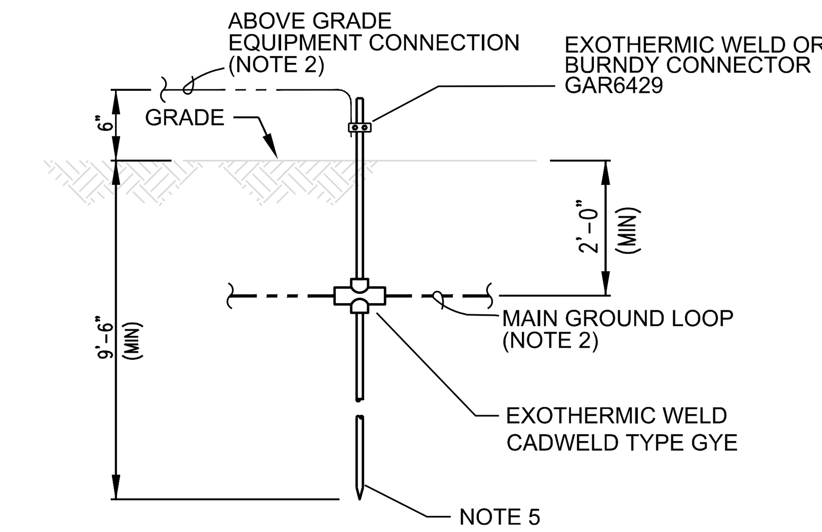


FLARE GROUNDING
DETAIL
SCALE: NONE
E3A

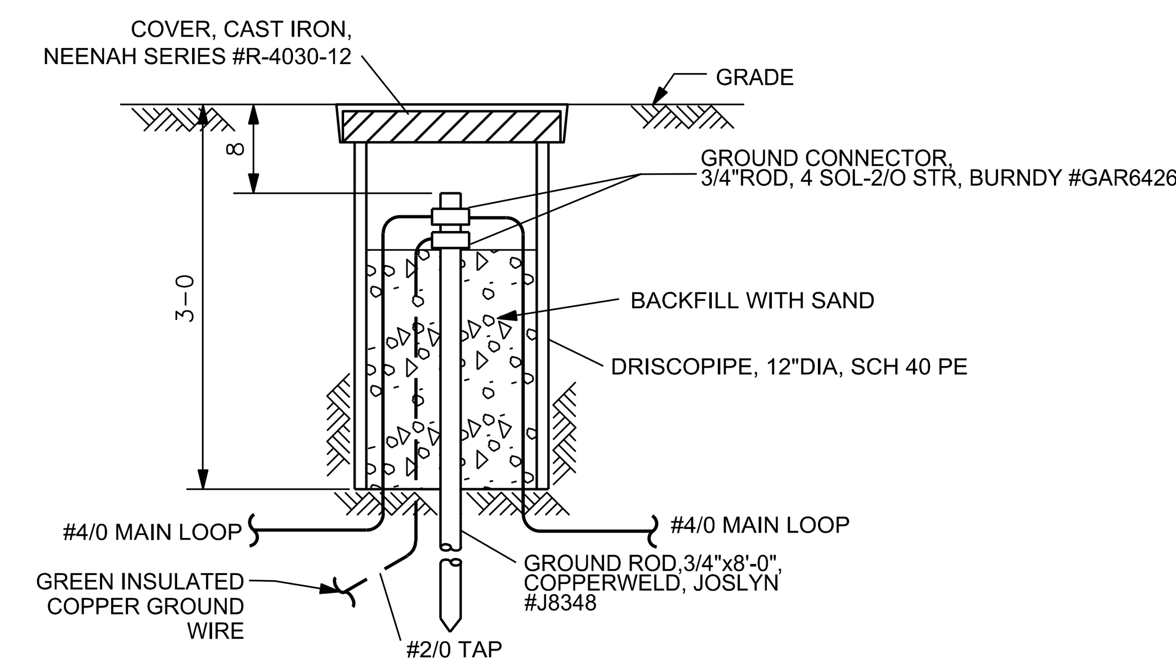


LEGEND SYMBOL: ●

UNDERGROUND TAP
#4/0 MAIN GROUND LOOP
DETAIL
SCALE: NONE
E3A



GROUND ROD
ABOVE GRADE CONNECTION WITH MAIN GROUND LOOP
DETAIL
SCALE: NONE
E3A



GROUND TEST WELL
DETAIL
SCALE: NONE
E3A

NOTES

1. CABLE TERMINALS TO BE EQUAL TO BURNDY "EA."
2. ALL GROUND WIRE TO BE STRANDED COPPER WITH GREEN 600V XHHW OR THW INSULATION.
3. MOTOR CONTROL CENTERS AND SWITCH GEAR SHALL HAVE A MINIMUM OF TWO "MAIN GROUND LOOP" SIZED GROUND CONNECTIONS FROM THE EQUIPMENT GROUND BUS DIRECTLY TO THE MAIN GROUND LOOP.
4. SERVIT POST SHALL BE EQUAL TO BURNDY "KC"
5. GROUND ROD TO BE 3/4" x 10' GALVANIZED STEEL. FOR EFFECTIVE USE OF GROUND ROD, RODS SHALL BE SPACED A MINIMUM OF 20' APART. REMOVE ROD GALVANIZING TO BARE STEEL BEFORE MAKING EXOTHERMIC (CADWELD) CONNECTION. THAN APPLY COATING OF COLD GALVANIZING TO ALL BARE METAL NON-GALVANIZED SURFACES.
6. SECURE PVC CONDUIT TO CONCRETE AT TWO LOCATIONS WITH CONDUIT CLAMPS.
7. MAIN GROUND LOOP TO BE DESIGNED ACCORDING TO FACILITY REQUIREMENTS BUT NOT SMALLER THAN #1/0.

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PROJECT
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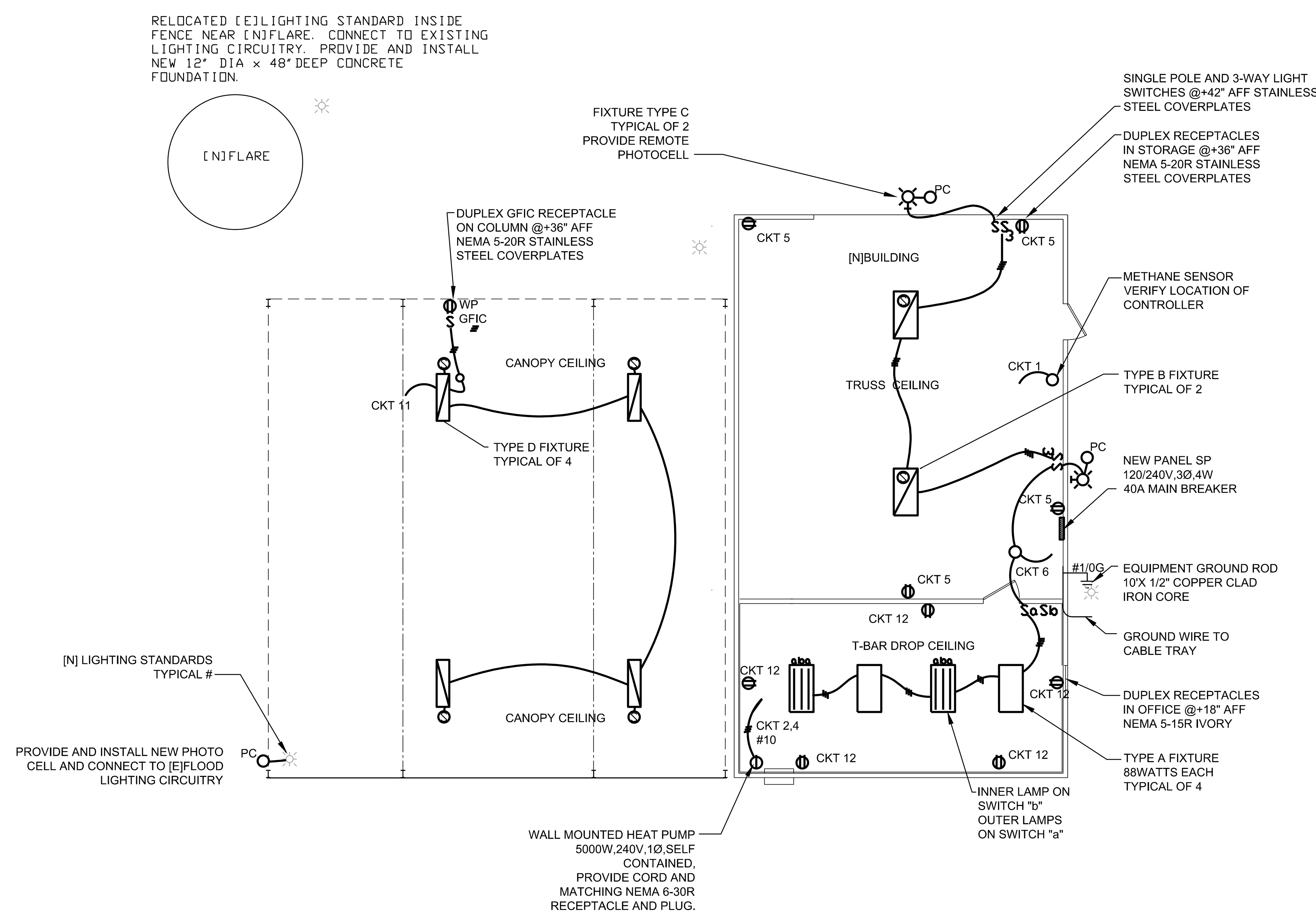
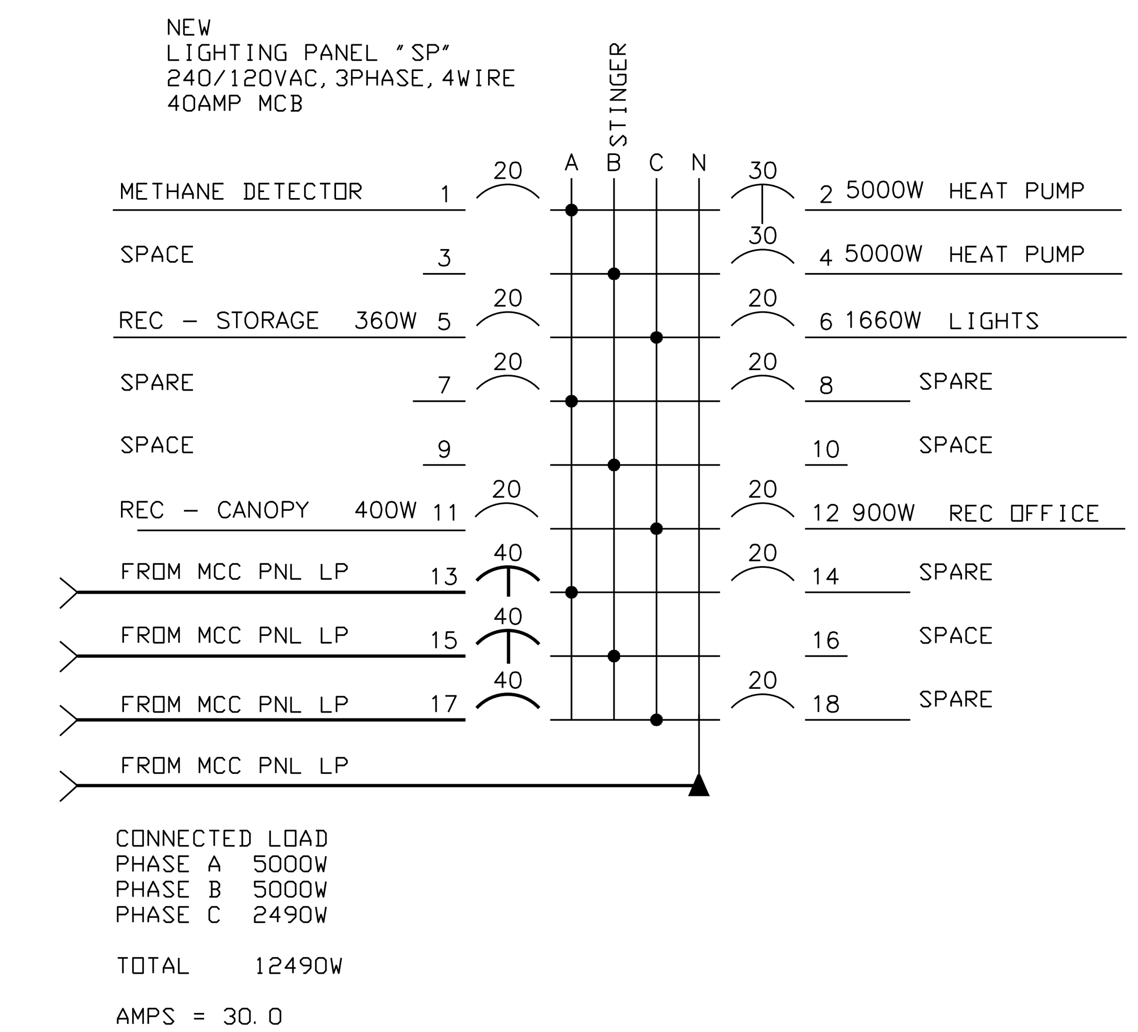
2016 GCCS EXPANSION

TITLE
BLOWER FLARE MODIFICATIONS
ELECTRICAL DETAILS

PROJECT No. 1420152 | Rev. 1 | 33 of 58 | DRAWING E5A



STORAGE BUILDING / CANOPY ELECTRICAL FLOOR PLAN



PANEL SCHEDULE

LIGHTING FIXTURE SCHEDULE

TYPE	WATTAGE	DESCRIPTION
FIXTURE TYPE A	3-32WT8 CW LAMPS	2X4 RECESSED T-BAR FIXTURE PRISMATIC LENS, 2-BALLAST
FIXTURE TYPE B	4-T5HO 57WATT LAMPS	2X4 LOWBAY FLUORESCENT PENDENT SECULAR REFLECTOR, MOTION SENSOR
FIXTURE TYPE C	1-ARRAY 60WATT LED 5000K	LED FLOOD IN WALL PACK @+12'-0" 13"Wx9"H IP65 W/REMOTE PHOTOCELL
FIXTURE TYPE D	2-T5HO 57WATT LAMPS	2X4 ENCLOSED FLUORESCENT PENDENT UL WET LOCATIONS, REMOTE MOTION SENSOR

CONSTRUCTION NOTE

1. CIRCUITRY SHALL BE IN CONDUIT AT ALL TIMES. CONDUIT CONCEALED IN WALLS OR CEILINGS SHALL BE EMT, RMC, OR IMC. CONDUIT IN EXPOSED AREAS IN STORAGE OR UNDER CANOPY SHALL BE GALVINIZED RIGID METAL CONDUIT "RMC".
2. PROVIDE AND INSTALL APPROVED AUTOMATIC FIRE ALARM SYSTEM. IF REQUIRED BY CODE.
3. LIGHTING FIXURE INSTALLATION SHALL MEET REQUIREMENTS IN CALIFORNIA TITLE 24 ENERGY COMPLIANCE REGULATIONS.

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0' 10' 20'
SCALE: 1.5"=20'

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PROJECT
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2016 GCCS EXPANSION

TITLE
BLOWER FLARE MODIFICATIONS
ELECTRICAL FLOOR PLAN -
STORAGE BUILDING

PROJECT No. 1420152 | Rev. 1 | 35 of 48 | DRAWING E6A

APPENDIX B
ALTERNATIVES TO LANDFILL NEW SOURCE PERFORMANCE STANDARDS (NSPS) REQUIREMENTS

1 ALTERNATIVE TO LANDFILL NSPS REQUIREMENTS

> **§60.752(b)(2)(i)(B)** The collection and control system design plan shall include any alternatives to the operational standards, test methods, procedures, compliance measures, monitoring, record keeping or reporting provisions of §60.753 through §60.758 proposed by the owner or operator.

Pursuant to Code of Federal Regulations (CFR) Title 40 Part 60 (known as New Source Performance Standards [NSPS]) Section (§)60.752(b)(2)(i)(B), a landfill gas collection and control system (GCCS) design plan may include proposed alternative procedures to the operational standards, test methods, procedures, compliance measures, monitoring, record keeping and reporting provisions of §60.753 through §60.758 in the NSPS. This section of the landfill GCCS design plan report identifies proposed exemptions/alternatives to the NSPS.

1.1 Temporary Partial GCCS Shutdowns

From time to time during normal operation and maintenance of the GCCS, control valves in the collection system must be closed in order to isolate a portion of the system for troubleshooting, maintenance, or addition of new wells. During such periods, wells in the temporary closure area may exhibit positive pressure for the static reading on the wellhead and gas collection header. The WPWMA requests this flexibility and notes that these temporary events will be documented as Startup, Shutdown and Malfunction (SSM) events as defined in the site's SSM Plan with proper documentation.

Exclusion of Leachate System from Operating Parameters

> **§60.753(c)** Operational Standards: "Operate each interior wellhead in the collection system with a LFG temperature less than 55 degrees Celsius and with either a nitrogen level less than 20 percent or an oxygen level less than 5 percent. The owner or operator may establish a higher operating temperature, nitrogen, or oxygen value at a particular well. A higher operating value demonstration shall show supporting data that the elevated parameter does not cause fires or significantly inhibit anaerobic decomposition by killing methanogens."

The GCCS may include future connections to leachate manholes and cleanout risers to extract LFG from the leachate collection system for interim odor and surface emissions control. Industry experience at other NSPS sites shows that leachate collection manholes and cleanout risers sometimes contain concentrations of nitrogen and oxygen similar to that of ambient air, above the NSPS thresholds. This is due to the fact that the leachate collection system is not an air-tight vacuum system, and was not designed as such. However, it does provide a valuable collection point for LFG, since LFG production tends to be heaviest in areas of moist refuse (such as that found directly above the leachate drainage layer).

Unlike the vertical gas extraction wells, the leachate manhole draws from the leachate collection system beneath the refuse. Therefore, concentrations of air within these extraction points will not cause subsurface oxidation within the refuse, as could potentially happen in a classic vertical extraction well within refuse. Therefore, WPWMA requests that the pressure and nitrogen/oxygen exceedance limits not apply to leachate cleanout risers and leachate manhole extraction points.

Determination of Oxygen Levels at Monitoring Points

> **§60.753(c)(2)** Operational Standards: "Unless an alternative test method is established as allowed by § 60.752(b)(2)(i) of this subpart, the oxygen shall be determined by an oxygen meter using Method 3A or 3C ... "

When applicable, WPWMA proposes to use a portable on-site multi-gas analyzer, in lieu of a laboratory method, for determining the oxygen content of the LFG at each vertical extraction well and monitoring point. The site will be using a portable meter, such as a Landtec GEM-2000 or equivalent, calibrated to the manufacturer's specifications, to determine the oxygen content of the LFG. This is acceptable to and has previously been approved by the USEPA.

Monitoring of Extraction Wells in Active Fill Areas

> **§60.755(a)(3)** Compliance Provisions: "For the purpose of demonstrating whether the gas collection system flow rate is sufficient to determine compliance with §60.752(b)(2)(ii)(A)(3), the owner or operator shall measure gauge pressure in the gas collection header at each individual well, monthly."
>
> **§60.755(a)(5)** Compliance Provisions: "For the purpose of identifying whether excess air infiltration into the landfill is occurring, the owner or operator shall monitor each well monthly for temperature and nitrogen or oxygen as provided in § 60.753(c)."
>
> **§60.756(a)** Monitoring of Operations: "Except as provided in §60.752(b)(2)(i)(B), Each owner or operator seeking to comply with §60.752(b)(2)(ii)(A) for an active gas collection system shall install a sampling port and a thermometer, other temperature measuring device, or an access port for temperature measurements at each wellhead and:
>
>> (l) Measure the gauge pressure in the gas collection header on a monthly basis as provided in §60.755(a)(3); and
>>
>> (2) Monitor nitrogen or oxygen concentration in the LFG on a monthly basis as provided in §60.755(a)(5); and

(3) Monitor temperature of the LFG on a monthly basis as provided in §60.755(a)(5)."

Future vertical extraction wells may be placed in the active areas several years before the waste has reached final elevation grades. This is in compliance with the NSPS. However, since the vertical extraction wells are placed in active areas, they periodically need to be "raised" (i.e., the well casing extended 15 feet to 25 feet vertically) in order to not be buried under lifts of waste. In such cases, the well is temporarily disconnected until the surrounding lift of waste is brought high enough to reconnect the well to the collection system. The time period between when a vertical extraction well is disconnected and raised, and when the waste height is high enough to reconnect the lateral pipeline riser, may range from a few weeks to a few months. This can result in missed monthly readings at the vertical extraction well, since the well casing is too high for the technician to safely reach.

Since the NSPS allows for exclusion of surface monitoring in "dangerous areas" of the site, WPWMA believes it is reasonable to request exclusion to monitoring the vertical extraction wells raised in active areas. WPWMA proposes that readings will be missed at a particular vertical extraction well, for up to two (2) months, as long as the vertical extraction well cannot be safely accessed. If WPWMA cannot bring the waste height up to the new grade and re-attach the vertical extraction well within a two (2) month period, then modifications to the lateral pipeline riser and wellhead assembly (such as the vertical extraction well being cut back down and re-attached) will be made for monitoring. This request is in accordance with §60.752(b)(2)(i)(B), which allows the operator to propose alternatives to the monitoring procedures in the NSPS.

Start-Up of New or Replacement Wells

§60.755(a)(4) Compliance Provisions: "Owners or operators are not required to expand the system as required in paragraph (a)(3) of this section during the first 180 days after gas collection system startup."

Landfill GCCS are typically built in phases to accommodate for additional waste placement and occasionally require the installation of new or replacement vertical extraction wells due to settlement, damage, etc. Installation of one or a few new or replacement vertical extraction wells can cause challenges with balancing the entire system and therefore may require additional time to not only achieve negative pressure in all vertical extraction wells but to also maintain the operating standard for oxygen, nitrogen, and/or temperature.

Per 40 CFR §60.755(a)(4), the Landfill is not required to expand the system during the first 180 days after GCCS start-up where pressure exceedances were recorded at one or more vertical extraction wells. Given the wellfield balancing challenges, WPWMA proposes that the exemption from system expansion applies to any individual vertical extraction well or series of vertical extraction wells associated with the new or replacement vertical extraction wells upon start-up.

2 ALTERNATIVE COMPLIANCE OPTIONS TO CALIFORNIA CODE OF REGULATIONS - PREVIOUSLY APPROVED

WPWMA previously submitted a proposal for alternative compliance options to CCR Title 17, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 6 (Title 17) to the PCAPCD. PCAPCD responded and approved various alternatives in an August 7, 2012 letter. The approved alternatives are presented below.

Methane Destruction Compliance Parameter - Flares

> **CCR §95464(b)(2)(A)(4)** requires that an enclosed flare operated as a control device be operated within the parameter ranges established during the initial or most recent source test.

Approved alternative: PCAPCD believes that it is reasonable that there be a tolerance on the flare operating temperature. If the last source test were used as the minimum operating temperature, then the allowable flare temperature would continually ratchet up with subsequent flare tests. PCAPCD accepts the requested 50 degree Fahrenheit below source test request. However, flare temperature is not the only compliance parameter. The methane destruction efficiency of at least 99 percent by weight of 95464(B)(2)(A)(1) must be demonstrated by annual or triennial source test. PCAPCD plans to amend the flare permits to include the annual methane destruction test.

Source Test Methods

> **CCR §95464(b)(4)** requires annual compliance testing of the control devices specifies the use of the test methods identified in CCR 95471(f), as follows: USEPA Methods 18, 25, 25A, or 25C.

Approved alternative: PCAPCD intends to add to the flare permits the 99 percent methane destruction requirement and use the test methods required in the permits. So the SEM should state that the test methods are called out in the permits. The Landfill Regulation requires flare testing annually until the destruction limit is achieved three (3) years consecutively, and then the testing frequency can be extended to three (3) years. The testing frequency in PCAPCD permits is biennially. Once the three (3) consecutive years of meeting the methane destruction requirement is achieved, PCAPCD intends to require the methane testing biennially with the other flare testing.

Wellhead Pressure Requirements

> **CCR §95469(c)** requires corrective action if monthly wellhead pressure monitoring results in a positive pressure reading except as exempted in CCR 95464(d) (well raising) and CCR 95464(e) (temporary shutdown in order to repair the components, due to catastrophic events such as earthquakes, to connect new LFG collection system components to the existing system, to extinguish landfill fires, or to perform construction activities.)

Approved alternative: PCAPCD approved the WPWMA request to allow temporary exemption from well head pressure requirements due to potential subsurface oxidation, well damage, poor LFG quality, or other reasons as documented by the WPWMA not listed in §95469. The event is to be described to the PCAPCD in writing and PCAPCD must concur.

Wellhead Pressure Exceedance Corrective Action

> **CCR §95469(c)(2)** requires further corrective actions be initiated, including, but not limited to, any necessary expansion of the GCCS, to correct any positive pressure readings if positive pressure readings cannot be corrected within 15 days after the initial positive pressure reading. CCR 95469(c)(3) requires corrective action, including any necessary expansion of the GCCS, to correct any positive pressure readings within 120 days of the initial positive pressure reading.

Approved alternative: PCAPCD will consider requests for alternative engineering solutions to be evaluated and allow an alternative timeline to consider and implement alternative solutions. This will require concurrence by PCAPCD for the engineering study and implementation.

Wellhead Negative Pressure Requirements

> **CCR §95464(c)** requires that wellheads be operated under negative pressure except as noted in CCR 95464(c)(d) or (e).

Approved alternative: PCAPCD concurred with WPWMA's interpretation is that this applies to wells within the limit of the waste and not to perimeter wells or soil vapor extraction wells which are not in refuse and are not extracting LFG, consistent with the NSPS.

Continuous Routing of LFG/Operations of GCCS

> **CCR §95464(b)(1)(A)** requires that the owner or operator of a GCCCS "Route the collected gas to a gas control device or devices, and operate the gas collection and control system continuously except as provided in CCR 95464(d) and (e)".

Approved alternative: PCAPCD will accept WPWMA's interpretation, consistent with the NSPS, that GCCS downtime of less than five (5) days and/or control device downtime of less than one (1) hour not be considered reportable deviations, and therefore only subject to the SSM reporting requirements.

Surface Emissions Monitoring Requirements

The sections below present the alternatives approved by PCPAPCD in their August 7, 2012 letter for surface emissions monitoring requirements.

Areas Excluded from Collection and SEM

> **CCR §95464(a)(1)(F)(1)** allows any areas of the landfill that contain only asbestos-containing waste, inert waste, or non-decomposable solid waste may be excluded from collection.

Approved alternative: Any areas of the landfill that contain only asbestos-containing waste, inert waste or non-decomposable solid waste may be excluded from collection and SEM.

Areas Excluded from SEM Where Safety Issues Exist

> **CCR §95471(c)(1)** requires that **t**he entire landfill surface must be divided into individually identified 50,000 square foot grids. The grids must be used for both instantaneous and integrated SEM.

Approved alternative: PCAPCD accepts and allows the exclusion of areas of greater than 25 percent slope.

Re-monitoring After Instantaneous and Integrated Exceedances

> **CCR §95469(a)(1)(B) and (a)(2)(B)** require correct action be taken by the owner or operator require corrective action be taken by the owner or operator such as, but not limited to, cover maintenance or repair, or well vacuum adjustments and location re-monitored within ten calendar days of a measured exceedance of the instantaneous and/or integrated surface emission standards.

Approved alternative: PCAPCD will allow additional time for re-monitoring in cases where the area is dangerous or cannot be safely reached.

SEM Remediation after Third Instantaneous and/or Third Integrated SEM Exceedance

CCR §95469(a)(1)(B)(2) and (a)(2)(B)(2) require the installation of a new or replacement well within 120 calendar days of detecting a third exceedance of the Instantaneous SEM limit of CCR 95465(a)(l) and/or the Integrated SEM limit of CCR 95465(a)(2).

Approved alternative: PCAPCD will allow other modifications than just additional wells, as appropriate, to correct exceedances. A corresponding alternative compliance timeline beyond 120 days will be allowed, as appropriate.

SEM Monitoring Height

CCR §95471(c)(1)(A) requires that SEM be conducted by holding the probe within three (3) inches of the landfill surface while traversing the grid.

Approved alternative: If an area clear of surface vegetation cannot be found in the walking path, PCAPCD will allow the top of the vegetation to be considered the landfill surface and the probe be held within three inches vertical of the vegetation surface.

Wind Speed

CCR §95471(c)(1)(C) requires that SEM must be terminated when the average wind speed exceeds file miles per hour or the instantaneous wind speed exceeds 10 miles per hour.

Approved alternative: PCAPCD will accept the alternative wind speeds of 10 miles per hour for average wind and 20 miles per hour for instantaneous wind speed.

Measurable Precipitation

CCR §95471(c)(1)(D) requires that SEM must be conducted only when there has been no measurable precipitation in the preceding 72 hours.

Approved alternative: PCAPCD will allow SEM to be conducted only when there has been no measurable precipitation in the preceding 24 hours. WPWMA shall minimize the times when SEM is conducted with precipitation in the preceding 24 to 72 hours.

Grid Areas – Near Landfill Waste Boundaries

> **CCR §95471(c)(1)** requires that the entire landfill surface must be divided into individually identified 50,000 square foot grids. The grids must be used for both instantaneous and integrated SEM.

Approved alternative: Since landfills are not sized in 50,000 square foot increments, PCAPCD will allow along waste area boundaries and around areas that cannot be subjected to SEM due to safety reasons, grid segments that are slightly larger or smaller than 50,000 square feet.

Closed Areas – Reduction to Annual SEM

> **CCR §95469(a)(3)** allows an owner or operator of a closed or inactive MSWQ landfill, or any closed or inactive areas on an active MSW landfill that can demonstrate that in the three years before the effective date of this subarticle that there were no measured exceedances of the limits specified in 95469 by annual or quarterly monitoring may monitor annually.

Approved alternative: PCAPCD will allow closed areas designated as Modules 1, 2, 10 and 11 to be tested annually. If an exceedance of the limits is measured, the testing of the affected area hall return to quarterly testing.

APPENDIX C

LANDGEM LANDFILL GAS EMISSIONS MODELING

Summary Report

Landfill Name or Identifier: Western Regional Sanitary Landfill

Date: Friday, October 28, 2016

Description/Comments:
LandGEM analysis for low food waste diversion case (34.5% food waste average after 2021)

About LandGEM:

First-Order Decomposition Rate Equation:

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} k L_o \left(\frac{M_i}{10} \right) e^{-k t_{ij}}$$

Where,
Q_{CH4} = annual methane generation in the year of the calculation (*m^3/year*)
i = 1-year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1-year time increment
k = methane generation rate (*$year^{-1}$*)
L_o = potential methane generation capacity (*m^3/Mg*)

M_i = mass of waste accepted in the i^{th} year (*Mg*)
t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (*decimal years*, e.g., 3.2 years)

LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model defaults are based on empirical data from U.S. landfills. Field test data can also be used in place of model defaults when available. Further guidance on EPA test methods, Clean Air Act (CAA) regulations, and other guidance regarding landfill gas emissions and control technology requirements can be found at http://www.epa.gov/ttnatw01/landfill/landflpg.html.

LandGEM is considered a screening tool — the better the input data, the better the estimates. Often, there are limitations with the available data regarding waste quantity and composition, variation in design and operating practices over time, and changes occurring over time that impact the emissions potential. Changes to landfill operation, such as operating under wet conditions through leachate recirculation or other liquid additions, will result in generating more gas at a faster rate. Defaults for estimating emissions for this type of operation are being developed to include in LandGEM along with defaults for convential landfills (no leachate or liquid additions) for developing emission inventories and determining CAA applicability. Refer to the Web site identified above for future updates.

Input Review

LANDFILL CHARACTERISTICS

Landfill Open Year	**1979**	
Landfill Closure Year (with 80-year limit)	**2056**	
Actual Closure Year (without limit)	***2056***	
Have Model Calculate Closure Year?	**No**	
Waste Design Capacity		*short tons*

MODEL PARAMETERS

Methane Generation Rate, k	**0.036**	*$year^{-1}$*
Potential Methane Generation Capacity, L_o	**116**	*m^3/Mg*
NMOC Concentration	**595**	*ppmv as hexane*
Methane Content	**50**	*% by volume*

GASES / POLLUTANTS SELECTED

Gas / Pollutant #1:	**Total landfill gas**
Gas / Pollutant #2:	**Methane**
Gas / Pollutant #3:	**Carbon dioxide**
Gas / Pollutant #4:	**NMOC**

WASTE ACCEPTANCE RATES

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*
1979	1,610	1,771	0	0
1980	36,205	39,826	1,610	1,771
1981	37,272	40,999	37,815	41,597
1982	39,026	42,929	75,087	82,596
1983	66,034	72,637	114,114	125,525
1984	99,795	109,775	180,147	198,162
1985	116,264	127,890	279,943	307,937
1986	132,545	145,799	396,206	435,827
1987	140,678	154,746	528,751	581,626
1988	186,641	205,305	669,429	736,372
1989	170,483	187,531	856,070	941,677
1990	170,042	187,046	1,026,553	1,129,208
1991	166,837	183,521	1,196,595	1,316,254
1992	168,149	184,964	1,363,432	1,499,775
1993	171,245	188,370	1,531,581	1,684,739
1994	158,437	174,281	1,702,826	1,873,109
1995	165,445	181,989	1,861,264	2,047,390
1996	165,146	181,661	2,026,708	2,229,379
1997	160,968	177,065	2,191,855	2,411,040
1998	181,424	199,566	2,352,823	2,588,105
1999	202,045	222,250	2,534,246	2,787,671
2000	235,023	258,525	2,736,292	3,009,921
2001	249,346	274,281	2,971,315	3,268,446
2002	266,225	292,847	3,220,661	3,542,727
2003	227,683	250,451	3,486,885	3,835,574
2004	233,951	257,346	3,714,568	4,086,025
2005	244,051	268,456	3,948,519	4,343,371
2006	256,545	282,199	4,192,570	4,611,827
2007	242,057	266,263	4,449,115	4,894,027
2008	217,299	239,029	4,691,172	5,160,290
2009	200,534	220,587	4,908,472	5,399,319
2010	187,152	205,867	5,109,005	5,619,906
2011	189,136	208,050	5,296,157	5,825,773
2012	181,798	199,978	5,485,293	6,033,822
2013	194,106	213,516	5,667,091	6,233,800
2014	198,375	218,213	5,861,197	6,447,317
2015	212,976	234,274	6,059,572	6,665,530
2016	202,644	222,908	6,272,549	6,899,804
2017	201,331	221,464	6,475,192	7,122,712
2018	193,676	213,044	6,676,523	7,344,175

WASTE ACCEPTANCE RATES (Continued)

Year	Waste Accepted		Waste-In-Place	
	(Mg/year)	(short tons/year)	(Mg)	(short tons)
2019	196,484	216,133	6,870,199	7,557,219
2020	199,405	219,345	7,066,683	7,773,352
2021	203,097	223,406	7,266,088	7,992,697
2022	206,986	227,685	7,469,185	8,216,103
2023	210,951	232,046	7,676,171	8,443,788
2024	214,992	236,491	7,887,122	8,675,834
2025	219,112	241,023	8,102,114	8,912,325
2026	223,311	245,642	8,321,226	9,153,348
2027	227,592	250,351	8,544,537	9,398,991
2028	231,955	255,150	8,772,129	9,649,341
2029	236,403	260,043	9,004,084	9,904,492
2030	240,937	265,030	9,240,486	10,164,535
2031	245,558	270,114	9,481,423	10,429,565
2032	250,269	275,296	9,726,981	10,699,679
2033	255,072	280,579	9,977,250	10,974,976
2034	259,967	285,964	10,232,322	11,255,554
2035	264,957	291,453	10,492,289	11,541,518
2036	270,044	297,048	10,757,246	11,832,971
2037	275,229	302,752	11,027,290	12,130,019
2038	280,515	308,567	11,302,519	12,432,771
2039	285,903	314,494	11,583,034	12,741,338
2040	291,396	320,536	11,868,938	13,055,832
2041	296,995	326,695	12,160,334	13,376,367
2042	302,703	332,973	12,457,329	13,703,062
2043	308,521	339,373	12,760,032	14,036,035
2044	314,453	345,898	13,068,553	14,375,409
2045	320,499	352,549	13,383,006	14,721,306
2046	326,662	359,329	13,703,505	15,073,855
2047	332,945	366,240	14,030,167	15,433,184
2048	339,351	373,286	14,363,112	15,799,424
2049	345,880	380,468	14,702,463	16,172,709
2050	352,536	387,789	15,048,343	16,553,177
2051	359,321	395,253	15,400,879	16,940,967
2052	366,238	402,862	15,760,200	17,336,220
2053	373,289	410,618	16,126,438	17,739,082
2054	373,289	410,618	16,499,727	18,149,700
2055	373,289	410,618	16,873,017	18,560,318
2056	0	0	17,246,306	18,970,937
2057	0	0	17,246,306	18,970,937
2058	0	0	17,246,306	18,970,937

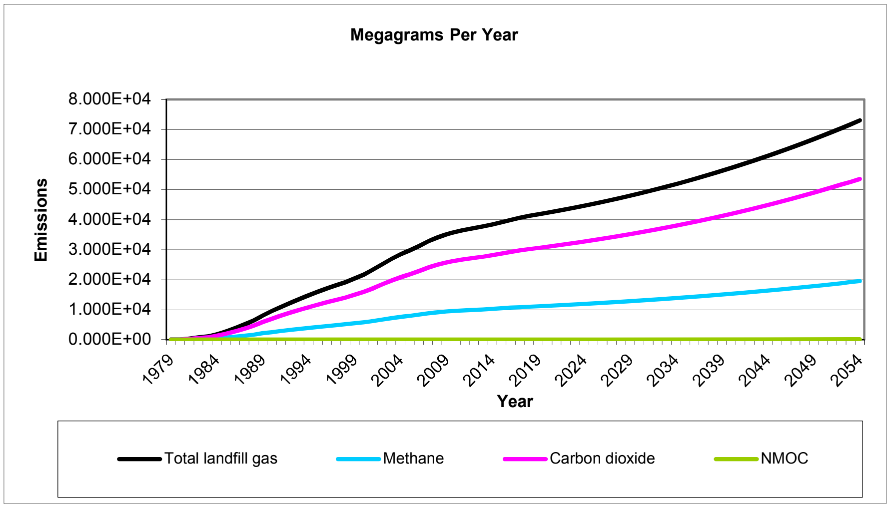
Pollutant Parameters

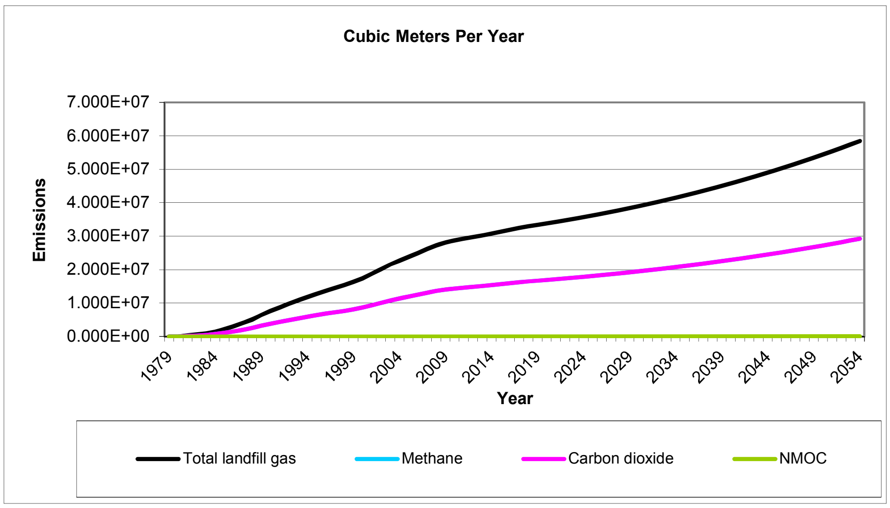
	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Gases	Total landfill gas		0.00		
	Methane		16.04		
	Carbon dioxide		44.01		
	NMOC	4,000	86.18		
Pollutants	1,1,1-Trichloroethane (methyl chloroform) - HAP	0.48	133.41		
	1,1,2,2-Tetrachloroethane - HAP/VOC	1.1	167.85		
	1,1-Dichloroethane (ethylidene dichloride) - HAP/VOC	2.4	98.97		
	1,1-Dichloroethene (vinylidene chloride) - HAP/VOC	0.20	96.94		
	1,2-Dichloroethane (ethylene dichloride) - HAP/VOC	0.41	98.96		
	1,2-Dichloropropane (propylene dichloride) - HAP/VOC	0.18	112.99		
	2-Propanol (isopropyl alcohol) - VOC	50	60.11		
	Acetone	7.0	58.08		
	Acrylonitrile - HAP/VOC	6.3	53.06		
	Benzene - No or Unknown Co-disposal - HAP/VOC	1.9	78.11		
	Benzene - Co-disposal - HAP/VOC	11	78.11		
	Bromodichloromethane - VOC	3.1	163.83		
	Butane - VOC	5.0	58.12		
	Carbon disulfide - HAP/VOC	0.58	76.13		
	Carbon monoxide	140	28.01		
	Carbon tetrachloride - HAP/VOC	4.0E-03	153.84		
	Carbonyl sulfide - HAP/VOC	0.49	60.07		
	Chlorobenzene - HAP/VOC	0.25	112.56		
	Chlorodifluoromethane	1.3	86.47		
	Chloroethane (ethyl chloride) - HAP/VOC	1.3	64.52		
	Chloroform - HAP/VOC	0.03	119.39		
	Chloromethane - VOC	1.2	50.49		
	Dichlorobenzene - (HAP for para isomer/VOC)	0.21	147		
	Dichlorodifluoromethane	16	120.91		
	Dichlorofluoromethane - VOC	2.6	102.92		
	Dichloromethane (methylene chloride) - HAP	14	84.94		
	Dimethyl sulfide (methyl sulfide) - VOC	7.8	62.13		
	Ethane	890	30.07		
	Ethanol - VOC	27	46.08		

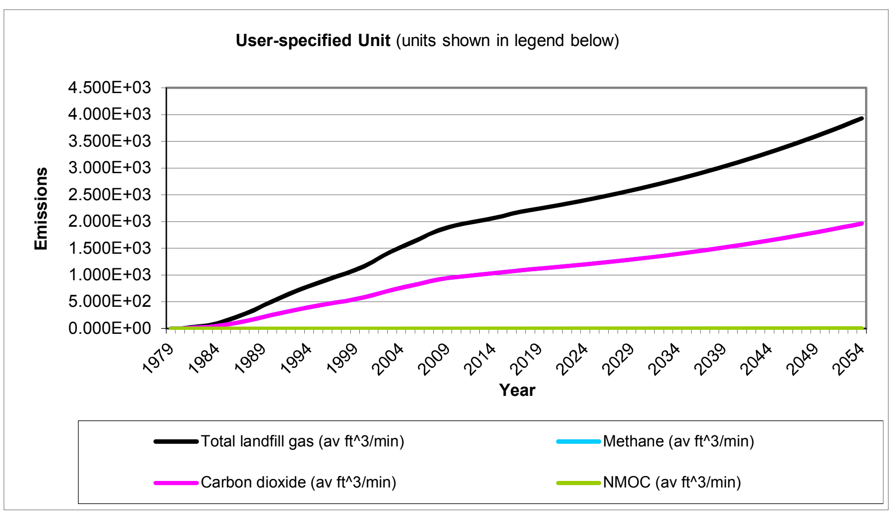
Pollutant Parameters (Continued)

	Gas / Pollutant Default Parameters:			User-specified Pollutant Parameters:	
	Compound	Concentration (*ppmv*)	Molecular Weight	Concentration (*ppmv*)	Molecular Weight
Pollutants	Ethyl mercaptan (ethanethiol) - VOC	2.3	62.13		
	Ethylbenzene - HAP/VOC	4.6	106.16		
	Ethylene dibromide - HAP/VOC	1.0E-03	187.88		
	Fluorotrichloromethane - VOC	0.76	137.38		
	Hexane - HAP/VOC	6.6	86.18		
	Hydrogen sulfide	36	34.08		
	Mercury (total) - HAP	2.9E-04	200.61		
	Methyl ethyl ketone - HAP/VOC	7.1	72.11		
	Methyl isobutyl ketone - HAP/VOC	1.9	100.16		
	Methyl mercaptan - VOC	2.5	48.11		
	Pentane - VOC	3.3	72.15		
	Perchloroethylene (tetrachloroethylene) - HAP	3.7	165.83		
	Propane - VOC	11	44.09		
	t-1,2-Dichloroethene - VOC	2.8	96.94		
	Toluene - No or Unknown Co-disposal - HAP/VOC	39	92.13		
	Toluene - Co-disposal - HAP/VOC	170	92.13		
	Trichloroethylene (trichloroethene) - HAP/VOC	2.8	131.40		
	Vinyl chloride - HAP/VOC	7.3	62.50		
	Xylenes - HAP/VOC	12	106.16		

Graphs


Megagrams Per Year
Emissions
8.000E+04
7.000E+04
6.000E+04
5.000E+04
4.000E+04
3.000E+04
2.000E+04
1.000E+04
0.000E+00
1979 1984 1989 1994 1999 2004 2009 2014 2019 2024 2029 2034 2039 2044 2049 2054
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


Cubic Meters Per Year
Emissions
7.000E+07
6.000E+07
5.000E+07
4.000E+07
3.000E+07
2.000E+07
1.000E+07
0.000E+00
1979 1984 1989 1994 1999 2004 2009 2014 2019 2024 2029 2034 2039 2044 2049 2054
Year
Total landfill gas
Methane
Carbon dioxide
NMOC


User-specified Unit (units shown in legend below)
Emissions
4.500E+03
4.000E+03
3.500E+03
3.000E+03
2.500E+03
2.000E+03
1.500E+03
1.000E+03
5.000E+02
0.000E+00
1979 1984 1989 1994 1999 2004 2009 2014 2019 2024 2029 2034 2039 2044 2049 2054
Year
Total landfill gas (av ft^3/min)
Methane (av ft^3/min)
Carbon dioxide (av ft^3/min)
NMOC (av ft^3/min)

Results

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1979	0	0	0	0	0	0
1980	1.654E+01	1.324E+04	8.898E-01	4.417E+00	6.621E+03	4.449E-01
1981	3.879E+02	3.106E+05	2.087E+01	1.036E+02	1.553E+05	1.043E+01
1982	7.570E+02	6.062E+05	4.073E+01	2.022E+02	3.031E+05	2.036E+01
1983	1.131E+03	9.057E+05	6.086E+01	3.021E+02	4.529E+05	3.043E+01
1984	1.769E+03	1.417E+06	9.520E+01	4.726E+02	7.084E+05	4.760E+01
1985	2.732E+03	2.188E+06	1.470E+02	7.297E+02	1.094E+06	7.349E+01
1986	3.830E+03	3.067E+06	2.060E+02	1.023E+03	1.533E+06	1.030E+02
1987	5.056E+03	4.048E+06	2.720E+02	1.350E+03	2.024E+06	1.360E+02
1988	6.322E+03	5.062E+06	3.401E+02	1.689E+03	2.531E+06	1.701E+02
1989	8.016E+03	6.418E+06	4.313E+02	2.141E+03	3.209E+06	2.156E+02
1990	9.483E+03	7.594E+06	5.102E+02	2.533E+03	3.797E+06	2.551E+02
1991	1.089E+04	8.724E+06	5.862E+02	2.910E+03	4.362E+06	2.931E+02
1992	1.222E+04	9.788E+06	6.576E+02	3.265E+03	4.894E+06	3.288E+02
1993	1.352E+04	1.082E+07	7.273E+02	3.611E+03	5.412E+06	3.637E+02
1994	1.480E+04	1.185E+07	7.962E+02	3.953E+03	5.925E+06	3.981E+02
1995	1.590E+04	1.273E+07	8.556E+02	4.248E+03	6.367E+06	4.278E+02
1996	1.704E+04	1.365E+07	9.168E+02	4.552E+03	6.823E+06	4.584E+02
1997	1.813E+04	1.452E+07	9.757E+02	4.844E+03	7.261E+06	4.878E+02
1998	1.915E+04	1.533E+07	1.030E+03	5.114E+03	7.666E+06	5.151E+02
1999	2.033E+04	1.628E+07	1.094E+03	5.431E+03	8.141E+06	5.470E+02
2000	2.169E+04	1.737E+07	1.167E+03	5.794E+03	8.684E+06	5.835E+02
2001	2.334E+04	1.869E+07	1.256E+03	6.233E+03	9.343E+06	6.278E+02
2002	2.507E+04	2.008E+07	1.349E+03	6.697E+03	1.004E+07	6.745E+02
2003	2.692E+04	2.156E+07	1.448E+03	7.191E+03	1.078E+07	7.242E+02
2004	2.831E+04	2.267E+07	1.523E+03	7.561E+03	1.133E+07	7.615E+02
2005	2.971E+04	2.379E+07	1.598E+03	7.936E+03	1.190E+07	7.992E+02
2006	3.117E+04	2.496E+07	1.677E+03	8.325E+03	1.248E+07	8.384E+02
2007	3.270E+04	2.618E+07	1.759E+03	8.734E+03	1.309E+07	8.797E+02
2008	3.403E+04	2.725E+07	1.831E+03	9.090E+03	1.362E+07	9.154E+02
2009	3.506E+04	2.807E+07	1.886E+03	9.364E+03	1.404E+07	9.431E+02
2010	3.588E+04	2.873E+07	1.930E+03	9.584E+03	1.436E+07	9.652E+02
2011	3.653E+04	2.925E+07	1.966E+03	9.758E+03	1.463E+07	9.828E+02
2012	3.718E+04	2.977E+07	2.001E+03	9.932E+03	1.489E+07	1.000E+03
2013	3.774E+04	3.022E+07	2.030E+03	1.008E+04	1.511E+07	1.015E+03
2014	3.840E+04	3.075E+07	2.066E+03	1.026E+04	1.537E+07	1.033E+03
2015	3.908E+04	3.129E+07	2.102E+03	1.044E+04	1.564E+07	1.051E+03
2016	3.988E+04	3.194E+07	2.146E+03	1.065E+04	1.597E+07	1.073E+03
2017	4.055E+04	3.247E+07	2.182E+03	1.083E+04	1.624E+07	1.091E+03
2018	4.119E+04	3.298E+07	2.216E+03	1.100E+04	1.649E+07	1.108E+03
2019	4.172E+04	3.341E+07	2.245E+03	1.114E+04	1.670E+07	1.122E+03
2020	4.226E+04	3.384E+07	2.274E+03	1.129E+04	1.692E+07	1.137E+03
2021	4.282E+04	3.429E+07	2.304E+03	1.144E+04	1.714E+07	1.152E+03
2022	4.339E+04	3.474E+07	2.334E+03	1.159E+04	1.737E+07	1.167E+03
2023	4.398E+04	3.522E+07	2.366E+03	1.175E+04	1.761E+07	1.183E+03
2024	4.459E+04	3.571E+07	2.399E+03	1.191E+04	1.785E+07	1.200E+03
2025	4.522E+04	3.621E+07	2.433E+03	1.208E+04	1.811E+07	1.217E+03
2026	4.588E+04	3.674E+07	2.468E+03	1.225E+04	1.837E+07	1.234E+03
2027	4.655E+04	3.727E+07	2.504E+03	1.243E+04	1.864E+07	1.252E+03
2028	4.724E+04	3.783E+07	2.542E+03	1.262E+04	1.891E+07	1.271E+03

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2029	4.795E+04	3.840E+07	2.580E+03	1.281E+04	1.920E+07	1.290E+03
2030	4.868E+04	3.898E+07	2.619E+03	1.300E+04	1.949E+07	1.310E+03
2031	4.944E+04	3.959E+07	2.660E+03	1.321E+04	1.979E+07	1.330E+03
2032	5.021E+04	4.021E+07	2.702E+03	1.341E+04	2.010E+07	1.351E+03
2033	5.101E+04	4.084E+07	2.744E+03	1.362E+04	2.042E+07	1.372E+03
2034	5.182E+04	4.150E+07	2.788E+03	1.384E+04	2.075E+07	1.394E+03
2035	5.266E+04	4.217E+07	2.833E+03	1.407E+04	2.108E+07	1.417E+03
2036	5.352E+04	4.286E+07	2.880E+03	1.430E+04	2.143E+07	1.440E+03
2037	5.440E+04	4.356E+07	2.927E+03	1.453E+04	2.178E+07	1.464E+03
2038	5.531E+04	4.429E+07	2.976E+03	1.477E+04	2.214E+07	1.488E+03
2039	5.623E+04	4.503E+07	3.025E+03	1.502E+04	2.251E+07	1.513E+03
2040	5.718E+04	4.579E+07	3.076E+03	1.527E+04	2.289E+07	1.538E+03
2041	5.815E+04	4.657E+07	3.129E+03	1.553E+04	2.328E+07	1.564E+03
2042	5.915E+04	4.736E+07	3.182E+03	1.580E+04	2.368E+07	1.591E+03
2043	6.016E+04	4.818E+07	3.237E+03	1.607E+04	2.409E+07	1.618E+03
2044	6.121E+04	4.901E+07	3.293E+03	1.635E+04	2.451E+07	1.647E+03
2045	6.227E+04	4.986E+07	3.350E+03	1.663E+04	2.493E+07	1.675E+03
2046	6.336E+04	5.074E+07	3.409E+03	1.692E+04	2.537E+07	1.705E+03
2047	6.448E+04	5.163E+07	3.469E+03	1.722E+04	2.582E+07	1.735E+03
2048	6.562E+04	5.254E+07	3.530E+03	1.753E+04	2.627E+07	1.765E+03
2049	6.678E+04	5.348E+07	3.593E+03	1.784E+04	2.674E+07	1.797E+03
2050	6.797E+04	5.443E+07	3.657E+03	1.816E+04	2.722E+07	1.829E+03
2051	6.919E+04	5.541E+07	3.723E+03	1.848E+04	2.770E+07	1.861E+03
2052	7.044E+04	5.640E+07	3.790E+03	1.881E+04	2.820E+07	1.895E+03
2053	7.171E+04	5.742E+07	3.858E+03	1.915E+04	2.871E+07	1.929E+03
2054	7.301E+04	5.846E+07	3.928E+03	1.950E+04	2.923E+07	1.964E+03
2055	7.426E+04	5.946E+07	3.995E+03	1.984E+04	2.973E+07	1.998E+03
2056	7.547E+04	6.043E+07	4.060E+03	2.016E+04	3.022E+07	2.030E+03
2057	7.280E+04	5.829E+07	3.917E+03	1.945E+04	2.915E+07	1.958E+03
2058	7.023E+04	5.623E+07	3.778E+03	1.876E+04	2.812E+07	1.889E+03
2059	6.774E+04	5.424E+07	3.645E+03	1.809E+04	2.712E+07	1.822E+03
2060	6.535E+04	5.233E+07	3.516E+03	1.745E+04	2.616E+07	1.758E+03
2061	6.304E+04	5.048E+07	3.392E+03	1.684E+04	2.524E+07	1.696E+03
2062	6.081E+04	4.869E+07	3.272E+03	1.624E+04	2.435E+07	1.636E+03
2063	5.866E+04	4.697E+07	3.156E+03	1.567E+04	2.348E+07	1.578E+03
2064	5.658E+04	4.531E+07	3.044E+03	1.511E+04	2.265E+07	1.522E+03
2065	5.458E+04	4.371E+07	2.937E+03	1.458E+04	2.185E+07	1.468E+03
2066	5.265E+04	4.216E+07	2.833E+03	1.406E+04	2.108E+07	1.416E+03
2067	5.079E+04	4.067E+07	2.733E+03	1.357E+04	2.034E+07	1.366E+03
2068	4.899E+04	3.923E+07	2.636E+03	1.309E+04	1.962E+07	1.318E+03
2069	4.726E+04	3.785E+07	2.543E+03	1.262E+04	1.892E+07	1.271E+03
2070	4.559E+04	3.651E+07	2.453E+03	1.218E+04	1.825E+07	1.226E+03
2071	4.398E+04	3.522E+07	2.366E+03	1.175E+04	1.761E+07	1.183E+03
2072	4.242E+04	3.397E+07	2.283E+03	1.133E+04	1.699E+07	1.141E+03
2073	4.092E+04	3.277E+07	2.202E+03	1.093E+04	1.638E+07	1.101E+03
2074	3.948E+04	3.161E+07	2.124E+03	1.054E+04	1.581E+07	1.062E+03
2075	3.808E+04	3.049E+07	2.049E+03	1.017E+04	1.525E+07	1.024E+03
2076	3.673E+04	2.942E+07	1.976E+03	9.812E+03	1.471E+07	9.882E+02
2077	3.544E+04	2.837E+07	1.907E+03	9.465E+03	1.419E+07	9.533E+02
2078	3.418E+04	2.737E+07	1.839E+03	9.130E+03	1.369E+07	9.195E+02
2079	3.297E+04	2.640E+07	1.774E+03	8.808E+03	1.320E+07	8.870E+02

Results (Continued)

Year	Total landfill gas			Methane		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2080	3.181E+04	2.547E+07	1.711E+03	8.496E+03	1.274E+07	8.557E+02
2081	3.068E+04	2.457E+07	1.651E+03	8.196E+03	1.228E+07	8.254E+02
2082	2.960E+04	2.370E+07	1.592E+03	7.906E+03	1.185E+07	7.962E+02
2083	2.855E+04	2.286E+07	1.536E+03	7.626E+03	1.143E+07	7.681E+02
2084	2.754E+04	2.205E+07	1.482E+03	7.357E+03	1.103E+07	7.409E+02
2085	2.657E+04	2.127E+07	1.429E+03	7.097E+03	1.064E+07	7.147E+02
2086	2.563E+04	2.052E+07	1.379E+03	6.846E+03	1.026E+07	6.894E+02
2087	2.472E+04	1.980E+07	1.330E+03	6.604E+03	9.898E+06	6.651E+02
2088	2.385E+04	1.910E+07	1.283E+03	6.370E+03	9.548E+06	6.415E+02
2089	2.300E+04	1.842E+07	1.238E+03	6.145E+03	9.211E+06	6.189E+02
2090	2.219E+04	1.777E+07	1.194E+03	5.928E+03	8.885E+06	5.970E+02
2091	2.141E+04	1.714E+07	1.152E+03	5.718E+03	8.571E+06	5.759E+02
2092	2.065E+04	1.654E+07	1.111E+03	5.516E+03	8.268E+06	5.555E+02
2093	1.992E+04	1.595E+07	1.072E+03	5.321E+03	7.975E+06	5.359E+02
2094	1.922E+04	1.539E+07	1.034E+03	5.133E+03	7.693E+06	5.169E+02
2095	1.854E+04	1.484E+07	9.973E+02	4.951E+03	7.421E+06	4.986E+02
2096	1.788E+04	1.432E+07	9.620E+02	4.776E+03	7.159E+06	4.810E+02
2097	1.725E+04	1.381E+07	9.280E+02	4.607E+03	6.906E+06	4.640E+02
2098	1.664E+04	1.332E+07	8.952E+02	4.444E+03	6.662E+06	4.476E+02
2099	1.605E+04	1.285E+07	8.635E+02	4.287E+03	6.426E+06	4.318E+02
2100	1.548E+04	1.240E+07	8.330E+02	4.136E+03	6.199E+06	4.165E+02
2101	1.494E+04	1.196E+07	8.035E+02	3.989E+03	5.980E+06	4.018E+02
2102	1.441E+04	1.154E+07	7.751E+02	3.848E+03	5.768E+06	3.876E+02
2103	1.390E+04	1.113E+07	7.477E+02	3.712E+03	5.564E+06	3.739E+02
2104	1.341E+04	1.073E+07	7.213E+02	3.581E+03	5.367E+06	3.606E+02
2105	1.293E+04	1.036E+07	6.958E+02	3.454E+03	5.178E+06	3.479E+02
2106	1.247E+04	9.989E+06	6.712E+02	3.332E+03	4.995E+06	3.356E+02
2107	1.203E+04	9.636E+06	6.474E+02	3.214E+03	4.818E+06	3.237E+02
2108	1.161E+04	9.295E+06	6.245E+02	3.101E+03	4.648E+06	3.123E+02
2109	1.120E+04	8.967E+06	6.025E+02	2.991E+03	4.483E+06	3.012E+02
2110	1.080E+04	8.650E+06	5.812E+02	2.885E+03	4.325E+06	2.906E+02
2111	1.042E+04	8.344E+06	5.606E+02	2.783E+03	4.172E+06	2.803E+02
2112	1.005E+04	8.049E+06	5.408E+02	2.685E+03	4.024E+06	2.704E+02
2113	9.696E+03	7.764E+06	5.217E+02	2.590E+03	3.882E+06	2.608E+02
2114	9.353E+03	7.490E+06	5.032E+02	2.498E+03	3.745E+06	2.516E+02
2115	9.022E+03	7.225E+06	4.854E+02	2.410E+03	3.612E+06	2.427E+02
2116	8.703E+03	6.969E+06	4.683E+02	2.325E+03	3.485E+06	2.341E+02
2117	8.396E+03	6.723E+06	4.517E+02	2.243E+03	3.361E+06	2.259E+02
2118	8.099E+03	6.485E+06	4.357E+02	2.163E+03	3.243E+06	2.179E+02
2119	7.812E+03	6.256E+06	4.203E+02	2.087E+03	3.128E+06	2.102E+02

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
1979	0	0	0	0	0	0
1980	1.212E+01	6.621E+03	4.449E-01	2.824E-02	7.879E+00	5.294E-04
1981	2.843E+02	1.553E+05	1.043E+01	6.624E-01	1.848E+02	1.242E-02
1982	5.548E+02	3.031E+05	2.036E+01	1.293E+00	3.607E+02	2.423E-02
1983	8.290E+02	4.529E+05	3.043E+01	1.932E+00	5.389E+02	3.621E-02
1984	1.297E+03	7.084E+05	4.760E+01	3.022E+00	8.430E+02	5.664E-02
1985	2.002E+03	1.094E+06	7.349E+01	4.666E+00	1.302E+03	8.746E-02
1986	2.807E+03	1.533E+06	1.030E+02	6.540E+00	1.825E+03	1.226E-01
1987	3.705E+03	2.024E+06	1.360E+02	8.634E+00	2.409E+03	1.618E-01
1988	4.633E+03	2.531E+06	1.701E+02	1.080E+01	3.012E+03	2.024E-01
1989	5.875E+03	3.209E+06	2.156E+02	1.369E+01	3.819E+03	2.566E-01
1990	6.950E+03	3.797E+06	2.551E+02	1.620E+01	4.518E+03	3.036E-01
1991	7.985E+03	4.362E+06	2.931E+02	1.861E+01	5.191E+03	3.488E-01
1992	8.958E+03	4.894E+06	3.288E+02	2.087E+01	5.824E+03	3.913E-01
1993	9.907E+03	5.412E+06	3.637E+02	2.309E+01	6.441E+03	4.328E-01
1994	1.085E+04	5.925E+06	3.981E+02	2.527E+01	7.051E+03	4.738E-01
1995	1.166E+04	6.367E+06	4.278E+02	2.716E+01	7.577E+03	5.091E-01
1996	1.249E+04	6.823E+06	4.584E+02	2.910E+01	8.119E+03	5.455E-01
1997	1.329E+04	7.261E+06	4.878E+02	3.097E+01	8.640E+03	5.805E-01
1998	1.403E+04	7.666E+06	5.151E+02	3.270E+01	9.122E+03	6.129E-01
1999	1.490E+04	8.141E+06	5.470E+02	3.473E+01	9.688E+03	6.509E-01
2000	1.590E+04	8.684E+06	5.835E+02	3.704E+01	1.033E+04	6.943E-01
2001	1.710E+04	9.343E+06	6.278E+02	3.985E+01	1.112E+04	7.471E-01
2002	1.838E+04	1.004E+07	6.745E+02	4.282E+01	1.195E+04	8.026E-01
2003	1.973E+04	1.078E+07	7.242E+02	4.598E+01	1.283E+04	8.618E-01
2004	2.075E+04	1.133E+07	7.615E+02	4.834E+01	1.349E+04	9.062E-01
2005	2.177E+04	1.190E+07	7.992E+02	5.074E+01	1.416E+04	9.511E-01
2006	2.284E+04	1.248E+07	8.384E+02	5.323E+01	1.485E+04	9.977E-01
2007	2.397E+04	1.309E+07	8.797E+02	5.584E+01	1.558E+04	1.047E+00
2008	2.494E+04	1.362E+07	9.154E+02	5.812E+01	1.621E+04	1.089E+00
2009	2.569E+04	1.404E+07	9.431E+02	5.987E+01	1.670E+04	1.122E+00
2010	2.630E+04	1.436E+07	9.652E+02	6.127E+01	1.709E+04	1.149E+00
2011	2.677E+04	1.463E+07	9.828E+02	6.239E+01	1.741E+04	1.169E+00
2012	2.725E+04	1.489E+07	1.000E+03	6.350E+01	1.772E+04	1.190E+00
2013	2.766E+04	1.511E+07	1.015E+03	6.445E+01	1.798E+04	1.208E+00
2014	2.814E+04	1.537E+07	1.033E+03	6.557E+01	1.829E+04	1.229E+00
2015	2.864E+04	1.564E+07	1.051E+03	6.673E+01	1.862E+04	1.251E+00
2016	2.923E+04	1.597E+07	1.073E+03	6.811E+01	1.900E+04	1.277E+00
2017	2.972E+04	1.624E+07	1.091E+03	6.926E+01	1.932E+04	1.298E+00
2018	3.019E+04	1.649E+07	1.108E+03	7.034E+01	1.962E+04	1.319E+00
2019	3.058E+04	1.670E+07	1.122E+03	7.125E+01	1.988E+04	1.336E+00
2020	3.097E+04	1.692E+07	1.137E+03	7.218E+01	2.014E+04	1.353E+00
2021	3.138E+04	1.714E+07	1.152E+03	7.312E+01	2.040E+04	1.371E+00
2022	3.180E+04	1.737E+07	1.167E+03	7.410E+01	2.067E+04	1.389E+00
2023	3.223E+04	1.761E+07	1.183E+03	7.511E+01	2.095E+04	1.408E+00
2024	3.268E+04	1.785E+07	1.200E+03	7.616E+01	2.125E+04	1.428E+00
2025	3.314E+04	1.811E+07	1.217E+03	7.724E+01	2.155E+04	1.448E+00
2026	3.362E+04	1.837E+07	1.234E+03	7.835E+01	2.186E+04	1.469E+00
2027	3.411E+04	1.864E+07	1.252E+03	7.949E+01	2.218E+04	1.490E+00
2028	3.462E+04	1.891E+07	1.271E+03	8.068E+01	2.251E+04	1.512E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
2029	3.514E+04	1.920E+07	1.290E+03	8.189E+01	2.285E+04	1.535E+00
2030	3.568E+04	1.949E+07	1.310E+03	8.314E+01	2.320E+04	1.559E+00
2031	3.623E+04	1.979E+07	1.330E+03	8.443E+01	2.355E+04	1.583E+00
2032	3.680E+04	2.010E+07	1.351E+03	8.575E+01	2.392E+04	1.607E+00
2033	3.738E+04	2.042E+07	1.372E+03	8.711E+01	2.430E+04	1.633E+00
2034	3.798E+04	2.075E+07	1.394E+03	8.851E+01	2.469E+04	1.659E+00
2035	3.860E+04	2.108E+07	1.417E+03	8.994E+01	2.509E+04	1.686E+00
2036	3.923E+04	2.143E+07	1.440E+03	9.140E+01	2.550E+04	1.713E+00
2037	3.987E+04	2.178E+07	1.464E+03	9.291E+01	2.592E+04	1.742E+00
2038	4.053E+04	2.214E+07	1.488E+03	9.445E+01	2.635E+04	1.770E+00
2039	4.121E+04	2.251E+07	1.513E+03	9.603E+01	2.679E+04	1.800E+00
2040	4.191E+04	2.289E+07	1.538E+03	9.765E+01	2.724E+04	1.830E+00
2041	4.262E+04	2.328E+07	1.564E+03	9.931E+01	2.771E+04	1.862E+00
2042	4.335E+04	2.368E+07	1.591E+03	1.010E+02	2.818E+04	1.893E+00
2043	4.409E+04	2.409E+07	1.618E+03	1.027E+02	2.867E+04	1.926E+00
2044	4.486E+04	2.451E+07	1.647E+03	1.045E+02	2.916E+04	1.959E+00
2045	4.564E+04	2.493E+07	1.675E+03	1.063E+02	2.967E+04	1.993E+00
2046	4.644E+04	2.537E+07	1.705E+03	1.082E+02	3.019E+04	2.028E+00
2047	4.725E+04	2.582E+07	1.735E+03	1.101E+02	3.072E+04	2.064E+00
2048	4.809E+04	2.627E+07	1.765E+03	1.121E+02	3.126E+04	2.101E+00
2049	4.894E+04	2.674E+07	1.797E+03	1.141E+02	3.182E+04	2.138E+00
2050	4.982E+04	2.722E+07	1.829E+03	1.161E+02	3.239E+04	2.176E+00
2051	5.071E+04	2.770E+07	1.861E+03	1.182E+02	3.297E+04	2.215E+00
2052	5.162E+04	2.820E+07	1.895E+03	1.203E+02	3.356E+04	2.255E+00
2053	5.255E+04	2.871E+07	1.929E+03	1.225E+02	3.417E+04	2.296E+00
2054	5.351E+04	2.923E+07	1.964E+03	1.247E+02	3.478E+04	2.337E+00
2055	5.442E+04	2.973E+07	1.998E+03	1.268E+02	3.538E+04	2.377E+00
2056	5.531E+04	3.022E+07	2.030E+03	1.289E+02	3.596E+04	2.416E+00
2057	5.335E+04	2.915E+07	1.958E+03	1.243E+02	3.469E+04	2.330E+00
2058	5.147E+04	2.812E+07	1.889E+03	1.199E+02	3.346E+04	2.248E+00
2059	4.965E+04	2.712E+07	1.822E+03	1.157E+02	3.228E+04	2.169E+00
2060	4.789E+04	2.616E+07	1.758E+03	1.116E+02	3.113E+04	2.092E+00
2061	4.620E+04	2.524E+07	1.696E+03	1.077E+02	3.003E+04	2.018E+00
2062	4.457E+04	2.435E+07	1.636E+03	1.038E+02	2.897E+04	1.947E+00
2063	4.299E+04	2.348E+07	1.578E+03	1.002E+02	2.795E+04	1.878E+00
2064	4.147E+04	2.265E+07	1.522E+03	9.663E+01	2.696E+04	1.811E+00
2065	4.000E+04	2.185E+07	1.468E+03	9.322E+01	2.601E+04	1.747E+00
2066	3.859E+04	2.108E+07	1.416E+03	8.992E+01	2.509E+04	1.686E+00
2067	3.722E+04	2.034E+07	1.366E+03	8.674E+01	2.420E+04	1.626E+00
2068	3.591E+04	1.962E+07	1.318E+03	8.367E+01	2.334E+04	1.568E+00
2069	3.464E+04	1.892E+07	1.271E+03	8.071E+01	2.252E+04	1.513E+00
2070	3.341E+04	1.825E+07	1.226E+03	7.786E+01	2.172E+04	1.459E+00
2071	3.223E+04	1.761E+07	1.183E+03	7.511E+01	2.095E+04	1.408E+00
2072	3.109E+04	1.699E+07	1.141E+03	7.245E+01	2.021E+04	1.358E+00
2073	2.999E+04	1.638E+07	1.101E+03	6.989E+01	1.950E+04	1.310E+00
2074	2.893E+04	1.581E+07	1.062E+03	6.742E+01	1.881E+04	1.264E+00
2075	2.791E+04	1.525E+07	1.024E+03	6.503E+01	1.814E+04	1.219E+00
2076	2.692E+04	1.471E+07	9.882E+02	6.274E+01	1.750E+04	1.176E+00
2077	2.597E+04	1.419E+07	9.533E+02	6.052E+01	1.688E+04	1.134E+00
2078	2.505E+04	1.369E+07	9.195E+02	5.838E+01	1.629E+04	1.094E+00
2079	2.417E+04	1.320E+07	8.870E+02	5.631E+01	1.571E+04	1.056E+00

Results (Continued)

Year	Carbon dioxide			NMOC		
	(Mg/year)	(m^3/year)	(av ft^3/min)	(Mg/year)	(m^3/year)	(av ft^3/min)
2080	2.331E+04	1.274E+07	8.557E+02	5.432E+01	1.515E+04	1.018E+00
2081	2.249E+04	1.228E+07	8.254E+02	5.240E+01	1.462E+04	9.822E-01
2082	2.169E+04	1.185E+07	7.962E+02	5.055E+01	1.410E+04	9.475E-01
2083	2.093E+04	1.143E+07	7.681E+02	4.876E+01	1.360E+04	9.140E-01
2084	2.019E+04	1.103E+07	7.409E+02	4.704E+01	1.312E+04	8.817E-01
2085	1.947E+04	1.064E+07	7.147E+02	4.537E+01	1.266E+04	8.505E-01
2086	1.878E+04	1.026E+07	6.894E+02	4.377E+01	1.221E+04	8.204E-01
2087	1.812E+04	9.898E+06	6.651E+02	4.222E+01	1.178E+04	7.914E-01
2088	1.748E+04	9.548E+06	6.415E+02	4.073E+01	1.136E+04	7.634E-01
2089	1.686E+04	9.211E+06	6.189E+02	3.929E+01	1.096E+04	7.364E-01
2090	1.626E+04	8.885E+06	5.970E+02	3.790E+01	1.057E+04	7.104E-01
2091	1.569E+04	8.571E+06	5.759E+02	3.656E+01	1.020E+04	6.853E-01
2092	1.513E+04	8.268E+06	5.555E+02	3.527E+01	9.839E+03	6.611E-01
2093	1.460E+04	7.975E+06	5.359E+02	3.402E+01	9.491E+03	6.377E-01
2094	1.408E+04	7.693E+06	5.169E+02	3.282E+01	9.155E+03	6.151E-01
2095	1.358E+04	7.421E+06	4.986E+02	3.166E+01	8.831E+03	5.934E-01
2096	1.310E+04	7.159E+06	4.810E+02	3.054E+01	8.519E+03	5.724E-01
2097	1.264E+04	6.906E+06	4.640E+02	2.946E+01	8.218E+03	5.522E-01
2098	1.219E+04	6.662E+06	4.476E+02	2.842E+01	7.927E+03	5.326E-01
2099	1.176E+04	6.426E+06	4.318E+02	2.741E+01	7.647E+03	5.138E-01
2100	1.135E+04	6.199E+06	4.165E+02	2.644E+01	7.377E+03	4.956E-01
2101	1.095E+04	5.980E+06	4.018E+02	2.551E+01	7.116E+03	4.781E-01
2102	1.056E+04	5.768E+06	3.876E+02	2.460E+01	6.864E+03	4.612E-01
2103	1.019E+04	5.564E+06	3.739E+02	2.373E+01	6.621E+03	4.449E-01
2104	9.825E+03	5.367E+06	3.606E+02	2.290E+01	6.387E+03	4.292E-01
2105	9.478E+03	5.178E+06	3.479E+02	2.209E+01	6.161E+03	4.140E-01
2106	9.143E+03	4.995E+06	3.356E+02	2.130E+01	5.944E+03	3.993E-01
2107	8.819E+03	4.818E+06	3.237E+02	2.055E+01	5.733E+03	3.852E-01
2108	8.508E+03	4.648E+06	3.123E+02	1.982E+01	5.531E+03	3.716E-01
2109	8.207E+03	4.483E+06	3.012E+02	1.912E+01	5.335E+03	3.585E-01
2110	7.916E+03	4.325E+06	2.906E+02	1.845E+01	5.146E+03	3.458E-01
2111	7.637E+03	4.172E+06	2.803E+02	1.780E+01	4.965E+03	3.336E-01
2112	7.367E+03	4.024E+06	2.704E+02	1.717E+01	4.789E+03	3.218E-01
2113	7.106E+03	3.882E+06	2.608E+02	1.656E+01	4.620E+03	3.104E-01
2114	6.855E+03	3.745E+06	2.516E+02	1.597E+01	4.456E+03	2.994E-01
2115	6.612E+03	3.612E+06	2.427E+02	1.541E+01	4.299E+03	2.888E-01
2116	6.379E+03	3.485E+06	2.341E+02	1.486E+01	4.147E+03	2.786E-01
2117	6.153E+03	3.361E+06	2.259E+02	1.434E+01	4.000E+03	2.688E-01
2118	5.935E+03	3.243E+06	2.179E+02	1.383E+01	3.859E+03	2.593E-01
2119	5.726E+03	3.128E+06	2.102E+02	1.334E+01	3.722E+03	2.501E-01

APPENDIX D

LANDFILL METHANE RULE (LMR) SURFACE EMISSIONS MONITORING PLAN

Building lifetime relationships with our clients and employees.

Landfill Methane Rule Surface Emissions Monitoring Plan

Western Regional Sanitary Landfill

May 2016

Prepared for:
Western Placer Waste Management Authority
3195 Athens Avenue
Lincoln, CA 95468

7600 Dublin Blvd., Suite 200
Dublin, CA 94568
(877) 633-5520

Revision History

Landfill Methane Rule (LMR) Surface Emissions Monitoring (SEM) Plan

Western Regional Sanitary Landfill
Lincoln, California

Add the effective date of the most recent revision to the list below. Do not overwrite or delete any dates. This is intended to be a complete record of all revisions made to this Plan, and assists in making certain that all plan revisions are retained at least five (5) years as required by California Code of Regulations (CCR) Title 17 §95470(a)(1)(D).

Date of Initial Issuance
November 2, 2011
REVISION DATES
May 20, 2016

TABLE OF CONTENTS

1 INTRODUCTION

1.1 Purpose of Plan

The Western Regional Sanitary Landfill (WRSL) is an active landfill located in Lincoln, Placer County, California, owned and operated by the Western Placer Waste Management Authority (WPWMA). This Surface Emissions Monitoring (SEM) Plan (Plan) has been prepared by Cornerstone on behalf of WPWMA to provide a monitoring protocol in compliance with the requirements of the California Code of Regulations (CCR) Title 17, Division 3, Chapter 1, Subchapter 10, Article 4, Subarticle 6, Methane Emissions from Municipal Solid Waste Landfills (CCR Title 17) Landfill Methane Rule (LMR), as mandated by Assembly Bill (AB) 32.

WRSL is subject to the SEM requirements of CCR Title 17 per §95463(b) because the waste-in-place (WIP) is greater than 450,000 tons and heat input capacity (HIC) of WRSL exceeds 3.0 million British thermal units per hour (MMBTU/hr). A landfill gas collection and control system (GCCS) has been installed at WRSL and is in continuous operation. Surface emissions will be monitored quarterly, as required by regulations and as described in this SEM Plan, unless otherwise approved.

2 LMR SURFACE EMISSIONS MONITORING PLAN

2.1 SEM Requirements

The purpose of SEM is to ensure that no location on the municipal solid waste (MSW) landfill surface exceeds 500 parts per million by volume (ppmv) (other than non-repeatable, momentary readings) during instantaneous SEM, nor any identified approximately 50,000 square foot (ft^2) grid exceed an average methane concentration of 25 ppmv methane during integrated SEM. Pursuant to CCR Title 17 §95469(a), instantaneous and integrated surface monitoring must be conducted on a quarterly basis unless otherwise approved. Due to a delay in implementation, per the California Air Resources Board (CARB), December 1, 2010 MSW Landfill Regulation Regulatory Advisory, the SEM became effective and starting July 1, 2011. The following test methods and procedures for surface emissions testing satisfy 40 Code of Federal Regulations (CFR) §60.753 (d) and the requirements of CCR Title 17 §95471.

2.1.1 Alternative Requests

Pursuant to CCR Title 17 §95468, WPWMA may request alternatives to the compliance measures, monitoring requirements, test methods and procedures of CCR Title 17 §95464, §95469, and §95471. The landfill owner or operator must file a written request with an explanation of the alternative compliance option (ACO) with the Executive Officer (EO), in this case the Placer County Air Pollution Control District (PCAPCD). The EO shall notify the landfill owner or operator in writing of the decision. An ACO Request was submitted to the PCAPCD on February 29, 2012, per CCR Title 17 §95468(a). A formal response to the ACO request was received by the Western Placer Waste Management Authority (WPWMA) on August 7, 2012.

Within this Plan, a brief description of approved ACO requests are included at the end of each section identifying any applicable alternative methods. ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.1.2 Monitoring Area and Grids

Pursuant to CCR Title 17 §95471(c)(1), the entire landfill surface must be divided into individually identified approximately 50,000 ft^2 grids, which shall be used for both instantaneous and integrated SEM. Appendix C contains an SEM Grid Map for WRSL which was developed in accordance with the requirements of CCR Title 17 §95471(c)(1):

- The walking pattern must be no more than a 25-foot spacing interval and must traverse each grid;

  - Per CCR Title 17 §95471(c)(1)(B)(1) and (2), if no SEM exceedances (refer to Sections 2.2 and 2.3 for instantaneous and integrated SEM exceedance limits) were detected in the past *three years prior to the effective date (July 1, 2011)* or are detected *after four consecutive quarterly monitoring events*, the walking pattern spacing may be increased to 100-foot intervals. If SEM exceedances are detected and cannot be remediated within ten calendar days or are detected during a compliance inspection, the landfill must return to a 25-foot spacing interval;
- The sampling path resembles a "serpentine" pattern which traverses the grid; and
- The walking pace should be approximately 100 feet per minute, except when limited by terrain or vegetation.

As of the date of this Plan, WRSL is divided into a total of 206 individual monitoring grids. The SEM Grid Map is located in Appendix C.

The following ACO requests are approved for monitoring areas and grids:

ACO Summary Description	Date Approved
Areas containing only asbestos-containing waste, inert waste, or non-decomposable waste.	August 7, 2012
Areas with a 25% slope or greater can be excluded.	August 7, 2012
Since landfills are not sized in 50,000 square foot increments, grid segments are allowed to be slightly larger or smaller than 50,000 square feet along waste area boundaries and around areas that cannot be subjected to SEM due to safety reasons.	August 7, 2012

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.1.3 Weather Conditions

Monitoring will be performed during typical meteorological conditions. The onsite weather station will be used for monitoring and recording wind speed data during the SEM events and reviewing periods of rainfall. The onsite weather station continuously measures and records wind speed and weather data. The onsite weather station is located at the scale house and can be seen on the Placer County website at:

http://www.placer.ca.gov/Departments/Facility/facweather.aspx

The field technician will check the wind speed using a hand-held anemometer. The wind speed will be measured and recorded to ensure the 15 minute averaged speed does not exceed 10 mph or the instantaneous wind speed does not exceed 20 mph, per the approved ACO (see below).

The field technician will also confirm the surface of WRSL is dry enough to traverse safely and there has been no measured precipitation within the past 24 hours, per the approved ACO (see below). Historical weather data at the onsite weather station will be checked prior to conducting SEM to ensure there has been no measurable precipitation in the preceding 24 hours.

The following ACO requests are approved for weather conditions:

ACO Summary Description	Date Approved
The District will accept alternative wind speeds of the following: If the average wind speed exceeds 10 miles per hour (mph), or the instantaneous wind speed exceeds 20 mph, surface testing can be terminated until the wind speed decreases and is within the acceptable limits.	August 7, 2012
The District will allow surface monitoring when there has been no measureable precipitation in the preceding 24 hours. WPWMA will minimize the times when SEM is conducted with precipitation in the preceding 24 to 72 hours.	August 7, 2012

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.1.4 Frequency

SEM will be performed quarterly (calendar basis) for the portion of the landfill with an active GCCS.

If portions of WRSL are closed or inactive, and if there is no measured instantaneous methane reading greater than 500 ppmv after four (4) consecutive quarterly monitoring periods, WRSL may thereafter perform SEM on an annual basis. Any exceedance of the 500 ppmv limit that cannot be remediated within 10 calendar days will result in a return to quarterly SEM of WRSL.

For a closed or inactive municipal solid waste (MSW) landfill, if there is no measured concentration of 200 ppmv methane or greater from the surface of the landfill, pursuant to CCR Title 17 §95463 (b)(2)(B)(3), WRSL may discontinue surface monitoring. WRSL must, however, submit a WIP report per CCR Title 17 §95470(b)(4) and all instantaneous surface monitoring records for review and approval by the EO within 90 days.

The following ACO requests are approved for SEM frequency:

ACO Summary Description	Date Approved
The District will allow closed areas designated as Modules 1, 2, 10 and 11 to be tested annually. If an exceedance of the limits is measured, then the testing of the affected area shall return to quarterly testing.	August 7, 2012

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.1.5 Recordkeeping

Per CCR Title 17 §95470, instantaneous and integrated SEM records must be stored onsite and be readily accessible in either a paper or electronic format. These records shall be kept for at least five (5) years. These records shall include calibration forms, weather data, the location and reading of the exceedance, as well as the results of the follow-up readings in the subsequent months (whether or not these readings were exceedances), the action taken to repair the area, and the date of the repair.

Alternative recordkeeping requirements may be allowed, following approval of an ACO request, as described in Section 2.1.1. The following ACO requests are approved for recordkeeping:

ACO Summary Description	Date Approved

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.2 Instantaneous SEM Requirements

2.2.1 Instantaneous SEM Procedures

Prior to initiating the instantaneous SEM monitoring event, the field technician will:

- Confirm the surface of WRSL is dry enough to traverse safely and there has been no measured precipitation within the past 24 hours, per the approved ACO (see Section 2.1.3);
- Check the wind speed using a hand-held anemometer. The wind speed will be measured and recorded to ensure the 15 minute averaged speed does not exceed 10 mph or the instantaneous wind speed does not exceed 20 mph, per the approved ACO (See Section 2.1.3);
- Assess the monitoring grids, locate grid boundaries, and on the SEM map identify all inaccessible areas;
- Calibrate the monitoring equipment (see Section 2.2.2); and
- Establish background methane concentrations by waving the wand of the flame ionization detector (FID) upwind and downwind outside the boundary of the landfill from a distance of at least 30 meters from perimeter wells.

During the instantaneous SEM monitoring event, the field technician will employ the following procedures:

- For each monitoring grid, the field technician will follow the traverse walking path and hold the monitoring probe no more than three (3) inches above the landfill surface;
- Continuously record the wind speed using the onsite anemometer and check the instantaneous wind speed periodically with a hand-held anemometer to ensure instantaneous wind speed does not exceed 20 mph, per the approved ACO;
- Document on the Exceedance and Monitoring Log and on the grid map 200 ppmv and 500 ppmv exceedance locations, along with any re-test dates and results (See Sections 2.2.3 and 2.2.4);
- While walking, the probe should be slowly moved from side to side to cover a path of four (4) to six (6) feet wide (approximately two [2] to three [3] feet on each side);
- Any areas where visual observations indicate elevated concentrations of landfill gas (LFG), such as distressed vegetation and cracks or seeps in the cover, will be visually inspected and monitored;
- A constant walking pace of approximately 100 feet per minute should be maintained except when limited by terrain or vegetation; and
- If the pace is interrupted for more than 10 to 15 seconds, the data logging should be paused and the cause should be noted on recordkeeping forms.

The following ACO requests are approved for procedures required prior to instantaneous SEM:

ACO Summary Description	Date Approved
The wand tip of the FID may be held within 3 inches of the top of vegetation in areas where the landfill surface is covered with low-lying vegetation such as grasses, while traversing the grid.	August 7, 2012

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.2.2 Instantaneous SEM Monitoring Equipment

An organic vapor analyzer, FID, or other portable hydrocarbon detector in general conformance with 40 CFR Part 60, Appendix A, Method 21 will be used to determine the methane concentration at each sampling point, pursuant to CCR Title 17 §95471(a). The instrument will be calibrated according to the manufacturer's recommendations prior to each monitoring period and calibration results recorded on the calibration forms located in Attachment A of the Surface Emissions Monitoring Report Template. The SEM Report Template is included in Appendix D.

A hand-held anemometer will be used for monitoring instantaneous wind speed. The onsite weather station will be used to record wind speed and weather data.

Alternative instantaneous SEM monitoring equipment may be allowed following approval of an ACO request, as described in Section 2.1.1. The following ACO requests are approved for instantaneous SEM monitoring equipment:

ACO Summary Description	Date Approved

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.2.3 200 PPMV Methane Instantaneous SEM Exceedances

In accordance with CCR Title 17 §95471(c)(2), the field technician must record instantaneous surface emissions readings ranging from 200 ppmv to 500 ppmv methane using the Instantaneous SEM 200 ppmv Exceedance and Monitoring Log, located in Attachment B of the LMR Surface Emissions Monitoring Report. The LMR Surface Emissions Monitoring Report Template is included in Appendix D of this Plan.

The field technician will record the date, time, grid and instantaneous reading location, methane concentration, and any additional comments. If multiple readings are observed in a given area, the technician will delineate the area with exceedances on the map and document the readings observed. Per CCR Title 17 §95471(c), instantaneous surface emissions from 200 ppmv up to and including 500 ppmv methane readings are only required to be recorded. No remedial action is required.

Alternatives may be approved for instantaneous SEM readings of 200 to 500 ppmv following approval of an ACO request, as described in Section 2.1.1. The following ACO requests are approved for instantaneous SEM readings of 200 to 500 ppmv:

ACO Summary Description	Date Approved

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.2.4 500 PPMV Methane Instantaneous SEM Exceedances

In accordance with CCR Title 17 §95471(c)(2), the field technician must record and remediate instantaneous surface emissions exceeding 500 ppmv methane. The Instantaneous SEM 500 ppmv Exceedance and Monitoring Log, located in Attachment B of the LMR Surface Emissions Monitoring Report Template must be completed for the monitoring event. The LMR Surface Emissions Monitoring Report Template is included in Appendix D of this Plan.

The field technician will record the date, time, grid and exceedance location, mark location on the SEM grid map, exceedance methane concentration, remedial action, and any additional comments.

If an exceedance of 500 ppmv methane is detected during instantaneous surface monitoring, the following procedures for monitoring and remediation will be employed:

Initial monitoring event: Any SEM reading greater than 500 ppmv methane above background will be recorded as an exceedance. The location of the exceedance will be marked and recorded. Cover maintenance or adjustments to the GCCS will be made following the initial monitoring event.

- *First 10-day re-monitoring event*: The locations where initial exceedances were detected will be re-monitored within 10 calendar days of the initial monitoring date. If the location continues to be in exceedance, it must be re-monitored within 10 calendar days. If no exceedance is detected, no further monitoring is required.
- *Second 10-day re-monitoring event:* If a location continues to be in exceedance during the first 10-day re-monitoring, the location must be re-monitored again within 10 calendar days. If no exceedance is detected, no further monitoring is required. Additional corrective action will be taken following the second 10-day re-monitoring.
  - If the second 10-day re-monitoring shows an exceedance (which is considered three times within a quarterly period), a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header piping or control device, and a corresponding timeline for installation may be submitted to the EO for approval.

The following ACO requests are approved for instantaneous SEM readings greater than 500 ppmv:

ACO Summary Description	Date Approved
The District will allow additional time for re-monitoring in cases where the area is dangerous or cannot be safely reached.	August 7, 2012
The District will allow other modifications than just additional wells, as appropriate, to correct exceedances. A corresponding alternative compliance timeline beyond 120 days will be allowed, as appropriate.	August 7, 2012

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.3 Integrated SEM Requirements

2.3.1 Integrated SEM Procedures

Prior to initiating the integrated SEM monitoring event, the field technician will:

- Confirm the surface of the landfill is dry enough to traverse safely and there has been no measured precipitation within the past 24 hours, per the approved ACO (see Section 2.1.3);
- Check the wind speed using a hand-held anemometer. The wind speed will be measured and recorded to ensure the 15-minute averaged speed does not exceed 10 mph or the instantaneous wind speed does not exceed 20 mph, per the approved ACO (See Section 2.1.3);
- Assess the monitoring grids, locate grid boundaries, and on the SEM map identify all inaccessible areas;
- Assemble the sampling unit and calibrate the monitoring equipment (see Section 2.3.2); and
- Establish background methane concentrations by waving the wand of the FID upwind and downwind outside the boundary of the landfill from a distance of at least 30 meters from perimeter wells.

During the integrated SEM monitoring event, the field technician will employ the following procedures:

- For each monitoring grid, the field technician will follow the traverse walking path and hold the monitoring probe no more than three inches above the landfill surface;
- Continuously record the wind speed using the onsite anemometer and check the instantaneous wind speed periodically with a hand-held anemometer to ensure instantaneous wind speed does not exceed 20 mph, per the approved ACO;
- While walking, the probe should be slowly moved from side to side to cover a path of four to six feed wide (approximately two to three feet on each side);
- Any areas where visual observations indicate elevated concentrations of LFG, such as distressed vegetation and cracks or seeps in the cover, will be visually inspected and monitored;
- If the pace is interrupted for more than 10 to 15 seconds, the data logging should be paused and the cause should be noted on recordkeeping forms; and
- Record the average methane concentration for each grid as well as any re-test dates and results (See Sections 2.3.3 and 2.3.4).

Alternative procedures required prior to integrated SEM may be allowed following approval of an ACO request, as described in Section 2.1.1. The following ACO requests are approved for procedures required prior to integrated SEM:

ACO Summary Description	Date Approved

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.3.2 Integrated SEM Monitoring Equipment

Similar equipment used in instantaneous monitoring will be used for the integrated monitoring. The meter used will be capable of averaging the methane readings collected across each grid to obtain the integrated reading.

2.3.3 Integrated SEM Results Below 25 PPMV

Per CCR Title 17 §95471(c)(3)(A), the field technician must record the average methane concentration for each grid. The Integrated Surface Monitoring Grid Log, located in Attachment B of the LMR Surface Emissions Monitoring Report Template must be completed for the monitoring event. The LMR Surface Emissions Monitoring Report Template is included in Appendix D of this Plan. The Log must include the average methane concentration for each grid. Grids with methane concentrations greater than 25 ppmv methane must be recorded on a separate exceedance log, as discussed in Section 2.3.4.

Alternatives for integrated SEM exceedances below 25 ppmv methane may be allowed following approval of an ACO request. See Section 2.1.1 for additional information. The following ACO requests are approved for integrated SEM procedures:

ACO Summary Description	Date Approved

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

2.3.4 25 PPMV Integrated SEM Exceedances

In accordance with CCR Title 17 §95471(c)(3), the field technician must record and remediate grids containing integrated surface emissions exceeding 25 ppmv on average. The Integrated SEM 25 ppmv Exceedance and Monitoring Log, located in Attachment B of the LMR Surface Emissions Monitoring Report Template must be completed for the monitoring event. The LMR Surface Emissions Monitoring Report Template is included in Appendix D of this Plan.

The field technician will record the date, time, grid number, mark location on the SEM grid map, average methane concentration for each grid, remedial action, and any additional comments.

If an exceedance of 25 ppmv methane is detected during integrated surface monitoring, the following procedures for monitoring and remediation will be employed:

- *Initial monitoring event:* Any detection of 25 ppmv or more will be recorded as an exceedance. Cover maintenance or adjustments to the GCCS will be made following the initial monitoring event.
- *First 10-day re-monitoring event*: The grid where initial exceedances were detected will be re-monitored within 10 calendar days of the initial monitoring date. If the grid continues to be in exceedance, it must be re-monitored within 10 calendar days. If no exceedance is detected, no further monitoring is required.
- *Second 10-day re-monitoring event:* If a grid continues to be in exceedance during the first 10-day re-monitoring, the grid must be re-monitored again within 10 calendar days. If no exceedance is detected, no further monitoring is required. Additional corrective action will be taken following the second 10-day re-monitoring.
  - If the second 10-day re-monitoring shows an exceedance (which is considered three (3) times within a quarterly period), a new well or other collection device shall be installed within 120 calendar days of the initial exceedance. An alternative remedy to the exceedance, such as upgrading the blower, header pipes or control device, and a corresponding timeline for installation may be submitted to the EO for approval.

The following ACO requests are approved for integrated SEM procedures:

ACO Summary Description	Date Approved
The District will allow additional time for re-monitoring in cases where the area is dangerous or cannot be safely reached.	August 7, 2012
The District will allow other modifications than just additional wells, as appropriate, to correct exceedances. A corresponding alternative compliance timeline beyond 120 days will be allowed, as appropriate.	August 7, 2012

The ACO requests are included in Appendix A, PCAPCD Correspondence. Detailed ACO requirements are included within Appendix B, Approved Alternative Compliance Options Summary.

LIMITATIONS

The work product included in the attached was undertaken in full conformity with generally accepted professional consulting principles and practices and to the fullest extent as allowed by law we expressly disclaim all warranties, express or implied, including warranties of merchantability or fitness for a particular purpose. The work product was completed in full conformity with the contract with our client and this document is solely for the use and reliance of our client (unless previously agreed upon that a third party could rely on the work product) and any reliance on this work product by an unapproved outside party is at such party's risk.

The work product herein (including opinions, conclusions, suggestions, etc.) was prepared based on the situations and circumstances as found at the time, location, scope and goal of our performance and thus should be relied upon and used by our client recognizing these considerations and limitations. Cornerstone shall not be liable for the consequences of any change in environmental standards, practices, or regulations following the completion of our work and there is no warrant to the veracity of information provided by third parties, or the partial utilization of this work product. Cornerstone is not responsible for the impacts of any changes in information, site operations or methods that may change in the future.

APPENDIX A
PCAPCD CORRESPONDENCE

Placer County
AIR POLLUTION CONTROL DISTRICT 110 Maple St., Auburn, CA 95603 • (530) 745-2330 • Fax (530) 745-2373 • www.placer.ca.gov/apcd
Thomas J. Christofk, Air Pollution Control Officer

August 7, 2012

Mr. Keith J. Schmidt, P.E.
Western Placer Waste Management Authority
11476 C Avenue
Auburn, CA 95603

Subject: District Response to Proposed Exceptions to SEM Plan

Dear Mr. Schmidt:

The following responds to the proposed alternative compliance options for the Western Regional Sanitary Landfill.

1) Areas Excluded from Collection and Surface Emission Monitoring (SEM)
   CCR 95464(a)(1)(F)(1) allows the exclusion of areas containing only asbestos-containing waste, inert waste, or non-decomposable waste.

   Placer County Air Pollution Control District (District) accepts and allows the clarifications made in the proposal.

2) Areas Excluded from SEM Where Safety Issues Exist
   CCR 95471(c)(1) requires that SEM activities be conducted over the entire landfill surface.

   The District accepts and allows the exclusion of areas as described in the proposal. Specifically, the use of 25% slope is allowed.

3) Methane Destruction Compliance Parameter – Flares
   CCR 95464(b)(2)(A)(4) requires that an enclosed flare operated as a control device be operated within the parameter ranges established during the initial or most recent source test.

   The District believes that it is reasonable that there be a tolerance on the flare operating temperature. If the last source test were used as the minimum operating temperature, then the allowable flare temperature would continually ratchet up with subsequent flare tests. The District accepts the requested 50 degree F below source test request.

   However, flare temperature is not the only compliance parameter. The methane destruction efficiency of at least 99 percent by weight of 95464(B)(2)(A)(1) must be demonstrated by annual or triennial source test. The District plans to amend your flare permits to include the annual methane destruction test.

4) Source Test Methods

As specified in CCR 95464(b)(4), annual compliance testing of the control devices specifies the use of the test methods identified in CCR 95471(f), as follows: USEPA Methods 18, 25, 25A, or 25C.

The District intends to add to the flare permits the 99 percent methane destruction requirement and use the test methods required in the permits. So the SEM should state that the test methods are called out in the permits.

The Landfill Regulation requires flare testing annually until the destruction limit is achieved three years consecutively, and then the testing frequency can be extended to three years. The testing frequency in the District permits is biennially. Once the three consecutive years of meeting the methane destruction requirement is achieved, we intend to require the methane testing biennially with the other flare testing.

5) Timeline for Leak Repairs

CCR 95468(a)(2) allows additional time for leak repairs at landfills with procurement and delivery delays for necessary parts to complete the repair, or adverse weather conditions that impede work.

WPWMA seems to be requesting a blanket ACO for times when requirements cannot be implemented within the timeline due to procurement or weather issues. This request is denied. The District prefers to initially have these requests be made specific to the individual incident. If there are numerous repetitive incidents, the District may consider a blanket ACO for this particular situation.

6) SEM Procedures

CCR95469(a) requires that owners or operators of landfills with a GCCS conduct instantaneous and integrated SEM quarterly using the procedures specified in CCR 95471(c).
Article 95471(c) does not specify whether the instantaneous and integrated SEMs are to be done individually or simultaneously. Either way is acceptable to the District as long as the SEM meets the requirements of the article.

7) Re-monitoring After Instantaneous and Integrated Exceedances

CCR95469(a)(1)(B) and (a)(2)(B) require corrective action be taken by the owner or operator such as, but not limited to, cover maintenance or repair, or well vacuum adjustments and location re-monitored within ten calendar days of a measured excedance of the instantaneous and/or integrated surface emission standards.

The District will allow additional time for re-monitoring in cases where the area is dangerous or cannot be safely reached, as requested.

8) SEM Remediation after Third Instantaneous and/or Third Integrated SEM Excedance

CCR 95469(a)(1)(B)(2) and (a)(2)(B)(2) require the installation of a new or replacement well within 120 calendar days of detecting a third excedance of the Instantaneous SEM limit of CCR 95465(a)(1) and/or the Integrated SEM limit of CCR 95465(a)(2).

The District will allow other modifications than just additional wells, as appropriate, to correct excedances. A corresponding alternative compliance timeline beyond 120 days will be allowed, as appropriate.

9) SEM Monitoring Height

CCR 95471(c)(1)(A) requires that SEM be conducted by holding the probe within three (3) inches of the landfill surface while traversing the grid.

If an area not clear of surface vegetation cannot be found in the walking path, the District will allow the top of the vegetation to be considered the landfill surface and the probe be held within three inches vertical of the vegetation surface.

10) Wellhead Pressure Requirements

CCR 95469(c) requires corrective action if monthly wellhead pressure monitoring results in a positive pressure reading except as exempted in CCR 95464(d) (well raising) and CCR 95464(e) (temporary shutdown in order to repair the components, due to catastrophic events such as earthquakes, to connect new LFG collection system components to the existing system, to extinguish landfill fires, or to perform construction activities.)

The WPWMA is requesting to allow temporary exemption from well head pressure requirements due to potential subsurface oxidation, well damage, poor LFG quality, or other reasons as documented by the WPWMA not listed in 95469. The District will allow these additional exemptions provided the event is described to the District in writing and the District concurs.

11) Wellhead Pressure Exceedance Corrective Action

CCR 95469(c)(2) requires further corrective actions be initiated, including, but not limited to, any necessary expansion of the GCCS, to correct any positive pressure readings if positive pressure readings cannot be corrected within 15 days after the initial positive pressure reading. CCR 95469(c)(3) requires corrective action, including any necessary expansion of the GCCS, to correct any positive pressure readings within 120 days of the initial positive pressure reading.

The District will consider requests for alternative engineering solutions to be evaluated and allow an alternative timeline to consider and implement alternative solutions. This will require concurrence by the District for the engineering study and implementation.

12) Wind Speed

CCR 95471(c)(1)(C) requires that SEM be terminated when the average wind speed exceeds five miles per hour (mph) or the instantaneous wind speed exceeds 10 mph. The Executive Officer may approve alternatives to this wind speed SEM termination for MSW landfills consistently having measured winds in excess of these specified limits.

The District agrees that the landfill is located in a windy area and will accept the alternative wind speeds of 10 mph for average wind and 20 mph for instantaneous wind speed.

13) Measurable Precipitation

CCR 95471(c)(1)(D) requires that SEM be conducted only when there has been no measurable precipitation in the preceding 72 hours.

The District will allow SEM to be conducted only when there has been no measurable precipitation in the preceding 24 hours, as requested. WPWMA shall minimize the times when SEM is conducted with precipitation in the preceding 24-72 hours.

14) Source Testing Schedule

CCR 95464(b)(4) requires that annual source testing be conducted no later than 45 days after the anniversary of the initial source test.

WPWMA is requesting that the control device source test be conducted with the District source testing of the flares for the Title V permit on the timing for the Title V tests without regard to the 45 day requirement. The District denies this request. The CCR 95464(b)(4) testing is initially required annually, while the Title V testing frequency is biennially. In years when both types of testing are required, the testing can be combined and scheduled to meet the 45 day requirement.

15) Grid Area – Near Landfill Waste Boundaries

CCR 95471(c)(1) requires that the entire surface of the landfill be divided up into individually identified 50,000 square foot grids which would be used for both instantaneous and integrated SEM.

Since landfills are not sized in 50,000 square foot increments, the District will allow, along waste area boundaries and around areas that cannot be subjected to SEM due to safety reasons, grid segments that are slightly larger or smaller than 50,000 square feet.

16) Grid Sizes – Areas Excluded from SEM

See ACP (15) above.

17) Closed Areas – Reduction to Annual SEM

In accordance with CCR 95469(a)(3), an owner or operator of a closed or inactive MSW landfill, or any closed or inactive area on an active MSW landfill that can demonstrate that in the three years before the effective date of this subarticle that there were no measured excedances of the limits specified in 95465 by annual or quarterly monitoring may monitor annually.

The District will allow closed areas designated as Modules 1, 2, 10, and 11 to be tested annually. If an excedance of the limits is measured, then the testing of the affected area shall return to quarterly testing.

18) Exemption from Compliance with Sections 95464 through 95470

In accordance with 95463(b)(2)(B)(3), if there is no measured concentration of methane of 200 ppmv or greater from the surface of a closed or inactive MSW landfill, the requirements of sections 95464 through 95470 no longer apply provided that the following information is submitted to and approved by the EO within 90 days:

a. Waste-in-Place report
b. All instantaneous monitoring records.

WPWMA is requesting that Modules 1, 2, 10, and 11 be exempted from compliance with these noted sections. This request is denied at this time. The request will be granted once the measured concentration of methane does not exceed 200 ppmv for four consecutive quarters.

19) Increase in Walking Pattern Spacing
Per CCR 9547(c)(1)(B)(1) and (2), if no SEM excedances were detected in the past three years prior to the effective date (July 1, 2011) or are detected after four consecutive quarterly monitoring events, the walking pattern spacing may be increased to 100-foot intervals. If SEM excedances are detected and cannot be remediated within ten calendar days or are detected during a compliance inspection, the WPWMA must return to a 25-foot spacing interval.

No ACO is required for increasing the walking pattern spacing for grids that have had no excedances as described above. WPWMA should keep records to justify the larger walking pattern.

PROPOSED CLARIFICATIONS

1) Continuous Routing of LFG/Operation of GCCS
CCR 95464(b)(1)(A) requires that the owner or operator of a GCCCS "Route the collected gas to a gas control device or devices, and operate the gas collection and control system continuously except as provided in CCR 95464(d) and (e)".

The District will accept WPWMA's interpretation, consistent with the NSPS, that GCCS downtime of less than five days and/or control device downtime of less than one hour not be considered reportable deviations, and therefore only subject to the SSM reporting requirements.

2) Wellhead Negative Pressure Requirements
CCR 95464(c) requires that wellheads be operated under negative pressure except as noted in CCR 95464(c)(d) or (e). WPWMA's interpretation is that this applies to wells within the limit of the waste and not to perimeter wells or soil vapor extraction wells which are not in refuse and are not extracting LFG, consistent with the NSPS. The District will concur with this interpretation.

If you have any questions regarding this matter, please contact me at (530) 745-2336.

Sincerely,

Don Duffy

Don Duffy
Air Pollution Control Engineer

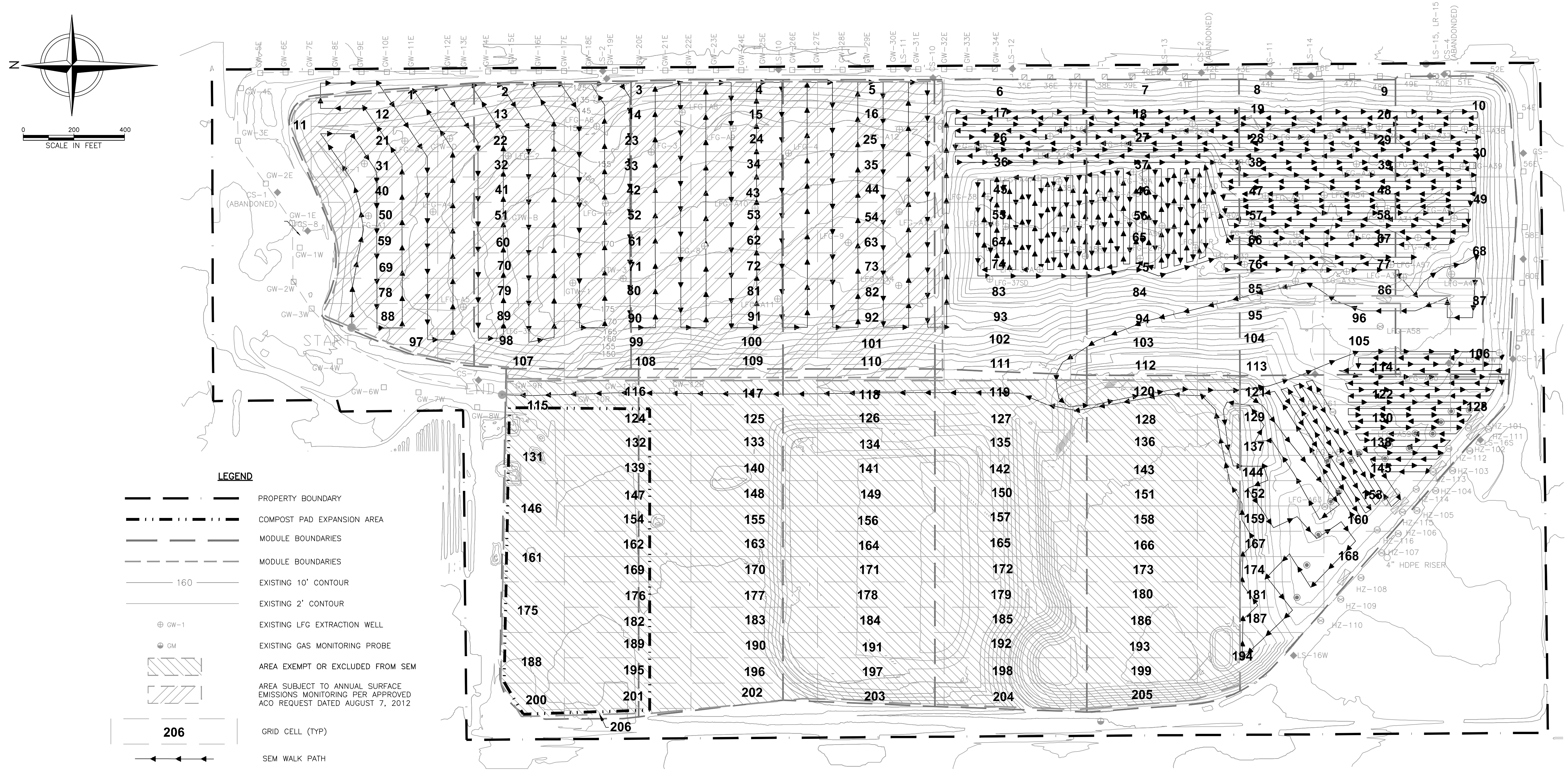
APPENDIX B
APPROVED ALTERNATIVE COMPLIANCE OPTIONS SUMMARY

WESTERN REGIONAL SANITARY LANDFILL
APPROVED ALTERNATIVE COMPLIANCE OPTIONS SUMMARY

Title 17 Section	Requirement	Alternative	Approval Date
95464(a)(1)(F)(1)	Any areas of the landfill that contain only asbestos-containing waste, inert waste or non-decomposable solid waste may be excluded from collection.	Any areas of the landfill that contain only asbestos-containing waste, inert waste or non-decomposable solid waste may be excluded from collection and surface emission monitoring.	August 7, 2012
95471(c)(1)	The entire landfill surface mist be divided into individually identified 50,000 square foot grids. The grids must be used for both instantaneous and integrated surface emissions monitoring.	The District accepts and allowed the exclusion of areas of greater than 25% slope.	August 7, 2012
95469(a)(1)(B) and (a)(2)(B)	For integrated and instantaneous monitoring corrective action is to be taken within ten calendar days of the measured exceedance of the SEM standards.	The District will allow additional time for re-monitoring in cases where the area is dangerous or cannot be safely reached.	August 7, 2012
95469(a)(1)(B)(2) and (a)(2)(B)(2)	For integrated and instantaneous monitoring a new or replacement will be installed within 120 days of detection of a third exceedance of the SEM limit.	The District will allow other modifications than just additional wells, as appropriate, to correct exceedances. A corresponding alternative compliance timeline beyond 120 days will be allowed, as appropriate.	August 7, 2012
95471(c)(1)(C)	Surface testing must be terminated when the average wind speed exceeds file miles per hour or the instantaneous wind speed exceeds 10 miles per hour.	The District will accept the alternative wind speeds of 10- miles per hour for average wind and 20 miles per hour for instantaneous wind speed.	August 7, 2012

Title 17 Section	Requirement	Alternative	Approval Date
95471(c)(1)(D)	Surface emissions testing must be conducted only when there has been no measurable precipitation in the preceding 72 hours.	The District will allow SEM to be conducted only when there has been no measurable precipitation in the preceding 24 hours. WPWMA shall minimize the times when SEM is conducted with precipitation in the preceding 24 to 72 hours.	August 7, 2012
95471(c)(1)	The entire landfill surface mist be divided into individually identified 50,000 square foot grids. The grids must be used for both instantaneous and integrated surface emissions monitoring.	Since landfills are not sized in 50,000 square foot increments, the District will allow along waste area boundaries and around areas that cannot be subjected to SEM due to safety reasons, grid segments that are slightly large or smaller than 50,000 square feet.	August 7, 2012
95469(a)(3)	An owner or operator of a closed or inactive MSWQ landfill, or any closed or inactive areas on an active MSW landfill that can demonstrate that in the three years before the effective date of this subarticle there were no measured exceedances of the limits…by annual or quarterly monitoring may monitor annually.	The District will allow closed areas designated as Modules 1, 2, 10 and 11 to be tested annually. If an exceedance of the limits is measured, the testing of the affected area hall return to quarterly testing.	August 7, 2012

APPENDIX C
INSTANTANEOUS AND INTEGRATED SEM EVENT MAP



NOTES:

1. TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS BY THE BASE MAPPING COMPANY LTD. DATE OF PHOTOGRAPHY: JULY 31, 2013.
2. FEATURES, CONTOURS, AND ELEVATIONS ON THESE BASE MAPS ARE APPROXIMATE INDICATIONS OF CURRENT AND FUTURE CONDITIONS.
3. SOURCE OF 2012 AS-BUILT DATA: AMERICAN ENVIRONMENTAL GROUP LTD. SUPPLEMENTAL 2013 GCCS IMPROVEMENTS AS-BUILT PIPING AND WELL LOCATIONS PER FIELD SURVEY PERFORMED BY F3 AND ASSOCIATES, DATED NOVEMBER 20, 2013 AND NOVEMBER 25, 2013. SUPPLEMENTAL GCCS LOCATIONS, INCLUDING HORIZONTAL COLLECTORS HZ-111 THROUGH HZ-116, PER FIELD OBSERVATIONS PERFORMED IN JANUARY 2014.
4. MONITORING DATES:
5. TECHNICIANS:

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
DATE OF ISSUE 05/18/2016		DRAWN BY RAW / DESIGNED BY JR			CHECKED BY ML / APPROVED BY CWY	

cornerstone environmental

PREPARED BY:
CORNERSTONE ENVIRONMENTAL GROUP, LLC

WESTERN REGIONAL SANITARY LANDFILL
PLACER COUNTY, CALIFORNIA

SURFACE EMISSION MONITORING MAP

SHEET NO. 1

PROJECT NO. 110343

APPENDIX D
LMR SURFACE EMISSIONS MONITORING REPORT TEMPLATE

7600 Dublin Boulevard, Suite 200, Dublin, CA 94568
T 877.633.5520 | F 925.560.9879 | W www.cornerstoneeg.com

DATE

Mr. Keith Schmidt
Western Regional Sanitary Landfill
3033 Fiddyment Road
Roseville, CA 95648

Re: QUARTER/YEAR Landfill Methane Rule Surface Emissions Monitoring Report
Western Regional Sanitary Landfill

Dear Mr. Schmidt:

This report for the Western Regional Sanitary Landfill (WRSL) contains the results of the QUARTER/YEAR Integrated and Instantaneous Landfill Methane Rule (LMR) Surface Emissions Monitoring (SEM). This monitoring was conducted in accordance with the requirements set forth in the California Code of Regulations (CCR) Title 17, Division 3, Chapter 1, Subarticle 6 (Title 17), as mandated by Assembly Bill (AB) 32 LMR. All monitoring and reporting was completed in accordance with the LMR WRSL SEM Plan, dated May 2016, prepared by Cornerstone Environmental Group, LLC (Cornerstone).

An Alternative Compliance Option (ACO) Request was submitted to the Placer County Air Pollution Control District (PCAPCD) on February 29, 2012, per CCR Title 17 §95468(a). A formal response to the ACO request was received by the Western Placer Waste Management Authority (WPWMA) on August 7, 2012.

The following is a summary of the monitoring results completed for QUARTER/YEAR on DATE.

Instantaneous and Integrated Surface Monitoring Procedures

The surface of the WRSL disposal area has been divided into 206 monitoring grids – approximately 50,000 square feet each. The Instantaneous and Integrated SEM was conducted using a flame ionization detector (FID) which meets or exceeds all guidelines set forth in the LMR SEM CCR Title 17 §95471(a). The FID was calibrated prior to use in accordance with the United States Environmental Protection Agency (USEPA) Method 21. The Instantaneous SEM procedures followed the requirements of CCR Title 17 §95471(c)(2). The Integrated SEM was conducted using an FID with averaging capabilities to average the methane readings measured while walking the surface of each grid. Calibration logs were completed by the field technician performing the SEM and a copy of the calibration forms are included in Appendix A of this report.

Weather Conditions during Monitoring

The wind speed was recorded and averaged in 15-minute intervals using an onsite anemometer with a continuous recorder for the entire duration of the monitoring event. Pursuant to the approved ACO request, if the average wind speed exceeded 10 miles per hour (mph), or the instantaneous wind speed exceeded 20 mph, surface testing was terminated until the wind speed decreased and was within the acceptable limits. During these monitoring events, the instantaneous and integrated wind speeds were within the required limits. Pursuant to the approved ACO request, surface monitoring was not conducted within 24 hours of measureable precipitation. Weather data collected during surface monitoring is available onsite, upon request.

Instantaneous Surface Monitoring

Field personnel walked the surface of the Landfill following the walking pattern as depicted in Attachment C, which traverses each monitoring grid. Pursuant to the approved ACO areas of the Landfill slopes greater than 14 degrees (25 percent) and areas only containing asbestos-containing waste, inert waste and/or non-decomposable waste were not monitored. As allowed by CCR Title 17 §95466, areas of the Landfill with active operations and areas of the landfill surface where the landfill cover materials have been removed and refuse has been exposed for the purpose of installing, expanding, replacing, or repairing components of the landfill gas, leachate or gas condensate collection and removal system, were excluded.

While walking, the wand tip of the FID was held within three (3) inches of the landfill surface while traversing the grid. Per an approved ACO request, the wand tip of the FID was held within 3 inches of vegetation in areas where the landfill surface is covered with low-lying vegetation such as grasses, while traversing the grid. All instantaneous surface monitoring was performed in accordance with Title 40 Code of Federal Regulation (CFR) §60.755 (c)(3) and CCR Title 17 §95471(c).

Any instantaneous surface readings of methane over 500 parts per million by volume (ppmv) methane were recorded and marked on the SEM Map, and Exceedances and Monitoring Log (Appendix B) and flagged for remediation. Any instantaneous surface readings of methane from (and including) 200 to 500 ppmv were recorded and marked on the SEM Map and the Exceedances and Monitoring Log (Appendix B). Readings between 200 to 500 ppmv are not an exceedance of CCR Title 17 §95465(a)(1-2), therefore no further action is required. The SEM Map is included in Appendix C of this report. WRSL personnel were informed of the SEM results immediately following monitoring.

Results of QUARTER/YEAR Instantaneous SEM

Readings between 200 ppmv and 500 ppmv Methane

There were INSERT readings between 200 ppmv and 500 ppmv methane detected during the initial monitoring event conducted on DATE. See Appendix B, Instantaneous SEM 200 ppmv Methane Readings and Monitoring Log, for details. Pursuant to CCR Title 17 §95471(c), instantaneous surface emissions exceeding 200 ppmv but below 500 ppmv methane are required to be recorded, however no remedial action is required.

500 ppmv or Higher Methane Exceedances

There was INSERT exceedance, in Grid #, of 500 ppmv methane detected on DATE. See Appendices B and C, Instantaneous SEM 500 ppmv Methane Exceedances and Monitoring Log, and SEM Map, for details.

[***If no exceedances detected:*** *Since there were no location with exceedances detected during the initial monitoring event, ten-day re-monitoring and thirty-day follow-up monitoring events were not required.]*

First Ten-day Re-monitoring Results

The first ten-day re-monitoring event was completed on DATE. Upon re-monitoring, Grid # was found to be in compliance of 500 ppmv methane.

[***If no exceedances detected:*** *No exceedances (methane readings above 500 ppmv) were detected during this monitoring event.]*

Second Ten-day Re-monitoring Results

On DATE, field personnel completed a 30-day follow-up monitoring of the exceedance of 500 ppmv methane in Grid # in accordance with the LMR SEM Regulations. Results indicated that no further exceedance of the 500 ppmv limit remained.

Integrated Surface Monitoring

Field personnel walked the surface of the Landfill following the walking pattern which traverses each monitoring grid, as depicted in Appendix C. Pursuant to the approved ACO areas of the Landfill slopes greater than 14 degrees (25 percent) and areas only containing asbestos-containing waste, inert waste and/or non-decomposable waste were not monitored. As allowed by CCR Title 17 §95466 areas of the Landfill with active operations and areas of the landfill surface where the landfill cover materials have been removed and refuse has been exposed for the purpose of installing, expanding, replacing, or repairing components of the landfill gas, leachate or gas condensate collection and removal system, were excluded.

The integrated surface sampling equipment consisted of an FID which meets or exceeds all guidelines set forth in the CCR Title 17 §95471(a). The FID was calibrated prior to use in accordance with the USEPA Method 21. The FID averaged the methane readings observed while walking the surface of each grid. During sampling, the probe was held within 3 inches of the landfill surface and any vegetation in areas where the landfill surface is covered with low-lying vegetation, as allowed by the approved ACO request.

The field technician traversed the grid walking path at a pace of approximately 100 feet per minute. Grids with results greater than 25 ppmv methane were recorded, marked on the SEM map, and flagged for remediation. The SEM Map is included in Appendix C of this report. WRSL personnel were informed of the SEM results immediately following monitoring.

Results of QUARTER/YEAR Integrated SEM

The average methane concentration of each grid was recorded during the monitoring event. See Appendix C, Integrated Surface Monitoring Grid Log.

There were INSERT grids (Grids #, #, and #) with exceedances of 25 ppmv or higher methane detected during the initial monitoring event conducted on DATE.

[***If no exceedances detected:*** *Since there were no location with exceedances detected during the initial monitoring event, no further monitoring is required.]*

See Appendices B and C, Integrated SEM 25 ppmv Exceedances and Monitoring Log, and SEM Map, for details.

First Ten-day Re-monitoring Results

The first ten-day re-monitoring event was completed on DATE.

If exceedances detected: Upon re-monitoring, all INSERT grids remained in exceedance of 25 ppmv methane.

Second Ten-day Re-monitoring Results

The second ten-day re-monitoring event was completed on DATE.

[***If no exceedances detected:*** *No exceedances (methane readings above 25 ppmv) were detected during this monitoring event.]*

If exceedances detected: All INSERT grids continued to be in exceedance of 25 ppmv methane.

Pursuant to CCR Title 17 §95469(a)(2)(B)(2), the owner and operator must install a new or replacement well as determined to achieve compliance no later than 120 calendar days after detecting the third exceedance. However, in accordance with the approved ACO, the District will allow other modifications than just additional wells such as upgrading the blower, header pipes or control device, as appropriate to correct exceedances, and a corresponding alternative compliance timeline beyond 120 days will be allowed, as appropriate.

All monitoring was completed in accordance with the 40 CFR §60.753 (d) and the LMR SEM CCR Title 17 requirements. If you have any questions regarding this report, please do not hesitate to contact me at PHONE NUMBER.

Sincerely,

Cornerstone Environmental Group, LLC

Enclosures: Appendix A - Calibration Records
Appendix B - Exceedances and Monitoring Log
Instantaneous SEM 200 ppmv Exceedance and Monitoring Log
Integrated SEM Monitoring Grid Log
Integrated SEM 25 ppmv Exceedances and Monitoring Log
Appendix C - SEM Event Map
Instantaneous and Integrated SEM Map

APPENDIX A
CALIBRATION RECORDS

CALIBRATION PRECISION TEST RECORD

Date: ____________

Expiration Date (3 months): _____

Time: ______ AM _______ PM

Instrument Make: ________ Model: _______________ S/N: _____

Measurement #1:

Meter Reading for Zero Air: ___________ ppm (a)

Meter Reading for Calibration Gas: ___________ ppm (b)

Measurement #2:

Meter Reading for Zero Air: ___________ ppm (c)

Meter Reading for Calibration Gas: ___________ ppm (d)

Measurement #3:

Meter Reading for Zero Air: ___________ ppm (e)

Meter Reading for Calibration Gas: ___________ ppm (f)

Calculate Precision:

$$\frac{\{|(500) - (b)| + |(500) - (d)| + |(500) - (f)|\}}{3} \times \frac{1}{500} \times 100$$

Less than 0.33% (must be < than 10%)

Performed By: ______________________

RESPONSE TIME TEST RECORD

Date: _____________

Expiration Date (3 months): ______

Time: ______ AM _______ PM

Instrument Make: _________ Model: _____ S/N: ___________

Measurement #1:

Stabilized Reading Using Calibration Gas: ____________ ppm
90% of the Stabilized Reading: ____________ ppm
Time to Reach 90% of Stabilized Reading after switching from Zero Air to Calibration Gas: ____________ seconds (a)

Measurement #2:

Stabilized Reading Using Calibration Gas: ____________ ppm
90% of the Stabilized Reading: ____________ ppm
Time to Reach 90% of Stabilized Reading after switching from Zero Air to Calibration Gas: ____________ seconds (b)

Measurement #3:

Stabilized Reading Using Calibration Gas: ____________ ppm
90% of the Stabilized Reading: ____________ ppm
Time to Reach 90% of Stabilized Reading after switching from Zero Air to Calibration Gas: ____________ seconds (c)

Calculate Response Time:

$$\frac{(a) + (b) + (c)}{3} =$$ ______ seconds (must be less than 30 seconds)

Performed By: ______________________

CALIBRATION PROCEDURE AND BACKGROUND DETERMINATION REPORT

Landfill Name: Western Regional Sanitary Landfill ____________ Date: _______

Time: ______ AM _______ PM

Instrument Make:_________ Model: ________________ S/N: ____________

Calibration Procedure

1. Allow instrument to internally zero itself while introducing zero air.
2. Introduce the calibration gas into the probe.

   Stable Reading = __________ppm

3. Adjust meter to read 500 ppm.

Background Determination Procedure

1. Upwind Reading (highest in 30 seconds): ____________ ppm (a)
2. Downwind Reading (highest in 30 seconds): ____________ ppm (b)

Calculate Background Value:

$\frac{(a) + (b)}{2}$ Background = ____________ppm

Performed By: _________________

APPENDIX B
EXCEEDANCES AND MONITORING LOGS

WESTERN REGIONAL SANITARY LANDFILL INSTANTANEOUS SURFACE EMISSIONS MONITORING
INSTANTANEOUS SEM 200 PPMV EXCEEDANCES AND MONITORING LOG

Grid #/Location	Brief Description	Initial Monitoring Event		Comments
		Monitoring Date/Time	Exceedance (ppmv)	

ppmv = parts per million by volume

Pursuant to CCR Title 17 §95471(c), instantaneous surface emissions exceeding 200 ppmv but below 500 ppmv are required to be recorded. No remedial action is required.

WESTERN REGIONAL SANITARY LANDFILL INSTANTANEOUS SURFACE EMISSIONS MONITORING
INSTANTANEOUS SEM 500 PPMV EXCEEDANCES AND MONITORING LOG

Grid #/ Location	Brief Description	Initial Monitoring Event		1st 10-Day Re-Monitoring Event			2nd 10-Day Monitoring Event			Comments
		Monitoring Date/Time	Exceedance (ppmv)	Monitoring Date/Time	No Exceedance <500 ppm	Exceedance >500 ppm	Monitoring Date/Time	No Exceedance <500 ppm	Exceedance >500 ppm	

WESTERN REGIONAL SANITARY LANDFILL
INTEGRATED SURFACE EMISSIONS MONITORING LOG

Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
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22					
23					
24					
25					
26					
27					
28					
29					
30					

Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
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59					
60					
61					
62					
63					

Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
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88					
89					
90					
91					
92					
93					
94					
95					
96					

Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
97					
98					
99					
100					
101					
102					
103					
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106					
107					
108					
109					
110					
111					
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129					

Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
130					
131					
132					
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140					
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160					
161					
162					

Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
163					
164					
165					
166					
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172					
173					
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175					
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190					
191					
192					
193					
194					
195					

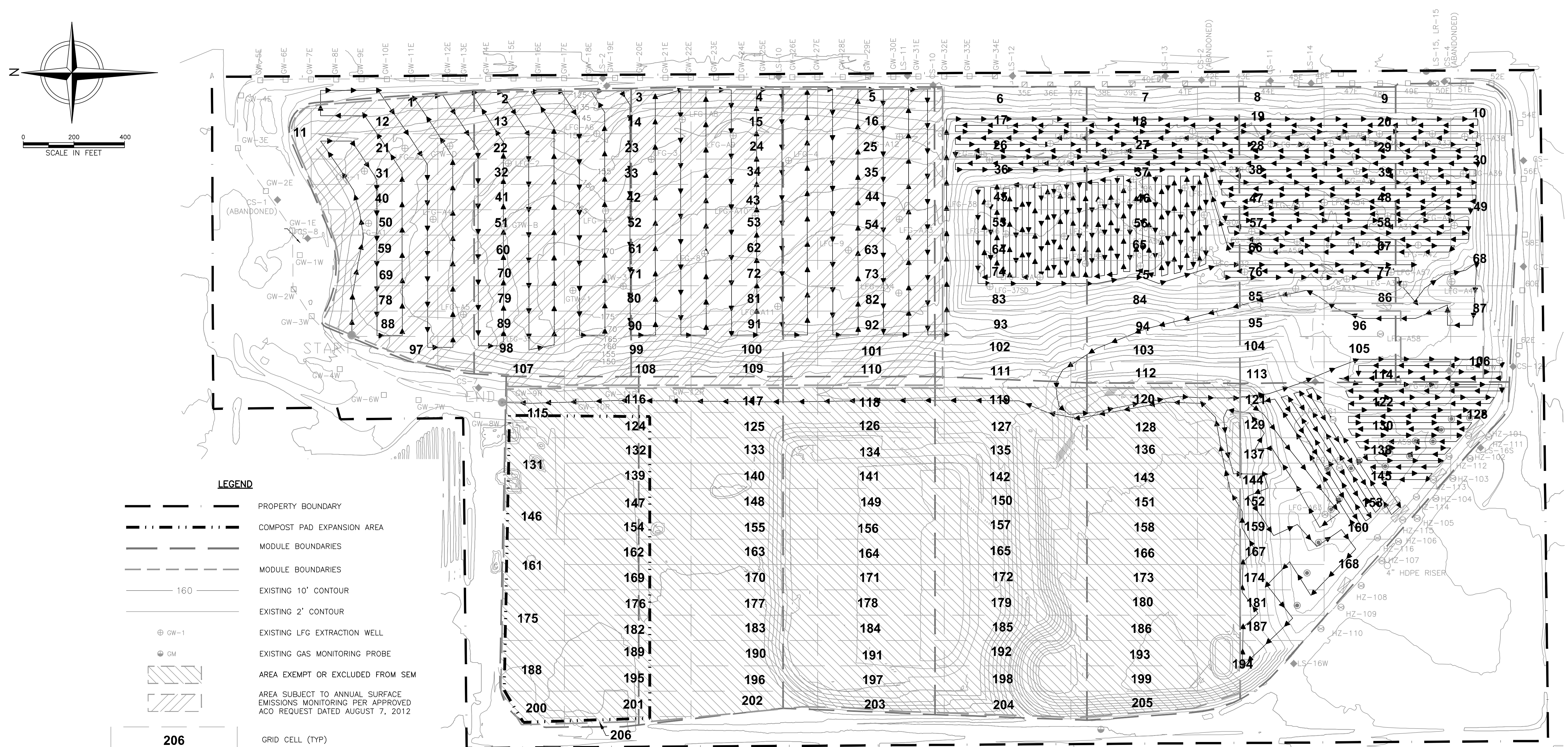
Grid Number	Date	Start Time	Stop Time	Average Methane Concentration (ppmv)	Comments
196					
197					
198					
199					
200					
201					
202					
203					
204					
205					
206					

ppmv = parts per million by volume

WESTERN REGIONAL SANITARY LANDFILL INSTANTANEOUS SURFACE EMISSIONS MONITORING
INTEGRATED SEM 25 PPMV EXCEEDANCES AND MONITORING LOG

Grid #/ Location	Brief Description	Initial Monitoring Event		1st 10-Day Re-Monitoring Event			2nd 10-Day Monitoring Event			Comments
		Monitoring Date/Time	Exceedance (ppmv)	Monitoring Date/Time	No Exceedance ≤25 ppm	Exceedance >25 ppm	Monitoring Date/Time	No Exceedance ≤25 ppm	Exceedance >25 ppm	

APPENDIX C
INSTANTANEOUS AND INTEGRATED SEM EVENT MAP



LEGEND

	PROPERTY BOUNDARY
	COMPOST PAD EXPANSION AREA
	MODULE BOUNDARIES
	MODULE BOUNDARIES
160	EXISTING 10' CONTOUR
	EXISTING 2' CONTOUR
GW-1	EXISTING LFG EXTRACTION WELL
GM	EXISTING GAS MONITORING PROBE
	AREA EXEMPT OR EXCLUDED FROM SEM
	AREA SUBJECT TO ANNUAL SURFACE EMISSIONS MONITORING PER APPROVED ACO REQUEST DATED AUGUST 7, 2012
206	GRID CELL (TYP)
	SEM WALK PATH

NOTES:

1. TOPOGRAPHY COMPILED BY PHOTOGRAMMETRIC METHODS BY THE BASE MAPPING COMPANY LTD. DATE OF PHOTOGRAPHY: JULY 31, 2013.
2. FEATURES, CONTOURS, AND ELEVATIONS ON THESE BASE MAPS ARE APPROXIMATE INDICATIONS OF CURRENT AND FUTURE CONDITIONS.
3. SOURCE OF 2012 AS-BUILT DATA: AMERICAN ENVIRONMENTAL GROUP LTD. SUPPLEMENTAL 2013 GCCS IMPROVEMENTS AS-BUILT PIPING AND WELL LOCATIONS PER FIELD SURVEY PERFORMED BY F3 AND ASSOCIATES, DATED NOVEMBER 20, 2013 AND NOVEMBER 25, 2013. SUPPLEMENTAL GCCS LOCATIONS, INCLUDING HORIZONTAL COLLECTORS HZ-111 THROUGH HZ-116, PER FIELD OBSERVATIONS PERFORMED IN JANUARY 2014.
4. MONITORING DATES:
5. TECHNICIANS:

REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY
DATE OF ISSUE 05/18/2016		DRAWN BY RAW / DESIGNED BY JR			CHECKED BY ML / APPROVED BY CWY	

cornerstone environmental

PREPARED BY:
CORNERSTONE ENVIRONMENTAL GROUP, LLC

WESTERN REGIONAL SANITARY LANDFILL
PLACER COUNTY, CALIFORNIA

SURFACE EMISSION MONITORING MAP

SHEET NO. 1

PROJECT NO. 110343

1/2" 0 1"