Alternative Compliance Request for S-SMA-0.25

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1.0 INTRODUCTION

Los Alamos National Laboratory (LANL or the Laboratory) is a multidisciplinary research facility owned by the U.S. Department of Energy (DOE) and managed by Los Alamos National Security, LLC (LANS). The Laboratory, located in Los Alamos County in northern New Mexico, covers approximately 36 mi^2 (see Figure 1). It is situated on the Pajarito Plateau, which is made up of a series of finger-like mesas separated by deep, west-to-east-oriented canyons cut by predominantly ephemeral and intermittent streams. On February 13, 2009, the Environmental Protection Agency (EPA), Region 6, issued National Pollutant Discharge Elimination System (NPDES) Permit No. NM0030759 (the Individual Permit or Permit) to DOE and LANS (collectively, the Permittees). The Individual Permit incorporating the latest modifications became effective on November 1, 2010 (EPA 2010).

Site monitoring area (SMA) S-SMA-0.25 is located in the north central portion of Technical Area 03 (TA-03), as shown in Figure 2. SMA-0.25 contains two solid waste management units (SWMUs or Sites). Confirmation monitoring samples collected in 2011 from S-SMA-0.25 showed copper, zinc, gross alpha, and total polychlorinated biphenyls (PCBs) at concentrations above the applicable target action levels (TALs). Because of these TAL exceedances, the Permittees are required to implement corrective action in accordance with Part I.E.2(a) through 2(d) or E.3 for the Sites located within this SMA. The deadline for completing corrective action is November 1, 2013, because the two Sites in S-SMA-0.25 are high priority.

Where the Permittees believe they have installed measures to minimize pollutants in their storm water discharges, as required by Part I .A of the Permit at a Site or Sites, but are unable to certify Completion of Corrective action under Sections E.2(a) through E.2(d) (individually or collectively), the Permittees may seek to place a site into Alternative Compliance. As described below the Permittees have determined that both Sites within this SMA, Site 03-013(a) and Site 03-052(f), can achieve completion of corrective only through the alternative compliance process in Part I.E.3.

This alternative compliance request is organized as follows:

- *Section 2.0, Regulatory Framework,* summarizes the scope of the Individual Permit, the relationship between the Individual Permit and the March 2005 Compliance Order on Consent (Consent Order), administered by the New Mexico Environment Department (NMED), and its associated corrective action processes.
- *Section 3.0, Overview of the Alternative Compliance Process,* summarizes the requirements in Part I.E.3(b) for making an alternative compliance request to EPA.
- *Section 4.0, Site Descriptions,* summarizes the historical operations that led to the Sites in S-SMA-0.25 being identified as SWMUs in the 1990 SWMU report (LANL 1990), the current use of the Sites, any Consent Order investigations and remedial actions conducted at the Sites, and the current status of the Sites under the Consent Order.
- *Section 5.0, Description of Control Measures Installed within S-SMA-0.25*, details the baseline control measures that were installed in S-SMA-0.25.
- *Section 6.0, Storm Water Monitoring Results,* describes the confirmation monitoring results and TAL exceedances.
- *Section 7.0, Basis of Alternative Compliance Request,* summarizes the underlying studies and technical information that lead the Permittees to conclude certification of completion of corrective action cannot be achieved under Parts I.E.2(a) through 2(d).

- *Section 8.0, Evaluation of Corrective Action Options,* details the Permittees evaluation of each of the corrective action options in Parts I.E.2(a) through 2(d) and the bases for the conclusion that certification of completion of corrective action is not possible.
- *Section 9.0, Proposed Alternative Compliance Approach*, describes the storm water controls proposed by the Permittees to achieve completion of corrective action under Part I.E.3.

2.0 REGULATORY FRAMEWORK

2.1 Background

The Individual Permit regulates storm water discharges associated with industrial activities from specified Sites. The Individual Permit does not, however, regulate storm water discharges associated with current conventional industrial activities at the Laboratory. This distinction is important at TA-03, which is subject to the Laboratory's NPDES Multi-Sector General Permit ([MSGP] No. NMR05GB21). The covered industrial sectors that apply to TA-03 are Sector AA, fabricated metal products, and Sector O, steam electric-generating facilities. Pursuant to the MSGP, the Laboratory has site-specific storm water pollution prevention plans (SWPPPs) and performs benchmark storm water monitoring for the two relevant industrial sectors within TA-03. The SWPPP is a written assessment of potential sources of pollutants in storm water runoff and the control measures that are implemented at each site to minimize the discharge of these pollutants in runoff. These control measures include site-specific best management practices (BMPs), maintenance plans, inspections, employee training, and reporting.

Under the MSGP, the Laboratory successfully reduced the monitored constituents for the TA-03 building 34 metal shop (Sector AA) from aluminum, iron, nitrate, nitrite nitrogen, and zinc to only zinc. The TA-03 power and steam plant (Sector O) is currently monitored for iron. In addition, three NPDES-permitted outfalls located in TA-03 (Figure 3) are currently monitored for the following pollutants: total residual chlorine, E. coli, total suspended solids, aluminum, phosphorous, copper, PCBs, and whole effluent toxicity.

The Individual Permit treats the potential historical releases at a Site as an "industrial activity" that creates a "point source discharge" and directs the Permittees to monitor storm water discharges from Sites at specified sampling points known as SMAs. An SMA is a single drainage area within a subwatershed and typically includes more than one Site. Storm water from a Site may drain to multiple subwatersheds and may be associated with multiple SMAs.

The Sites regulated under the Individual Permit are a subset of the SWMUs and areas of concern (AOCs) that are being addressed under the Consent Order issued by NMED. The Consent Order fulfills the corrective action requirements in §3004(u) and §3008(h) of the Resource Conservation and Recovery Act (RCRA).

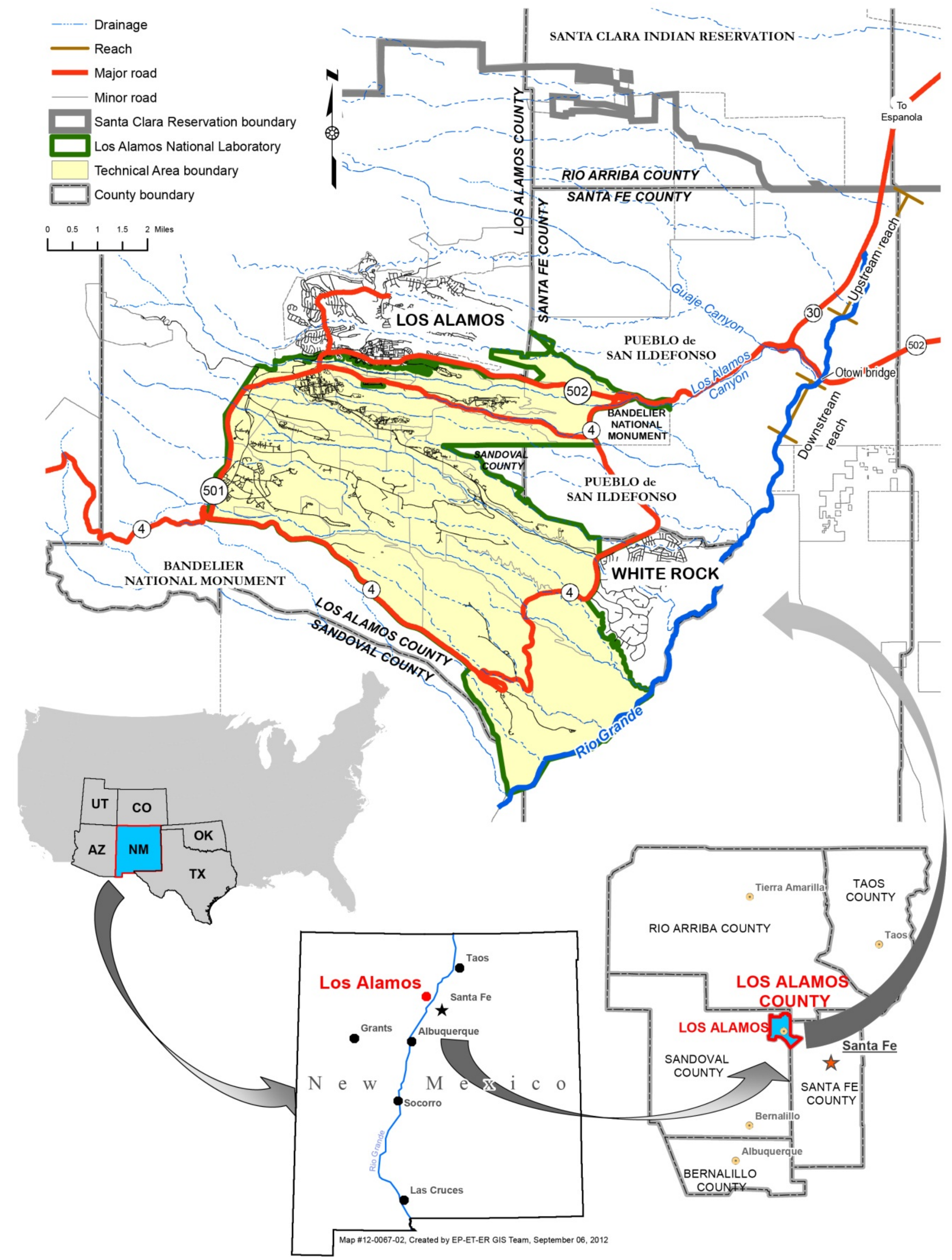

Figure 1 Location of the Laboratory with insets of New Mexico State and Los Alamos County

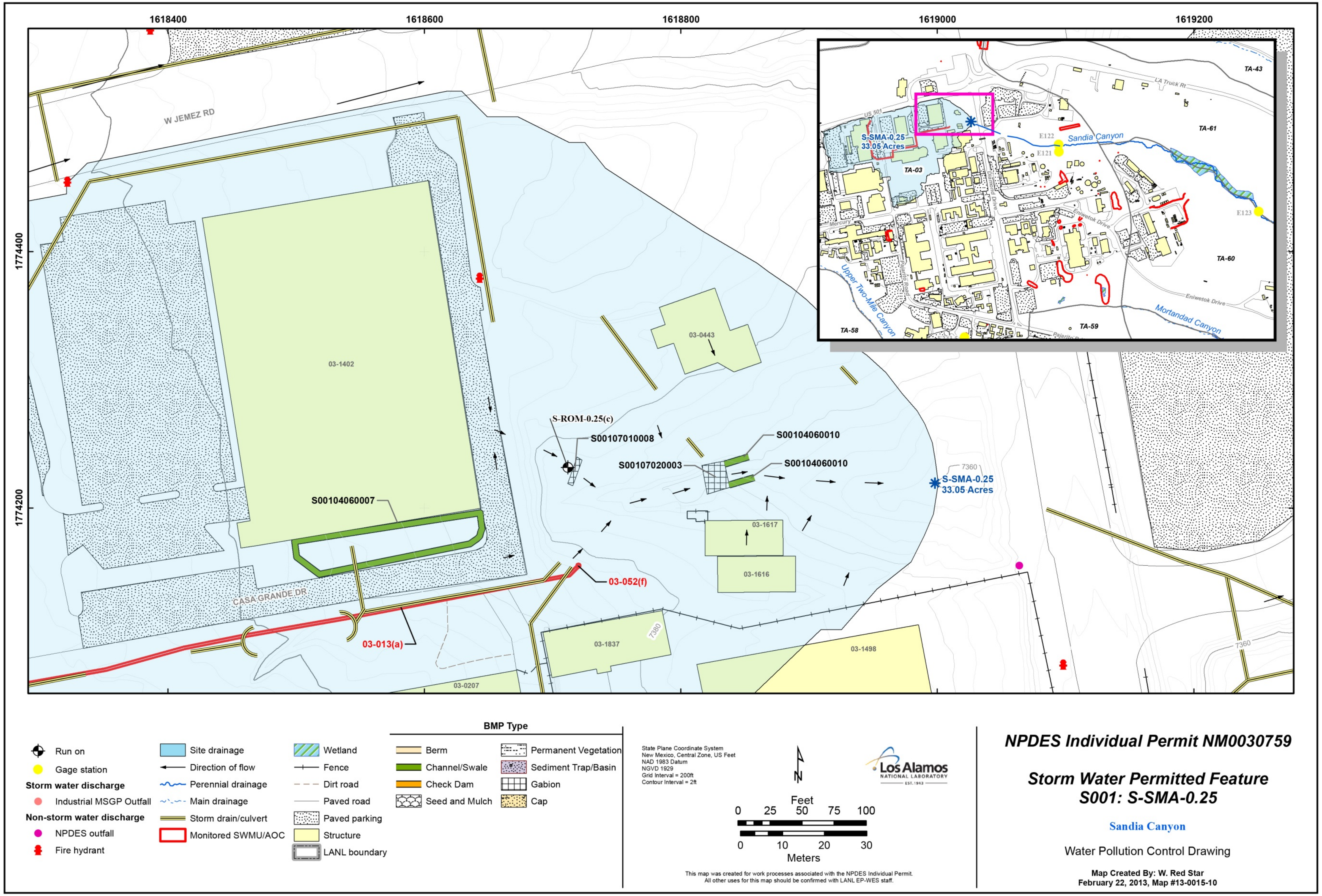

Figure 2 Project map of S-SMA-0.25 showing monitored Sites, sampler locations, gage stations, and baseline controls

Figure 3 NPDES-permitted outfalls in TA-03

A SWMU is a discernible unit at which solid wastes may have been "routinely and systematically released," possibly resulting in a release of hazardous constituents. The identification and investigation of SWMUs and AOCs is an iterative process. The initial identification process is conservative—that is, it errs on the side of inclusion if there is any indication in the record a possible historical release of hazardous wastes or hazardous constituents. The Consent Order requires initial investigations to run broad, conservative analytical scans regardless of what the historical reviews indicate may have been released. As a result, all samples in the first phase of investigations under the Consent Order are typically analyzed for EPA target analyte list metals, total cyanide, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), PCBs, and nitrate and perchlorate.

As the phased investigations proceed under the Consent Order, some AOCs and SWMUs will be eligible for no further action status (e.g., the data reveal no hazardous constituents were released). For the remaining SWMUs and AOCs, the phased investigations proceed until the nature and extent of contamination from the historical release have been defined in all relevant media, and it can be shown the site poses no unacceptable risk to human health and the environment under current and reasonably foreseeable future land use. The investigation and remediation of SWMUs and AOCs under the Consent Order began before the effective date of the Individual Permit and continues concurrently with implementation of the Permit.

A Site that has met the definition of a SWMU or AOC was evaluated for inclusion in the Individual Permit based on the following criteria: (1) the SWMU/AOC is exposed to storm water (e.g., not capped or subsurface); (2) the SWMU/AOC contains “significant industrial material” (e.g., not cleaned up or has contamination in place); and (3) the SWMU/AOC potentially impacts surface water. The selection of SWMUs and AOCs for inclusion in the Individual Permit was based on historical information and any storm water, sediment, and soil data available at the time the Permit application was submitted.

The Individual Permit contains nonnumeric technology-based effluent limitations, coupled with a comprehensive, coordinated inspection and monitoring program, to minimize pollutants in the Permittees’ storm water discharges associated with historical industrial activities from specified Sites. The Permittees are required to implement site-specific control measures (including BMPs) to address the nonnumeric technology-based effluent limits, as necessary, to minimize pollutants from the Sites in their storm water discharges.

The Permit establishes TALs that are equivalent to New Mexico State water-quality criteria. These TALs are used as benchmarks to determine the effectiveness of control measures implemented under the Permit. That is, confirmation monitoring sample results for an SMA are compared with applicable TALs. If one or more confirmation monitoring results exceeds a TAL, the Permittees must take corrective action. Part I.E.2 of the Individual Permit defines “completion of corrective action” as follows:

- Analytical results from confirmation sampling show pollutant concentrations for all pollutants of concern at a Site to be at or below applicable TALs;
- Control measures that totally retain and prevent the discharge of storm water have been installed at the Site;
- Control measures that totally eliminate exposure of pollutants to storm water have been installed at the Site; or
- The Site has achieved RCRA corrective action complete with or without controls status or a certificate of completion under the Consent Order.

Under certain circumstances, the Individual Permit allows the Permittees to submit a request to EPA to have a Site or Sites placed into “Alternative Compliance” (Figure 4). Part I.E.3, Alternative Compliance, addresses the criteria and requirements for making a request for alternative compliance and the actions EPA will take in response to the request.

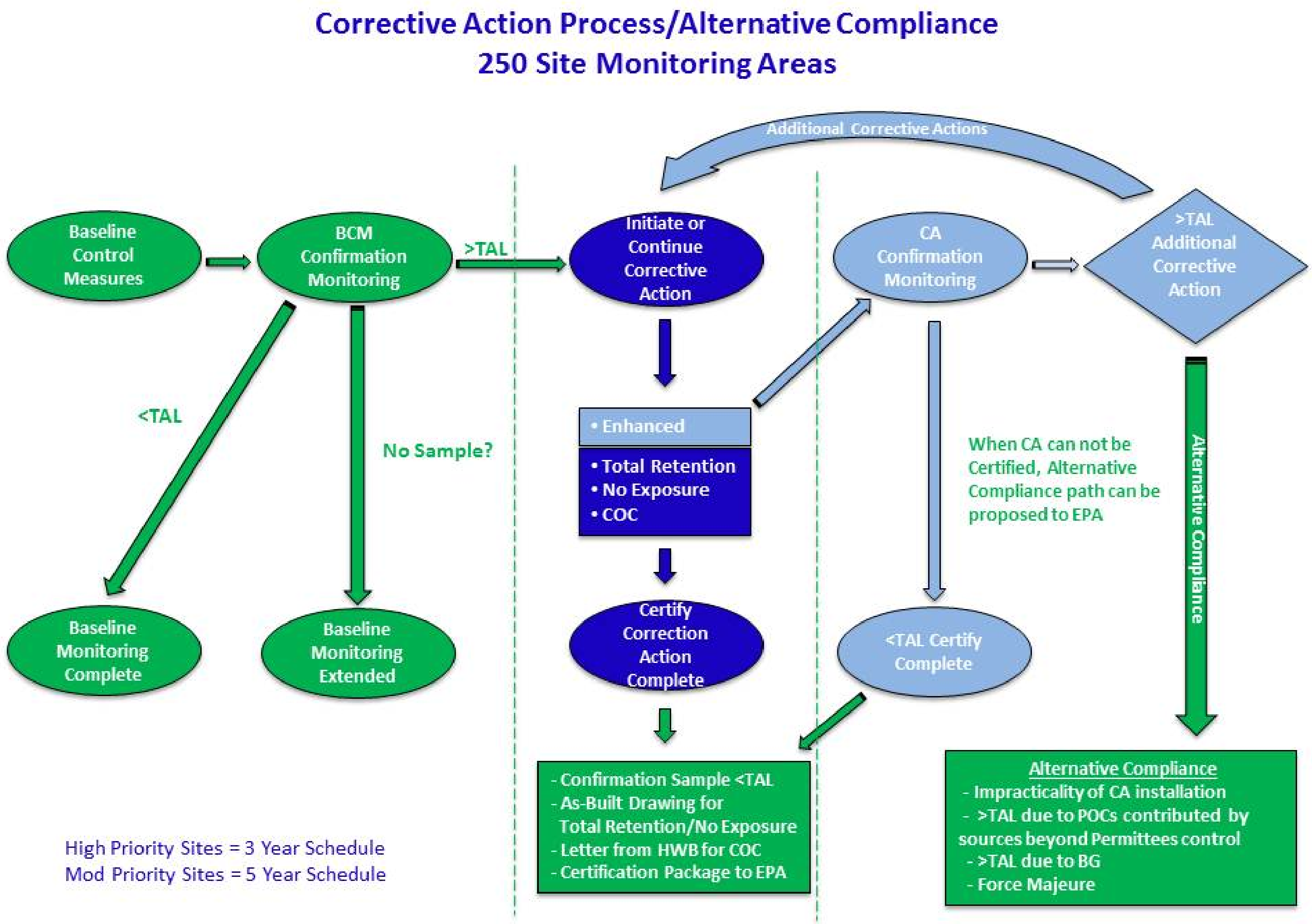

Figure 4 Flow chart of the corrective action process/alternative compliance

3.0 OVERVIEW OF ALTERNATIVE COMPLIANCE PROCESS

The Permittees may seek to place a Site or Sites into alternative compliance when they have installed baseline control measures to minimize pollutants in storm water discharges but are unable to certify completion of corrective action under Part I.E.2(a) through (d), individually or collectively. Part I.E.3(b) requires the Permittees to file a written request with EPA on, or at least 6 mo before, the applicable deadlines for completion of corrective action. The applicable deadlines to complete corrective action at high priority Sites and moderate priority Sites are October 31, 2013, and October 31, 2015, respectively.

If EPA grants the alternative compliance request in whole or in part, it will issue a new individually tailored work plan for the Site or Sites. EPA will also extend the compliance deadline for completion of corrective action, as necessary, to implement this work plan. If EPA denies the alternative compliance request, it will promptly notify the Permittees of the specifics of its decision and of the time frame under which completion of corrective action must be completed under Parts I.E.2(a) through I.E.2(d).

The first requirement that must be met to qualify for alternative compliance is that the Permittees must have "installed measures to minimize pollutants in their storm water discharges as required by Part. I.A of the Permit at a Site or Sites…." Part I.A describes the nonnumeric technology-based effluent limitations required under the Individual Permit to minimize pollutants in storm water discharges. The erosion and sedimentation and run-on and runoff controls identified in Part I.A were installed as baseline controls measures within the first 6 mo of the effective date of the Permit, and certifications of completion were submitted to EPA. The other nonnumeric technology-based effluent limitations include employee training and the elimination of non–storm water discharges not authorized by an NPDES permit.

The second requirement is that the Permittees must demonstrate they will not be able to certify completion of corrective action under Parts I.E.2(a) through I.E.2(d), individually or collectively. Part I.E.3 lists the following examples of conditions that could prevent the Permittees from certifying corrective action complete: force majeure events, background concentrations of pollutants of concern, site conditions that make installing further control measures impracticable, or pollutants of concern contributed by sources beyond the Permittees' control. This list of provides examples of the type of conditions that EPA will consider as the basis for an alternative requirements request; it is not an inclusive list.

The third requirement is that the Permittees develop a detailed demonstration of how they reached the conclusion that they are unable to certify completion of corrective action under Part I.E.2(a) through (d), individually or collectively. This demonstration should include any underlying studies and technical information.

Once completed, the alternative compliance request and all supporting documentation must be submitted to EPA and made available for public review and comment for a period of 45 days. Although not required by the Individual Permit, the Permittees have scheduled a public meeting on June 4, 2013, at Fuller Lodge in Los Alamos, New Mexico.

The Permittees will issue a public notice of issuance of the alternative compliance request and the public meeting by publishing a notice in the *Los Alamos Monitor* and the *Santa Fe New Mexican*, by mailing a copy of the notice to those individuals on the NMED-maintained LANL Facility Mailing List and to NMED and by posting the notice on the Individual Permit section of the Laboratory's public website. This public notice will include the following:

- The subject, the time, and the place of the public meeting and the ways in which interested persons may present their views;

- The name and address of the EPA office processing the alternative compliance request for which notice is being given;
- The name, address and telephone number of a person from whom interested persons may obtain further information; and
- A description of where interested persons may secure hard copies of the alternative compliance request.

At the conclusion of the public comment period and the public meeting, the Permittees will prepare a written response to all relevant and significant comments and concerns raised during the comment period. This response will be provided to each person who requests a copy in writing by mail or email, including those who check the option for a copy on the online comment submittal form. The response will also be posted in the Individual Permit section of the Laboratory's public website.

The Permittees will then submit the alternative compliance request, along with the complete record of public comment and the Permittees' response to comments, to EPA Region 6 for a final determination on the request.

4.0 SITE DESCRIPTIONS

The 33-acre S-SMA-0.25 encompasses Sites 03-013(a) and 03-052(f) [SWMUs 03-013(a) and 03-052(f)], much of the developed area in the north-central portion of TA-03, and the drainage downgradient of the SWMU 03-052(f) outfall (Figure 2). Current conventional industrial operations in the north-central portion of TA-03 include the following core operational facilities for the Laboratory: the principal administration buildings, library, the Chemistry and Metallurgy Research (CMR) Building, Beryllium Technology Facility, a gas-fired electrical-generating plant, and a former sanitary wastewater treatment plant (WWTP) and supporting structures.

TA-03 was originally built as a firing site in 1945 that was decommissioned and cleared in 1949. In the early 1950s, operational facilities from former TA-01 (located in the Los Alamos townsite) were relocated to TA-03. Early TA-03 facilities included the Van de Graaff accelerator building, a laboratory and support structures, the communications building, the CMR Building, the general and chemical warehouses, the cryogenics laboratory, the administration building, the Sigma Building, a fire house, and the physics building. Additional new construction continued through the 1960s and 1970s, when storage areas, shops, office buildings, a WWTP, asphalt batch plant, cement batch plant, and numerous transportable structures were added. Support structures for these facilities included an automotive repair garage, a gas station, steam-cleaning facility, and warehouses. The Oppenheimer Study Center was constructed in 1977, and an annex was added to the administration building in 1981. A computer facility and several national centers for various scientific activities were constructed in the 1990s. The National Security Sciences Building (NSSB) (03-1400) and associated parking structure (03-1402) were completed in 2006.

4.1 Site 03-013(a)

Site 03-013(a) was a 1500-ft-long corrugated metal pipe storm drain that was likely constructed in the 1960s (Figure 2) (LANL 1996). It served building 03-38, a shop and maintenance facility, until 1987 when the drains were rerouted to TA-03 sanitary sewer. Most of the corrugated metal pipe associated with Site 03-013(a) was removed in 2004 to accommodate the construction of the NSSB and the new parking structure east of the Otowi Building (LANL 2008). A new storm drain line was installed west of Site 03-052(f) to manage storm water runoff from the new parking structure. The new storm drain discharges to Site 03-052(f).

The former storm drain at Site 03-013(a) ran underground around maintenance building 03-38, east along the south side of the Otowi Building (03-261), and connected to four other storm drains before daylighting 100 ft east of the Otowi Building, where it became an open concrete and rock-lined ditch (LANL 1993). The open drain continued past transportable office buildings (03-1616 and 03-1617) and beneath streets and sidewalks to a point northeast of the Oppenheimer Study Center (building 03-207) where it discharged to the SWMU 03-052(f) outfall (Figure 2) before draining into Sandia Canyon (LANL 1993). Wastewater from floor drains, sinks, and water fountains in building 03-38 discharged to Site 03-013(a) until 1987 when the drains were rerouted to the TA-03 sanitary sewer system for treatment at the TA-46 WWTP (LANL 1995).Runoff from parking lots and paved areas on the east side of building 03-38 also discharged to this storm drain through a drop inlet located at the northeast corner of the building; this inlet was plugged in 1991.

4.2 Site 03-052(f)

Site 03-052(f) is a former NPDES-permitted outfall (EPA 03A023) that received liquids from floor drains in former buildings 03-105 and 03-287, and possibly other buildings, as well as discharge from a cooling tower (former structure 03-156). The storm drain outfall is located northeast of building 03-0207 and is the same discharge point for Site 03-013(a). Outfall 03A023 was removed from the NPDES permit on July 11, 1997. Buildings 03-105, 03-287, 03-43, and cooling tower 03-156 were demolished in 2003.

During the early 1980s, three reported spills also may have impacted Site 03-052(f). The first spill was approximately 200 gal. of a mixture of water and waste oil that was discharged when an automatic compressor blowdown mechanism failed. A second spill from a ruptured air-compressor oil line resulted in the release of approximately 1 qt of compressor oil to the floor drains in former building 03-287; this spill produced an oily sheen on the surface of the water at the Site 03-052(f) outfall. A third spill occurred when approximately 15 gal. of diesel fuel was released from a ruptured truck fuel line into the utilities construction trench between buildings 03-1793 and 03-1794. On the same day, a clay sewer pipe in the utility trench broke, releasing approximately 2000 gal. of wastewater into the excavation. A sump was used to remove the wastewater from the excavation and the wastewater may have been discharged to Site 03-052(f).

Industrial materials historically managed at Sites 03-013(a) and 03-052(f) included petroleum-based solvents, acids, and caustics from the maintenance contractor’s shop in building 03-38 and three reported petroleum hydrocarbon spills. There is no evidence that radionuclides were managed, handled, or disposed of at Sites 03-013(a) or 03-052(f). While there was no documented release of PCBs from either compressor oils or other petroleum products that were historically discharged at these Sites, these types of products may have contained PCBs. Copper and zinc may have been associated with pipe fitting and welding operations.

4.3 Summary of Consent Order and Other Investigations

A limited number of sediment samples were collected from Sites 03-013(a) and 03-052(f) before the effective date of the Consent Order in 2005. Seven sediment samples (five samples plus one field duplicate and one collocated sample) were collected during the 1994 RCRA facility investigation (RFI) from five locations (at depths ranging from 0 to 0.5 ft) along the sides and within the SWMU 03-052(f) outfall channel 10 to 50 ft downstream from the outfall pipe (LANL 1995). Sampling locations were biased to areas where sediment accumulated (LANL 1996). Samples were analyzed for gross-alpha, -beta, and -gamma radioactivity, tritium, target analyte list metals, PCBs, VOCs, and SVOCs. Chromium, copper, and mercury were detected above background values (BVs) in one sample. Lead was detected above BVs in three samples and zinc in six samples. Aroclor-1254 and total PCBs were detected in one sample at concentrations below residential soil screening levels (SSLs). VOCs and radionuclides were not detected. Data also showed low concentrations of polyaromatic hydrocarbons (PAHs), which were attributed to runoff from the adjacent parking lot (LANL 1996).

Because Site 03-013(a) is associated with active facilities, no sampling was conducted at SWMU 03-013(a) during the 2009 Consent Order investigation of Upper Sandia Canyon Aggregate Area (LANL 2010). Consent Order characterization and investigation activities at this Site will be delayed until building 03-1400 and structure 03-1402 are demolished in the future.

Site 03-052(f) was, however, investigated as part of the 2009 Upper Sandia Canyon Aggregate Area investigation (LANL 2010). Samples were collected at seven locations, one at the outfall and six from within the drainage channel east and downgradient of the outfall (two depths at each location). The Consent Order requires initial investigations to run broad, conservative analytical scans, regardless of whether or not historical reviews indicate these constituents are likely to be present. As a result, all samples were analyzed for target analyte list metals, VOCs, SVOCs, Total petroleum hydrocarbons-diesel range organics (TPH-DRO), PCBs, cyanide, perchlorate, americium-241, isotopic plutonium, and isotopic uranium.

No inorganic chemicals or PCBs were detected above residential SSLs. Three PAHs were detected above residential SSLs at four locations, and TPH-DRO was detected above residential SSLs at two of the same locations in the middle of the drainage channel east of the outfall. Radionuclides were not detected or detected above natural or anthropogenic background activities in soil and tuff samples at SWMU 03-052(f). Therefore, this investigation report narrowed the list of likely pollutants released to the environment from the historical use of industrial materials to Site 03-052(f) to petroleum products (LANL 2010).

Based on the sampling results presented in the Upper Sandia Canyon Aggregate Area investigation report (LANL 2010), the lateral and vertical extent of contaminants are defined for SWMU 03-052(f), except for the vertical extent of several inorganic and organic constituents at six locations and the lateral extent of three organic constituents at one location. On September 2, 2011, the Laboratory submitted a Phase II investigation work plan that proposed collecting 16 shallow subsurface samples from seven locations; NMED approved the work plan on September 29, 2011 (LANL 2011; NMED 2011). The Laboratory is currently reevaluating the data and expects that additional sampling for extent will be necessary at a minimum of one location.

4.4 Rationale for Inclusion of Sites in the Individual Permit

Sites 03-052(f) and 03-013(a) were identified as high priority PCB Sites in the Individual Permit based on the detection of PCBs in storm water samples collected from Sandia E station E122 (Figure 2) pursuant to the Federal Facility Compliance Agreement. At the time the application was submitted, Aroclor-1254 and Aroclor-1260 were detected at 0.33 µg/L and 0.11 µg/L, respectively, at station E122 (Sandia left fork at Asphalt Plant).

5.0 DESCRIPTION OF CONTROL MEASURES INSTALLED WITHIN S-SMA-0.25

A number of baseline control measures were installed within S-SMA-0.25 in accordance with Part I.A. All active control measures are listed in Table 1, and their locations are shown on the project map (Figure 2). Copies of the certification packages, including photographs, are provided in Attachment A. Table 1 presents descriptions of each of the baseline control measures used at the Site.

Table 1
Active Control Measures for S-SMA-0.25

Control ID	Control Name	Run-on Control?	Runoff Control?	Sediment Control?	Erosion Control?	Control Status
S00104060010	Channel/Swale- Rip Rap		X		X	B
S00104060007	Channel/Swale- Rip Rap	X			X	CB
S00107010008	Gabions- Gabions		X	X		CB
S00102010002	Established Vegetation-Grasses and Shrubs				X	CB
S00102020006	Established Vegetation-Forested/Needle Cast				X	CB
S00107020003	Gabions- Gabion Blanket		X		X	CB

Note Blank cell indicates control type does not apply.
B: Additional baseline control measure.
CB: Certified baseline control measure.

Rain gage RG121.9 recorded 2 storm events at S-SMA-0.25 during the 2012 season. These rain events triggered 2 post-storm inspections. Post-storm inspections and all other inspection activity conducted at the SMA are summarized in Table 2.

Table 2
Control Measure Inspections during 2011 and 2012

Inspection Type	Inspection Reference (from The Maintenance Connection)	Inspection Date
Preventative Maintenance	BMP-14028	07-08-2011
Storm Rain Event	BMP-16264	08-09-2011
Storm Rain Event	BMP-17234	08-24-2011
Storm Rain Event	BMP-18909	09-14-2011
TAL Exceedance	COMP-20167	10-14-2011
S-SMA-0.25: Annual Erosion Evaluation 2011	COMP-20013	10-14-2011
S-SMA-0.25: Annual Erosion Evaluation 2012	COMP-23446	06-07-2012
Storm Rain Event	BMP-25247	07-24-2012
Storm Rain Event	BMP-28704	10-23-2012

Maintenance activities conducted at the SMA are summarized in the Table 3.

Table 3
Maintenance during 2011 and 2012

Maintenance Reference	Maintenance Conducted	Maintenance Date	Response Time	Response Discussion
BMP-25866	Installed riprap S00104060010 to both sides of gabion blanket S00107020003.	08-01-12	8 day(s)	Maintenance conducted in timely manner.

Note: No maintenance activities were conducted in 2011.

6.0 STORM WATER MONITORING RESULTS

The location of the sampler for S-SMA-0.25 is shown in Figure 2. Baseline confirmation samples were collected from S-SMA-0.25 on July 28 and August 15, 2011, showing exceedances for copper, zinc, gross alpha, and total PCBs. These data are summarized in Table 4.The results of this sampling effort are presented in graphs as a ratio of the respective maximum target action level (MTAL) or average target action level (ATAL) in Attachment B.

Table 4
Summary of Storm Water Data

Analyte	Unit	Number of Detects	Concentration Range	ATAL	Geometric Mean	Geometric Mean/ATAL Ratio	MTAL	Number of MTAL Exceedances
Copper	µg/L	2	9.7 to 10.9	n/a*	n/a	n/a	4.3	2
Gross alpha	pCi/L	2	8.22 to 28.1	15	15.2	1.01	n/a	n/a
Total PCB	µg/L	1	0.05	0.00064	0.05	78.1	n/a	n/a
Zinc	µg/L	2	52.9 to 74.4	n/a	n/a	n/a	42	2

* n/a = Not applicable.

Following installation of baseline controls, baseline confirmation samples were collected from S-SMA-0.25 on July 28, 2011, and August 15, 2011..

Monitoring results showed exceedances of TALs for copper, total PCB, and zinc in storm water samples.

7.0 BASIS OF ALTERNATIVE COMPLIANCE REQUEST

Both Sites in S-SMA-0.25, 03-013(a) and 03-052(f), are the subject of this alternative compliance request. The Individual Permit requires the Permittees to complete corrective action at high priority sites within 3 yr of the IP's effective date of November 1, 2010.

Part I.E.3(a) lists a number of factors that could prevent the Permittees from certifying the completion of corrective action under Parts I.E.2(a)through E.2 (d), individually or collectively. These factors include, but are not limited to, force majeure events, background concentrations of pollutants of concern, site conditions that make it impracticable to install further control measures, and pollutants of concern contributed by sources beyond the Permittees' control. The evaluation of these factors was divided into the following two categories:

- Sources of pollutants
- Technical feasibility and practicability

The underlying studies, technical information, engineering evaluations, and other factors related to the applicability of these two categories to the feasibility of implementing corrective action options at Sites 03-013(a) and 03-052(f) are detailed below.

7.1 Sources of Pollutants

7.1.1 Copper and Zinc

Copper and zinc were detected in soil samples collected at the Site. Although copper and zinc were detected above naturally occurring background soil and/or tuff concentrations at 9 and 10 locations, respectively, the concentrations of both metals were orders of magnitude below the residential SSL indicating there was likely not a significant historical source of copper or zinc at the site.

Because the two metals that exceed TALs from S-SMA-0.25, copper and zinc, are also common in urban storm water, a literature search was performed to identify potential sources of copper and zinc in storm water from industrial and urban areas. The sources of metals in urban storm water are numerous including, but not limited to, automobile tires, roofing and down spouts, metal culverts, and chainlink fencing. These pollutants accumulate until the first significant storm of the season (Rosenbloom 2009).

The following potential sources were consistently identified in the literature search.

Galvanized Metals

Galvanization is the process of coating iron or steel with zinc, which acts to protect the metal from corrosion or rust. Galvanized metal storm water sewer pipes and chainlink fences are common sources of zinc in storm water runoff at industrial and commercial sites. Chainlink fencing has a considerable area of exposed galvanized material: a linear inch of a 6-ft-high fence has a comparable surface area to a 1 in. wide by 7-ft long galvanized metal roof (Golding 2006). Other typical galvanized surfaces include metal roofs and siding; roof heating, ventilation, and air-conditioning (HVAC) systems, ductwork, turbines and equipment boxes; downspouts and gutters; and light poles (Golding 2008).

Parking and Paved Areas Subject to Vehicle Traffic

Contributions of zinc to the parking areas, loading docks, and paved grounds common to industrial facility sites appear to come from two primary sources: motor oil and tire wear (Golding 2006).

Motor oil is known to contain high levels of zinc and may also contain copper. Major brands of motor oil contain zinc from 0.11%–0.20% zinc by weight (Golding 2006). Motor oil accumulating on paved surfaces during periods of little or no precipitation and areas where motor oil leaks, such as parking areas and loading docks, contribute to an industrial facility’s storm water discharge (Golding 2006).

Tire material consists of 1% zinc by weight, which is released with tire wear as particulate dust or as deposits onto pavement. This release of zinc from tire wear has been found to be a source in storm water runoff (Golding 2006).

Vehicle brake emissions are one of the most important sources of copper in the urban environment (Sondhi 2010). Copper and other metal additives have been used in brake pads since the 1960s. Between 1998 and 2002, the use of copper in domestic brake pads increased by 90% to meet new federal safety federal regulations. The content of copper in brake pads varies from 15%–25% at present and accounted for an estimated 47% of copper in a Maryland urban residential neighborhood. Brake emissions in California were estimated to contribute 80% of the copper found in urban storm water runoff leading to the South San Francisco Bay (Sondhi 2010).

7.1.2 Regional Background Metals Study and Run-on Data Evaluation

Storm water samples were collected from 2009 to 2012 at developed urban monitoring locations throughout the Laboratory and within the Los Alamos County townsite to determine BVs for metals. These results are summarized in a recent Laboratory publication analyzing background and baseline metals in northern New Mexico titled “Background Metals Concentrations and Radioactivity in Storm Water on the Pajarito Plateau, Northern New Mexico” (hereafter, the Background Metals Report [LANL 2013]). The principal objectives of the study were (1) to determine background concentrations in runoff for metals and radionuclide constituents and (2) to determine the baseline concentrations of metals and radionuclide constituents in urban runoff from the Los Alamos townsite and Laboratory property. Sampling locations were selected to avoid any known contamination and to provide reasonable estimates of baseline concentrations, including a wide variety of bedrock source areas and sediment texture. Water-quality conditions measured at background sites and at urban locations reflect the contaminant levels in storm runoff that were derived from the landscape.

The monitoring locations evaluated in the Background Metals Report (LANL 2013) were upstream (upgradient) of Sites and considered representative of a developed landscape associated with buildings, parking lots and roads. The results were analyzed using Statistica 8.0 (StatSoft 2007, Statistica 8.0, Statistics and Analytical Software Package, Tulsa, OK) and ProUCL 4.1.01 (available at http://www.epa.gov/nerlesd1/databases/datahome.htm). Statistical analyses were considered significant at $p < 0.05$. An upper tolerance limit ([UTL] 95%; 95% confidence) was calculated to represent a BV to compare with TAL exceedances observed at SMA locations that experience run-on from urban sources (Table 5).

The Permittees also collected run-on storm water samples during the 2012 field season to support this alternative compliance request. The samples were collected within the SMA and above the SWMU, and the location of the sampler is shown in Figure 2.

The results of the comparison of urban “background” and site-specific run-on data for copper and zinc with the analytical results obtained under the Individual Permit are summarized below.

Copper

The copper background UTL for storm water runoff from an urban/developed landscape on the Pajarito Plateau is 32.3 µg/L, over three times greater than the Individual Permit storm water results of 9.7 µg/L and 10.9 µg/L. This relationship confirms the source of copper in storm water at S-SMA-0.25 is not from the historical release of industrial materials at the Sites.

Site-specific storm water run-on samples collected within the SMA, but parallel to the Sites, contained copper at concentration ranging from 4.05 µg/L to 6.75 µg/L, greater than the TAL of 4.3 µg/L in two of three samples. These data strongly indicate the copper is associated with storm water run-on from urban development, not with the historical use of industrial materials at the Sites. These findings are also consistent with likely sources of copper identified in the literature. The parking lots at TA-03 serve as collection points for pollutants from brakes pads and motor oil that are deposited on the impervious pavement.

The absence of a Site source of copper is confirmed by the lack of a detectable difference between concentrations of copper in storm water collected running on to the Sites, at the SMA, and running off from the SMA at E-123 as shown in Figure 5.

In addition to evaluating the regional and site-specific background sources of copper in storm water, the Permittees also applied the biotic ligand model (BLM) to calculate the criteria maximum concentration (CMC). The CMC calculated by the BLM uses a full chemical analysis, including hardness, and identifies copper complexes and free copper concentrations that may produce a biological insult to a target organism in an aquatic ecosystem. This is an estimate of the highest concentration of copper in ambient water to which an aquatic community can be *exposed briefly* without resulting in an unacceptable adverse effect. A conservative approach was used to calculate the CMC value of 39.1 µg/L for storm water at S SMA-0.25, which is higher than the TAL of 4.3 µg/L. This value was calculated using bulk chemistry of run-on storm water and the lowest hardness and highest copper value in storm water runoff from the Site. All copper results in Site runoff are below the CMC.

Zinc

The zinc background UTL calculated for storm water runoff from an urban/developed landscape on the Pajarito Plateau is 1120 µg/L (LANL 2013), greater than the Individual Permit storm water results of 52.9 µg/L and 74.4 µg/L by 2 orders of magnitude. This relationship confirms the source of zinc in storm water at S-SMA-0.25 is not from the historical release of industrial materials at the Sites.

Site-specific storm water run-on samples collected within the SMA, but parallel to the Sites, contained zinc at concentrations ranging from 21.8 µg/L to 60.1 µg/L. In two of three cases, zinc in storm water run-on is greater than the TAL of 42 µg/L. These data confirm the TAL exceedance is not related to historical use of industrial materials at the Site and strongly indicate the zinc is associated with storm water run-on from urban development.

These findings are also consistent with likely sources of zinc identified in the literature. Storm water discharged to the Site 03-052(f) outfall has been carried through galvanized culverts and pipes since the 1960s. The parking lots at TA-03 serve as collection points for pollutants from engine oil, tires, and brakes pads that are deposited on the impervious pavement. Galvanized fencing and building materials and at TA-03 are additional sources of zinc.

The absence of a Site source of zinc is confirmed by the lack of a detectable difference between concentrations of zinc in storm water collected running on to the Sites, at the SMA, and running off from the SMA at E123, as shown in Figure 6.

PCBs

PCBs are common anthropogenic constituents as a result of environmental cycling of past releases of PCBs. DOE, the NMED–DOE Oversight Bureau, and LANS conducted a multiyear cooperative study to characterize PCBs in certain surface waters located in the upper Rio Grande watershed and in areas in and around the Laboratory. The May 2012 report, entitled “Polychlorinated Biphenyls in Precipitation and Stormwater within the Upper Rio Grande Watershed*”* (hereafter, the PCB Background Report), was submitted to EPA on February 1, 2013.

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Table 5
Comparison of BV and TAL Exceedances at SMA Locations

Water																			
	Individual Permit Compliance				Hardness Adjusted TAL				Background Comparison		BLM-Adjusted TALs		Run-On		E122 (Storm Water)		E122 (Snowmelt)		
Location	Analyte	Permit TAL	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceedance)	Hardness-Adjusted TAL at S-SMA-0.25[a]	No.of Detects/Total No. of Analyses (% Hardness-Adjusted TAL at S-SMA-0.25 Exceedance)	Hardness Adjusted TAL at E123	No.of Detects/Total No. of Analyses (% Hardness-Adjusted TAL at E123 Exceedance)	Background UTL from Urban Landscape[b]	% Permit Results Exceed Urban Background UTL	Criterion Maximum Concentration (CMC)[c]	No.of Detects/Total No. of Analyses (% CMC Exceedance)	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceedance)	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceedance)	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceed)
S-SMA-0.25	Copper (μg/L)	4.3	9.7–10.9	(2/2) 100%	6.1	2/2 (100%)	7.6	2/2 (100%)	32.3	0%	39.1	2/2 (0%)	4.05–6.75	3/3 (67%)	3.5–86.7 (10.8)	16/16 (88%)	7.5 (na)	1/1 (100%)
S-SMA-0.25	Gross alpha (pCi/L)	15	8.22–28.1 (15.2)	(2/2) 50%	na[d]	na	na	na	8.94	0%	na	na	1.94–34.7 (5.98)	2/3 (33%)	1.23–32.2 (7.4)	11/11 (63%)	4.5 (na)	1/1 (0%)
S-SMA-0.25	Total PCB (μg/L)	0.00064	0.0502 (0.0502)	(1/1) 100%	na	na	na	na	0.098	0%	na	na	0.000268–0.0112 (0.00112)	3/3 (67%)	Aroclor PCBs 0.05–0.33 (0.10)	4/15 (100%)	na	na
S-SMA-0.25	Zinc (μg/L)	42	52.9–74.4	(2/2) 100%	74.1	2/2 (50%)	92.6	2/2 (0%)	1120.0	0%	na	na	21.8–60.1	3/3 (67%)	6.9–1100 (59.4)	14/14 (64%)	163 (na)	1/1 (100%)

Table 5 (continued)

		Water						Soils		
		E123 (Storm Water)		E123 (Base Flow)		E123 (Snowmelt)		03-052(f) ALLH		
Location	Analyte	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceedance)	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceedance)	Concentration Range (Geometric Mean)	No.of Detects/Total No. of Analyses (% Permit TAL Exceedance)	ALLH BV in mg/kg[e]	Concentration Range in mg/kg	No.of Detects/Total No. of Analyses (% Sediment BV Exceedance)
S-SMA-0.25	Copper (µg/L)	4.1–17.5	33/36 (86%)	3 to 6.72 (10)	18/25 (24%)	3.7	1/1 (0%)	14.7	2.58–20.9	7/7 (71%)
S-SMA-0.25	Gross alpha (pCi/L)	1.72–66.9 pCi/L (16.1)	19/20	–0.19–2.2 (1.18)	1/14 (0%)	14 (14)	1/1 (0%)	na	na	na
S-SMA-0.25	Total PCB (µg/L)	0.43–0.9 (0.612)	4/4 (100%)	0.03–0.05 (0.0387)	2/2 (100%)	na	0/0	na	Aroclor PCBs (0.21–0.24)	Aroclor PCBs 11/14 (No BV)
S-SMA-0.25	Zinc (µg/L)	11.1–108	35/36 (25%)	10.8–99	25/25 (28%)	11.5	1/1 (0%)	48.8	32.8–200	7/7 (71%)

[a] The hardness-adjusted TAL for metals using the calculated hardness at a specific SMA.

[b] The statistical 95%/95 confidence interval UTL of storm water collected across the developed urban landscape on the Pajarito Plateau.

[c] Criteria maximum concentration (CMC). The new criterion or TAL calculated by the biotic ligand model (BLM) using a full chemical analysis and considering copper complexes and pH. This is an estimate of the highest concentration of copper in ambient water to which an aquatic community can be *exposed briefly* without resulting in an unacceptable adverse effect. This is the acute criterion and represents a more applicable TAL for copper.

[d] na = Not available.

[e] Background value for all horizons soil media (ALLH).

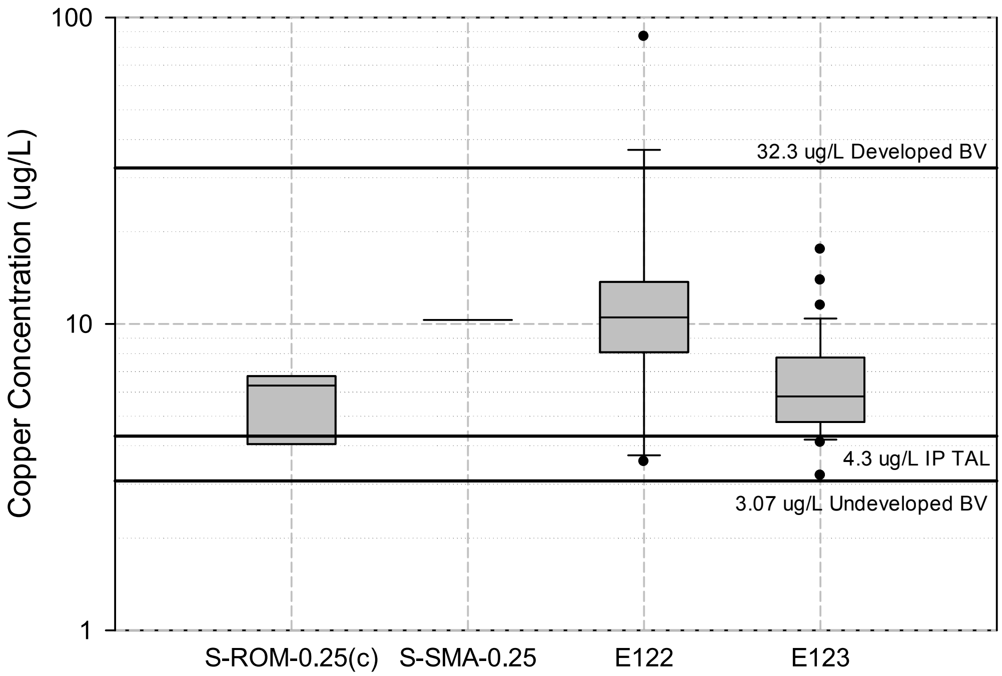

Figure 5 **Statistical range of copper in storm water running onto the SWMU [S-ROM-0.25(c)], in discharges from the SWMU itself (S-SMA-0.25), and at downstream gage stations E122 and E123**

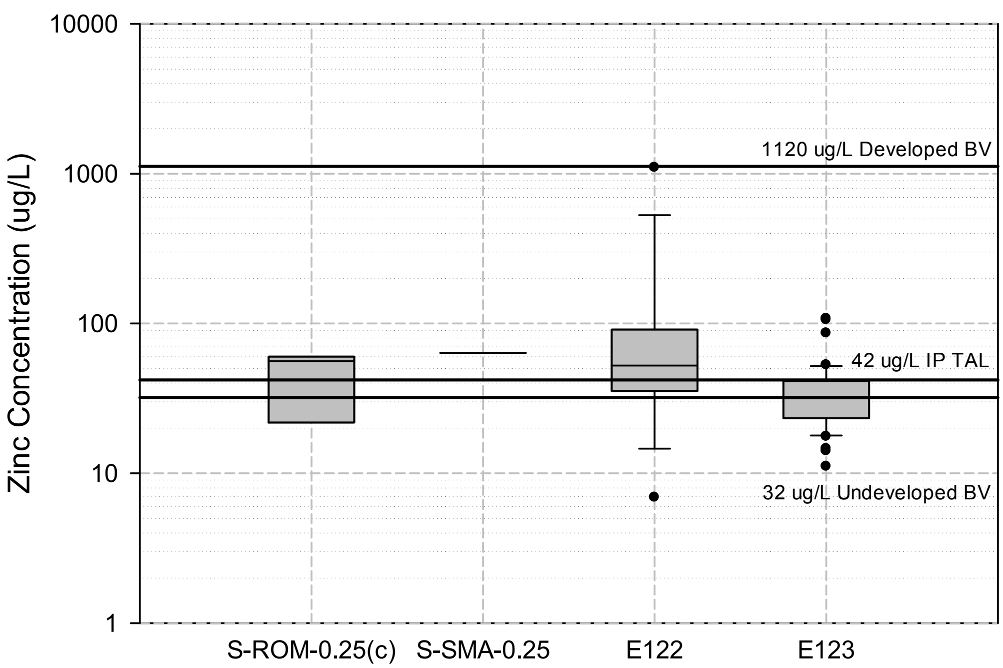

Figure 6 **Statistical range of zinc in storm water running onto the SWMU [S-ROM-0.25(c)], in discharges from the SWMU itself (S-SMA-0.25), and at downstream gage stations E122 and E123**

This study was designed to characterize PCB levels in precipitation and storm water in the non-industrialized portions of the upper Rio Grande watershed (LANL 2012). The principal objectives of the study were to determine (1) baseline levels of PCB concentrations in precipitation and snowpack in northern New Mexico; (2) baseline levels of PCB concentrations storm water in northern New Mexico streams and arroyos that are tributaries to the Rio Grande and Rio Chama; (3) the range of PCB concentrations found in the Rio Grande during base-flow and storm-flow conditions; (4) baseline levels of PCBs in storm water from undeveloped watersheds of the Pajarito Plateau; (5) the concentrations of PCBs in urban runoff from the Los Alamos town site and Laboratory property, and (6) how these findings may be used to target significant pollution sources. The following excerpts from the PCB Background Report (LANL 2012) summarize the findings relative to these objectives.

> Total PCB concentrations for precipitation and stormwater are summarized in Table 16 [of the PCB Background Report, presented as Table 6 in this request]. The concentrations in precipitation were generally low, probably reflecting the rural nature of the study area. Although PCB concentrations in precipitation and snowpack are relatively low, those sources still play a major indirect role in impacting surface-water quality. Over long periods of time—perhaps decades—precipitation events leave behind an inventory of PCBs on surface soil. The quality of nearby surface water deteriorates once the surface soil is eroded and carried by runoff into watercourses. Temporary deterioration of water quality is observed in drainages both small and large. Storm flow occurs infrequently. These flow events are generally very short lived, with flows lasting from less than an hour to—rarely—several days….
>
> Environmental monitoring results show that small tributaries carrying a moderate amount of suspended soil/sediment likely will have total PCB concentrations above human health WQC [water-quality criteria] (0.64 ng/L) and occasionally the wildlife habitat WQC (14 ng/L), even in the absence of industrial pollution. PCB concentrations above the WQC would be expected in the most remote parts of the drainage system because of the high sediment load carried by small tributaries during periods of storm runoff. Table 16 [of the PCB Background Report] shows that concentrations greater than the New Mexico human health WQC were measured in 91% of stormwater samples collected from tributaries to the Rio Chama and Rio Grande, in 28% to 78% in ephemeral channels on the Pajarito Plateau, and in 38% of stormwater samples from the Rio Grande or Rio Chama.
>
> Sources of PCBs detected in water may include recognizable discrete local-scale PCB sources as well as ubiquitously dispersed sources. The upper ranges of PCB concentrations in baseline or Rio Grande storm runoff were approximately an order of magnitude larger than those for precipitation (less than 1 ng/L in precipitation and 10 ng/L to 50 ng/L in storm runoff). This increase was primarily from the presence of PCBs associated with suspended sediment in runoff. Similarly, another order of magnitude increase in PCB concentrations was evident when upper ranges in urban runoff (above 100 ng/L) were compared with upper ranges in baseline or Rio Grande storm runoff. The higher concentrations associated with the urban runoff likely resulted from the contribution of additional diffuse local sources in the urban environment. This finding is consistent with information in the toxicological profile for PCBs published by the Agency for Toxic Substances and Disease Registry as well numerous studies that report PCB concentrations in stormwater in urban areas are higher than in rural locations….

The disparity between PCB concentrations during base-flow (ambient) and storm-flow periods because of suspended sediment is significant. While concentrations are elevated during storm runoff events in perennial or intermittent segments, they may recover quickly to lower levels during the intervening periods of base flow (unless impacted by a significant pollution source). On a time-weighted basis, average exposure levels in the water column would be relatively low, yet the perennial segment could exceed NMWQCC [New Mexico Water Quality Control Commission] criteria if the assessment data set includes samples collected when runoff was occurring.

To illustrate the role of suspended sediment in affecting PCB concentrations in surface water, data for base-flow periods were compiled for these same drainage areas. Figure 48 [of the PCB Background Report, presented as Figure 7 of this request] shows that PCB concentrations were only rarely above the New Mexico human health WQC under base-flow conditions because suspended sediment concentrations associated with base flow were very low, typically less than 100 mg/L. For perennial or intermittent surface waters, base flow predominates perhaps 90% or more of the time. Consequently, on any given day, the PCB concentrations in the water column of perennial or intermittent surface water would be relatively small. (LANL 2012)

Table 6
Summary of Total PCB Concentrations in Upper Rio Grande Watershed

Category	Median (ng/L)	UTL (ng/L)	Max Conc. (ng/L)	Percentage of Results Greater Than NM Health Standard (0.64 ng/L)	Percentage of Results Greater Than NM Wildlife Standard (14 ng/L)
Precipitation	0.12	0.68	0.61	0	0
Snowpack	0.14	0.7	0.65	8	0
Rio Grande/Rio Chama					
Base Flow	0.01	—*	1.36	6	0
Storm Water (Runoff)	0.24	—	51.4	39	3
Northern New Mexico Tributaries Storm Water	5.5	24	30.6	91	22
Baseline Pajarito Plateau Storm Water					
Reference Sites (Flows Originating on Pajarito Plateau)	0.4	11.7	11.6	28	0
Western Boundary Sites (Flows Originating in Jemez Mountains)	2.1	19.5	20.7	78	17
Reference and Western Boundary Combined	0.97	13	20.7	56	10
Urban Runoff Los Alamos Townsite	12	98	144	98	46

*— = Not available.

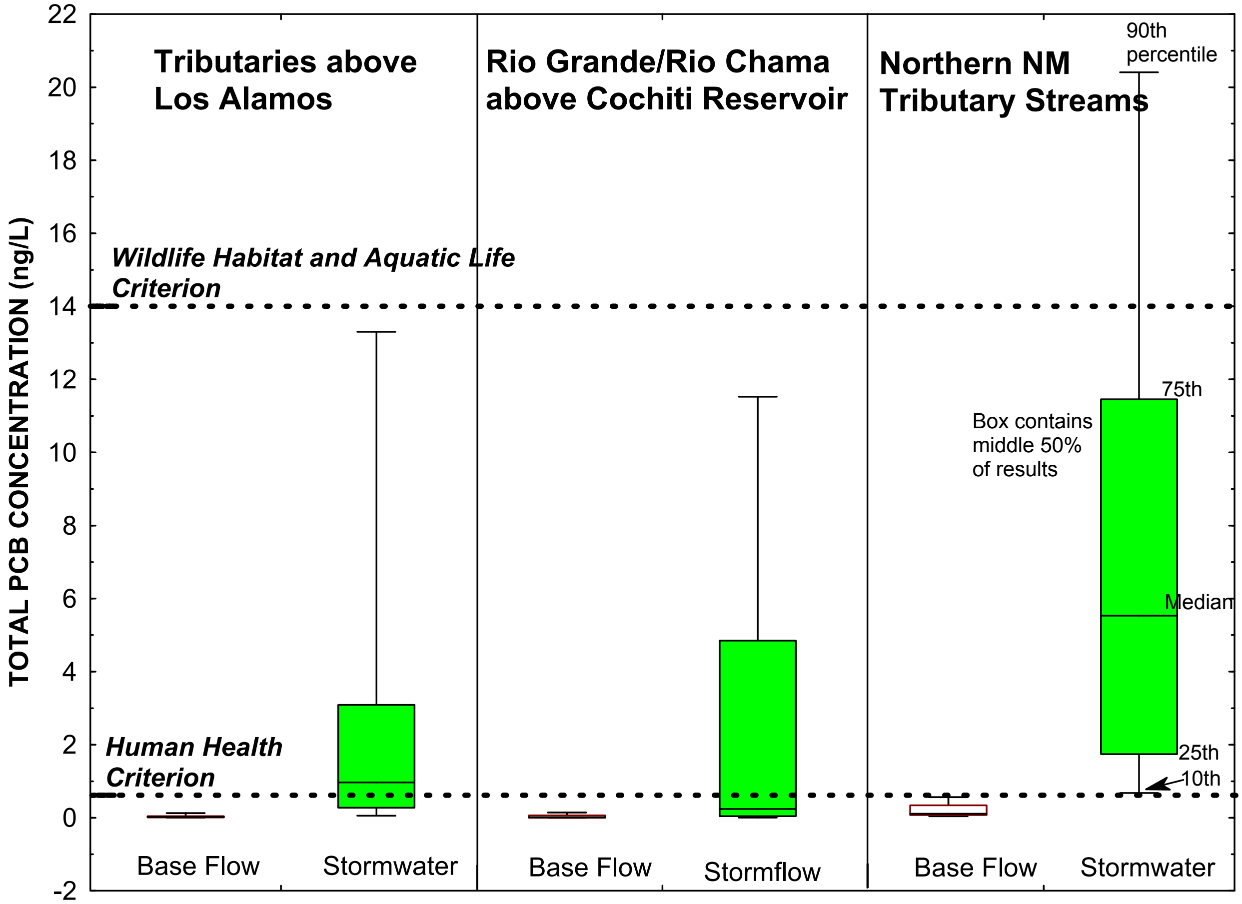

Figure 7 **Box plots of base flow and storm runoff PCB concentrations for various drainages in the upper Rio Grande system**

The PCB background UTL for storm water runoff from an urban/developed landscape on the Pajarito Plateau is 0.098 μg/L (LANL 2012). Both the background UTL and the Individual Permit storm water result of 0.0502 μg/L are higher than the 0.00064 μg/L TAL.

Site-specific storm water run-on samples collected within the SMA contained PCBs at concentrations ranging from 0.000268 μg/L to 0.0112 μg/L, which are also greater than the TAL in two of three samples but similar to storm water samples collected running off the SMA at E-123 (Figure 8). Although the Site may contribute to the PCBs found in the SMA sample these relationships demonstrate that that the primary source of PCBs contributing to the TAL exceedance in the storm water at S-SMA-0.25 is urban "background" PCBs.

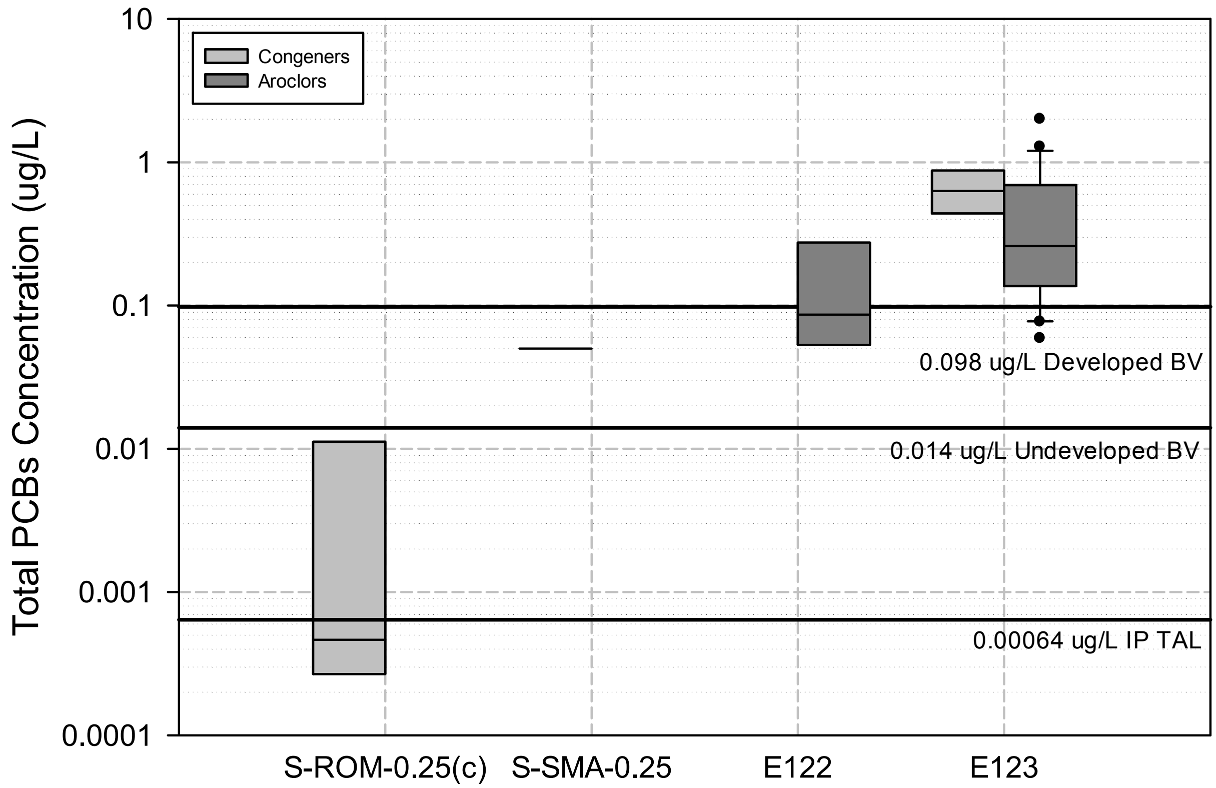

Figure 8 **Statistical range of total PCBs in storm water running onto the SWMU [S-ROM-0.25(c)], in discharges from the SWMU itself (S-SMA-0.25), and at downstream gage stations E122 and E123. Note: storm water collected at S-ROM-0.25(c) and S-SMA-0.25 was analyzed using PCB congener methods, storm water collected from E122 was analyzed using PCB Aroclor methods, and storm water collected from E123 was analyzed using both the Aroclor and congener methods.**

Gross Alpha

Radionuclides were not detected or detected above BVs/fallout values (FVs) in soil and tuff samples at Site 03-052(f) and are not associated with industrial materials present at this site. Naturally occurring uranium is considered to be the primary source of elevated gross alpha results. Other naturally occurring alpha emitters, such as those belonging to the thorium decay series, are known to be present in the tuff and are also likely contributors to the elevated alpha values. Uranium and thorium isotopes, however, are excluded from the definition of adjusted gross-alpha radioactivity, on which the TAL is based.

7.2 Technical Feasibility and Practicability

Because neither Site 03-013(b) nor 03-052(f) is the source of the copper, zinc, gross alpha, or PCB TAL exceedances, the construction of enhanced controls, a cap, or other cover, or a total retention structure will not affect the concentrations of these constituents in run-off from these Sites. The urban storm water discharges that are specifically associated with current conventional industrial activities at TA-03, are covered under the MSGP and described in Section 2.1.

8.0 EVALUATION OF CORRECTIVE ACTION OPTIONS

A request to place a Site or Sites in alternative compliance must include a detailed demonstration of how the Permittees reached the conclusion that they will be unable to certify completion of corrective action under Parts I.E.2(a) through E.2(d). The Permittees have thoroughly evaluated these corrective action options and reached the conclusion that they are unable to certify completion of corrective action for Sites 03-013(a) and 03-052(f). An engineering evaluation was performed to determine if the construction of enhanced controls, total retention structures, or a cap would successfully address the TAL exceedances at these two Sites and will allow the Permittees to certify completion of corrective action under Part I.E.2. This evaluation of corrective action options was based on the Permittees determination that the Sites are not the source of the copper, zinc, gross alpha, or PCB TAL exceedances.

8.1 Enhanced Control Measures to Meet the TAL

The Permittees performed a thorough engineering examination of enhanced control measure options to treat storm water at S-SMA-0.25. This study began in July 2009 with the development of preliminary conceptual storm water control alternatives and continued through September 2012. The study has involved meetings, site visits, discussions, email correspondence, evaluation of alternatives, and collaboration with Communities for Clean Water (CCW) and its technical liaison, Biohabitats, Inc. Because typical storm water enhanced controls used by the Permittees at other Sites under the Individual Permit are not feasible in large-scale watersheds such as S-SMA-0.25, the initial focus of this evaluation was to identify storm water controls that would eliminate exposure of pollutants to storm water.

The Permittees presented their initial alternative analysis and conceptual design for S-SMA-0.25 to CCW and Biohabitats at the September 2011 technical meeting and asked them to provide the Permittees with their technical assessment. CCW and Biohabitats recommended that the Permittees consider low-impact design (LID) approaches instead of the total retention or no exposure structures outlined in the initial alternatives analysis. LID methods of controlling storm water focus on treating storm water near its source and relying on infiltration and evapotranspiration to reduce storm water volumes.

The Permittees worked closely with CCW and Biohabitats to identify possible LID approaches that could serve as enhanced control measures to address the TAL exceedances in S-SMA-0.25. From September 2011 to December 2012, the Permittees, CCW and Biohabitats held six technical meetings, four site visits, and one trip to view LID projects in Santa Fe, New Mexico. On December 6, 2012, Biohabitats, Inc., presented a conceptual design analysis at a public meeting (presented in Attachment C). Biohabitats proposed several LID technologies at various locations in S-SMA-0.25, including bioretention gardens, wetlands, phytoremediation plantings, rainwater cisterns, and in-line sediment traps/vortex separators. Biohabitats also proposed locations for installing various LID technologies that were provided in a map (see Attachment C).

The Permittees and their outside engineering consultant, Brown and Caldwell, reviewed the proposed LID approaches and installation locations. The Biohabitats' proposal was also reviewed by Laboratory utilities and infrastructure group. After considering the Biohabitats' proposal and conducting field visits, the Permittees modified Biohabitats' plan, and the modifications are summarized in Table 7.

Table 7
Modifications to the Biohabitats' Proposal

Biohabitats' Proposal	Permittees' Response	Comment
Construct rainwater cisterns to capture roof runoff	Not feasible at TA-03	The cisterns would require a large amount of maintenance.
Install sediment traps/vortex separators	Not feasible at TA-03	The Permittees discussed this with Biohabitats/CCW at the March 12, 2012, technical meeting. The parties agreed that the maintenance issues associated with sediment accumulation would override the potential benefit.
Construct a wetland in the main S-SMA-0.25 drainage just south of the parking garage near the University House	Feasible but not practicable at this location	Although it is possible to construct a wetland in the location proposed by CCW/Biohabitats, the available area is somewhat small. It is likely that the area would need to be excavated, and vertical sidewalls would need to be installed to develop a significant amount of storage. In addition, the proposed location is in a culturally sensitive resource area for the San Ildefonso Pueblo, which would significantly limit areas of construction.
Construct several bioretention gardens in the landscaped area just north and east of the Otowi Building	Not feasible at the proposed locations	The landscaped area is currently xeriscaped with coarse aggregate groundcover (along with vegetation) and is acting as enhanced control.
Construct a bioretention garden near the surface parking lot at the southeast corner of the Casa Grande Drive/West Jemez Road intersection	Feasible if moved to another location	The bioretention garden is feasible if the location is moved to an area just north of the parking garage to capture runoff from more impervious areas.
Construct bioretention basins in the utility/fire access corridor along the west side of the Otowi Building	Not feasible at the proposed location.	The proposed location on the west side of the Otowi building is not feasible because of the presence of underground utilities.
Construct several bioretention basins in the surface parking lot, which is located in the southeast corner of the intersection of Pajarito Road and West Jemez Road	Feasible at this location with minor modifications	The proposed bioretention basins are feasible if reconfigured to conform to the existing parking lot layout and to maximize runoff capture.
Construct two sediment pools and associated drop structures in the drainage channel near the University House	Feasible at this location with minor modifications	A series of small wetlands/sediment pools could be constructed in this area to mitigate current stream bank erosion and to provide some sediment retention.

The Permittees worked closely with Biohabitats during the design efforts for LID alternatives at S-SMA-0.25. Four bioretention areas were moved forward for design and further evaluation as corrective measures in January 2012.

A summary of each bioretention area is provided below.

- ***Riprap channel and bioretention basin.*** The proposed location of this bioretention basin is in an open area next to and north of the parking garage near the Otowi Building. An earthen berm would then be constructed to form the downstream end of the basin. Overflows from the basin would discharge into an existing grated inlet. The Permittees have completed the design for the riprap channel and bioretention basin option. Biohabitats performed a review of this design, and the Permittees worked with them to resolve their comments.
- ***Bioretention garden***. The proposed location of this bioretention garden is the middle of an existing parking lot west of Otowi in an area that is currently between lanes of parking stalls. The basin would be sized to capture runoff from approximately 0.6 acres of impervious landscape. The shallow basin would be filled with surge stone and growth media. The basin would be connected to a drainage system that discharges off the parking lot and road into a local storm sewer after the first flush is captured and treated in the garden. The Permittees have completed the design for the bioretention garden option. Biohabitats performed a review of this design, and the Permittees worked with them to resolve their comments.
- ***Two interconnected bioretention basins***. The proposed location of the two interconnected bioretention basins is an open, grassy area northeast of the bioretention garden. The proposed location for these basins is sloped from west to east, allowing the upper basin to drain into the lower basin then into an existing manhole that is part of a storm sewer. This design would require a reconfiguration of the underground sprinkler system. The Permittees have completed the design for this interconnected bioretention basin option. Biohabitats performed a review of this design, and the Permittees worked with them to resolve their comments.
- ***Sediment pools and drop structures***. The proposed location of the two sediment pools and drop structures is the small drainage south of the University House. The Permittees have completed a preliminary design for the sediment pool option, which has been reviewed by the Laboratory's utilities and infrastructure group and Biohabitats.

Although it is technically feasible to build the four LID-enhanced control measures recommended by CCW and Biohabitats, the Permittees would still not be able to achieve TALs and certify completion of corrective action under Part I.E.2(a) because the urban and natural background, not the two Sites, are the primary sources of the constituents that caused the TAL exceedances.

8.2 Control Measures That Totally Retain and Prevent the Discharge of Storm Water

The Permittees performed a total retention engineering evaluation for Sites 03-013(a) and 03-052(f) to determine if it is feasible to build a control measure that would totally retain and prevent the discharge of storm water from these Sites. The Permittees evaluated two potential total retention alternatives: building a retention structure in S-SMA-0.25 above the monitoring point in the 03-052(f) channel (Alternative 1) and building a combined retention structure for S-SMA-0.25 and S-SMA-2.0 (Alternative 2).

Alternative 1: Build a retention structure in S-SMA-0.25 above the monitoring point in the 03-052(f) channel

This alternative evaluated the technical feasibility of building a retention structure above the monitoring point in the 03-052(f) channel. The high percentage of urban development north of Diamond Drive and downstream of the Sites significantly limits the amount of space available for locating a retention structure. The only undeveloped area is located between the outlet of the Site 03-052(b) storm water culvert and Diamond Drive. The feasibility of using this location is further limited because several utilities cross the area midpoint between Diamond Drive and the storm water culvert outlet.

The Permittees determined that two small retention structures could be constructed in the available area of the 03-052(f) channel, which would result in a storm water capture volume of 0.87 acre-ft. The available volume is significantly less than the 6 acre-ft of water needed to retain 100% of a 1 in. runoff event. Based on this evaluation, the Permittees determined Alternative 1 would not allow the Permittees to achieve TALs and certify completion of corrective action under Part I.E.2(b). No further design of this alternative was pursued.

Alternative 2: Build a combined retention structure for S-SMA-0.25 and S-SMA-2.0

This alternative evaluated the technical feasibility of building a combined retention structure for S-SMA-2.0, located to the east of S-SMA-0.25 in TA-03, and S-SMA-0.25 that would utilize the "land bridge" below where these two watersheds converge (Figure 9) as a total retention structure.

The approximate amount of impervious surface for S-SMA-0.25 is 90%. The approximate amount of impervious surface for S-SMA-2.0 is 80%. For the combined watershed retention structure, the Permittees were conservative and assumed 100% runoff from both watersheds. Out of the 50-acre watershed, approximately 0.9 acres, or 1.8% of the watershed, discharges over Site 03-056(c). The total storage required for these two watersheds is approximately 9 acre-ft of water. The area just above the land bridge is the only location at TA-03 where it is possible to construct a retention structure of this magnitude. The retention depth required to hold 9 acre-ft behind the land bridge is 26 ft, which is not technically practicable. Figure 9 shows the total retention alternatives for S-SMA-0.25 and S-SMA-2.0 in Upper Sandia Canyon.

The construction of this total retention structure would include the following components:

- Performing a geotechnical investigation to determine the stability of the land bridge and the foundation materials.
- Building an access road to the top and bottom of the land bridge.
- Removing the upstream face of the land bridge to a depth of approximately 20-ft and rebuilding it to an engineered standard using quality-control processes to ensure structural stability.
- Installing an impervious upstream liner on the upstream face of the land bridge, including extending the liner to key it into bedrock or upstream to form a partial seepage cutoff barrier.
- Exposing the welded high-density polyethylene (HDPE) storm drain to canyon bottom and holding it in place with two concrete cast blocks.
- Constructing a spillway at the proper elevation, including a downstream discharge area to safely discharge storm events greater than the design capacity of the structure.
- Excavating the upstream end of the existing 72-in. corrugated metal pipe that carries storm flows under the land bridge.

- Constructing a reinforced concrete riser that has openings in the sides gaged to release flows from the reservoir over a period of days and prevent water from ponding for long periods of time.
- Clearing the reservoir area of trees and unwanted vegetation below the storage level.

Although it is technically feasible to build this total retention option, it is not technically practicable to pursue this option for the following reasons:

- Base flows are required to prevent overtopping of the land bridge. As a result, this option would become a detention structure, not a "total retention" structure.
- Two active NPDES outfalls [SWMUs 03-045(b) and 03-045(c)] would have to be rerouted around the land bridge and then discharged into the Sandia wetlands.
- The retention depth of 15 to 31 ft of water behind the land bridge could result in increased hydraulic head at the location of the source of contamination associated with the chromium plume and potentially increase migration of contamination to groundwater.

In addition, even if this total retention structure was built, the Permittees would still not be able to certify completion of corrective action under Part I.E.2(b) because TAL exceedances would still occur as a result of urban "background" copper, zinc, and PCBs within the SMA watershed.

8.3 Control Measures That Totally Eliminate the Exposure of Pollutants to Storm Water

The Permittees performed an engineering evaluation to determine if it is feasible to build one or more control measures that would totally eliminate the exposure of exposed soil at Sites 03-013(a) and 03-052(f). The Permittees evaluated a no exposure option for 03-013(a) and a partial no-exposure option for 03-052(f) that included the following components.

- Slip-line the existing culverts and replace or coat manholes and inlets to isolate any residual contaminants from historical operations that existed in the old storm drain [i.e., Site 03-013(a)] and to avoid storm water contact with SWMU 03-052(f). Slip-lining was evaluated instead of full replacement of the storm drain system because it could be installed with less disruption and for less cost than putting in a new system in this highly urban area where numerous utilities and other infrastructure are present.
- Place the open channel below the storm drain outlet in a HDPE pipe and tie it directly into the corrugated metal pipe under Diamond Drive. The new storm drain culvert will serve to isolate the drainage from water collected at the Sites, preventing further potential contamination caused by flushing of the drainage way sediment.
- Cover the pipe with earth and landscaping the surrounding area appropriately.

Although it is technically feasible to slip-line the existing storm drain and carry the storm water farther downstream, it is impractical to pursue this option for the following reasons:

- The Sites are not the source of the constituents that exceeded TALs.
- This option serves only to convey storm water and does not improve or change water quality.
- TAL exceedances would still occur as a result of urban "background" copper, zinc, and PCBs within the SMA watershed.

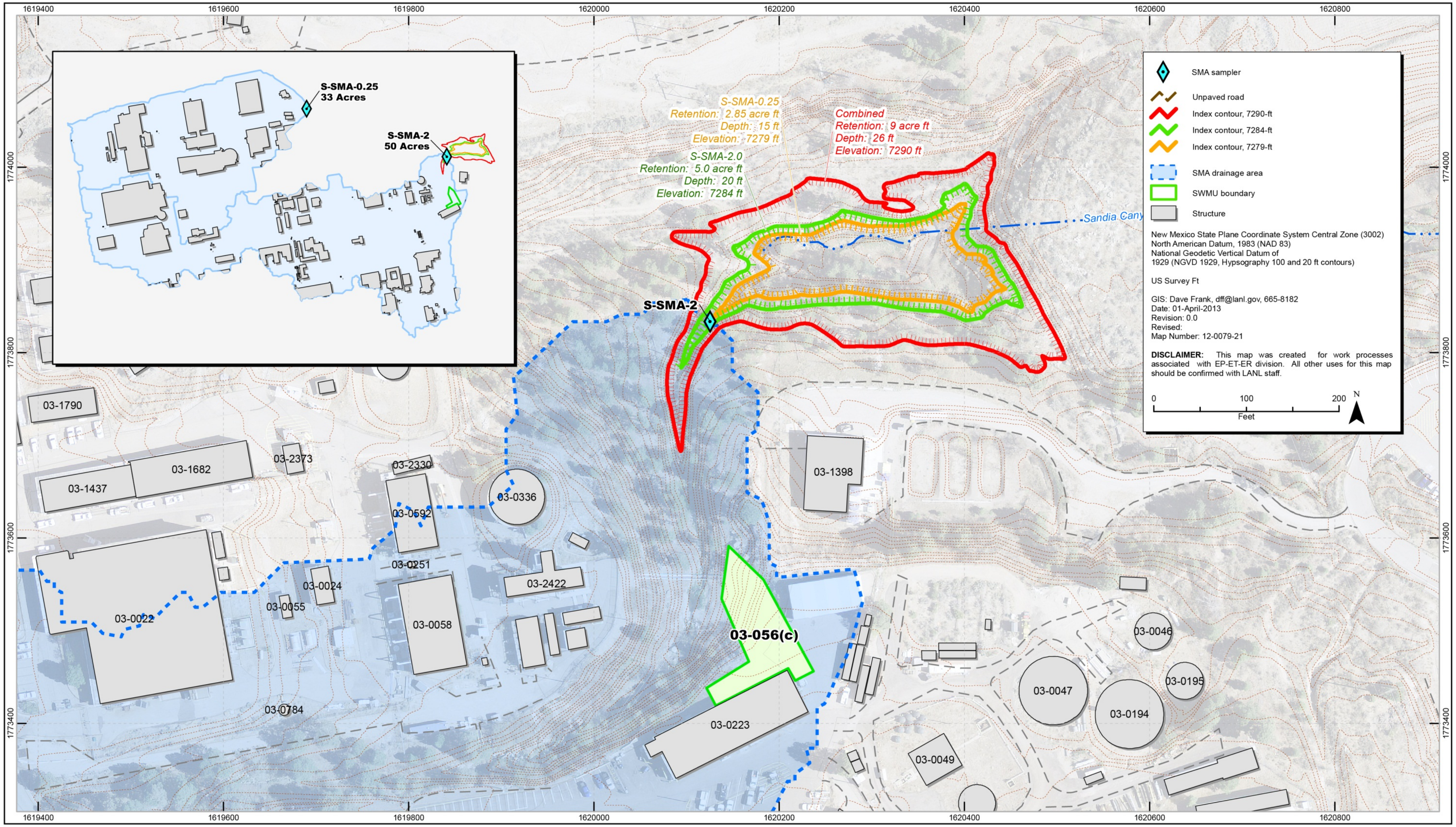

Figure 9 Total retention alternatives for S-SMA-0.25 and S-SMA-2.0 in Upper Sandia Canyon

8.4 Receipt of an NMED-Issued Certificate of Completion under the RCRA Consent Order

Neither of the Sites in S-SMA-0.25 is currently eligible for certificates of completion under the Consent Order for the following reasons:

- Consent Order characterization and investigation activities at Site 03-013(a) are delayed until building 03-1400 and structure 03-1402 are demolished in the future, and
- There are still unresolved questions about the sources and the extent of PAHs at Site 03-052(f).

9.0 PROPOSED ALTERNATIVE COMPLIANCE APPROACH

Based on this evaluation of corrective action options, the Permittees have concluded that they are unable to certify completion of corrective action for Sites 03-013(a) or 03-052(f) under Parts I.E.2(a) through E.2(d). This conclusion is based on the following factors:

- The Sites are not the source of the pollutants that have exceeded TALs.
    - ❖ Although copper and zinc were detected above naturally occurring background soil and/or tuff concentrations, the concentrations of both metals were orders of magnitude below the residential SSL. These data demonstrate copper and zinc were not significant industrial materials historically used at Sites 03-013(a) or 03-052(f).
    - ❖ S-SMA-0.25 is located within TA-03, where most of the storm water discharges are associated with typical urban run-off conditions at the Laboratory, not the small exposed area where Site 03-052(f) discharges. The likely sources of copper and zinc are accumulations from brake pad wear on parking areas and galvanized fencing, culverts, and other building materials, respectively. This determination is supported by scientific literature, the Metals Background Report, and site-specific run-on samples.
    - ❖ Aroclor-1254 and total PCBs were detected in one sample at Site 03-013(a) at concentrations below residential SSLs. No PCBs were detected above residential SSLs at Site 03-052(f). These data demonstrate PCBs were not significant industrial materials historically used at Sites 03-013(a) or 03-052(f).
    - ❖ The PCB background UTL for storm water runoff from an urban/developed landscape on the Pajarito Plateau is 0.098 µg/L, greater than the Individual Permit storm water result.
    - ❖ Site-specific storm water run-on samples collected within the SMA also demonstrate urban "background" PCBs also contribute to the TAL exceedance.
    - ❖ Radionuclides were not detected or detected above BVs/FVs in soil and tuff samples at either Site. These data demonstrate that radionuclides were not significant industrial materials historically used at these Sites.
    - ❖ Both uranium and the thorium-decay series are naturally occurring in tuff. The uranium is considered to be the primary source of elevated gross-alpha results but could not cause an exceedance of the TAL for adjusted gross alpha radioactivity since they are excluded from the definition of adjusted gross alpha radioactivity.

- The construction of enhanced control measures, while technically feasible, would not result in confirmation sample concentrations below TALs because the source of the pollutants is not from the Sites. Two of the four enhanced controls described in section 8.1 that proceeded to the design stage were rejected for the following reasons:
  - ❖ The two interconnected bioretention basins on the north side of the Otowi building would require the relocation of existing utilities and require the removal of established trees and other vegetation.
  - ❖ The sediment pools and drop structures in the drainage channel near the University House would not result in any significant improvement of water quality. The conclusion was reached after the watershed was modeled using the EPA stormwater management model and the results were discussed with Biohabitats in January 2013. The parties agreed LID benefits would not be achieved with this alternative.
- The construction of a total retention structure, while technically feasible, would not result in confirmation sample concentrations below TALs because the source of the pollutants is not from the Sites.
- The construction of control measures that would eliminate exposure of pollutants to storm water, while technically feasible, would not result in confirmation sample concentrations below TALs because the source of the pollutants is not from the Sites.

If EPA concurs with the Permittees' corrective action evaluation and places these Sites into alternative compliance, the Permittees request that EPA consider the construction of the remaining two LID-enhanced controls discussed in section 8.1 of this request as part of its individually tailored work plan for S-SMA-0.25:

- A riprap channel and bioretention basin in the open area north of the parking garage near the Otowi Building (Attachment D illustrates current erosion conditions and the design of the rip-rap channel and bioretention basin) and
- a bioretention garden in the middle of an existing west Otowi parking lot (Attachment E presents information on the current parking lot condition and the design of bioretention garden).

As detailed in section 7.1 the installation of these enhanced controls will not result in comfirmation sample results below TALs for copper, zinc, gross alpha or PCBs. The Permittees believe that these structures will, however, result in some improvement to storm water quality.

In addition to any requirements that EPA will issue if this alternative compliance request is granted, the Laboratory is also performing work under the Consent Order downstream of the Sites in Upper Sandia Canyon. The Laboratory is working with NMED under the Consent Order to ensure the Sandia wetlands continue to maintain the hydrologic and geochemical conditions that are minimizing contaminant migration. This work includes a series of three stepped-grade-control structures followed by a cascade pool to arrest a headcut taking place in the lower portion of the wetland (Figure 10). Construction began in April 2013 and is scheduled to be completed in June 2013. The objective of this scope of work, which was approved by NMED on November 15, 2011, is to ensure that the Sandia wetlands continue to maintain their hydrologic and geochemical conditions to minimize contaminant migration.

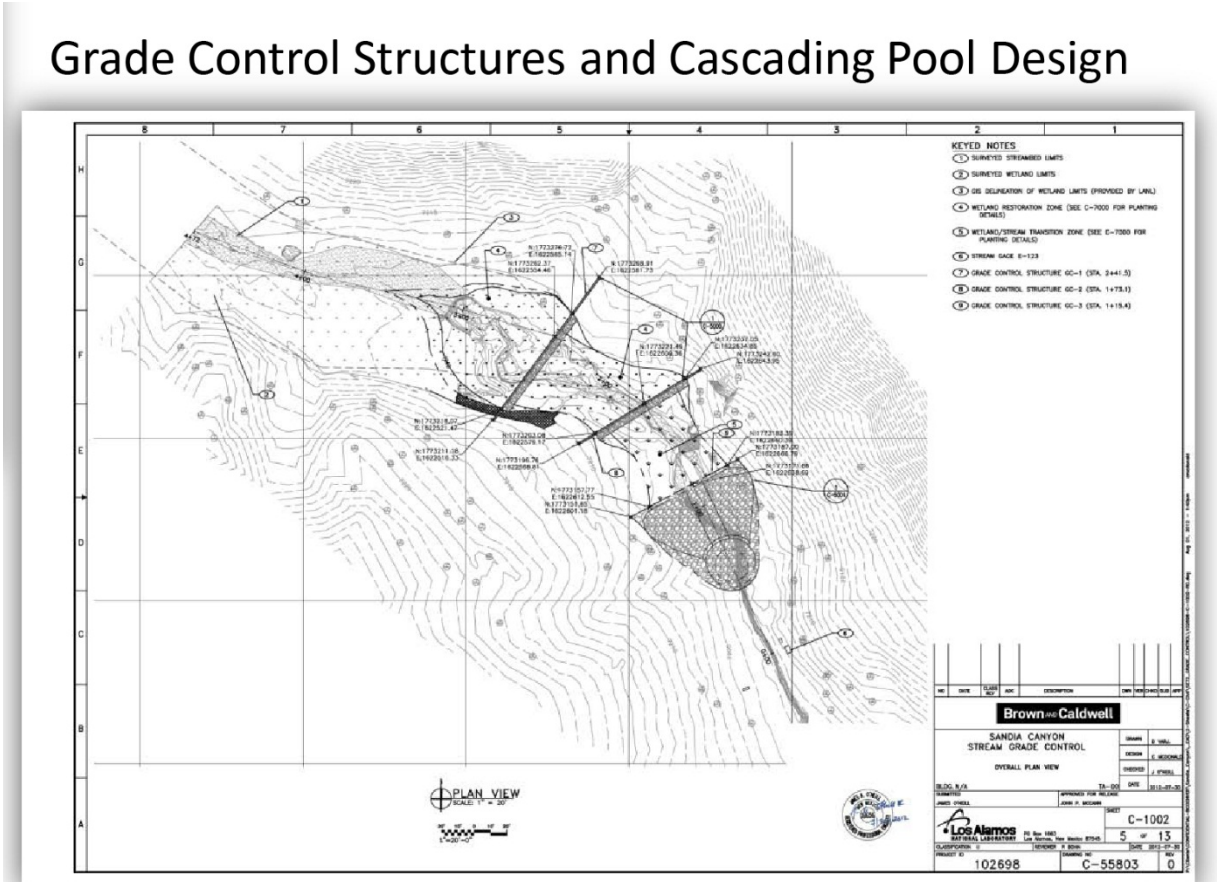

Figure 10 Current and future conditions of the terminus of Sandia Canyon wetlands

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Attachment A

Certification of Completion of Baseline Controls at S-SMA-0.25

LOS ALAMOS NATIONAL LABORATORY LA-UR-10-07681

CERTIFICATION OF COMPLETION OF BASELINE CONTROL MEASURE IMPLEMENTATION AT THE FOLLOWING PERMITTED FEATURES / SITE MONITORING AREAS

NPDES Permit No. NM0030759

PERMITTED FEATURE	SITE MONITORING AREA
S001	S-SMA-0.25
S003	S-SMA-2
S006	S-SMA-3.6

CERTIFICATION OF COMPLETION OF BASELINE CONTROL MEASURE IMPLEMENTATION AT THE FOLLOWING PERMITTED FEATURES / SITE MONITORING AREAS

NPDES Permit No. NM0030759

CERTIFICATION STATEMENT OF AUTHORIZATION

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

A R Grieggs ________________ 11/22/10 ________________

Anthony R. Grieggs
Group Leader, ENV-RCRA
Environmental Protection Division
Los Alamos National Laboratory

Date

Gene Turner ________________ 11/17/10 ________________

Gene Turner, Environmental Permitting
Los Alamos Site Ofiice
National Nuclear Security Administration

Date

PF: S001 SMA: S-SMA-0.25

Baseline Control Measures Required :

Type of Control Measure	Erosion Control (EC)	Run-Off Control (ROF)	Run-On Control (RON)	Sediment Control (SC)
Berms			X	X
Channel/Swale	X		X	
Established Vegetation	X			
Gabions	X	X		X

Baseline Control Measures Installed :

BMP ID	Type of Control Measure	Control Measure	Photo ID	EC	ROF	RON	SC
S001030600009	Berms	Straw Wattles	8661-1r.JPG			X	X
S00104060007	Channel/Swale	Rip Rap	7599-1.JPG	X		X	
S00102020006	Established Vegetation	Permanent Vegetation Forested/Needle Cast	7599-3.JPG	X			
S00102010002	Established Vegetation	Permanent Vegetation Grasses and Shrubs	7599-4.JPG	X			
S00107020003	Gabions	Gabion Blanket	7599-5.JPG	X	X		
S00107010008	Gabions	Gabions	7599-2.JPG		X		X

Comments

None applicable.

PF: S001 SMA: S-SMA-0.25

Photo 7599-1.JPG (taken 08/03/10) S00104060007 : Channel/Swale - Rip Rap.

Photo 7599-2.JPG (taken 08/03/10) S00107010008 : Gabions - Gabions.

PF: S001 SMA: S-SMA-0.25

Photo 7599-3.JPG (taken 08/03/10) S00102020006 : Established Vegetation - Permanent Vegetation Forested/Needle Cast.

Photo 7599-4.JPG (taken 08/03/10) S00102010002 : Established Vegetation - Permanent Vegetation Grasses and Shrubs.

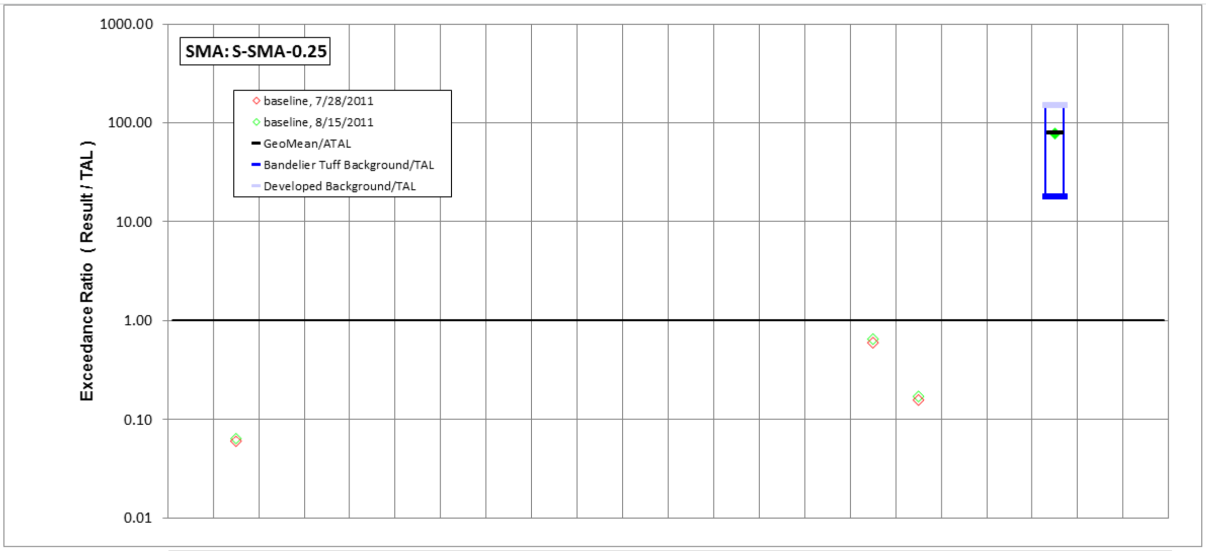
PF: S001 SMA: S-SMA-0.25

Photo 7599-5.JPG (taken 08/03/10) S00107020003 : Gabions - Gabion Blanket.

Photo 8661-1r.JPG (taken 09/03/10) S00103060009 : Berms - Straw Wattles.

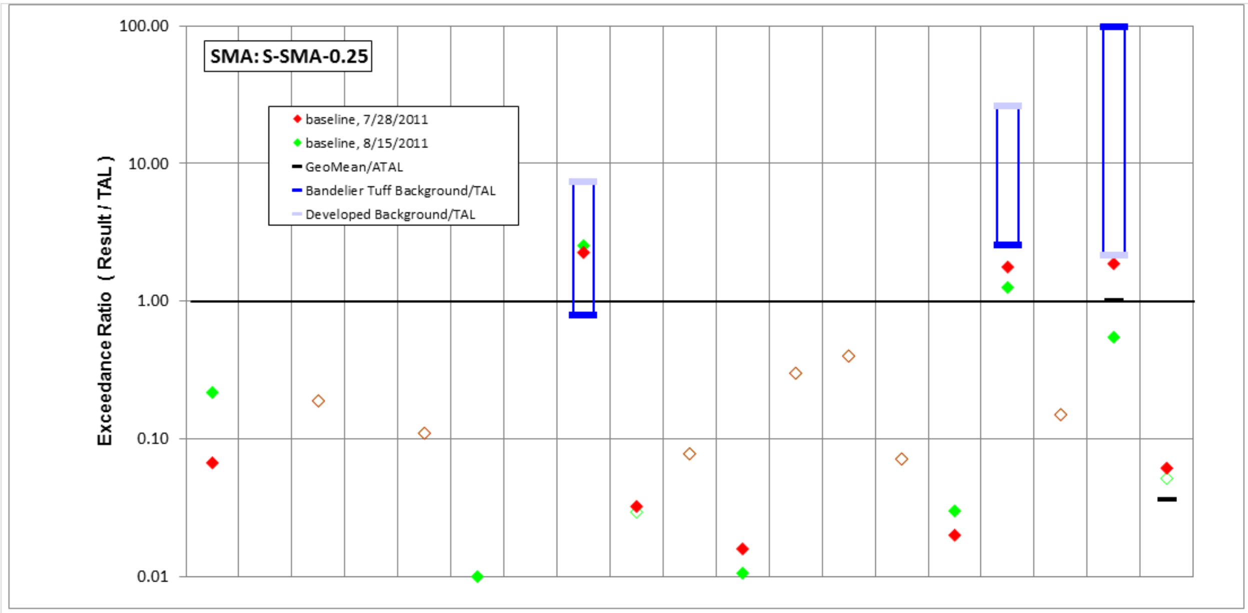
Attachment B

Storm Water Exceedances in Baseline Confirmation Samples at S-SMA-0.25



	Aldrin	Benzo(a)pyrene	BHC[gamma-]	Chlordane (alpha/gamma)	Chlordane[alpha-]	Chlordane[gamma-]	DDD[4,4'-]	DDE[4,4'-]	DDT[4,4'-]	Dieldrin	Endosulfan I	Endosulfan II	Endrin	Heptachlor	Heptachlor Epoxide	Hexachlorobenzene	Pentachlorophenol	RDX	Tetrachlorodibenzo dioxin[2,3,7,8-]	**Total PCB**	Toxaphene (Technical Grade)	Trinitrotoluene [2,4,6-]
std used in ratio calculations	-	ATAL	-	-	-	-	-	-	-	-	-	-	-	-	-	ATAL	MTAL	-	-	ATAL	-	-
std value	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	5	19	-	-	6E-04	-	-
unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
8/15/2011 result	-	*0.32*	-	-	-	-	-	-	-	-	-	-	-	-	-	*3.26*	*3.26*	-	-	**0.05**	-	-
result / TAL	-	*0.064*	-	-	-	-	-	-	-	-	-	-	-	-	-	*0.65*	*0.17*	-	-	**78**	-	-
7/28/2011 result	-	*0.3*	-	-	-	-	-	-	-	-	-	-	-	-	-	*3*	*3*	-	-	-	-	-
result / TAL	-	*0.06*	-	-	-	-	-	-	-	-	-	-	-	-	-	*0.6*	*0.16*	-	-	-	-	-

Bold font indicates result>TAL; italic font indicates undetected results; "-" is used if no analytical results were available.



	Aluminum	Antimony	Arsenic	Boron	Cadmium	Chromium	Cobalt	**Copper**	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Vanadium	**Zinc**	Cyanide, weak acid dissociable	**Gross alpha**	Radium-226 and Radium-228
std used in ratio calculations	MTAL	ATAL	ATAL	ATAL	MTAL	MTAL	ATAL	MTAL	MTAL	ATAL	MTAL	ATAL	MTAL	ATAL	ATAL	MTAL	ATAL	ATAL	ATAL
std value	750	640	9	5000	1	210	1000	4.3	17	0.77	170	5	0.5	6.3	100	42	0.01	15	30
unit	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	pCi/L	pCi/L
8/15/2011 result	163	*1*	*1.7*	26.2	*0.11*	2.1	1.2	**10.9**	*0.5*	*0.06*	1.8	*1.5*	*0.2*	*0.45*	3	**52.9**	*0.002*	8.22	*1.55*
result / TAL	0.22	*0.002*	*0.19*	0.0052	*0.11*	0.01	0.0012	**2.5**	*0.029*	*0.078*	0.011	*0.3*	*0.4*	*0.071*	0.03	**1.3**	*0.15*	0.55	*0.052*
7/28/2011 result	50.3	*1*	*1.7*	34.5	*0.11*	*2*	*1*	**9.7**	0.55	*0.06*	2.7	*1.5*	*0.2*	*0.45*	2	**74.4**	*0.002*	**28.1**	1.84
result / TAL	0.067	*0.002*	*0.19*	0.0069	*0.11*	*0.01*	*0.001*	**2.3**	0.032	*0.078*	0.016	*0.3*	*0.4*	*0.071*	0.02	**1.8**	*0.15*	**1.9**	0.061

Bold font indicates result>TAL; italic font indicates undetected results; "-" is used if no analytical results were available.

Attachment C

Biohabitats Conceptual Design for S-SMA-0.25

Stormwater Management Principles

- Slow stormwater runoff velocity and reduce volumes
- Settle , capture, bind, and/or remove contaminated sediments
- Convert ornamental landscape areas to biofiltration
- Amend soil with compost, improve soil microbiology

SWMU A

Issues

- Contaminated materials from building and existing drainage system in stormwater runoff
- Drainage passes through to SWMU B

Opportunities

- Disconnect rooftop and surface runoff to cisterns and bioretention
- Install sediment traps

SWMU B

Issues

- Concentrated contaminants from campus, serves as main drainageway
- Trees and stream are ecologically and aesthetically valuable

Opportunities

- Expand existing channel to larger, wider wetland to slow and filter runoff
- Amend soil with compost
- Add native and phytoremediating plant species

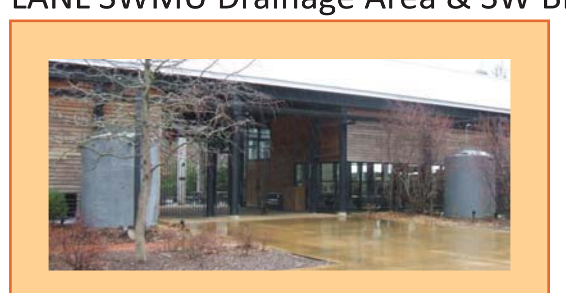
Legend

- existing storm drain
- existing gabion
- proposed bioretention rain garden
- proposed wetland
- proposed phytoremediation planting
- proposed rainwater cistern
- proposed sediment trap / vortex separator

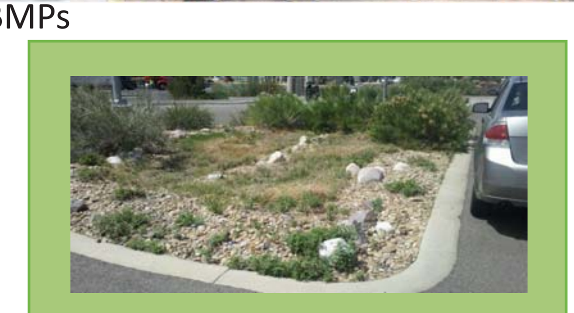
*Locations and footprints are for illustrative purposes only and design requires confirmation

LANL SWMU Drainage Area & SW BMPs

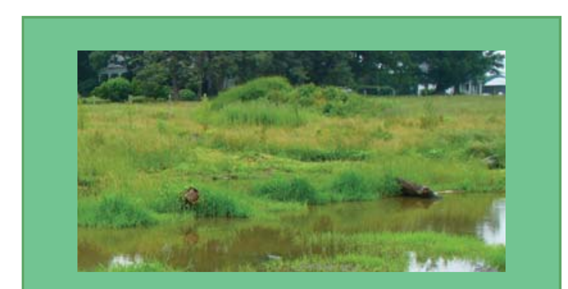
Sediment Trap / Vortex Separator



Rainwater Cistern



Bioretention/Biofiltration



Pond/Wetland

Phytoremediation

LOS ALAMOS NATIONAL LAB	LANL CAMPUS SWMU AND STORMWATER BMPS	DATE: 1.26.12	NSI a wholly owned subsidiary of Biohabitats

Attachment D

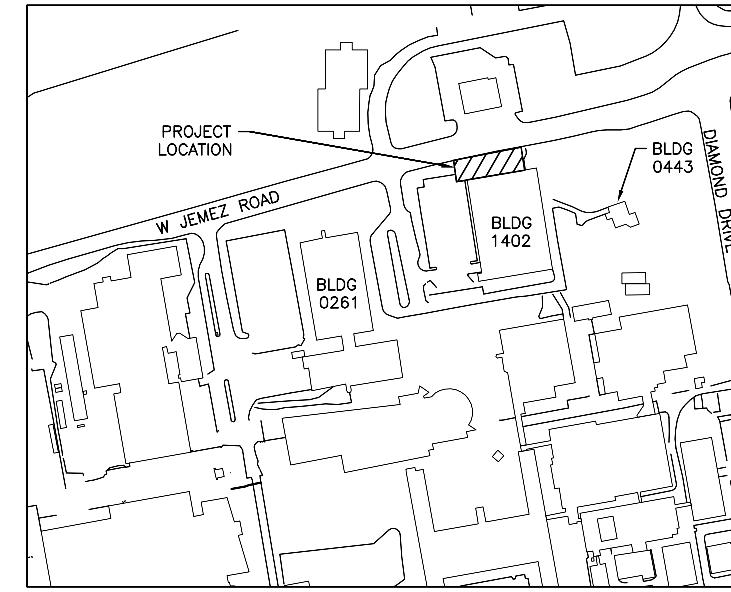
Enhanced Control Current Conditions and Design of Riprap Channel and Bioretention Basin

Current Conditions for Enhanced Control Riprap Channel and Bioretention Basin

Design of Proposed Riprap Channel and Bioretention Basin

S-SMA-0.25 ENHANCED STORM WATER CONTROLS

BLDG. NA TA-03



LOCATION PLAN
SCALE: NONE TA-03

PRODUCT OPTIONS/SUBSTITUTIONS

"OR APPROVED EQUAL" IS ALWAYS IMPLIED AFTER A BRAND NAME, PATENT PROCESS OR CATALOG NUMBER. THE CONTRACTOR MAY SUBSTITUTE ANY BRAND, PROCESS OR CATALOG NUMBER APPROVED AS AN EQUAL BY THE CONTRACT ADMINISTRATOR. THE ONLY EXCEPTION IS WHERE "NO SUBSTITUTION" IS SPECIFIED. SEE GENERAL PROVISION "MATERIAL AND WORKMANSHIP".

PROJECT DESIGN DATA

DESIGN STORMS FOR INDIVIDUAL PERMIT (IP) CORRECTIVE ACTIONS AND CONTROL MEASURES – DESIGN GUIDE (EP-DIV-GUIDE-20087)

LANL ESM CHAPTER 3, SECTION G20

PEAK RUNOFF $Q_{100\ YR,\ 24\ HR}$ = 10.0 CU FEET/SEC

LIST OF DRAWINGS

REVISION NUMBER	SHEET NUMBER	DISCIPLINE SHEET NUMBER	DRAWING TITLE
	1	G-0001	TITLE SHEET
	2	C-0001	LEGEND, ABBREVIATIONS AND GENERAL NOTES
	3	C-1000	SITE PLAN
	4	C-3000	SECTION VIEWS – 1
	5	c-3001	SECTION VIEWS – 2
	6	C-5000	CIVIL DETAILS
	7	C-7000	PLANTING PLAN

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS
90% SUBMITTAL

TITLE SHEET

BLDG NA TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

SUBMITTED
APPROVED FOR RELEASE

Los Alamos NATIONAL LABORATORY
PO Box 1663
Los Alamos, New Mexico 87545

SHEET G-0001
1 OF 7

CLASSIFICATION UNC
REVIEWER
DATE
PROJECT ID 102750
DRAWING NO C-55812
REV C

90% REVIEW NOT FOR CONSTRUCTION

8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

LEGEND

	NORTH ORIENTATION SYMBOL
10' 5' 0 5' 10' 1"=10'-0"	GRAPHIC SCALE
1 C-5000	DETAIL TAG
A C-5001	SECTION TAG
X	SECTION END LINE
OR	GATE VALVE
POINT #	SURVEY CONTROL POINT
7300	EXISTING CONTOUR
7300	NEW CONTOUR
x x x x	EXISTING FENCE LINE
E E	EXISTING ELECTRICAL LINE
E2 E2	EXISTING ELECTRICAL LINE
T T	EXISTING BURIED COMMUNICATION LINE
G G	EXISTING NATURAL GAS LINE
ST ST	EXISTING STORM DRAIN LINE
ST ST	NEW STORM DRAIN LINE

	RIPRAP (ADEP-SPEC-C-31-3700 OR AS NOTED)
	UTILITY TRENCH BEDDING (ADEP-SPEC-C-31-2000)
	EXISTING EARTH
	RECOMPACTED NATIVE FILL MATERIAL (ADEP-SPEC-C-31-2000)
	MISC EXISTING STRUCTURE
	CONCRETE (ADEP-SPEC-C-03-3053)
	SURGE STONE (ADEP-SPEC-C-31-2000)
	BERM FILL (ADEP-SPEC-C-31-2000)
	GROWING MEDIA

ABBREVIATIONS

ALT	– ALTERNATING
BLDG	– BUILDING
℄	– CENTERLINE
CTS	– CENTERS
CU	– CUBIC
DIA	– DIAMETER
EA	– EACH
EF	– EACH FACE
ELEV	– ELEVATION
EW	– EACH WAY
FL	– FLOWLINE
FT	– FOOT OR FEET
HDPE	– HIGH DENSITY POLYETHYLENE
HR	– HOUR
INV	– INVERT
LF	– LINEAR FEET
MAX	– MAXIMUM
MIN	– MINIMUM
MSGP	– MULTI-SECTOR GENERAL PERMIT
NAD	– NORTH AMERICAN DATUM
NGVD	– NATIONAL GEODETIC VERTICAL DATUM
NMDOT	– NEW MEXICO DEPARTMENT OF TRANSPORTATION
O.C. or O/C	– ON CENTER
OH	– OVERHEAD
PK	– PLACE KEEPER
PVC	– POLYVINYL CHLORIDE
RCP	– REINFORCED CONCRETE PIPE
SEC	– SECOND
SMA	– STORM WATER MANAGEMENT AREA
STA	– STATION
SWMU	– SOLID WASTE MANAGEMENT UNIT
TA	– TECHNICAL AREA
TOC	– TOP OF CONCRETE/TOP OF CURB
TYP	– TYPICAL
T&B	– TOP AND BOTTOM
YR	– YEAR
ø	– DIAMETER

GENERAL NOTES

1. IF THIS SHEET IS NOT 24X36 THEN IT IS A REDUCED SIZE PLOT.
2. DATA FOR ALL ELEVATIONS AND NORTHING/EASTING POINTS STATED (EXISTING AND PROPOSED) ARE BASED ON PROVIDED EXISTING SURVEY INFORMATION.
3. REFER TO SPECIFICATIONS FOR ADDITIONAL DESIGN INFORMATION NOT SHOWN ON DRAWINGS.
4. ALL ELEVATIONS ARE FINISHED GRADE, UNLESS OTHERWISE NOTED.
5. THE SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF ALL FLOWS, INCLUDING STORM FLOWS, IN AND ENTERING AND EXITING THE CONSTRUCTION AREA.
6. THE SUBCONTRACTOR SHALL MAINTAIN AND PROTECT EXISTING STRUCTURES AND UTILITIES.
7. EARTHWORK SHALL BE PERFORMED ACCORDING TO ADEP-SPEC-C-31-2000 UNLESS MODIFIED HERE-IN.
8. UTILITY TRENCHING AND INSTALLATION SHALL BE PERFORMED ACCORDING TO ADEP-SPEC-C-33-4000 UNLESS MODIFIED HERE-IN.
9. GEOSYNTHETIC SHALL BE INSTALLED IN ACCORDANCE WITH ADEP-SPEC-C-31-3519.

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

90% REVIEW NOT FOR CONSTRUCTION

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS
90% SUBMITTAL

LEGEND, ABBREVIATIONS AND GENERAL NOTES

BLDG NA TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

SUBMITTED | APPROVED FOR RELEASE

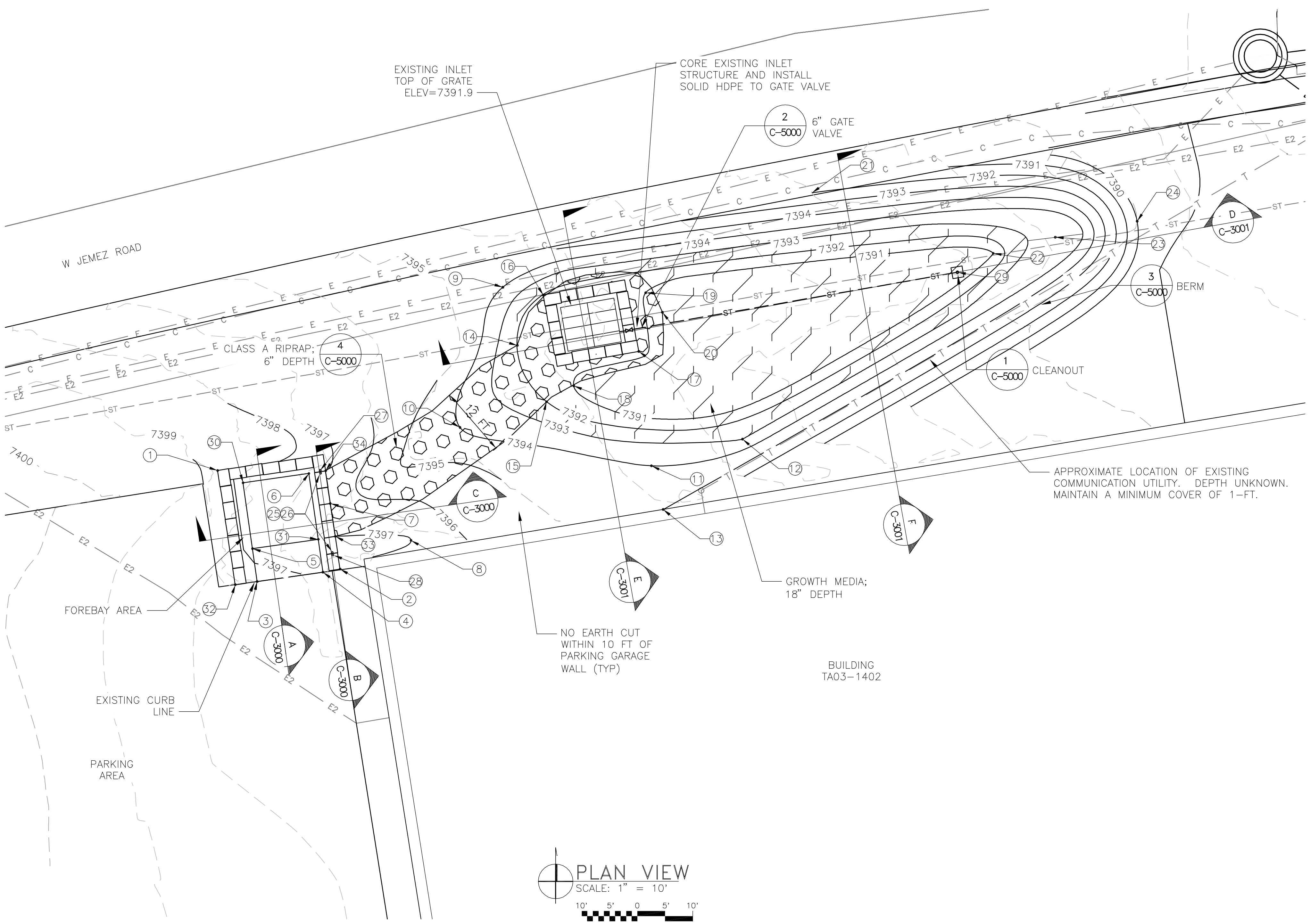
Los Alamos NATIONAL LABORATORY
PO Box 1663
Los Alamos, New Mexico 87545

SHEET C-0001
2 OF 7

CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C-55812 | REV C

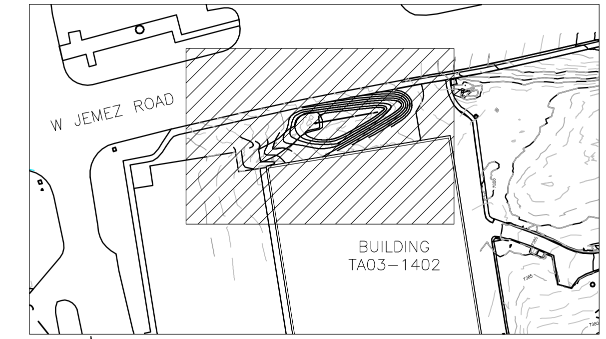
H G F E D C B A



PLAN VIEW

SCALE: 1" = 10'

1"=10'-0"



LOCATION SITE

NOT TO SCALE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.
2. THE AUTOCAD .DWG VERSION OF THIS DRAWING WILL BE MADE AVAILABLE TO THE CONTRACTOR TO AID IN THE FIELD STAKING AND LAYOUT.
3. GROWTH MEDIA:
   - 85% BEDDING SAND
   - 15% COMPOST MIXTURE
   - PRE-MIXED PRIOR TO DELIVERY
4. COMPOST MIXTURE:
   - 50% CLASS 1 STA REGISTERED COMPOST
   - 50% LOOSELY-PACKED SHREDDED PAPER

LAYOUT POINTS TABLE

POINT NO	NORTHING	EASTING	ELEVATION
1	1774442.2	1618400.2	MATCH
2	1774424.4	1618422.3	MATCH
3	1774422.1	1618407.4	MATCH
4	1774423.8	1618419.2	MATCH
5	1774428.0	1618406.5	7396.2 TOC
6	1774441.6	1618416.7	7396.2 TOC
7	1774436.2	1618428.6	7396.7
8	1774429.5	1618435.1	7394.0
9	1774475.2	1618451.7	7394.0
10	1774449.9	1618478.5	7394.0

POINT NO	NORTHING	EASTING	ELEVATION
11	1774443.0	1618494.9	7393.0
12	1774447.8	1618480.7	7394.0
13	1774435.2	1618480.7	7394.0
14	1774464.8	1618454.3	7392.0
15	1774454.6	1618459.6	7392.0
16	1774473.8	1618459.0	7393.0 TOC
17	1774463.6	1618476.2	7393.0 TOC
18	1774457.4	1618464.5	7391.0
19	1774474.2	1618477.5	7391.0
20	1774470.7	1618480.5	7391.0

POINT NO	NORTHING	EASTING	ELEVATION
21	1774492.3	1618507.5	7392.0
22	1774481.4	1618540.2	7391.0
23	1774484.3	1618551.4	7393.5
24	1774487.1	1618566.1	7390.0
25	1774441.9	1618418.8	7396.7 TOC
26	1774427.2	1618421.0	7396.7 TOC
27	1774442.0	1618418.8	7397.0 TOC
28	1774427.1	1618421.0	7397.0 TOC
29	1774477.9	1618533.7	7391.0 TOC
30	1774439.9	1618404.8	7396.2 TOC

POINT NO	NORTHING	EASTING	ELEVATION
31	1774429.7	1618418.4	7396.2 TOC
32	1774421.5	1618403.4	MATCH
33	1774430.2	1618421.5	7395.5
34	1774442.1	1618419.8	7395.5

90% REVIEW
NOT FOR
CONSTRUCTION

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS
90% SUBMITTAL

SITE PLAN

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

BLDG NA TA-03

SUBMITTED | APPROVED FOR RELEASE

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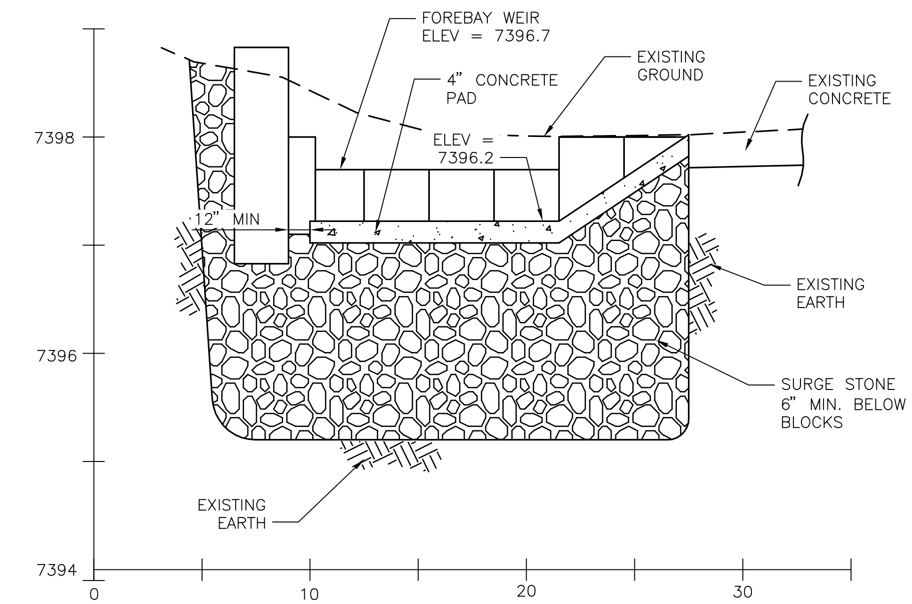
PO Box 1663
Los Alamos, New Mexico 87545

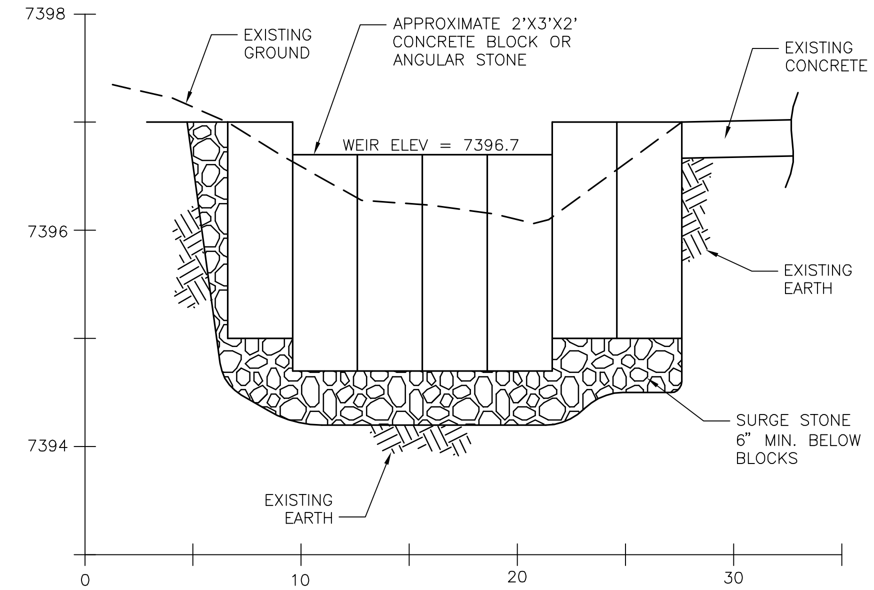
SHEET C-1000
3 OF 7

CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C-55812 | REV C



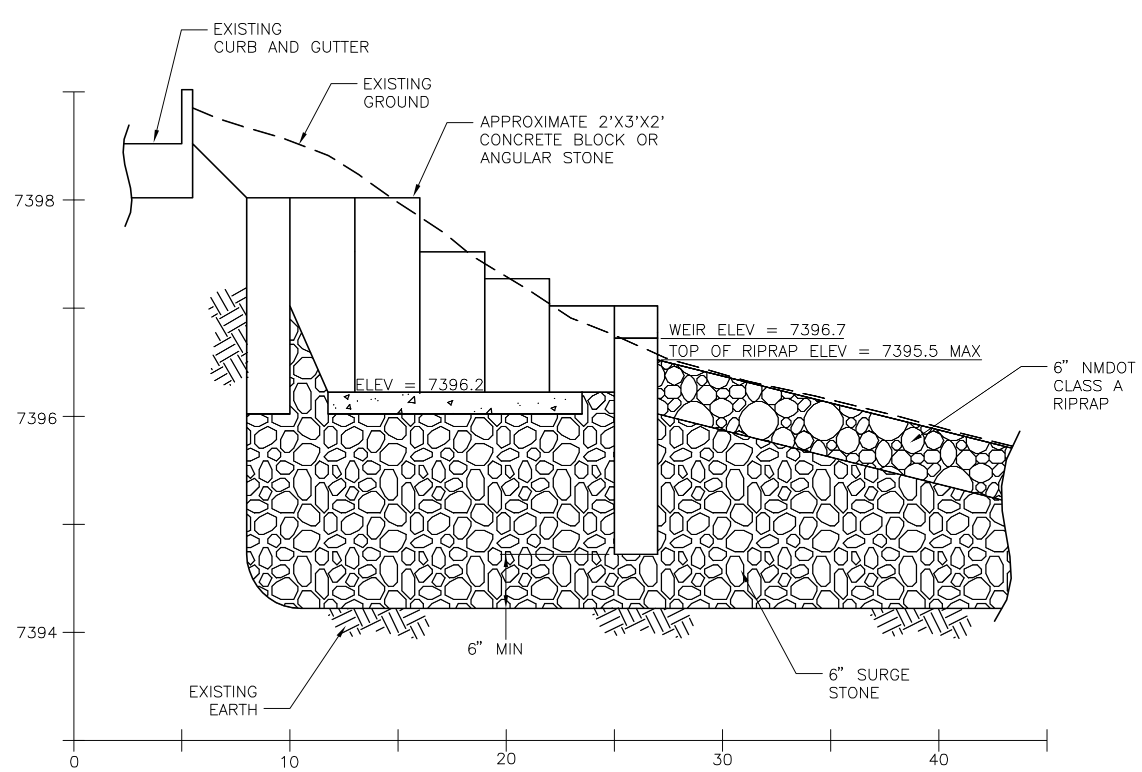
A C-1000 CROSS SECTION
SCALE: NONE



B C-1000 CROSS SECTION
SCALE: NONE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.
2. GROWTH MEDIA:
   85% BEDDING SAND
   15% COMPOST MIXTURE
   PRE-MIXED PRIOR TO DELIVERY
3. COMPOST MIXTURE:
   50% CLASS 1 STA REGISTERED COMPOST
   50% LOOSELY-PACKED SHREDDED PAPER



C C-1000 CROSS SECTION
SCALE: NONE

90% REVIEW
NOT FOR
CONSTRUCTION

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS
90% SUBMITTAL

SECTION VIEWS – 1

BLDG NA TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

SUBMITTED | APPROVED FOR RELEASE

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PO Box 1663
Los Alamos, New Mexico 87545

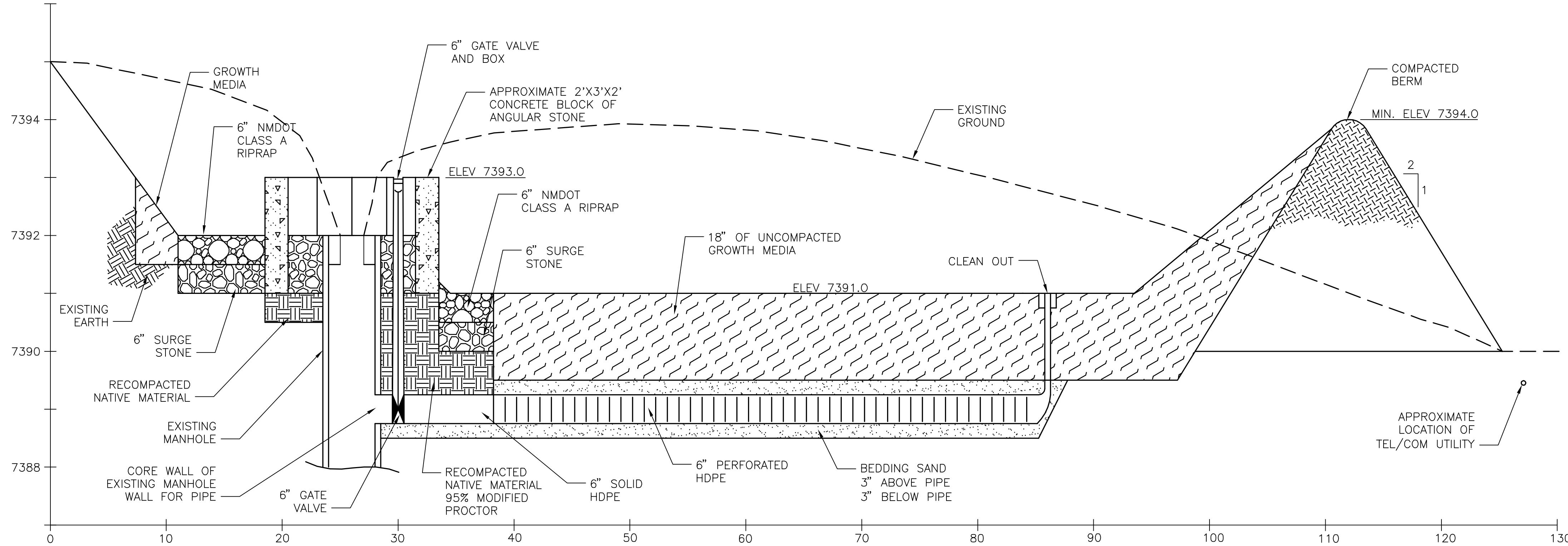
SHEET C-3000
4 OF 7

CLASSIFICATION UNC | REVIEWER | DATE

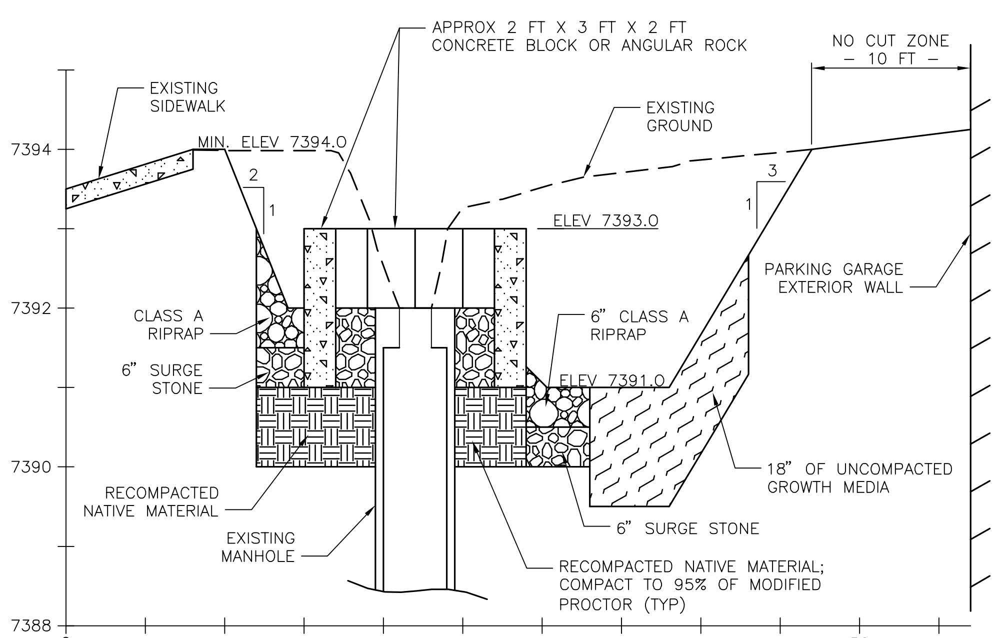
PROJECT ID 102750 | DRAWING NO C-55812 | REV C

GENERAL NOTES:

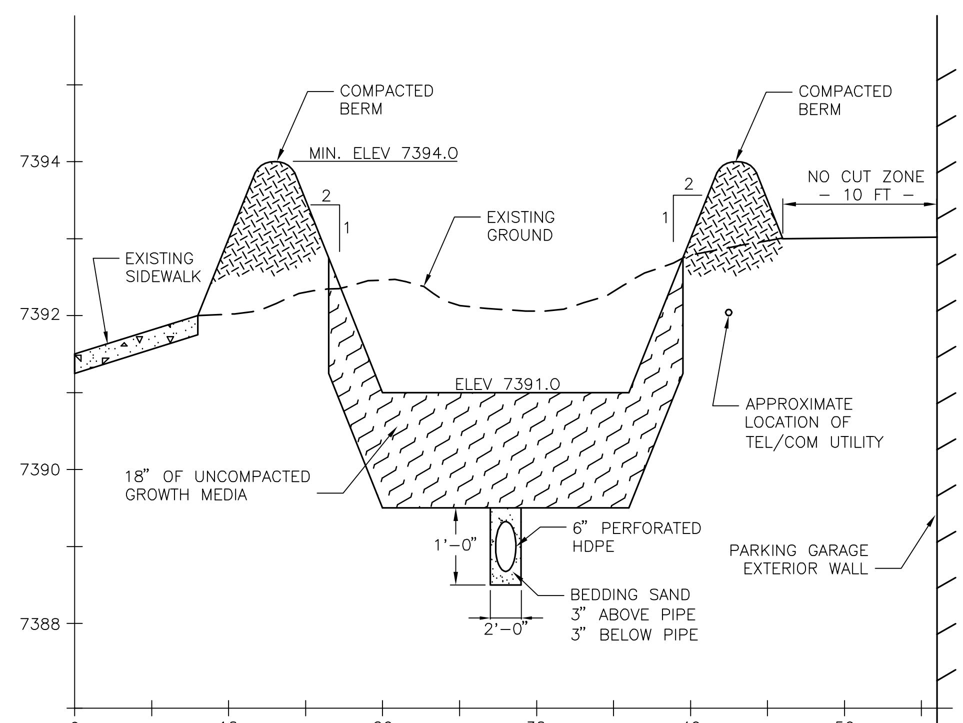
1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.
2. GROWTH MEDIA:
   - 85% BEDDING SAND
   - 15% COMPOST MIXTURE
   - PRE-MIXED PRIOR TO DELIVERY
3. COMPOST MIXTURE:
   - 50% CLASS 1 STA REGISTERED COMPOST
   - 50% LOOSELY-PACKED SHREDDED PAPER



D C-1000 CROSS SECTION
SCALE: NONE



E C-1000 CROSS SECTION
SCALE: NONE



F C-1000 CROSS SECTION
SCALE: NONE

90% REVIEW NOT FOR CONSTRUCTION

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS
90% SUBMITTAL

SECTION VIEWS - 2

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

BLDG NA TA-03

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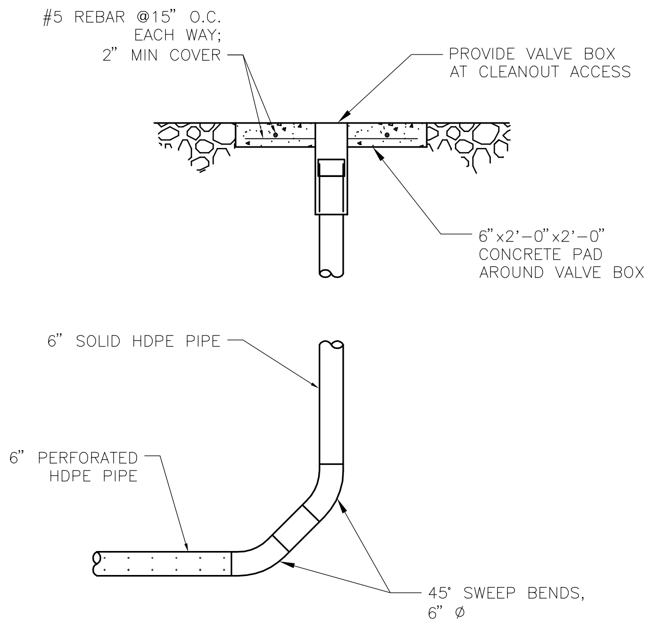
SHEET C-3001 — 5 OF 7

CLASSIFICATION UNC | REVIEWER | DATE

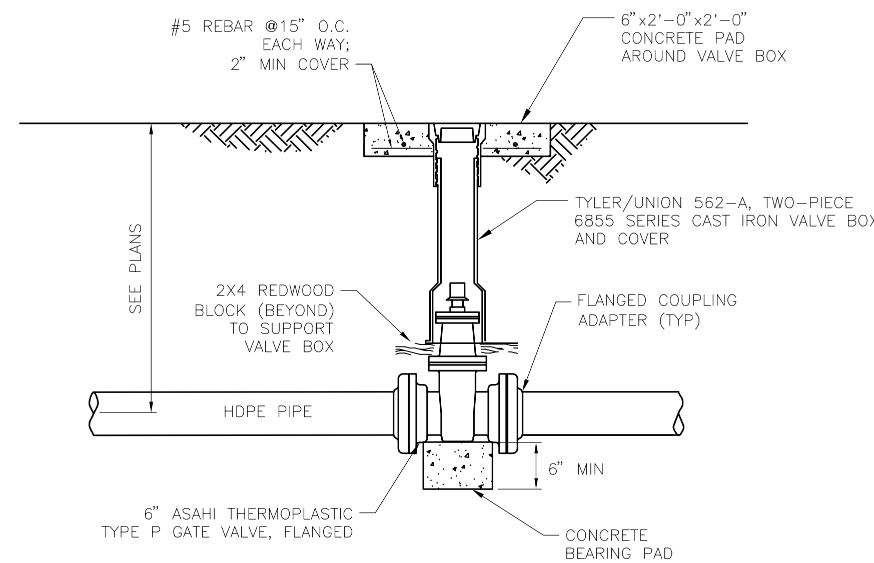
PROJECT ID 102750 | DRAWING NO C-55812 | REV C

GENERAL NOTES:

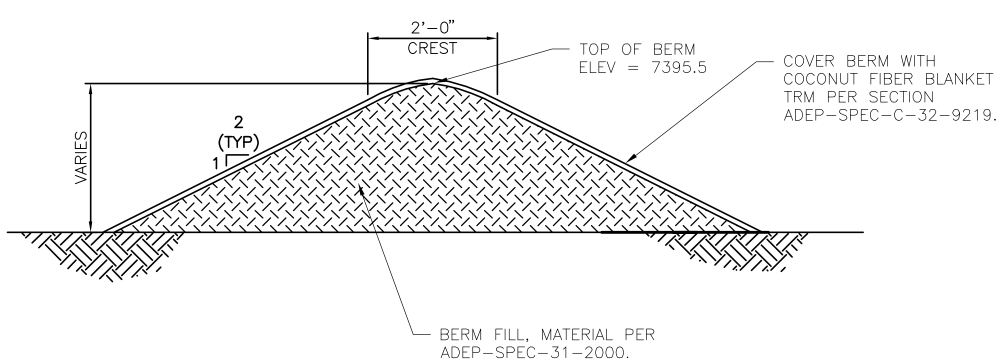
1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.
2. CAST-IN-PLACE CONCRETE PER ADEP-SPEC-C-03-3053.
3. REINFORCED CONCRETE PER ADEP-SPEC-C-03-3001.
4. UTILITY TRENCHING PER ADEP-SPEC-C-33-4000.



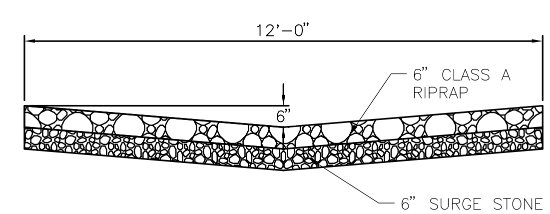
1 / C-1000 6" CLEANOUT
NO SCALE



2 / C-1000 6" GATE VALVE
NO SCALE



3 / C-1000 EARTH BERM
NO SCALE



4 / C-1000 CLASS A RIRRAP
NO SCALE

90% REVIEW NOT FOR CONSTRUCTION

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS
90% SUBMITTAL

CIVIL DETAILS

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

BLDG NA TA-03

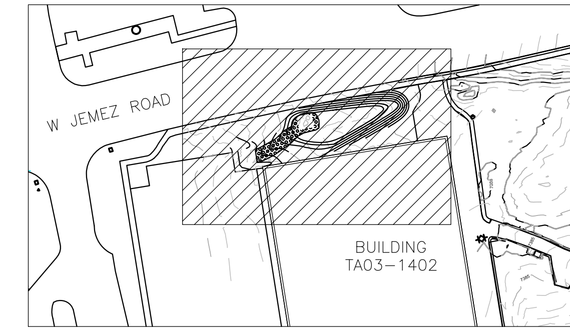
SUBMITTED | APPROVED FOR RELEASE

Los Alamos NATIONAL LABORATORY
PO Box 1663 Los Alamos, New Mexico 87545

SHEET C-5000
6 OF 7

CLASSIFICATION UNC | REVIEWER | DATE

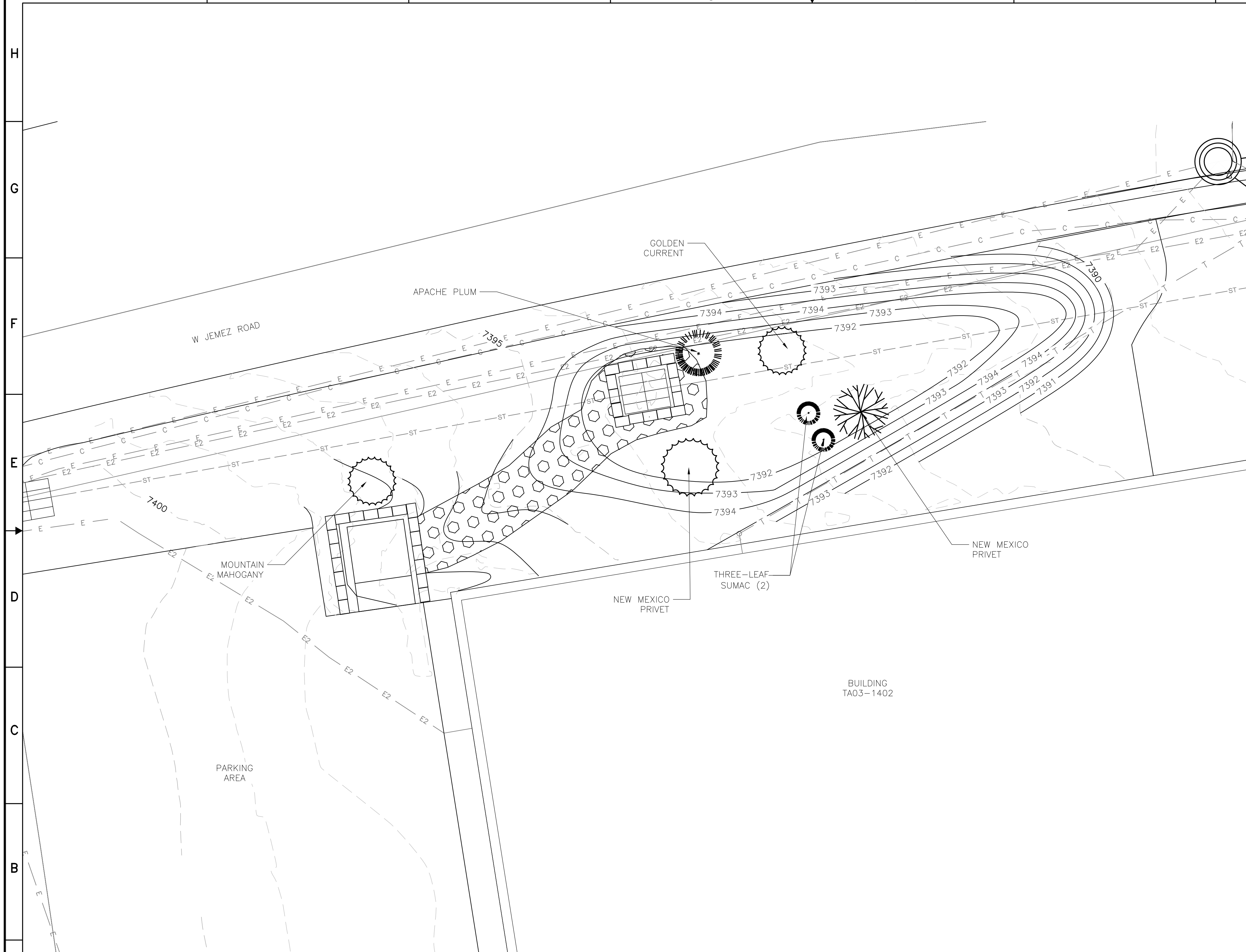
PROJECT ID 102750 | DRAWING NO C-55812 | REV C



LOCATION SITE
NOT TO SCALE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.
2. PLANT DISTURBED AREAS WITH WILDFLOWER MIX PER ADEP–SPEC–C–32–9212.



PLAN VIEW
SCALE: 1" = 10'

10' 5' 0 5' 10'
1"=10'-0"

90% REVIEW NOT FOR CONSTRUCTION

ECN TYPE I # CAP–102750–ECN–0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S–SMA–0.25 STORM WATER CONTROLS
90% SUBMITTAL
PLANTING PLAN

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	03/13/2013

BLDG NA TA–03

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Los Alamos, New Mexico 87545

SHEET C–7000
7 OF 7

CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C–55812 | REV C

Attachment E

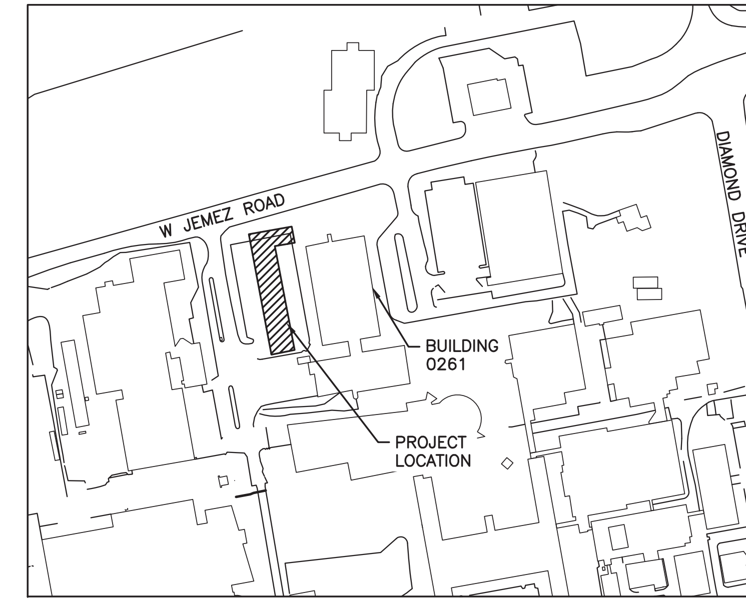
Enhanced Control Current Conditions and Design of Bioretention Garden

Current Conditions for Proposed Bioretention Garden Site

Design of Proposed Bioretention Garden

S-SMA-0.25 STORM WATER CONTROLS - LID (WEST)

BLDG. NA TA-03



LOCATION PLAN
SCALE: NONE TA-03

PRODUCT OPTIONS/SUBSTITUTIONS

"OR APPROVED EQUAL" IS ALWAYS IMPLIED AFTER A BRAND NAME, PATENT PROCESS OR CATALOG NUMBER. THE CONTRACTOR MAY SUBSTITUTE ANY BRAND, PROCESS OR CATALOG NUMBER APPROVED AS AN EQUAL BY THE CONTRACT ADMINISTRATOR. THE ONLY EXCEPTION IS WHERE "NO SUBSTITUTION" IS SPECIFIED. SEE GENERAL PROVISION "MATERIAL AND WORKMANSHIP".

PROJECT DESIGN DATA

DESIGN STORMS FOR INDIVIDUAL PERMIT (IP) CORRECTIVE ACTIONS AND CONTROL MEASURES – DESIGN GUIDE (EP-DIV-GUIDE-20087)

LANL ESM CHAPTER 3, SECTION G20 (OCTOBER 2006 EDITION)

PEAK RUNOFF $Q_{100\ YR,\ 24\ HR}$ = 13.0 CU FEET/SEC

LIST OF DRAWINGS

REVISION NUMBER	SHEET NUMBER	DISCIPLINE SHEET NUMBER	DRAWING TITLE
C	1	G-0001	TITLE SHEET
C	2	C-0001	LEGEND, ABBREVIATIONS AND GENERAL NOTES
C	3	C-1000	PLAN AND PROFILE OF BIORETENTION BASIN WEST OF BUILDING TA03-0261
C	4	C-3000	SECTION VIEWS - 1
C	5	C-3001	SECTION VIEWS - 2
C	6	C-4000	PLANTING PLAN OF BIORETENTION BASIN WEST OF BUILDING TA03-0261
C	7	C-5000	CIVIL DETAILS - 1
C	8	C-5001	CIVIL DETAILS - 2
C	9	V-0001	SURVEY CONTROL SHEET

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

TITLE SHEET

BLDG NA TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

SUBMITTED

APPROVED FOR RELEASE

JAMES A. O'NEILL NEW MEXICO PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION

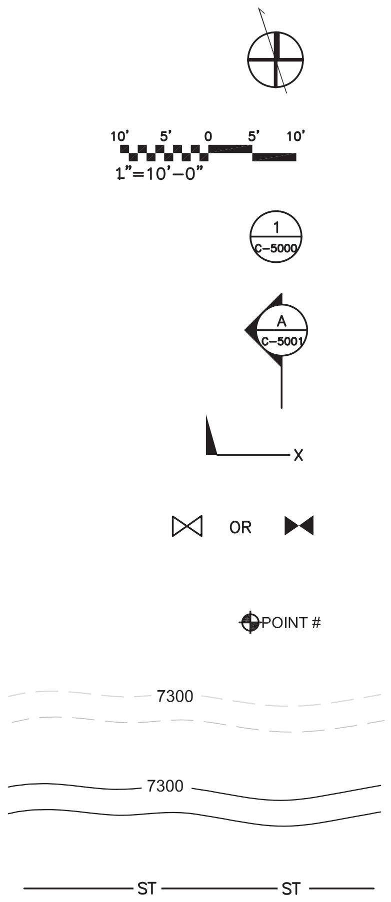
Los Alamos NATIONAL LABORATORY
PO Box 1663
Los Alamos, New Mexico 87545

SHEET G-0001
1 OF 9

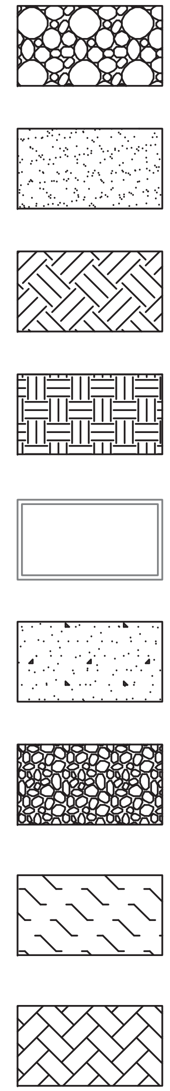
CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C-55812 | REV C

LEGEND



	NORTH ORIENTATION SYMBOL
	GRAPHIC SCALE
	DETAIL TAG
	SECTION TAG
	SECTION END LINE
	GATE VALVE
	SURVEY CONTROL POINT
	EXISTING CONTOUR
	NEW CONTOUR
	NEW STORM DRAIN LINE



	RIPRAP (ADEP-SPEC-C-31-3700 OR AS NOTED)
	UTILITY TRENCH BEDDING (ADEP-SPEC-C-31-2000)
	EXISTING EARTH
	BERM FILL (ADEP-SPEC-C-31-2000)
	MISC EXISTING STRUCTURE
	CONCRETE (ADEP-SPEC-C-03-3053)
	SURGE STONE (ADEP-SPEC-C-31-2000)
	GROWING MEDIA
	PERMEABLE INTERLOCKING CONCRETE PAVERS

ABBREVIATIONS

ALT	– ALTERNATING
BLDG	– BUILDING
DIA	– DIAMETER
EA	– EACH
EL	– ELEVATION
ELEV	– ELEVATION
FT	– FOOT OR FEET
HDPE	– HIGH DENSITY POLYETHYLENE
HR	– HOUR
INV	– INVERT
LF	– LINEAR FEET
MAX	– MAXIMUM
MIN	– MINIMUM
MSGP	– MULTI-SECTOR GENERAL PERMIT
NAD	– NORTH AMERICAN DATUM
NGVD	– NATIONAL GEODETIC VERTICAL DATUM
NMDOT	– NEW MEXICO DEPARTMENT OF TRANSPORTATION
PERF	– PERFORATED
SEC	– SECOND
SMA	– STORM WATER MANAGEMENT AREA
STA	– STATION
SWMU	– SOLID WASTE MANAGEMENT UNIT
TA	– TECHNICAL AREA
TOC	– TOP OF CONCRETE/TOP OF CURB
TYP	– TYPICAL
YR	– YEAR

GENERAL NOTES

1. IF THIS SHEET IS NOT 24X36 THEN IT IS A REDUCED SIZE PLOT.
2. DATA FOR ALL ELEVATIONS AND NORTHING/EASTING POINTS STATED (EXISTING AND PROPOSED) ARE BASED ON PROVIDED EXISTING SURVEY INFORMATION.
3. REFER TO SPECIFICATIONS FOR ADDITIONAL DESIGN INFORMATION NOT SHOWN ON DRAWINGS.
4. ALL ELEVATIONS ARE FINISHED GRADE, UNLESS OTHERWISE NOTED.
5. THE SUBCONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF ALL FLOWS, INCLUDING STORM FLOWS, IN AND ENTERING AND EXITING THE CONSTRUCTION AREA.
6. THE SUBCONTRACTOR SHALL MAINTAIN AND PROTECT EXISTING STRUCTURES AND UTILITIES.
7. EARTHWORK SHALL BE PERFORMED ACCORDING TO ADEP-SPEC-C-31-2000 UNLESS MODIFIED HERE-IN.
8. UTILITY TRENCHING AND INSTALLATION SHALL BE PERFORMED ACCORDING TO ADEP-SPEC-C-33-4000 UNLESS MODIFIED HERE-IN.
9. GEOSYNTHETIC SHALL BE INSTALLED IN ACCORDANCE WITH ADEP-SPEC-C-31-3519.
10. SEED ALL UNPAVED DISTURBED AREAS USING A SEED MIX PREPARED IN ACCORDANCE WITH ADEP-SPEC-C-32-9219 SEEDING.

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)	DRAWN	E. MARTIN
LEGEND, ABBREVIATIONS AND GENERAL NOTES	DESIGN	J. O'NEILL
	CHECKED	J. O'NEILL
BLDG NA TA-03	DATE	04/05/2013

SUBMITTED | APPROVED FOR RELEASE

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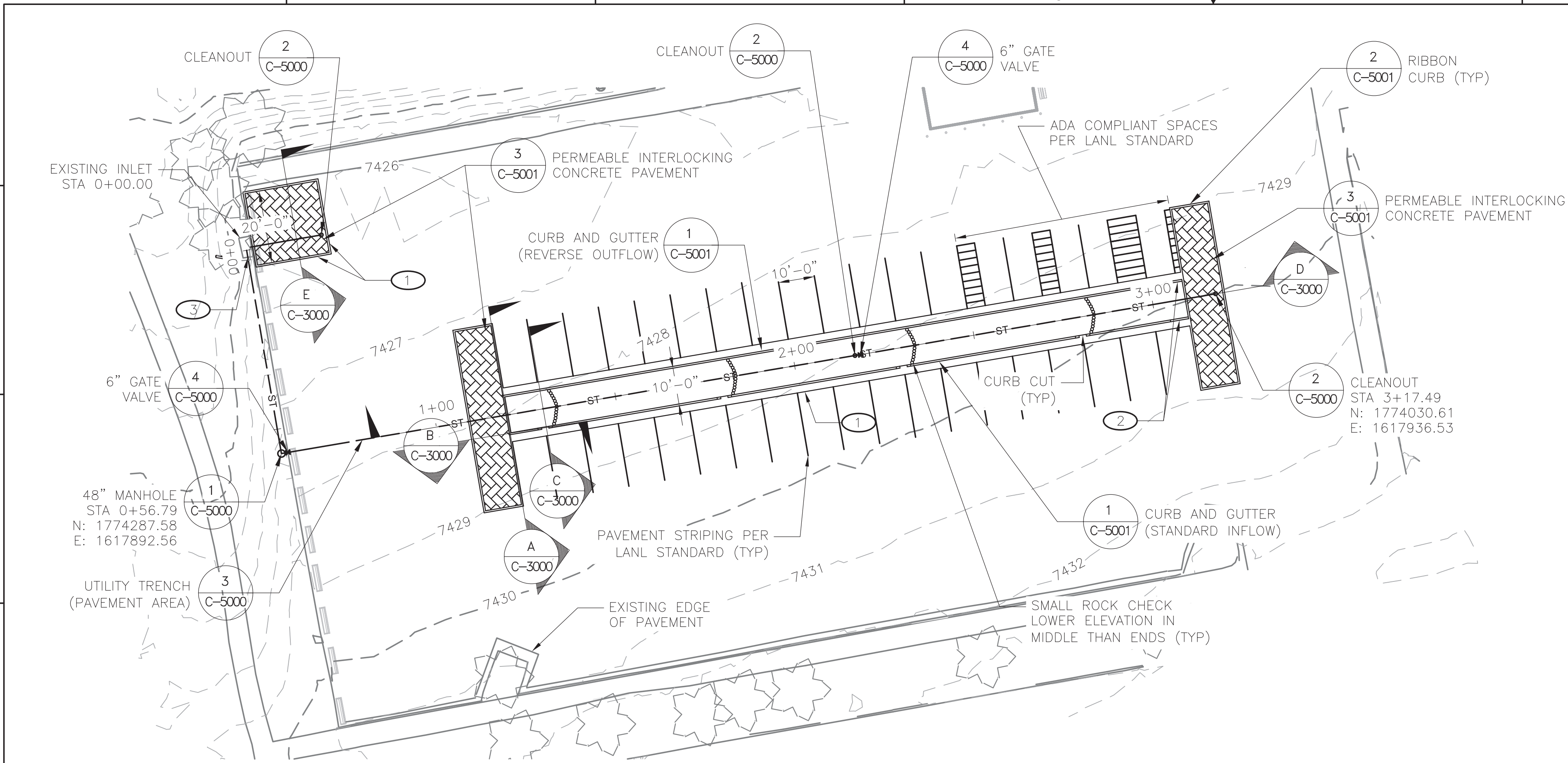
PO Box 1663
Los Alamos, New Mexico 87545

SHEET C-0001
2 OF 9

CLASSIFICATION UNC | REVIEWER | DATE

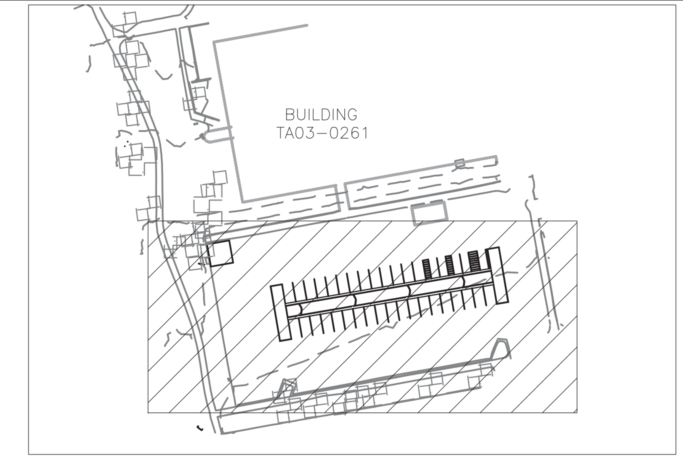
PROJECT ID	DRAWING NO	REV
102750	C-55812	C

JAMES A. O'NEILL NEW MEXICO PROFESSIONAL ENGINEER NOT FOR CONSTRUCTION



PLAN VIEW

20' 10' 0 10' 20'
1"=20'-0"



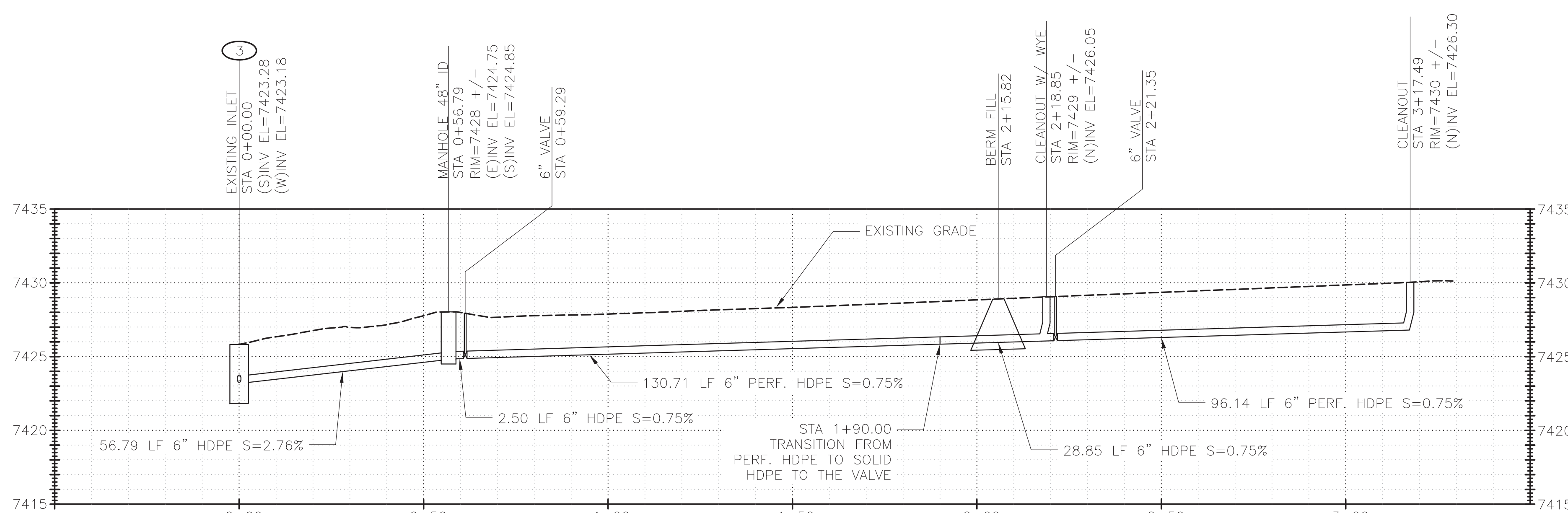
KEY PLAN
NOT TO SCALE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.

KEYED NOTES :

1. SAW CUT CLEAN EDGES ALONG ASPHALT. MATCH EXISTING GRADES AS NOTED.
2. TRANSITION TO 6-INCH CURB HEIGHT OVER 5 FEET.
3. CORE EXISTING MANHOLE/BASIN AND INSTALL NEW PIPE. FIELD VERIFY EXISTING INVERTS.



PROFILE VIEW

VERT. SCALE 1"= 20'
HORIZ. SCALE 1"= 5'

JAMES A. O'NEILL NEW MEXICO PROFESSIONAL ENGINEER — NOT FOR CONSTRUCTION

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

PLAN AND PROFILE OF BIORETENTION BASIN WEST OF BUILDING TA03-0261

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

BLDG NA TA-03

SUBMITTED | APPROVED FOR RELEASE

Los Alamos NATIONAL LABORATORY PO Box 1663 Los Alamos, New Mexico 87545

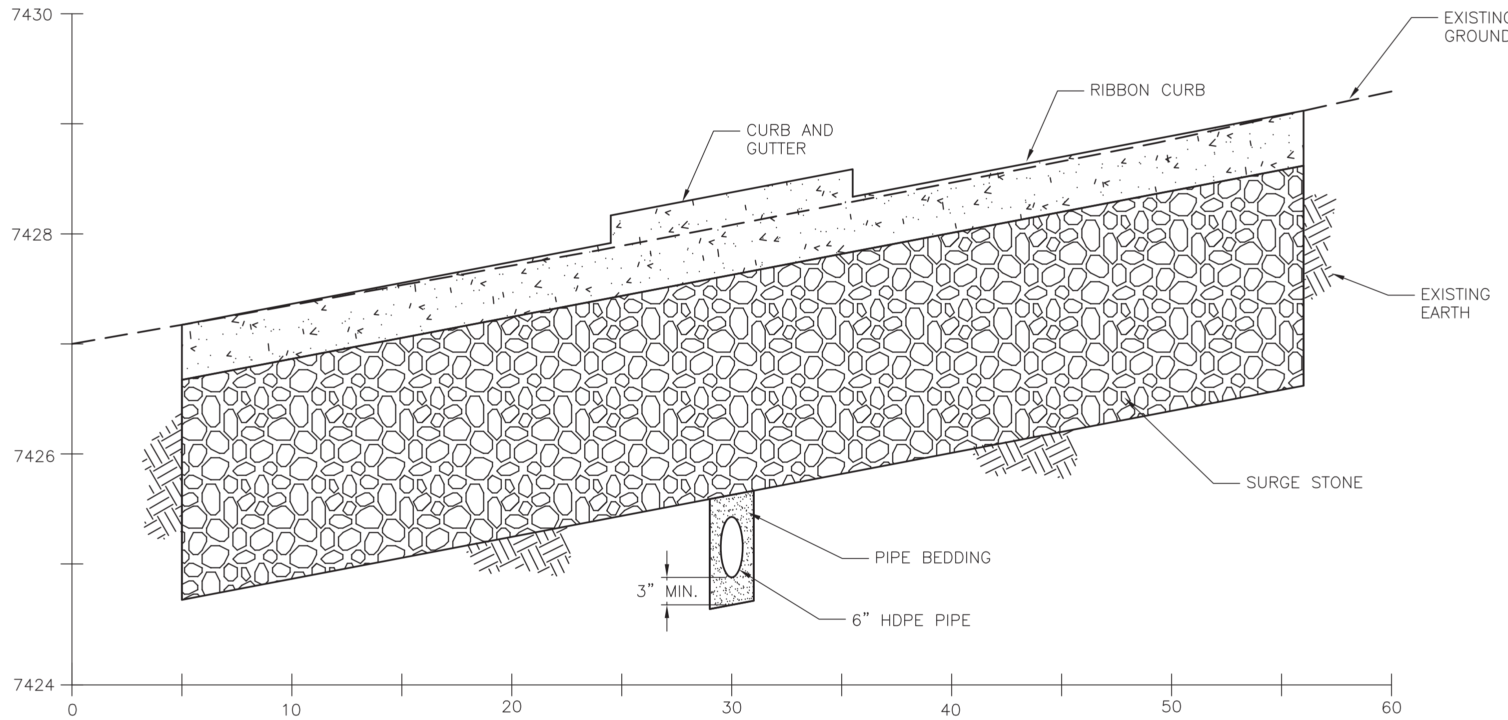
SHEET C-1000
3 OF 9

CLASSIFICATION UNC | REVIEWER | DATE

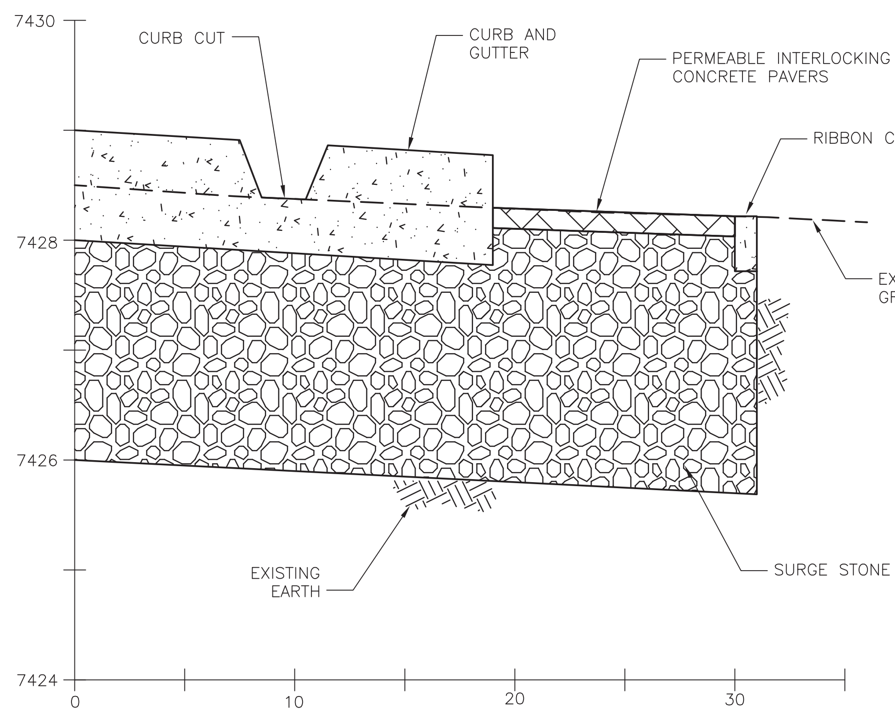
PROJECT ID 102750 | DRAWING NO C-55812 | REV C

GENERAL NOTES:

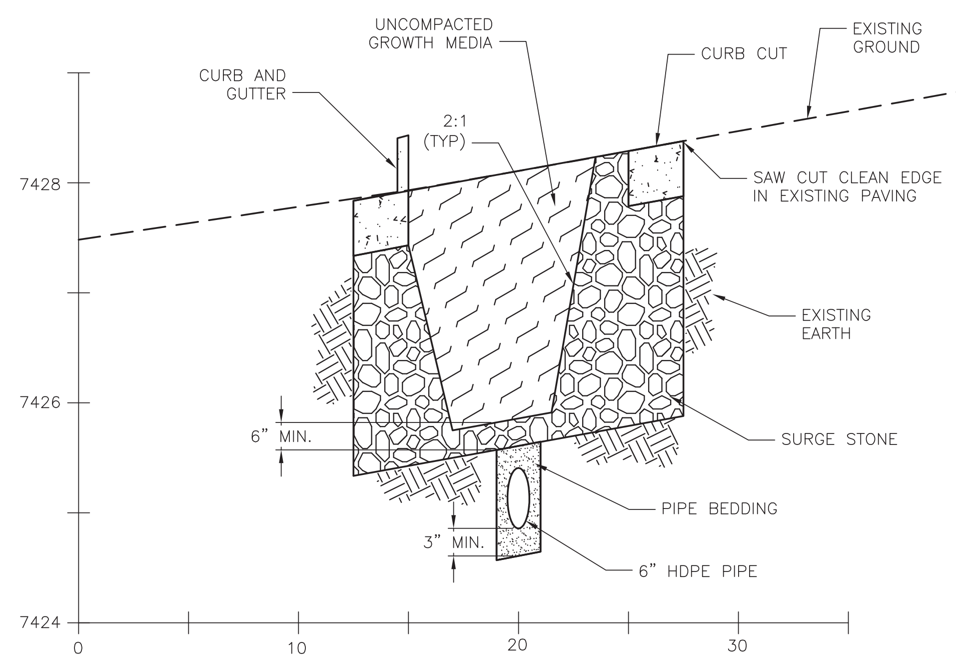
1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT.
2. GROWTH MEDIA:
   85% BEDDING SAND
   15% COMPOST MIXTURE
   PRE-MIXED PRIOR TO DELIVERY
3. COMPOST MIXTURE:
   50% CLASS 1 STA REGISTERED COMPOST
   50% LOOSELY-PACKED SHREDDED PAPER



A C-1000 CROSS SECTION
SCALE: NONE



B C-1000 CROSS SECTION
SCALE: NONE



C C-1000 CROSS SECTION
SCALE: NONE

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

SECTION VIEWS - 1

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

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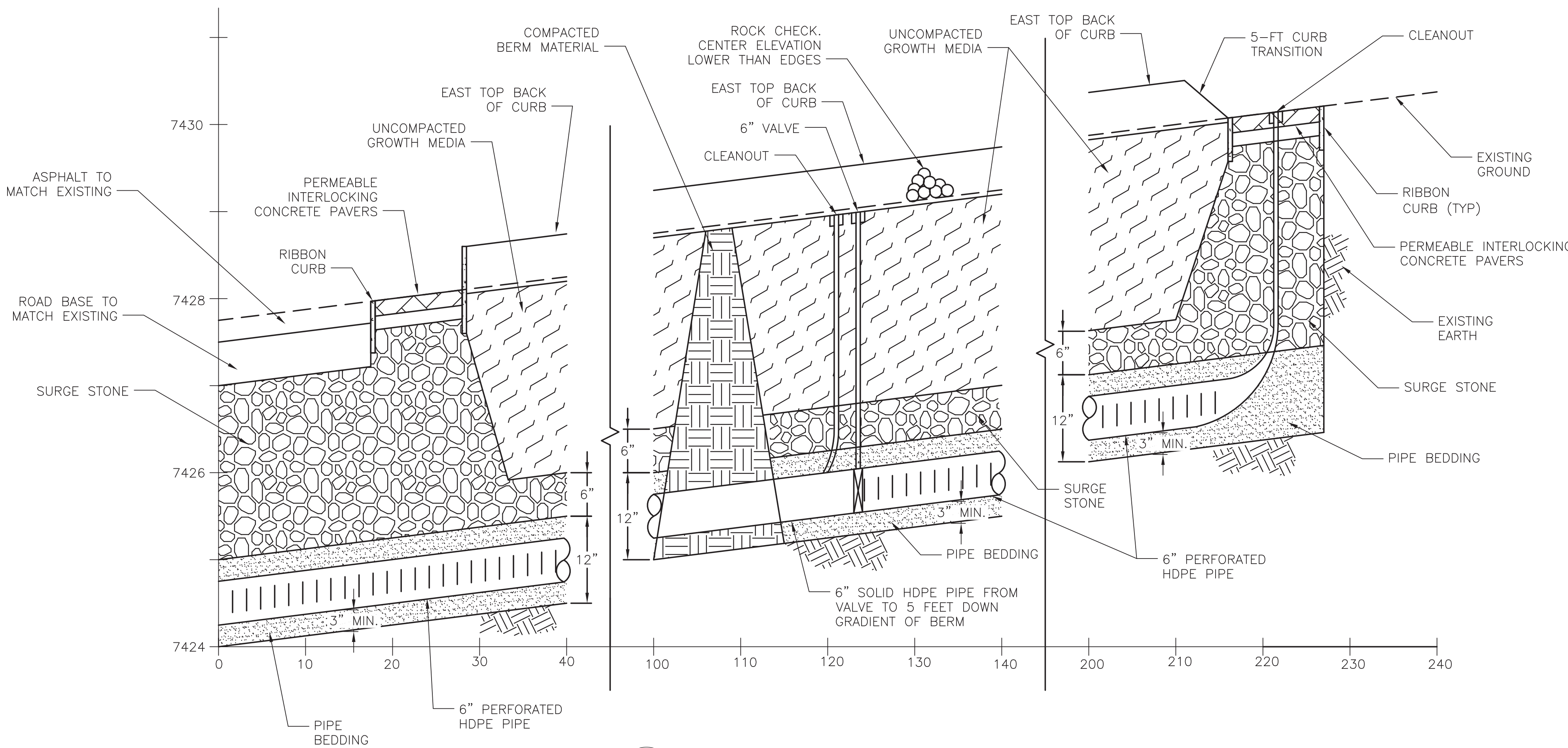
Los Alamos, New Mexico 87545

SHEET C-3000
4 OF 9

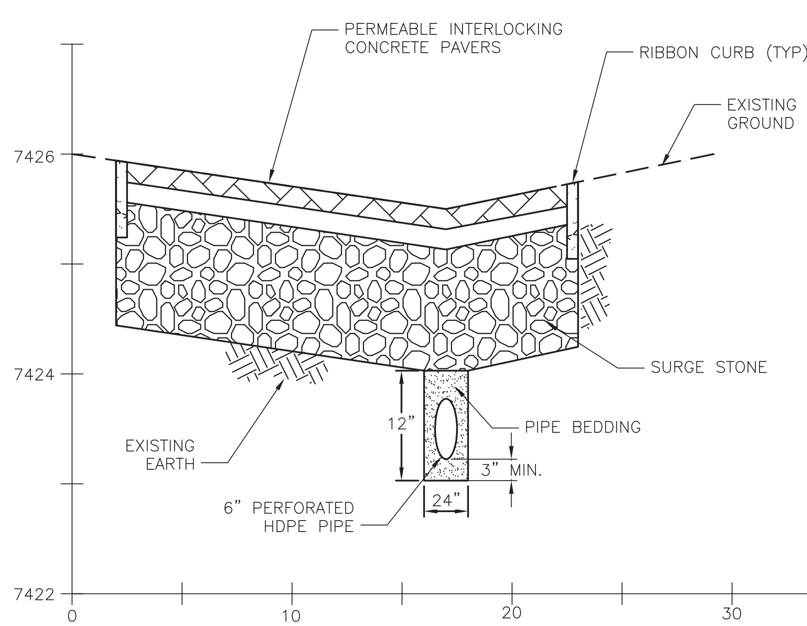
CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C-55812 | REV C

NOT FOR CONSTRUCTION



D C-1000 CROSS SECTION
SCALE: NONE



E C-1000 CROSS SECTION
SCALE: NONE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT.
2. GROWTH MEDIA:
   85% BEDDING SAND
   15% COMPOST MIXTURE
   PRE-MIXED PRIOR TO DELIVERY
3. COMPOST MIXTURE:
   50% CLASS 1 STA REGISTERED COMPOST
   50% LOOSELY-PACKED SHREDDED PAPER

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

SECTION VIEWS - 2

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

BLDG NA TA-03

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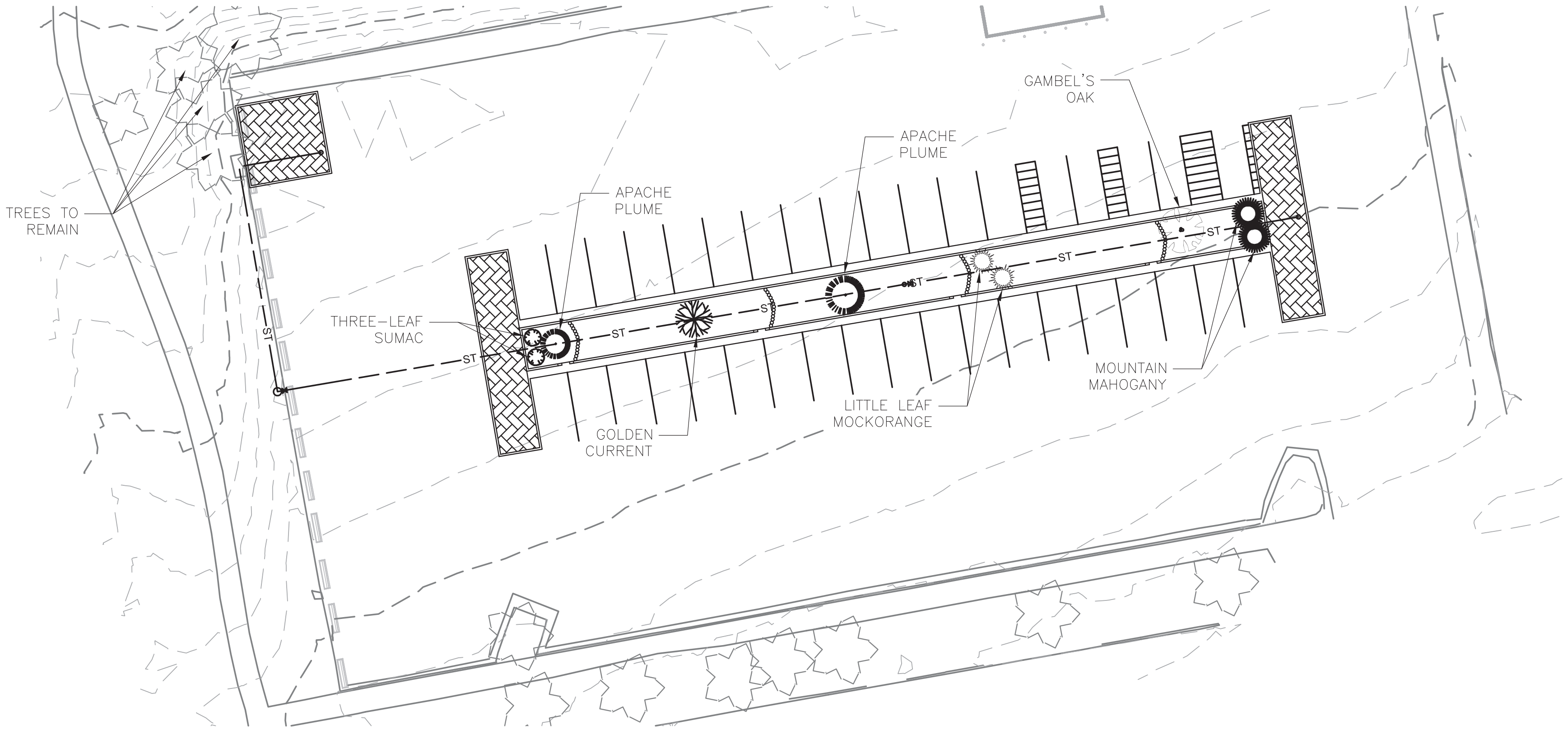
JAMES A. O'NEILL NEW MEXICO 18768 PROFESSIONAL ENGINEER — NOT FOR CONSTRUCTION

Los Alamos NATIONAL LABORATORY PO Box 1663 Los Alamos, New Mexico 87545

SHEET C-3001 5 OF 9

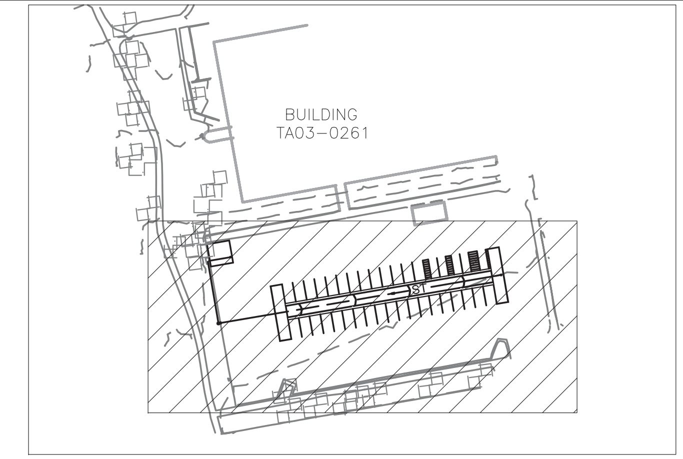
CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C-55812 | REV C



PLAN VIEW

20' 10' 0 10' 20'
1"=20'-0"



LOCATION SITE
NOT TO SCALE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.
2. AREAS DISTURBED BY GRADING TO BE COVERED WITH 6-INCH LAYER OF GROWTH MEDIA COMPACTED TO 80% STANDARD PROCTOR.
3. PLANT WILDFLOWER MIX IN DISTURBED AREAS PER ADEP-SPEC-C-32-9212.

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

PLANTING PLAN FOR BIORETENTION BASINS NORTH AND WEST OF BUILDING TA03-0261

BLDG NA TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

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SHEET C-4000
6 OF 9

CLASSIFICATION UNC | REVIEWER | DATE

PROJECT ID 102750 | DRAWING NO C-55812 | REV C

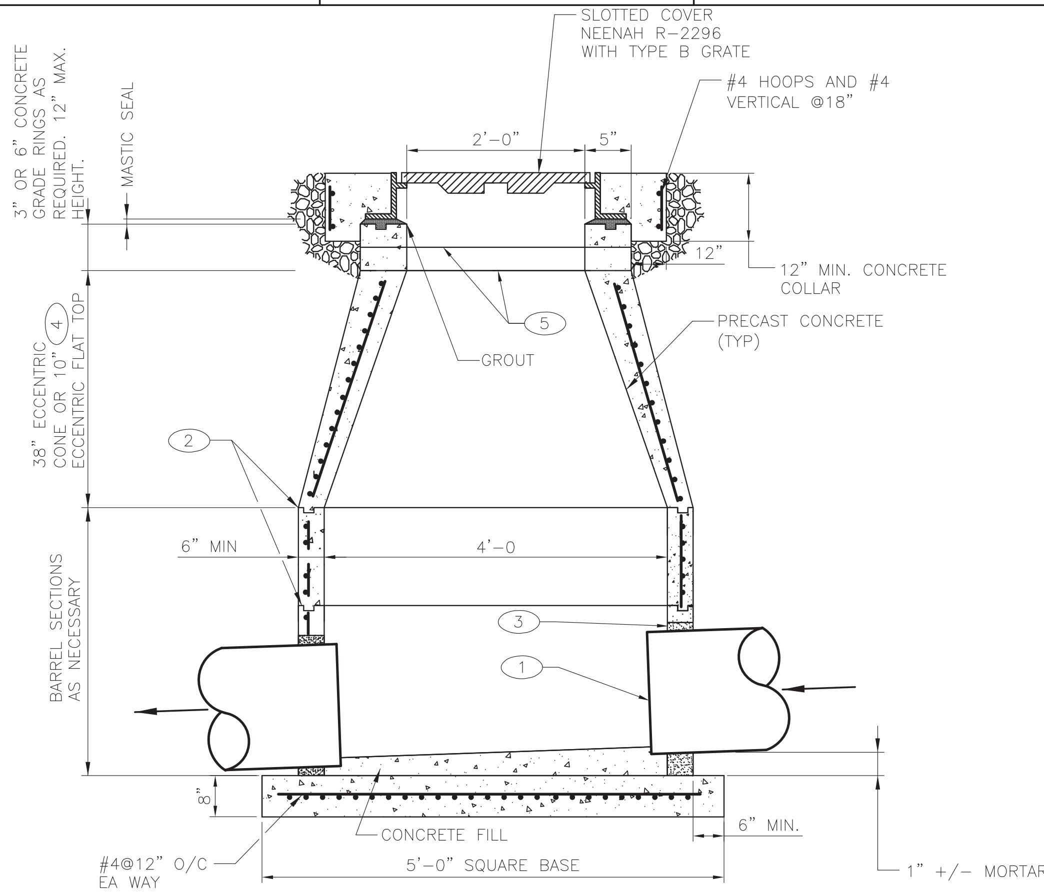
JAMES A. O'NEILL NEW MEXICO PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION

GENERAL NOTES:

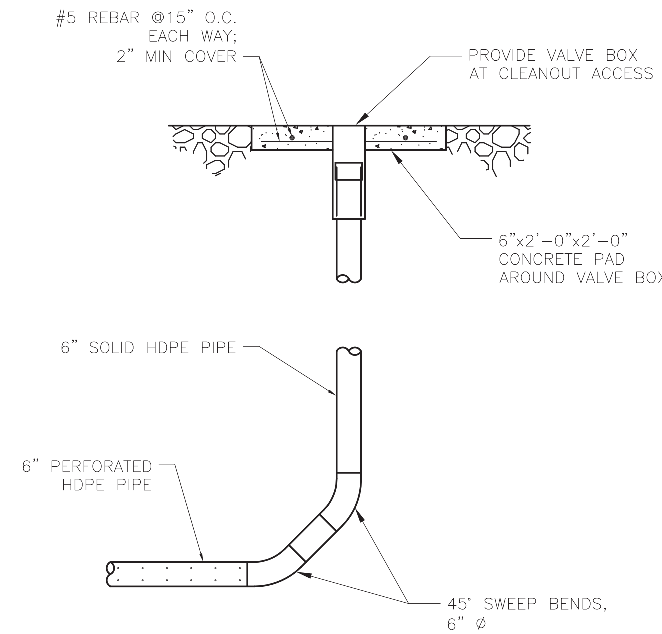
1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT.
2. CAST-IN-PLACE CONCRETE PER ADEP-SPEC-C-03-3053.
3. REINFORCED CONCRETE PER ADEP-SPEC-C-03-3001.
4. UTILITY TRENCHING PER ADEP-SPEC-C-33-4000.

KEYED NOTES:

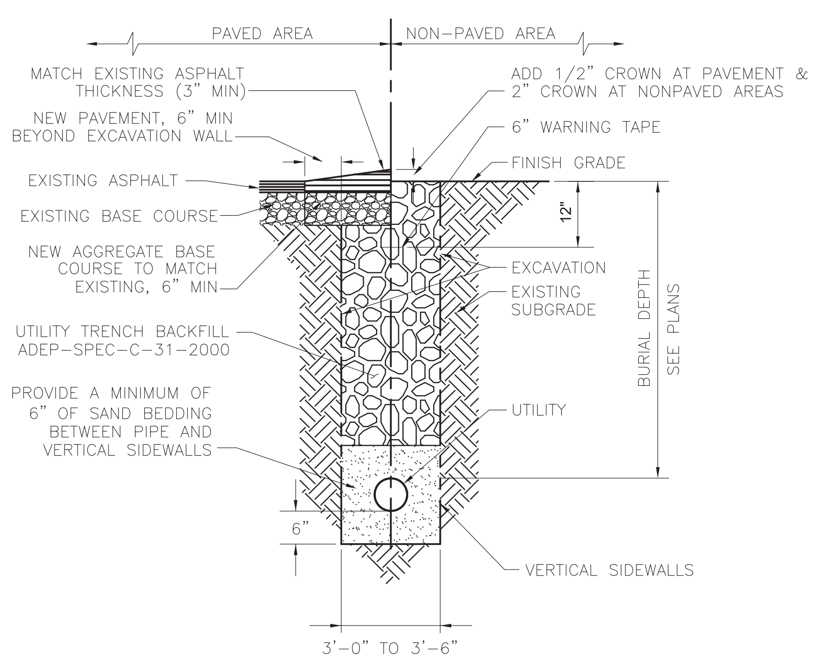
1. STOP ALL PIPE 3" TO 6" INTO MANHOLE.
2. CLEAN ALL JOINTS AND INSTALL SEALING GASKETS.
3. GROUT WATER STOP (TYP).
4. DO NOT USE FLAT TOPS IN PARKING LOTS OR ROADWAYS.
5. MASTIC AND/OR GROUT FOR WATER TIGHT SEAL AND THE PREVENTION OF DISPLACEMENT OF RINGS AND COVER.



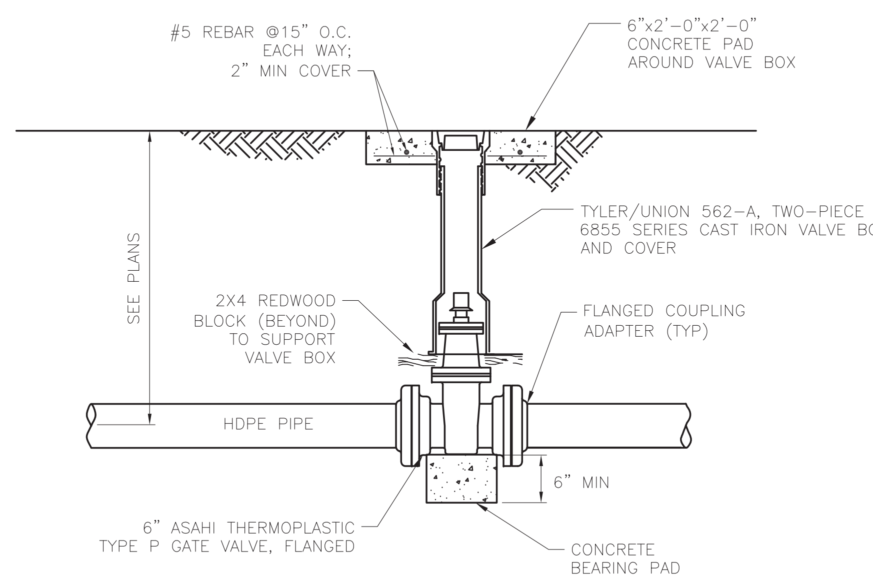
1 MANHOLE
C-1000 C-1001 NO SCALE



2 6" CLEANOUT
C-1000 C-1001 NO SCALE



3 UTILITY TRENCH
C-1000 NO SCALE



4 6" GATE VALVE
C-1000 C-1001 NO SCALE

NOT FOR CONSTRUCTION (JAMES A. O'NEILL, NEW MEXICO, PROFESSIONAL ENGINEER)

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

CIVIL DETAILS-1

BLDG NA   TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

SUBMITTED   APPROVED FOR RELEASE

Los Alamos NATIONAL LABORATORY   PO Box 1663 Los Alamos, New Mexico 87545

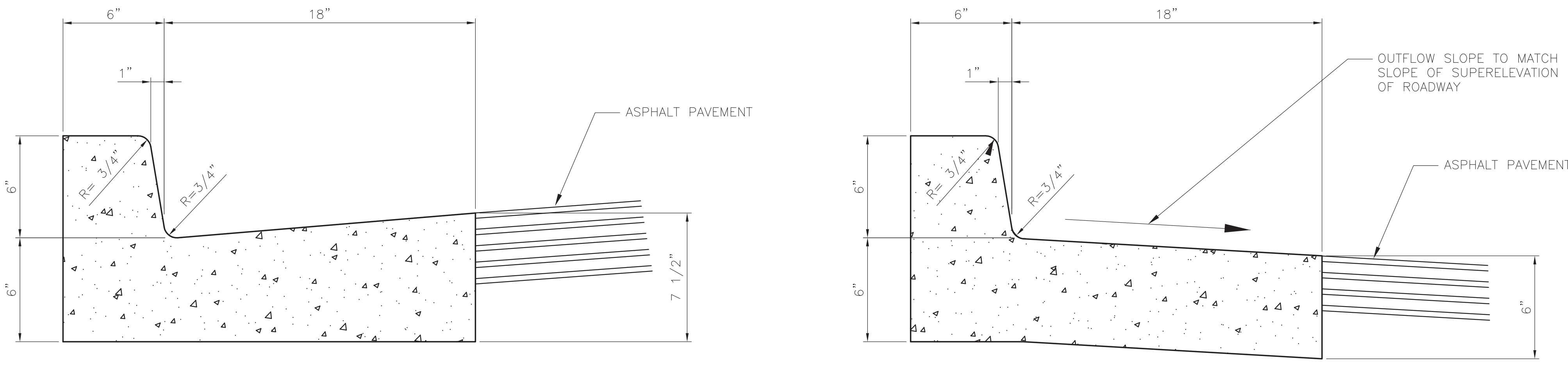
SHEET C-5000   7 OF 9

CLASSIFICATION UNC   REVIEWER   DATE

PROJECT ID 102750   DRAWING NO C-55812   REV C

GENERAL NOTES:

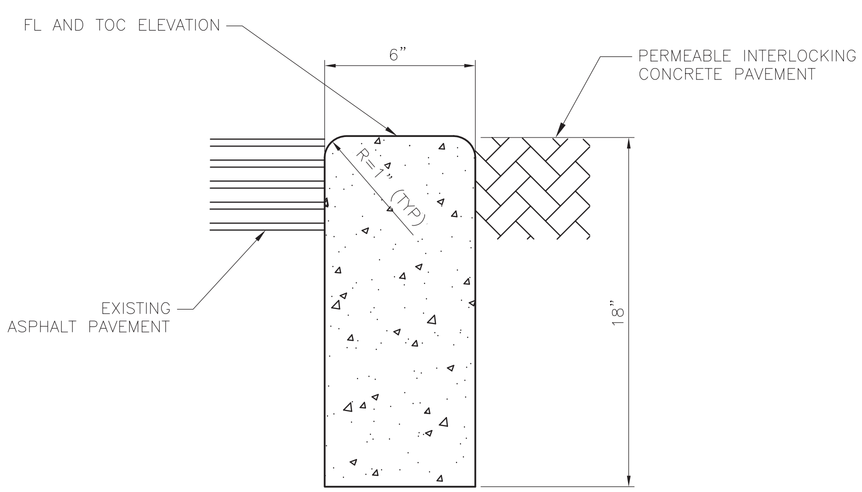
1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT.
2. CAST-IN-PLACE CONCRETE PER ADEP-SPEC-C-03-3053.



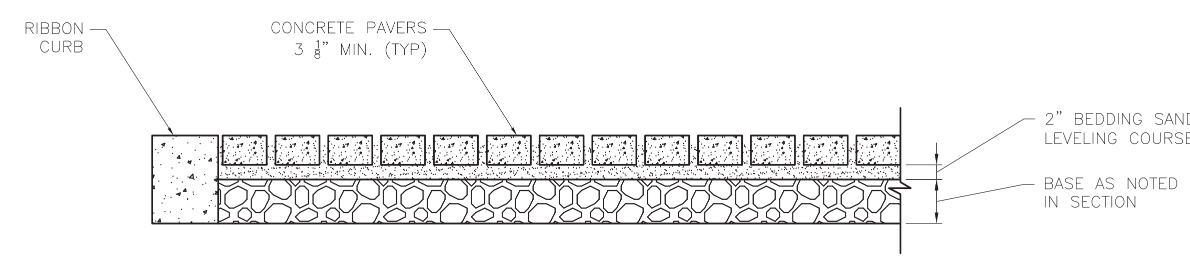
STANDARD INFLOW

REVERSE OUTFLOW

1 C-1000 CURB AND GUTTER
NO SCALE



2 C-1000 RIBBON CURB
NO SCALE



3 C-1000 PERMEABLE PAVEMENT
NO SCALE

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

CIVIL DETAILS-2

BLDG NA TA-03

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

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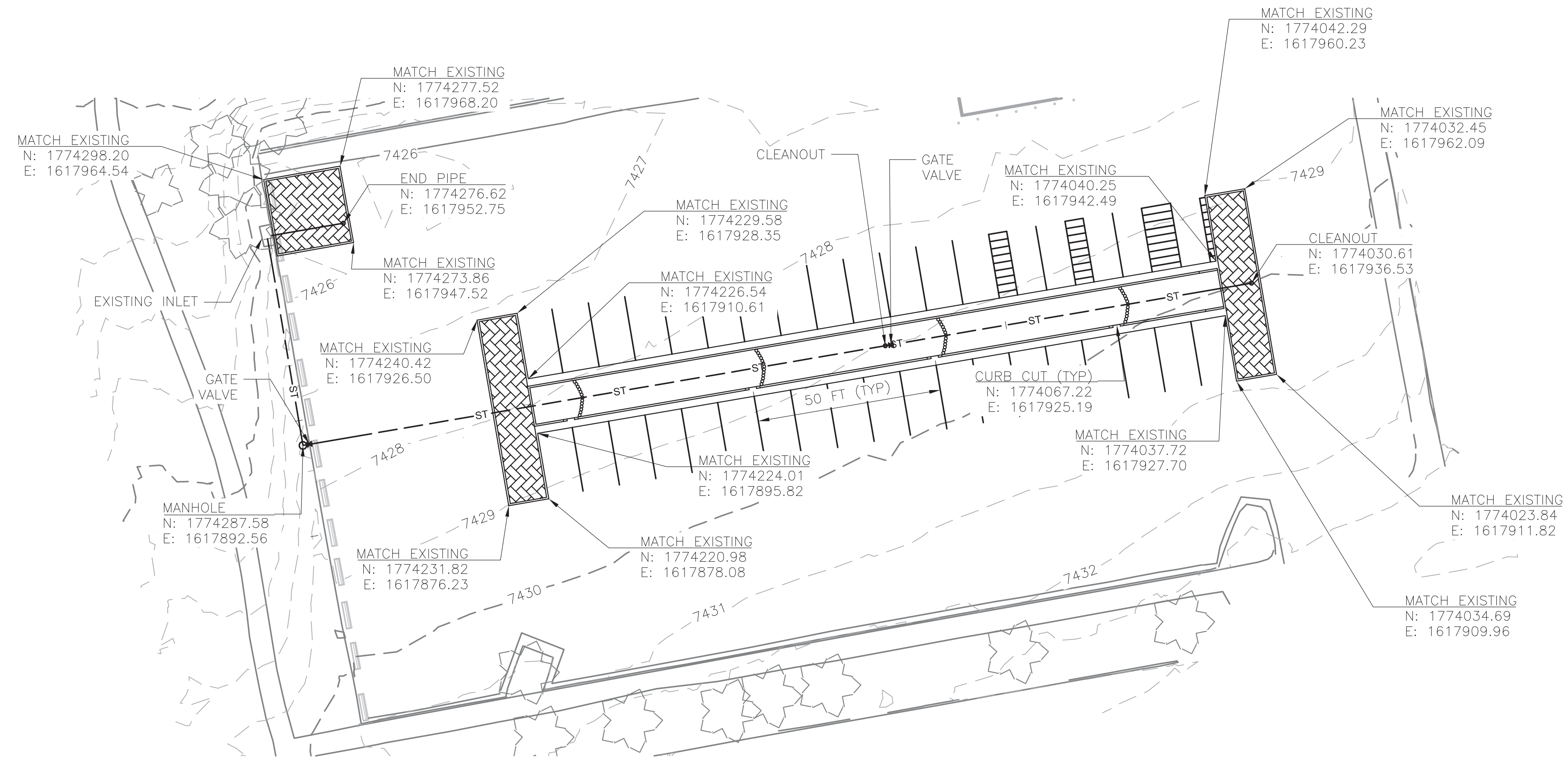
SHEET C-5001
8 OF 9

CLASSIFICATION UNC | REVIEWER | DATE

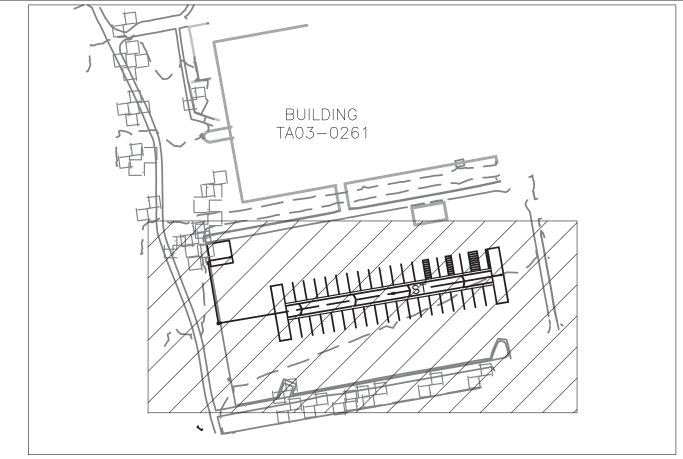
PROJECT ID 102750 | DRAWING NO C-55812 | REV C

JAMES A. O'NEILL NEW MEXICO PROFESSIONAL ENGINEER NOT FOR CONSTRUCTION



PLAN VIEW

20' 10' 0 10' 20'
1"=20'-0"



LOCATION SITE
NOT TO SCALE

GENERAL NOTES:

1. IF THIS SHEET IS NOT 24" x 36", THEN IT IS A REDUCED SIZE PLOT. USE GRAPHIC SCALE ACCORDINGLY.

ECN TYPE I # CAP-102750-ECN-0022

NO	DATE	CLASS REV	ADC	DESCRIPTION	DWN	DES	CHKD	SUB	APP

Brown AND Caldwell

S-SMA-0.25 STORM WATER CONTROLS-LID (WEST)

SURVEY CONTROL PLAN FOR BIORETENTION BASIN WEST OF BUILDING TA03-0261

DRAWN	E. MARTIN
DESIGN	J. O'NEILL
CHECKED	J. O'NEILL
DATE	04/05/2013

BLDG NA TA-03

SUBMITTED

APPROVED FOR RELEASE

Los Alamos NATIONAL LABORATORY
PO Box 1663
Los Alamos, New Mexico 87545

SHEET V-0001
9 OF 9

CLASSIFICATION UNC
REVIEWER
DATE
PROJECT ID 102750
DRAWING NO C-55812
REV C

JAMES A. O'NEIL NEW MEXICO PROFESSIONAL ENGINEER
NOT FOR CONSTRUCTION