ARCADIS Design & Consultancy for natural and built assets

Universal Propulsion Company, Inc.

ENGINEERING CONTROL PLAN

Former Universal Propulsion Company, Inc.
Facility Phoenix, Arizona

DECEMBER 2018

ENGINEERING CONTROL PLAN

Former Universal Propulsion Company, Inc. Facility, Phoenix, Arizona

Prepared for:

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EXPIRES 03-31-19

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ACRONYMS AND ABBREVIATIONS

Arcadis	Arcadis U.S., Inc.
AZ HWMA	Arizona Hazardous Waste Management Act
CMI WP	Corrective Measures Implementation Work Plan
CMS Report	Corrective Measures Study Report
COC	constituent of concern
Facility	25401 North Central Avenue in Phoenix, Arizona
mg/kg	milligrams per kilogram
RI	remedial investigation
RI Report	Final Remedial Investigation Report
SAP	Sampling and Analysis Plan
Site	former UPCO Facility in Phoenix, Arizona
UPCO	Universal Propulsion Company, Inc.
USEPA	United States Environmental Protection Agency
WMP	Waste Management Plan

1 INTRODUCTION

This Engineering Control Plan (ECP) describes the controls, inspections, maintenance and contingency plans that will be implemented at the former Universal Propulsion Company, Inc. (UPCO) facility located in Phoenix, Arizona [(Site) (**Figure 1**)] to prevent or minimize potential exposure to constituents of concern (COCs) that remain in soils at the Site above the site clean-up standard. Implementation of this plan is part of ongoing monitoring of the Corrective Measures for Soil Alternative SA-2 pursuant to the Arizona Hazardous Waste Management Act (AZ HWMA) Permit entered into by UPCO and the Arizona Department of Environmental Quality (ADEQ). The Final Remedial Investigation Report (ARCADIS U.S., Inc. [Arcadis] 2011), Quality Assurance Project Plan (QAPP) (Hargis+Associates [H+A] 2004), and Corrective Measures Study Report (Arcadis 2015), Corrective Measures Implementation Work Plan (CMI WP) (Arcadis 2016b) and the Updated Groundwater Monitoring Plan and QAPP Addendum (Arcadis 2016a) support this ECP.

This plan fulfills the requirements for a written ECP in accordance with Arizona Revised Statutes (ARS) §49-152.01 – Engineering Controls. The purpose of the UPCO engineering controls is to protect against erosion and to control potential hazards by eliminating routes of exposure to soil containing COCs and by potentially reducing constituent migration through isolation and elimination of surface water infiltration. This ECP includes the following information:

- Introduction (Section 1)
- Engineering Controls (Section 2)
- Institutional Controls (Section 3)
- Inspection and Maintenance Requirements (Section 4)
- Record Keeping and Reporting (Section 5)
- Contingency Plan (Section 6)
- Cost Analysis (Section 7)
- Financial Responsibility (Section 8)

- References (Section 9)

1.1 Site Description and Background

The Site is located at 25401 North Central Avenue in Phoenix, Arizona, near the intersection of Central Avenue and Happy Valley Road (**Figure 1**). The Site is unpaved and surrounded by a security fence, and access is controlled with a locked gate along Happy Valley Road. The Site is approximately 160 acres, and is bounded by Central Avenue to the west, Yearling Road to the north, Happy Valley Road to the south, and Union Hills to the east.

UPCO leased the property from the Arizona State Land Department until they purchased it on November 10, 2015 at a public auction. Prior to being demolished by January 2010, the former UPCO facility consisted of various manufacturing, storage, and administrative buildings/structures, which were separated into operational areas (**Figure 2**). These areas of the Site are: A-Complex, B-Complex, C-Complex, D-Complex, E-Complex (Storage Magazine Area; SMA), F-Complex, Old Burn Area, and the Open Burn Unit (New Burn Area). In accordance with the AZ HWMA Permit for the Site, a Remedial Investigation (RI) Report (Arcadis 2011) was submitted in June 2011 which summarized the soil characterization activities conducted at the Site. The RI soil characterization activities were conducted in phases between 2002 and 2008, with pre-design soil investigations conducted in 2014 and in April 2015. The soil investigation activities included the sampling and analysis of surface and subsurface soil samples at each of the former facility operational areas. The RI Report identified perchlorate and metals (arsenic and lead) in soil as COCs at concentrations higher than cleanup standards (Arcadis 2011).

Hydrogeologic investigation activities were conducted between December 2003 and December 2014 at and near the Site. (CMS; Arcadis 2015). A total of 30 groundwater wells have been installed. The locations of the UPCO monitoring wells are shown on **Figure 3**. **Table 1** includes a summary of well locations and construction details. Remedial investigation activities conducted at the Site indicate that perchlorate has been released to the environment from past operations. Regular groundwater sampling events have been conducted since 2003 to monitor and evaluate

dissolved-phase perchlorate concentrations in groundwater. During the January 2018 sampling event, perchlorate was detected in monitoring wells MW-1, MW-2, MW-13, MW-19, MW-20, EW-1, EW-2, IW-1, IW-3, and RW-1 at or above the groundwater cleanup goal of 14 micrograms per liter (µg/L). Concentrations of perchlorate exceeding the groundwater cleanup goal of 14 µg/L were measured most recently within the area estimated to be approximately 300 feet wide and approximately 2,200 feet long, which extends from the vicinity of well IW-1 at the central-eastern property boundary to the vicinity of well MW-1 at the southern property boundary (**Figure 3**).

1.2 Regulatory Background

The October 30, 2015 Corrective Measures Study (CMS) Report presented the development, evaluation, and recommendation of the following corrective measures alternatives for the Site:

- Soil Alternative SA-2 – Soil Excavation and Off-Site Disposal, Soil Capping, Deed Restrictions
- Groundwater Alternative GW-2 – Source Area Groundwater Extraction, Ex-Situ Treatment with Anaerobic Bioreactor, Reinjection, and Alluvium In-Situ Biological Reduction

On December 22, 2015, ADEQ approved the CMS Report as a Class 1 Permit Modification with the recommended remedial alternatives SA-2 and GW-2 (ADEQ 2015). The following corrective action objectives (CAOs) for soil and groundwater, as presented in the CMS, were developed to be protective of human health:

<u>Soil:</u>

- Reduce or eliminate direct contact by a potential receptor (including ingestion, inhalation, or dermal absorption) or threat of direct contact with COCs in surface and subsurface soils.
- Reduce or eliminate the potential for COCs in surface and subsurface soils to migrate to groundwater.

- To the maximum extent practicable, reduce or eliminate further releases that might pose a threat to human health and the environment.
- In accordance with Part IV, Condition C.10 of the AZ HWMA facility permit, achieve a cleanup level for soils that complies with the Arizona Soil Remediation Standards rule (Arizona Administrative Code Title 18, Chapter 7, Article 2).
- Meet applicable waste management requirements.

Groundwater:

- Minimize, stabilize, or eliminate further migration of the constituent plume.
- Prevent migration of perchlorate in groundwater at concentrations higher than 14 µg/L to any active private domestic well in the area bounded by Central Avenue, 7th Street, Yearling Road, and Jomax Road.
- Control the source(s) of release(s) to reduce or eliminate, to the maximum extent practicable, further releases that might pose a threat to human health and the environment.
- In accordance with Part IV, Condition C.9 of the AZ HWMA facility permit, achieve a site-wide groundwater cleanup goal for perchlorate of 14 µg/L.
- Achieve the site-wide groundwater cleanup goal within 30 years.
- Meet applicable waste management requirements.

The May 2, 2016 CMI WP describes the plan for implementing remedial alternatives SA-2 and GW-2. ADEQ approved the CMI WP as a Class 1 Permit Modification on June 27, 2016. The following cleanup standards were established for the COCs in soil and groundwater:

Soil Cleanup Standards

- Perchlorate (soil) = 16 milligrams per kilogram (mg/kg)
- Lead = 400 mg/kg
- Arsenic = 10 mg/kg

Groundwater Cleanup Standards

- Perchlorate = 14 µg/L
- 1,1-Dichloroethene = 7.0 µg/L
- 1,4-Dioxane = 3.5 µg/L

1.3 Closure Activities

Soil Alternative SA-2 was implemented in accordance with the ADEQ-approved CMS, CMI WP, and ADEQ-approved construction design drawings. The Engineering Controls included in Soil Alternative SA-2, consist of four engineered caps and one rip-rap cover, and were installed by February 2018. Implementation, monitoring, maintenance, post-closure care, and financial assurance of the Soil Alternative SA-2 are regulated under the AZHWMA Permit and are described in Section 2.

Implementation, monitoring, maintenance, post-closure care, and financial assurance of Groundwater Alternative GW-2 are also regulated under the AZHWMA Permit. Implementation of Groundwater Alternative GW-2 began with construction of the groundwater treatment facility (GWTF) in August 2018. The GWTF is anticipated to be operational in 2019 and operate for approximately 10 years. Following the completion of Groundwater Alternative GW-2, it is assumed that the site-wide groundwater cleanup goal for perchlorate will have been achieved and there will be no engineering controls necessary to complete Groundwater Alternative GW-2.

1.4 Contact Information

The technical contact for this facility is:

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(480) 535-7427

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Charlotte, NC 28217
(704) 423-7071

2 ENGINEERING CONTROLS

2.1 Engineering Control Systems

Four engineered caps and one rip-rap cover were installed in accordance with the ADEQ-approved Soil Alternative SA-2 design drawings (**Appendix A**). The engineered caps are designed and constructed to prevent potential receptor contact with COCs in soils and minimize potential leaching of COCs in soil to groundwater. Specifically, the engineered caps have been designed and installed to protect against soil erosion and settlement, and to provide positive drainage to prevent water from ponding and infiltrating within the engineered cap areas. Per the manufacturer, when properly maintained, the engineered caps (HydroTurf®) are designed to have an operational life of 50-plus years (WatershedGeo®, 2018).

The rip-rap cover was designed and constructed to prevent potential receptor contact with arsenic remaining in soils above the arsenic site cleanup standard of 10 mg/kg and to minimize the potential for soil erosion and migration from beneath the cover. The rip-rap cover was not designed or constructed to protect against infiltration of water through the cover because site specific data indicates that arsenic remaining in soil does not have the potential to leach. The rip-rap cover is located outside ephemeral washes and in an area with low surface water flows, which will minimize degradation of the nonwoven geotextile filter fabric utilized in construction of the cover due to erosion and material decomposition. Therefore, the expected operational life of the filter fabric used in construction of the rip-rap cover is approximately 20 to 30 years (Thrace LinQ, 2018). Because the only other material used in construction of the rip-rap cover is stone, which has nearly infinite operational life, the operational life of the entire rip-rap cover is limited to that of the filter fabric; or approximately 20 to 30 years.

During implementation of Soil Alternative SA-2, the maximum concentration of arsenic detected for in-place soil remaining below the rip-rap cover was 31 mg/kg. **Table 2** presents all the in-place soil arsenic concentrations detected in soil remaining below the rip-rap cover. Arizona's minimum groundwater protection level (GPL) for arsenic is 290 mg/kg. Because the maximum

concentration of arsenic for in-place soil remaining below the rip-rap cover is less than the GPL and depth to groundwater is approximately 250 feet below ground surface (bgs), there is no potential for arsenic remaining in soils to leach to groundwater and cause dissolved-phase arsenic concentrations in groundwater to exceed the cleanup standard. In addition, three composite soil samples were collected from the excavated soils within the Old Burn Area, which included the rip-rap cover area. Each composite soil sample was analyzed for toxicity characteristic leaching procedure (TCLP) RCRA 8 metals in accordance with USEPA Method 6010B/7470A. All three arsenic TCLP concentrations were non-detect at or above the method reporting limit of 0.50 milligrams per liter (mg/L). The arsenic TCLP analytical results also demonstrate that arsenic remaining in soil does not have the potential to leach to groundwater and cause dissolved-phase arsenic concentrations in groundwater to exceed the cleanup standard.

2.1.1 Engineered Caps

The final capping system installed at the UPCO site consists of four engineered caps within the; 1) Waterbore Area, 2) C-Complex Area, and 3) New Burn Area (**Appendix A**). The engineered caps are constructed with a 60mil linear low-density polyethylene (LLDPE) MicroSpike® geomembrane liner overlain by a HydroTurf® CS surface layer to minimize erosion of the soil and to prevent surface water infiltration. The HydroTurf® CS surface layer is made up of woven geotextile and an engineered synthetic turf which is infilled with Hydrobinder®, resulting in a fiber reinforced high-strength concrete matrix. The engineered cap systems are anchored on all sides by a concrete anchor trench. Details for each engineered cap are described below and As-Built drawings are provided in **Appendix A**.

2.1.1.1 Waterbore Area

The engineered cap within the Waterbore Area caps an area of approximately 16,765 square feet (sq. ft.), which includes the HydroTurf® and concrete anchor trench (**Appendix A**). Within the footprint of the cap, two groundwater monitoring wells (MW-13 and MW-19), and three moisture monitoring wells (MMW-1, MMW-2, and MMW-3) penetrate the HydroTurf®. The cap is

sealed around each well penetration with an LLDPE liner boot. Boot details are shown on the as-builts provided in **Appendix A**. The concrete anchor trench encompasses the entire HydroTurf® to anchor the liner and HydroTurf® into the native ground. The anchor trench is approximately 2'-6" wide and approximately 2' feet deep except where it crosses the ephemeral wash. Due to potential scouring within the wash from rain events, and to protect against surface water infiltrating laterally beneath the cap, the anchor trench upgradient of the cap is a minimum of 4' deep, 8' wide at the surface, and 4' wide at the bottom. The anchor trench downgradient of the cap is a minimum of 4' deep and 2'-6" wide and tied into the downgradient rip-rap apron. Photos of the constructed engineered cap are provided in **Appendix B**.

2.1.1.2 C-Complex Area

The engineered cap within the C-Complex Area caps an area of approximately 6,839 sq. ft., which includes the HydroTurf® and concrete anchor trench (**Appendix A**). The concrete anchor trench encompasses the entire HydroTurf® to anchor the liner and HydroTurf® into the native ground. The anchor trench is approximately 2'-6" wide and approximately 2' feet deep. Photos of the constructed engineered cap are provided in **Appendix B**.

2.1.1.3 New Burn Area

There are two engineered caps located within the New Burn Area covers (**Appendix A**). The larger cap protects an area of approximately 9,664 sq. ft. and the smaller cap protects an area of approximately 2,486 sq. ft. Total area covered includes the HydroTurf® and concrete anchor trench. The concrete anchor trench encompasses the entire HydroTurf® to anchor the liner and HydroTurf® into the native ground. The anchor trench is approximately 2'-6" wide and approximately 2' feet deep.

Within the footprint of the smaller cap, one groundwater monitoring well (MW-21) penetrates the HydroTurf®. The cap is sealed around the well penetration with an LLDPE liner boot. Boot details are shown on the as-builts provided in **Appendix A**. Photos of the constructed engineered cap are provided in **Appendix B**.

2.1.2 Rip-Rap Cover

The final cover system installed within the Old Burn Area consists of a rip-rap cover (**Appendix A**) that protects an area of approximately 765 sq. ft. The rip-rap cover is constructed of a 1-foot thick layer of rip-rap stone underlain by a nonwoven geotextile fabric. Prior to installation of the rip-rap cover, the area was excavated, backfilled, and compacted to within 1-foot of the ground surface. A nonwoven geotextile fabric (THRACE LINQ 130EX), 4-feet wide, was installed on top of the soil. Each joint of the geotextile was overlapped a minimum of 12-inches and brought up around the edges of the excavation. D_{50} 8-inch size stone, with a size no smaller than 4-inches, was placed on the geotextile within the cap area in a uniform rip-rap layer. The top of the rip-rap cover is at the same grade as the ground surface of the surrounding area. The rip-rap cover was installed in accordance with ADEQ guidance and was subsequently approved by ADEQ via site inspection of the cover construction. As-builts for the rip-rap cover are provided in **Appendix A** and photos of the constructed rip-rap cover are provided in **Appendix B**.

2.2 Run-On and Run-Off Controls

Run-on and run-off controls for the engineered caps and rip-rap cover are designed and constructed to provide erosion protection and eliminate pooling and lateral infiltration of water at and near the ground surface. The run-on and run-off controls are described below.

2.2.1 Engineered Caps

A concrete anchor trench encompasses each of the four engineered caps (**Appendix A**). The anchor trench provides run-on and run-off control. The anchor trench is a continuous poured concrete apron that is a minimum of 2-feet 6-inch wide and 2-feet deep outside of the wash and a minimum of 2-feet 6-inch wide and 4-feet deep across the wash, as described in Section 2.1. A rip-rap apron, approximately 30-feet wide and 33-feet long, is constructed at the downgradient transition from the anchor trench to soil within the ephemeral wash in the Waterbore Area (**Appendix A**). A nonwoven geotextile fabric (THRACE LINQ 130EX) was installed below the area of rip-rap and anchored on the upstream and downstream ends by a concrete anchor trench. Stone used for the rip-rap were of a minimum D50 of 12-inches with a size no smaller

than 8-inches placed in uniform layer with a minimum thickness of 24 inches. The surface of the rip-rap apron is at a similar elevation of the surrounding native surface. Procedures for maintaining the run-on and run-off controls for the engineered caps are described in Section 5.1 and construction details for the concrete anchor trench and rip-rap apron are provided in **Appendix A**.

2.2.2 Rip-Rap Cover

Rip-rap underlain by a non-woven geotextile fabric, as described in Section 2.1.2, provides the run-on and run-off control for the rip-rap cover located in the Old Burn Area (**Appendix A**). The rip-rap cover protects against erosion of soils containing arsenic concentrations that exceed the site clean-up standard. Procedures for maintaining the cover are described in Section 5.2 and construction details for the rip-rap cover is provided in **Appendix A**.

3 INSTITUTIONAL CONTROLS

Institutional Controls shall remain in place to protect the public health and the environment because of ongoing groundwater remediation on a portion of the Property. The Institutional Control consists of the following:

i. Owner shall be restricted from the drilling and/or installation and/or use of wells within the Institutional Control portions of the Parent Parcel Property (**Figure 4**). Installation and/or use of wells on the Institutional Control portions of the Property will interfere with the ongoing groundwater monitoring and/or remediation taking place on the Engineering Control portions of the Property.

ii. If a well is required as a result of Owner's remediation plan, Owner shall seek approval in writing from ADEQ and any other necessary state agency before installing the well.

iii. Restricts the current Owner and subsequent owners from access to subsurface water under all portions of the Institutional Control Property for the duration of the Declaration.

iv. All Owners shall be restricted from residential use of the portion of the Property as depicted in **Figure 4**.

4 INSPECTION AND MAINTENANCE REQUIREMENTS

This section describes the inspection and maintenance process for the ECs and ICs in place at the Site. Inspections will be performed to identify areas requiring action, as applicable, documenting changes in site conditions, and recording information relating to the effectiveness of the ECs. Inspection and maintenance will be performed by qualified personnel knowledgeable of the ECs and ICs in place at the Site. All inspections will be overseen by a Registered Professional Engineer in the State of Arizona. Liner repairs (i.e. woven geotextile or 60 mil LLDPE microspike® liner) will be performed by a Watershed Geosynthetics (WG) trained individual or other qualified person that meets the training requirements of WG. The results of the inspections, the associated checklists/forms, and maintenance performed will be included in a semi-annual inspection report. Reporting details are provided in Section 6.

4.1 Engineered CAPs

Prudent care shall be taken when conducting work on covered areas to prevent damage to the engineered caps. Inspections, maintenance, and repair of the engineered caps, HydroTurf® CS systems, will be conducted in accordance with Watershed Geosynthetics, LLC (WG) HydroTurf® CS and Z Monitoring & Maintenance Guidelines (**Appendix C**). Site-specific inspection procedures are listed below, and a comprehensive inspection checklist is provided in **Appendix D**.

<u>Waterbore Area Cap:</u>

- Inspect for scouring within the wash upgradient of the cap. If scouring is identified and is greater than one-foot in depth, corrective maintenance shall be conducted.

- Walk the perimeter of the anchor trench and inspect for substantial erosion or subsidence and note signs of areas where pooling of water may occur.
- Inspect the boot around each the five wells that penetrate the cap HydroTurf®. Check to ensure that the two stainless steel bands are tight and in good condition on each of the five boots. Check the condition of the sealant at the top of the boot and confirm that the entire circumference between the boot and well casing is sealed and that there is no excessive cracking or deterioration that could lead to a leak. Check condition of LLDPE boot around each well monument and verify no signs of cracks or punctures through the boot.
- Inspect the rip-rap apron and confirm that no rock has been displaced downstream. Note signs of slumping within the rip-rap apron. Note significant gaps within the rip-rap apron where the underlying geotextile is exposed and note if the rip-rap material is physically deteriorated or otherwise compromised.

C-Complex Area Cap:

- Walk the perimeter of the anchor trench and inspect for substantial erosion or subsidence and note areas where pooling of water may occur.

New Burn Area Cap:

- Walk the perimeter of the anchor trenches and inspect for substantial erosion or subsidence and note areas where pooling of water may occur.
- Inspect the boot around the well that penetrates the small cap HydroTurf®. Check to ensure that the two stainless steel bands are tight and in good condition. Check the condition of the sealant at the top of the boot and confirm that the entire circumference between the boot and well casing is sealed and that there is no excessive cracking or deterioration that could lead to a leak.

4.1.1 Inspection Frequency

The engineered caps will be inspected semi-annually for the first 5 years during the months of April and October. After 5 years, inspection frequency will be re-evaluated. In addition, the engineered caps will be inspected following a storm event as follows:

- Storm events will be established by monitoring the Flood Control District of Maricopa County on-line rain gauge (14200) data monthly.
- This rain gauge is located at the Deer Valley Airport monthly within two miles of the site. It is assumed that surface water will flow in the wash when 1-inch or greater of rain-fall occurs within a 24-hour period.
- Therefore, if any 1-day rain event equals or exceeds 1-inch of total rain, a visual surface inspection of the run-on and run-off controls, and cap integrity will be conducted within 7 calendar days.

4.1.2 Maintenance Requirements

Maintenance will be performed on items identified as unacceptable on the inspection check list. Maintenance will be performed within approximately 30 days following the discovery of an unacceptable item and a summary of maintenance performed during the period covered will be provided in the semi-annual inspection report as described in Section 6. Typical maintenance activities and procedures are listed below:

- Scouring in the wash; backfill and compact area with native soil. If scouring continues in same area, fill with a cement grout.
- Cap Perimeter Erosion; backfill and compact area(s) with native soil. If erosion continues is same area, try to slope area to divert surface water away or place a cement grout within that area.
- Boot Seal-Stainless steel Bands; tighten bands if necessary. Replace bands if they no longer work as designed.
- Boot Seal-Sealant; Remove and replace sealant.

- HydroTurf®; all HydroTurf® cap maintenance items shall be done in accordance with WG HydroTurf® CS and Z Monitoring & Maintenance Guidelines (**Appendix C**).
- Rip-Rap; place addition rock in areas where gaps have increased or displaced rock that potentially expose filter fabric below. Remove build-up of debris (litter, wood, etc.) that would impede water flow through the rip-rap area.

4.2 Rip-Rap Cover

The rip-rap cover system installed at the Old Burn area (**Appendix A**) is designed and constructed to protect against erosion and possible migration of soils containing arsenic concentrations that exceed the site clean-up standard and to prevent exposure through dermal contact with the soil beneath the cover. Site-specific inspection procedures are listed below, and an inspection checklist is provided in **Appendix D**

- Inspect for trash and debris.
- Inspect for erosion around the edges of area. If erosion exceeds 6-inches in depth, maintenance shall be performed.
- Inspect for animal burrow, holes, and mounds.
- Inspect for long-term effectiveness of rip-rap cover and recurring issues, such as continuous burrows or erosion within same area.

4.2.1 Maintenance Requirements

Maintenance will be performed on items identified as unacceptable on the inspection form. Maintenance will be performed within approximately 30 days following the discovery of an unacceptable item and a summary of maintenance performed during the period covered will be provided in the semi-annual report as described in Section 6. Typical maintenance activities and procedures are listed below:

- Remove trash and unwanted debris from area.

- Stabilize eroded or undercut areas with native soil and compacted. If area continues to erode, fill area with a cement grout or extend the rip-rap cover beyond the design as shown on the plans in **Appendix A**.
- Prepare a plan that more effectively reduces long term maintenance costs and improves overall effectiveness of the cover.

5 RECORD KEEPING AND REPORTING

This section describes record keeping and reporting requirements. All inspection components include maintenance and repair requirements.

5.1 Record Keeping

Record keeping will be maintained in accordance with this ECP and the AZ HWMA Permit. The following records shall be maintained:

- Current and complete copy of the ECP, including all appendices.
- Current written versions of operating procedures and related guidance as referenced in this ECP.
- All completed inspection forms
- All completed maintenance and repairs
- All records or actions taken to prevent or mitigate releases of constituents to the environment

5.2 Inspection Report

Reporting will be performed semi-annually in accordance with A.R.S. §49-152.01. Inspection reports will be prepared and submitted within approximately 30 days following the inspection to:

Arizona Department of Environmental Quality
Attn: DEUR Coordinator
1110 W. Washington St., 6th Floor
Phoenix, AZ 85007

The inspection report will contain the following:

- Description of the condition of the ECs
- Nature and cost of all restoration made to the ECs during the calendar year
- Current photographs of the ECs
- Statement describing the status of the financial assurance mechanism
- All completed inspection forms

6 CONTINGENCY PLAN

This section describes the restoration of the ECs in the event of an intentional or unintentional breach.

6.1 Intentional Breach

In the event that the EC fails and must be restored or does not achieve the intended level of protection or mitigation due to an intentional breach, the SA-2 remedial alternative as described in the CMS will be reevaluated and modified, or implementation of different remedial alternative will be proposed. Proposed changes to the remedial alternative will be coordinated with ADEQ.

6.2 Unintentional Breach

In the event of an unintentional breach caused by vandalism, severe weather, or acts of god, the ECs must be restored to its original design. For purposes of estimating costs to restore the ECs in the event of an unintentional breach, it is assumed that approximately 50 sq ft of the engineered cap would be repaired every 10 years. If any of the engineered caps are fully

breached and lead to complete failure of the cap, costs to replace each entire cap once is provided. Summary of repairs to the ECs will be included in the annual report.

7 COST ANALYSIS

In accordance with ARS 49-152.01, a cost analysis summary associated with inspection, maintenance, repairing, or restoring of the ECs is provided below. Detailed cost analysis, with a 20% contingency for each item listed below, is provided in **Appendix E**.

- Cost to construct ECs; Per the manufacturer, the designed operational life of the engineered caps is 50-plus years. Cost analysis is for a 30-year period, and therefore, one full reconstruction of the engineered caps is included; $453,390. Because the operational life of the rip-rap cover is approximately 20 to 30-years, as described in Section 2.1, one full reconstruction cost of the rip rap cover is included; $2,747.50.
- Semi-Annual Inspection and maintenance costs of ECs; It is assumed that inspection and maintenance will be performed twice per year with an annual cost of $3,484 for a duration of 30-years; $104,520.
- Restoring an EC if it fails; Per the manufacturer, the designed operational life of the engineered caps is 50-plus years. Therefore; the only thing that is anticipated to fail are the boot seals. Assumes each boot seal (6 total) to be restored once every ten years. Boot seal restoration includes replacing stainless steal bands, neoprene gasket, and sealant; $13,500.
- Unintentional breach of an EC; It is assumed that an unintentional breach, of approximately 50 sq ft, may occur once every ten years. Costs associated with repairing an unintentional breach over 30 years is $1,800.
- Intentional breach of an EC; No intentional breach to an EC will be performed without ADEQ's approval, and none are anticipated; therefore, no costs are provided.
- Semi-Annual Reporting; One report will be prepared and submitted semi-annually for 30 years; $294,960.

8 FINANCIAL RESPONSIBILITY

The current owner shall continue to be responsible for the financial assurance for the duration of DEURs, which includes this ECP. The financial assurance is the mechanism used to cover the costs associated with inspections, maintenance, reporting, or restoration of the ECs. In accordance with A.R.S. 49-152.01, a statement of financial capability of the owner and a dedicated financial mechanism will be prepared and submitted under separate cover for the costs detailed in Section 7.

9 REFERENCES

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TABLES

Table 1
Groundwater Well Summary
Former Universal Propulsion Company, Inc. Facility
Phoenix, Arizona

Well ID	Easting	Northing	ADWR Number	Total Casing Depth (feet bgs)	Screened Interval (feet bgs)	Measuring Point Elevation (feet amsl)
MW-1	653227.14	807065.13	55-201485	240	180-240	1560.43
MW-2	653288.68	807648.25	55-201484	250	200-250	1571.22
MW-3	652625.62	808671.08	55-204187	271	221-271	1583.58
MW-4	654284.83	808871.85	55-204186	300	245-285	1620.34
MW-5	653871.17	808127.33	55-204185	285	230-280	TBD[1]
MW-6	652258.53	807361.63	55-204184	210	155-205	1551.65
MW-7	652125.72	806534.14	55-205001	210	155-205	1541.35
MW-8	653422.61	806160.23	55-205002	235	180-230	1542.18
MW-9	654356.82	806138.65	55-801548	255	200-250	1565.60
MW-10	651342.65	807055.87	55-801549	205	150-200	1536.11
MW-11	654182.70	807785.50	55-803736	315	260-310	TBD[1]
MW-12	653210.87	807117.21	55-803737	480	450-480	1560.91
MW-13	654137.58	808274.82	55-217221	480.5	440-480	1587.86
MW-14	653238.01	808362.53	55-217222	500	445-485	1602.48
MW-15	653225.43	808314.03	55-217223	325	270-320	1600.48
MW-16	652624.02	808727.68	55-813047	500	445-485	1585.36
MW-17	652108.14	807746.04	55-813046	260	205-255	1560.72
MW-18	652551.52	806026.10	55-811047	230	175-225	1533.53
MW-19	654123.16	808257.78	55-813045	305	250-300	1587.17
MW-20	653603.36	807861.04	55-814005	280	235-285	TBD[1]
MW-21	653452.17	807288.28	55-814006	270	215-265	1565.28
MW-22	653886.82	808387.28	55-222508	280	210-280	1588.46
PW-1	652363.12	807457.36	55-500280	500	420-480	1554.46
EW-1	654072.86	808187.83	55-222510	300	250-300	TBD[1]
EW-2	653202.70	807087.51	55-222511	305	210-305	TBD[1]
MI-1	654207.54	808310.57	55-222512	335	250-335	TBD[1]
MI-2	653818.36	808425.16	55-222513	285	210-285	1583.68
MI-3	653358.52	807678.13	55-222514	255	180-255	TBD[1]
RW-1	654327.57	808477.20	55-223676	340	265-340	TBD[1]
RW-2	654020.88	808671.20	55-223677	332	252-332	TBD[1]
RW-3	TBD[1]	TBD[1]	55-228101	400	330-400	TBD[1]

Notes and Abbreviations:
1 = Wells are part of the groundwater treatment facility and will be resurveyed after construction is complete
Coordinates are expressed in North American Datum 83 State Plane Arizona Central (International feet)
ADWR = Arizona Department of Water Resources
amsl = above mean sea level

Table 2
In-Place Soil Arsenic Concentrations
Former Universal Propulsion Company, Inc. Facility
Phoenix, Arizona

OLD BURN AREA							
Location	Sample ID	Sample Date	Matrix	Type	Arsenic Concentration (mg/kg) 10'	DU Size (sq ft)	Depth (ft bgs)
OB-EX-03-1	OX1-DU1-2	10/13/2017	SO	Step out	19	75	0-4
	OX1-DU2	10/5/2017	SO	SW	5.7	44	0-3.5
	OX1-DU4	10/5/2017	SO	SW	6.4	54	0-3.5
	OX1-DU5-2	10/13/2017	SO	Step out	27	32.5	4.5
	OX1-DU6-1	10/11/2017	SO	Step out	5.9	32.5	4
OB-EX-02-1	OX2-DU1	10/5/2017	SO	SW	7.1	11	0-2
	OX2-DU2	10/5/2017	SO	SW	7.7	35	0-2
	OX2-DU3	10/5/2017	SO	SW	8.1	35	0-2
	OX2-DU4-2	10/13/2017	SO	Step out	21	67.5	0-2
	OX2-DU5-2	10/13/2017	SO	B	27	74.25	4.5
	OX2-DU6-2	10/13/2017	SO	Step out	31	60.75	4.5
	OX2-DU7-2	10/13/2017	SO	Step out	24	74.25	4.5

Notes

' Established site clean-up standard
B = bottom decision unit
DU = decision unit
ft bgs = feet below ground surface
mg/kg = milligram per kilogram
sq ft = square feet
SW = sidewall decision unit
SO = soil
= concentration exceeded the established site clean-up standard

FIGURES

\\Scottsdale-AZ\Project\UPC\GIS\Projects\Engineering control plan 10-2013\Figure 1 site location map.mxd 10/15/2013

LEGEND

★ Approximate site location

NOTES

- Basemap source: ESRI National Geographic World Map.

Miles
0 4 8
Scale 1" = 8 mi

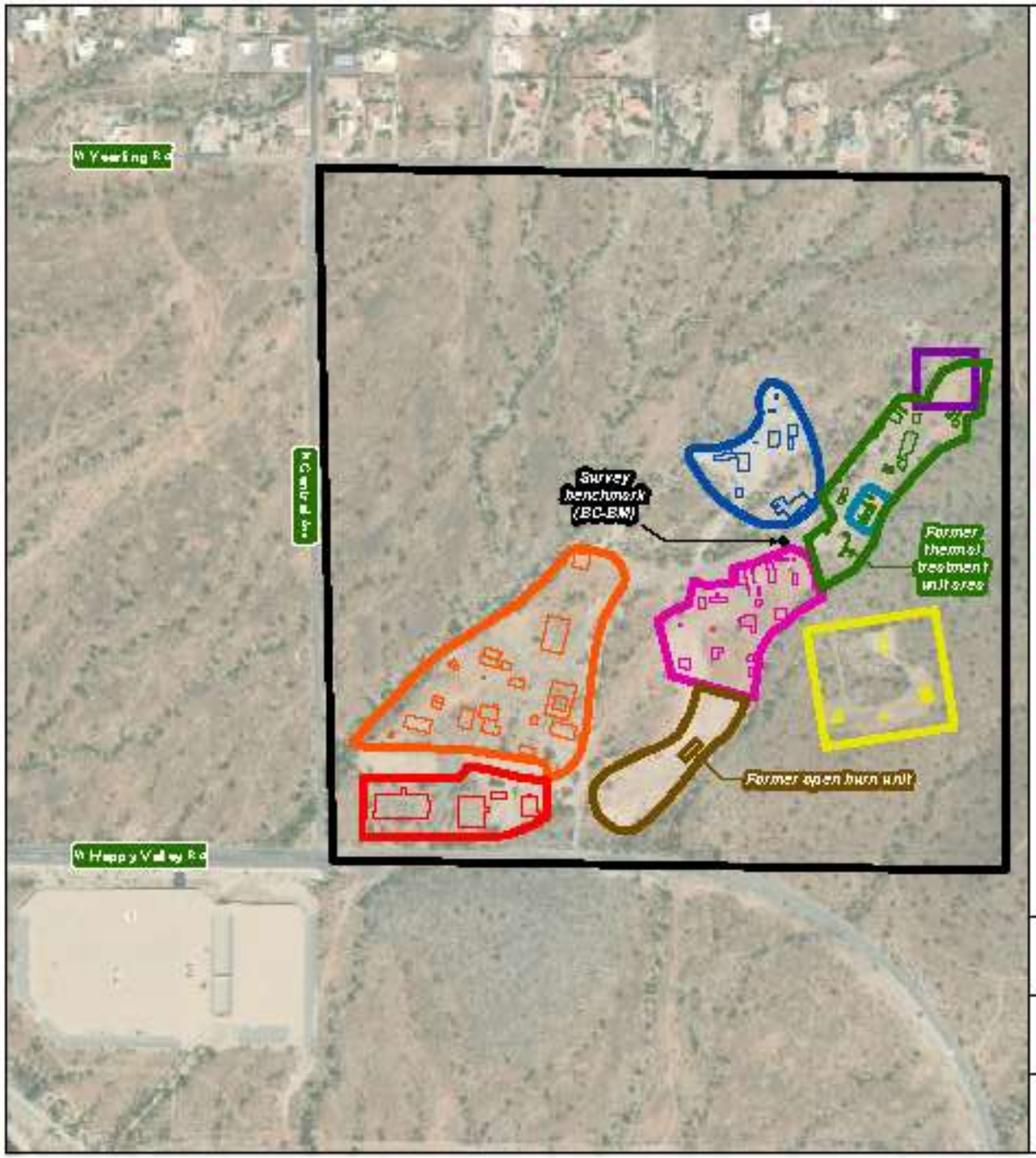
FORMER UNIVERSAL PROPULSION COMPANY, INC. FACILITY
PHOENIX, ARIZONA
ENGINEERING CONTROL PLAN

SITE LOCATION MAP

ARCADIS

FIGURE 1

\\Scottsdale-A2\Project\UPCO\GIS\Projects\Engineering control plan 10-2013\Figure 2 facility operational areas.mxd 10/15/2013



LEGEND

- Property boundary
- A- Complex
- B- Complex
- C- Complex
- D- Complex
- E- Complex/Storage Magazine Area
- F- Complex
- New Burn Area
- Old Burn Area
- Waterbore Area

NOTES

- Aerial photo source: ESRI World Imagery.

Feet
0 300 600
Scale 1" = 600'

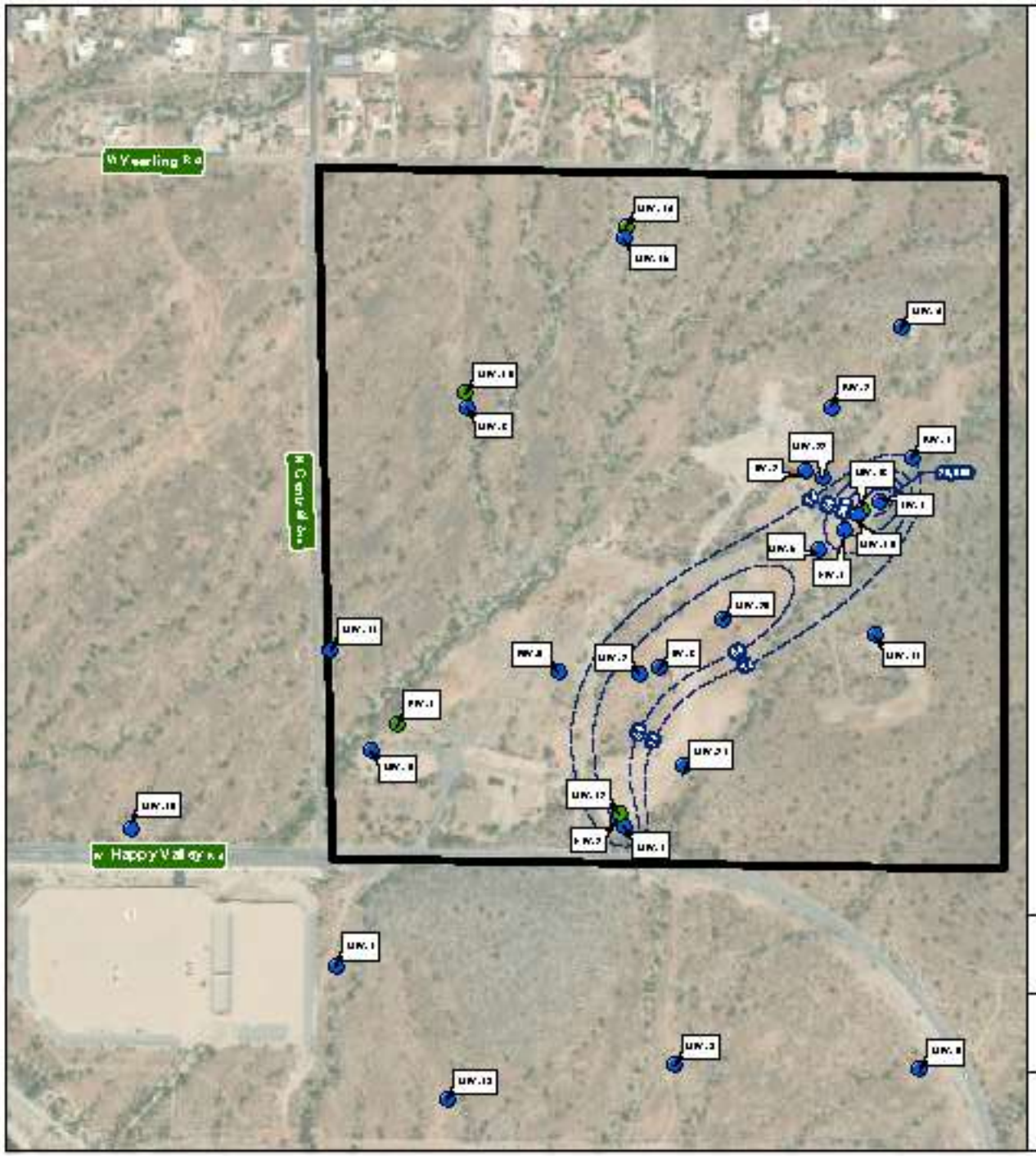
FORMER UNIVERSAL PROPULSION COMPANY, INC. FACILITY
PHOENIX, ARIZONA
ENGINEERING CONTROL PLAN

FACILITY OPERATIONAL AREAS

ARCADIS

FIGURE 2

\\Scottsdale-AZ\Project\UPCO\GIS\Projects\Engineering control plan 10-2018\Figure 3 perchlorate concentrations 12-2017 to 01-2018.mxd 10/18/2018



LEGEND

- Property boundary
- Groundwater well (shallow)
- Groundwater well (deep)
- Perchlorate concentration contour (dashed where inferred)

NOTES

- Aerial photo source: ESRI World Imagery.
- Perchlorate isoconcentration contours are expressed in micrograms per liter (µg/L).
- Arizona Health Based Guidance Level (HBGL) for perchlorate = 14 µg/L.

Feet
0 300 600
Scale 1" = 600'

FORMER UNIVERSAL PROPULSION COMPANY, INC. FACILITY
PHOENIX, ARIZONA
ENGINEERING CONTROL PLAN

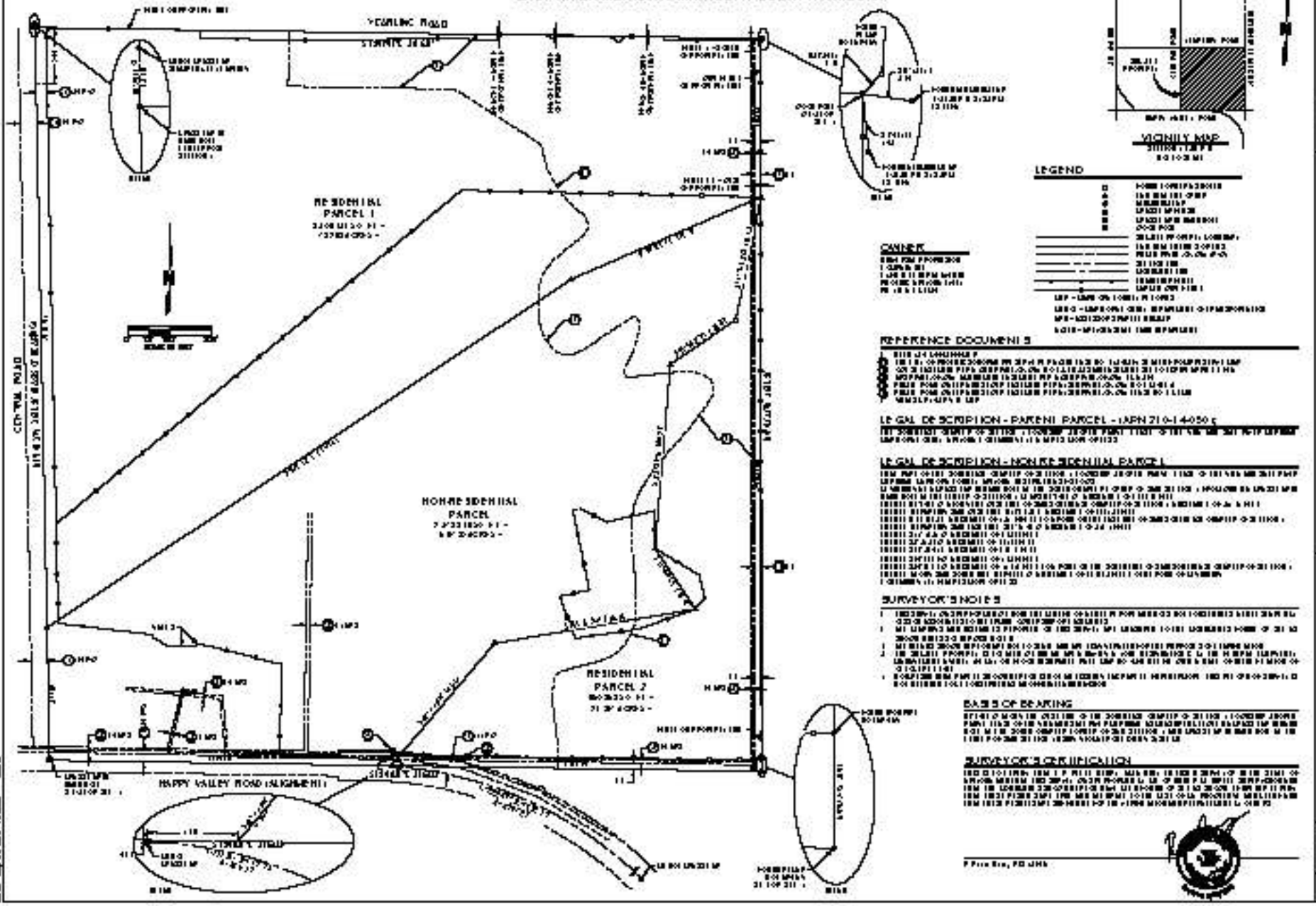
GROUNDWATER WELL LOCATIONS AND 2018
PERCHLORATE ISOCONCENTRATION CONTOURS

ARCADIS

FIGURE
3

RECORD OF SURVEY

OF THE SOUTHEAST QUARTER OF SECTION 5, TOWNSHIP 4 NORTH, RANGE 3 EAST OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA



APPENDIX A

As-Built

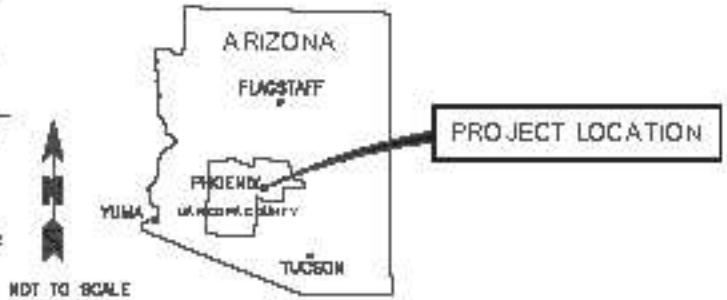
CONSTRUCTION DRAWINGS FOR

SOIL EXCAVATION AND CAPPING
FORMER UPCO FACILITY
FOR

UTC AEROSPACE SYSTEMS

PHOENIX, ARIZONA

JANUARY 2018



INDEX TO DRAWINGS

C-00	COVER PAGE
C-01	OVERALL SITE PLAN
C-02	C-COMPLEX EXCAVATION AND RESTORATION PLAN AND ENGINEERED CAP DESIGN
C-03	C-COMPLEX PLAN AND CROSS SECTIONS
C-04	E-COMPLEX EXCAVATION AND RESTORATION PLAN
C-05	OLD BURN AREA EXCAVATION AND RESTORATION PLAN
C-06	OLD BURN CAP DESIGN CROSS SECTIONS
C-07	NEW BURN AREA EXCAVATION AND RESTORATION PLAN
C-08	NEW BURN AREA CAP DESIGN CROSS SECTIONS
C-09	WATERBORE EXCAVATION AND RESTORATION PLAN
C-10	WATERBORE AREA CAP DESIGN CROSS SECTIONS
C-11	DETAILS
C-12	DETAILS

CONTACTS

CLIENT CONTACT: BRUCE C. AMO
MANAGER, REMEDIAL PROGRAMS
UTC AEROSPACE SYSTEMS
2730 W. TYVOLA ROAD
CHARLOTTE, NC 28217

PROPERTY OWNER AND MANAGER: UNIVERSAL PROPULSION COMPANY, INC. IN MARICOPA COUNTY

PREPARER: ARCADIS INC. (ARCADIS)
JENA PRIOR PROJECT ENGINEER
410 N. 44TH STREET
SUITE 1000
PHOENIX, ARIZONA 85008
PHONE: 602.438.0883
FAX: 602.436.0102

PROPERTY DATA

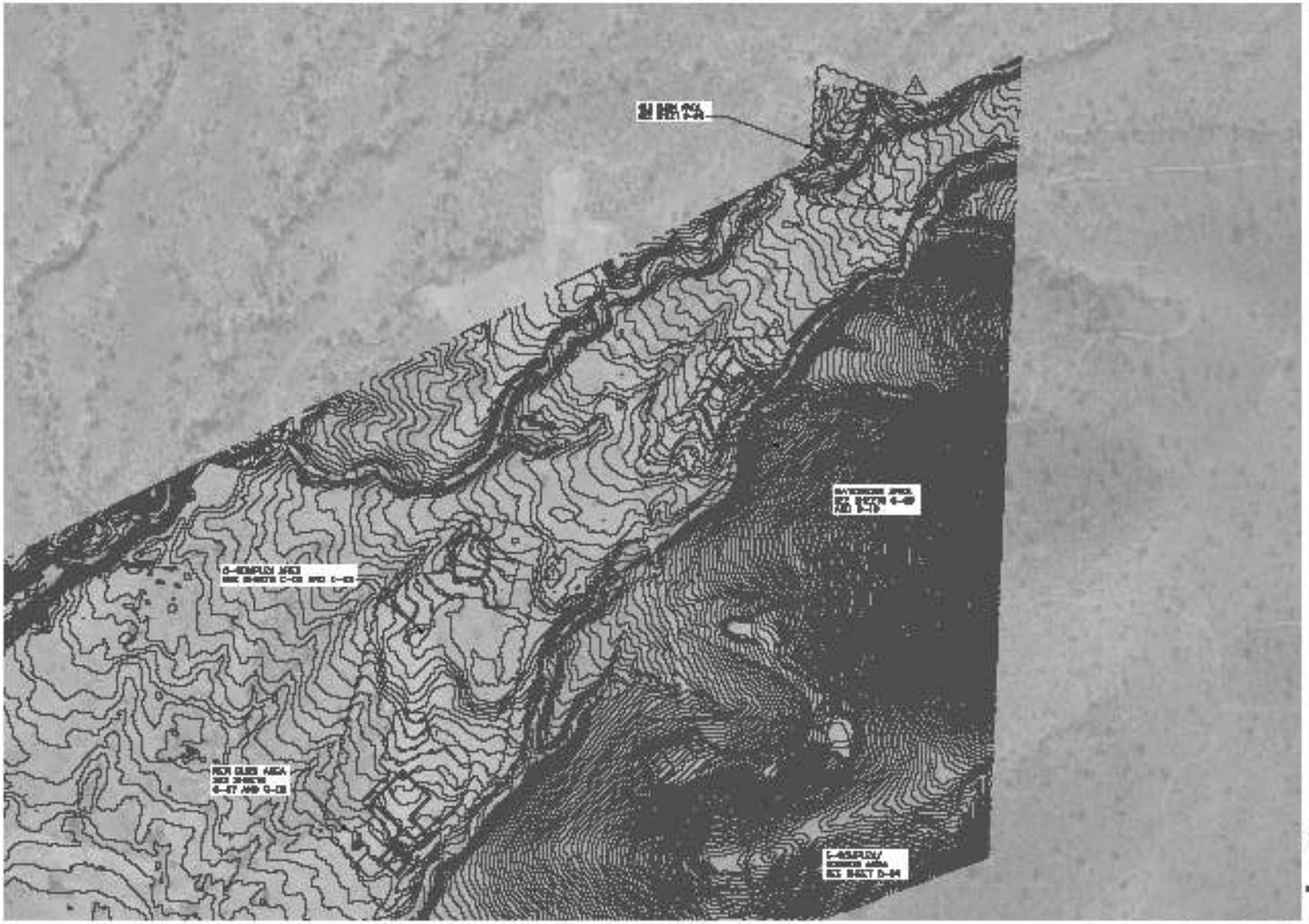
PROPERTY ADDRESS:	25401 N. CENTRAL AVENUE PHOENIX, ARIZONA
PARENT PARCEL:	APN 210-14-000
LAND USE:	VACANT COMMERCIAL LAND
LEGAL DESCRIPTION:	THE SOUTHEAST QUARTER OF SECTION 3, TOWNSHIP 4 NORTH, RANGE 3 EAST, OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA, CONTAINING 156.87 ACRES, MORE OR LESS
PROPERTY DIMENSIONS:	2910.27' X 2636.92' APPROXIMATE
ACREAGE:	156.87

ARCADIS

COVER PAGE

C-00

SHEET 1 OF 12



ARCADIS

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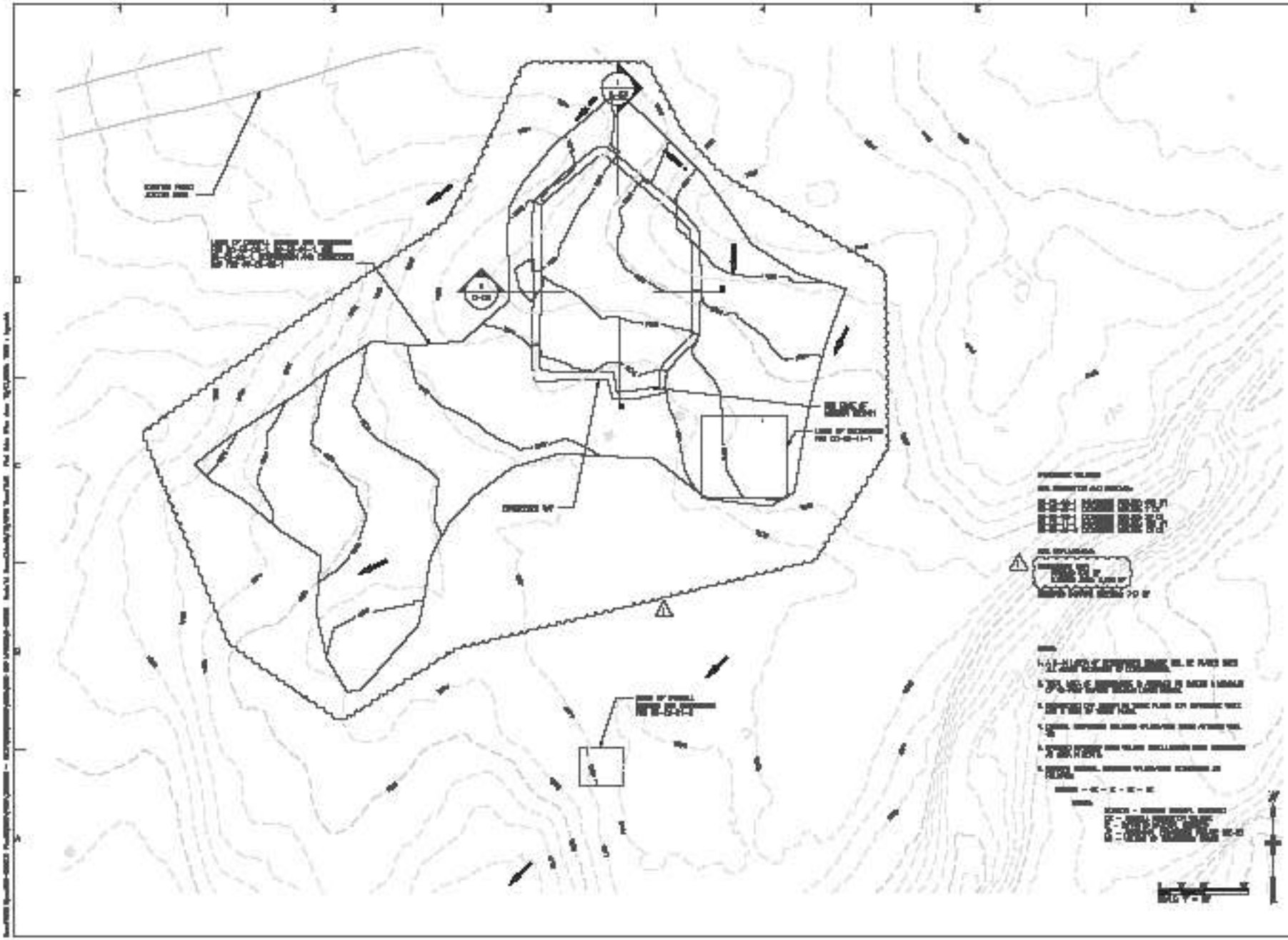
FORMER UPPER QUALITY
SOIL REMEDIATION

OVERALL
SITE PLAN

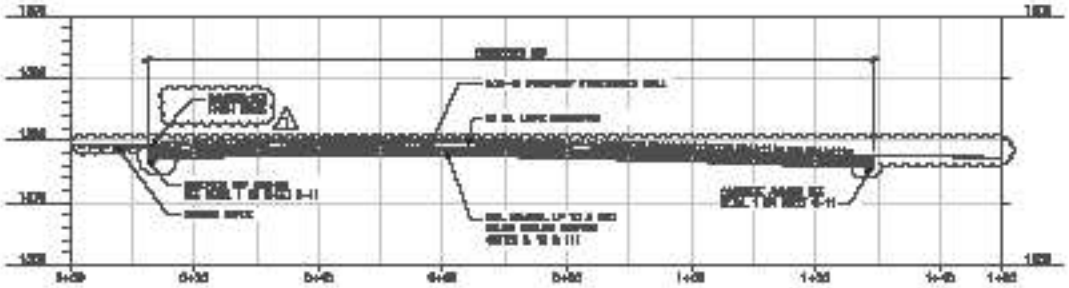
C-01



ARCADIS

C-COMPLEX EXCAVATION AND RESTORATION PLAN AND EXCAVATED CAP DESIGN

C-D2



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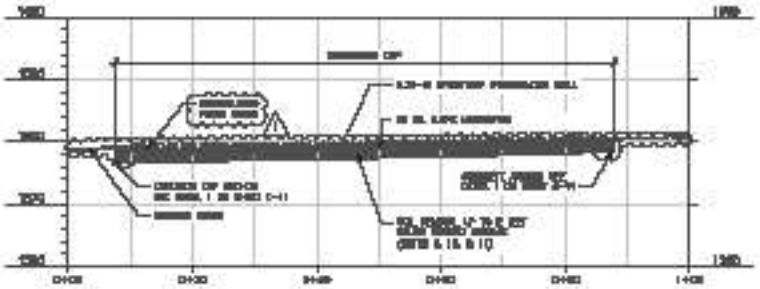

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ARCADIS

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FORMER UNOCAL FACILITY
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DRAWN BY	JLF
CHKD BY	JP
APPROVED BY	[illegible]

DWG FILE

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PLAN AND
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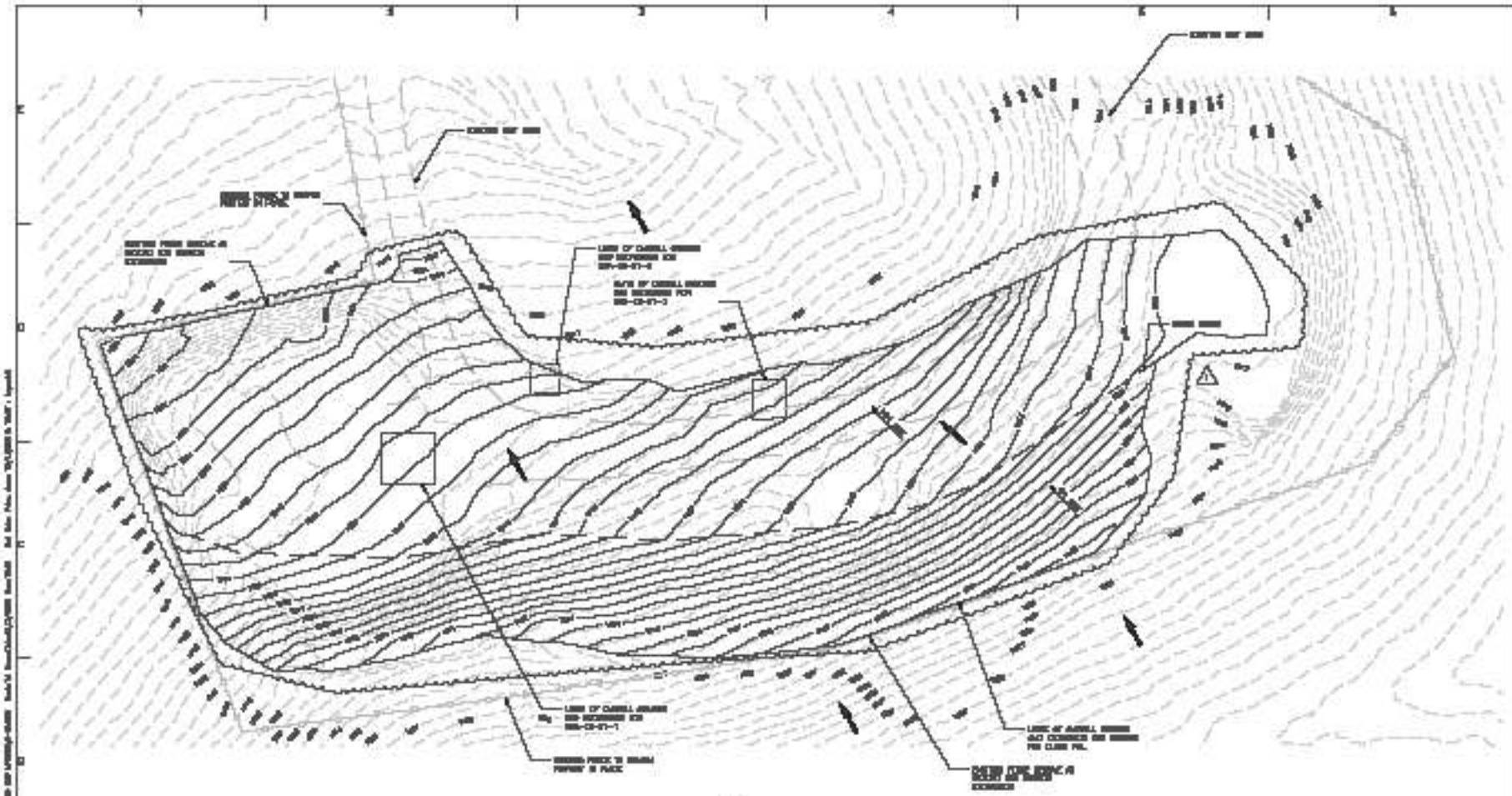
SCALE H: 1"=10' V: 1"=10'

C-03

SHEET 4 OF 13



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CONSULTANTS

TITLE

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E-COMPLEX

EXCAVATION AND RESTORATION PLAN

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C-D4

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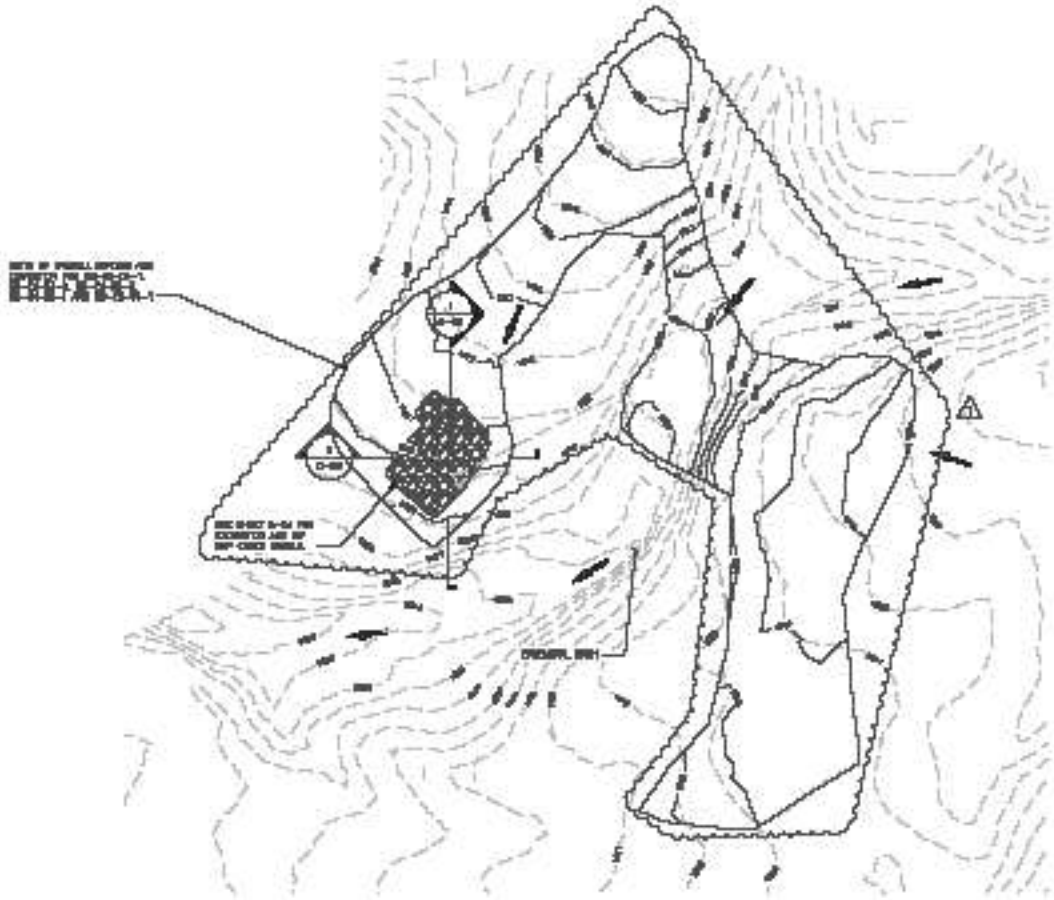

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SEAL

FORMER UPPER QUALITY
COIL REMEDIATION

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SHEET TITLE

OLD MILL AREA
CHAMPION MILL RESTORATION
PLAN

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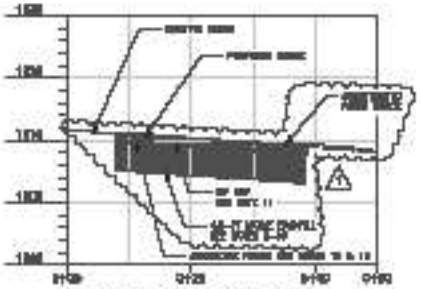
1"=40'

C-D5

SHEET 5 OF 12



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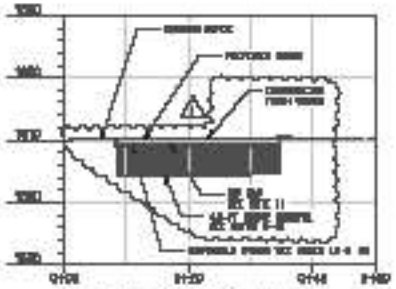

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ARCADIS

CONSULTANTS

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FORMER LAYER FACILITY
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OLD BURN AREA CAP DESIGN
CROSS SECTIONS

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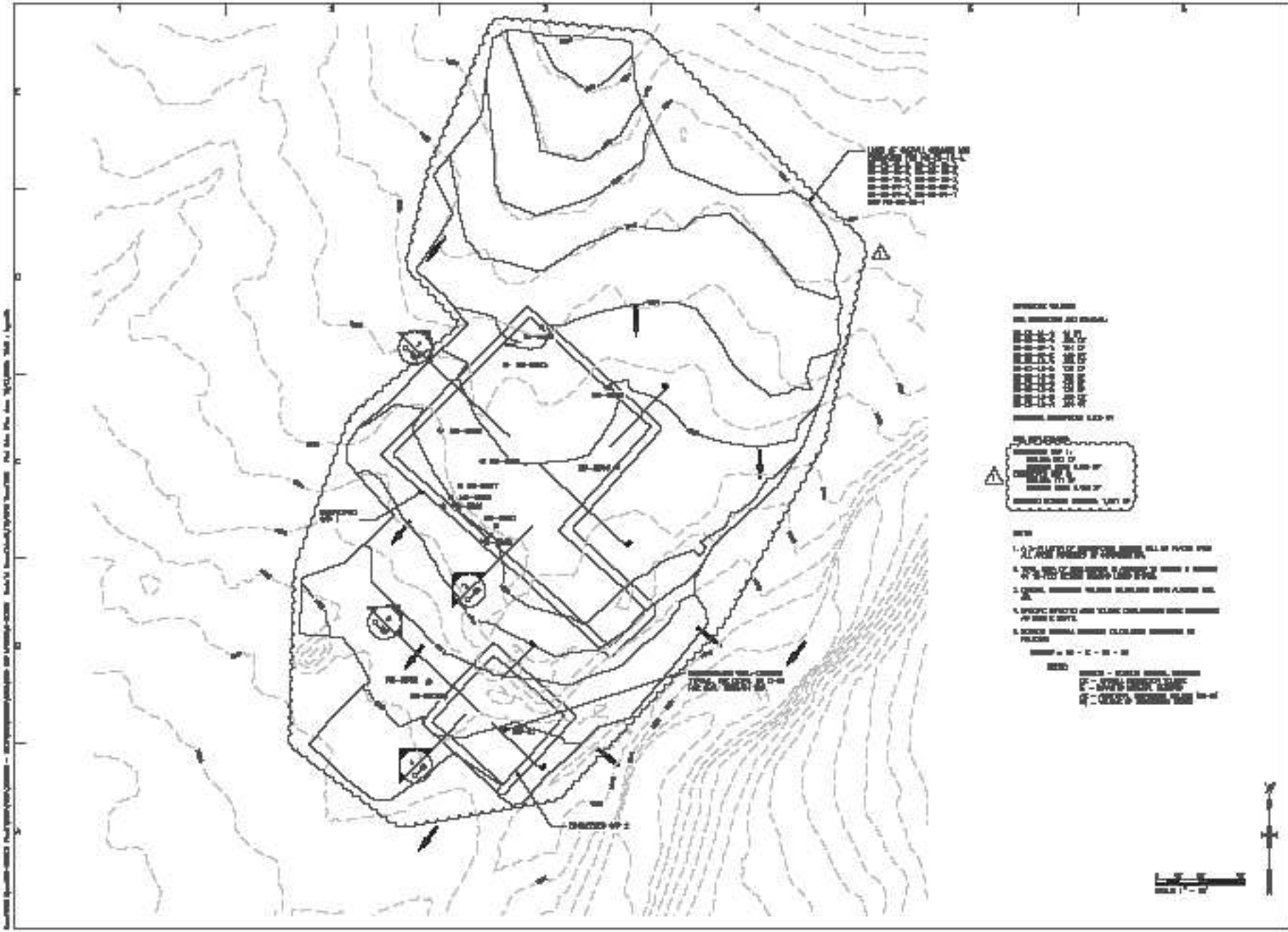
SHEET 7 OF 12



ARCADIS

CONSULTANT

SEAL

CITY OF PASADENA
LITE AUTOMOTIVE SYSTEMS
PROJECT, ARDEN

FORMER LITER QUALITY
COAL REMEDIATION

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COPYRIGHT

DATE

PROJECT NO.

FILE NAME

DRAWN BY

DESIGN BY

CHECKED BY

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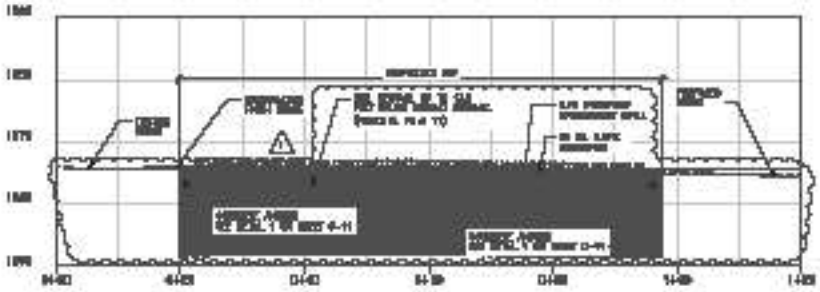
NEW RUN AREA
CONTAINER MIX RESTORATION
PLAN

SCALE

1"=40'

C-D7

SHEET 8 OF 12



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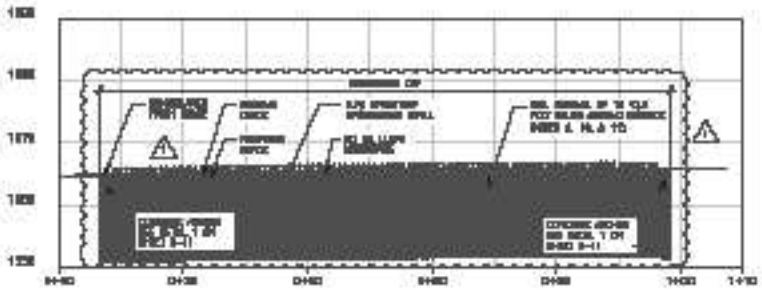

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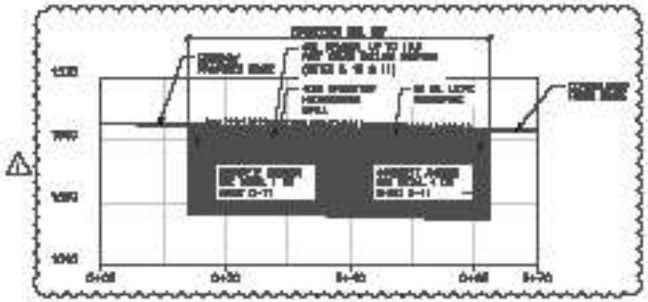

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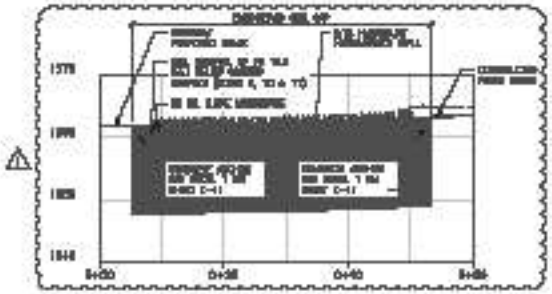

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ARCADIS

No.	DATE	ISSUED FOR	BY
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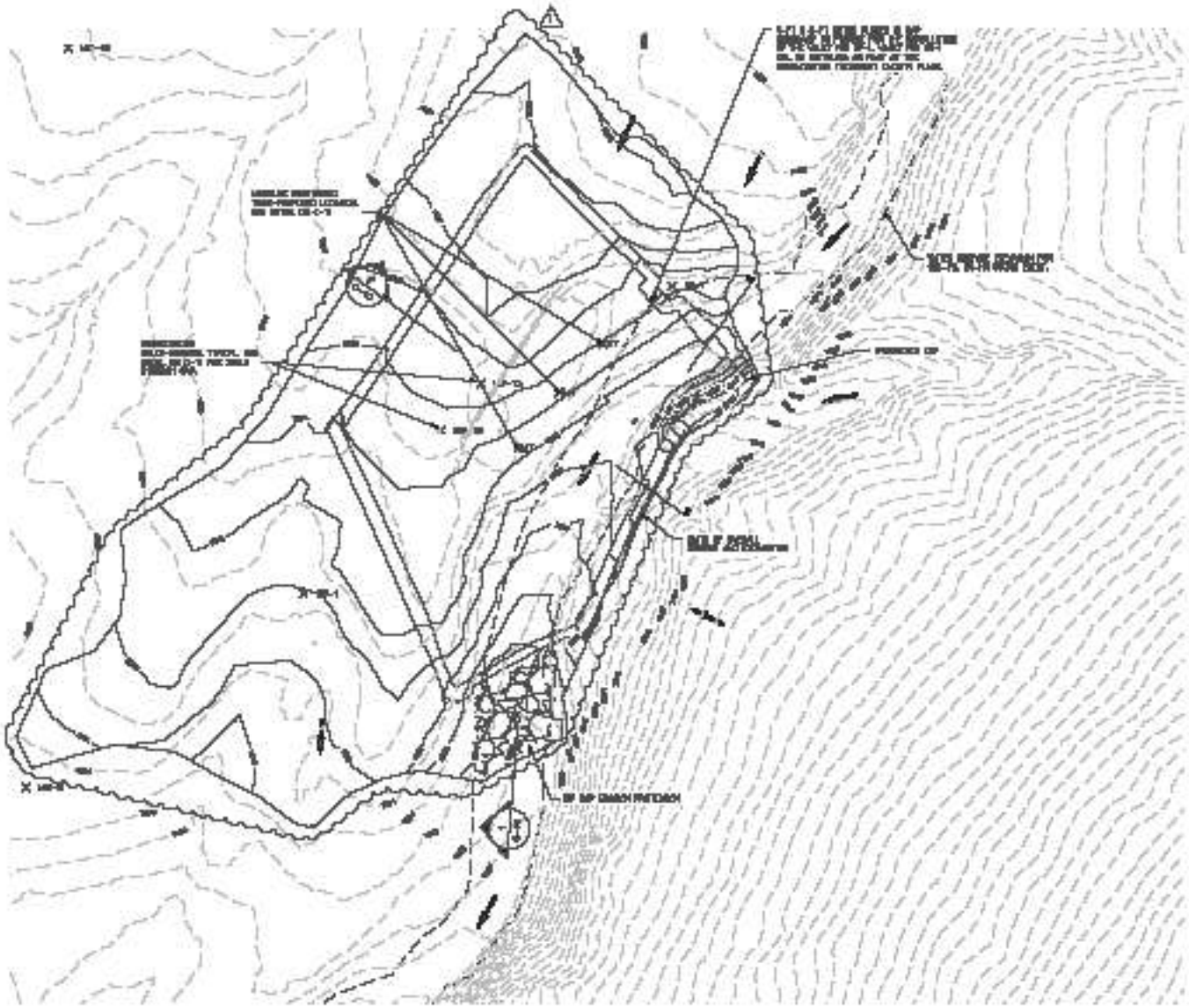
FORMER UPPER QUALITY
COAL REMEDIATION

NEW BURN AREA
40'0" DESIGN
CROSS SECTIONS

C-D8



ARCADIS

CONSULTANTS

SEAL

CITY OF PASADENA
LITE ASSESSMENT SYSTEMS
PROJECT, ARCADIS

FORMER LITER QUALITY
SOIL REMEDIATION

DRAWING

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DRAINAGE AND RESTORATION
PLAN

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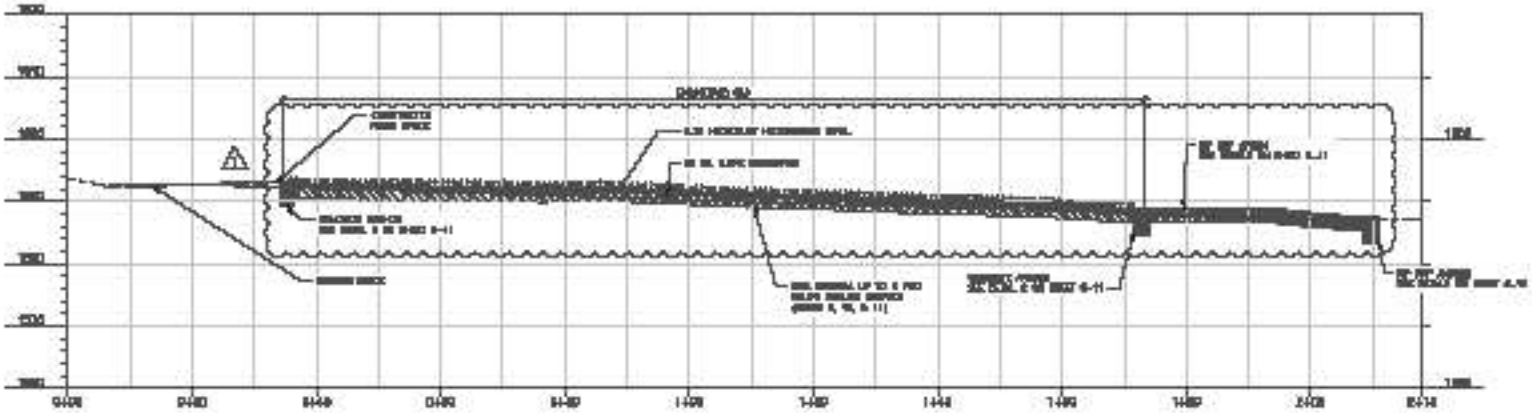
C-09

SHEET 10 OF 12



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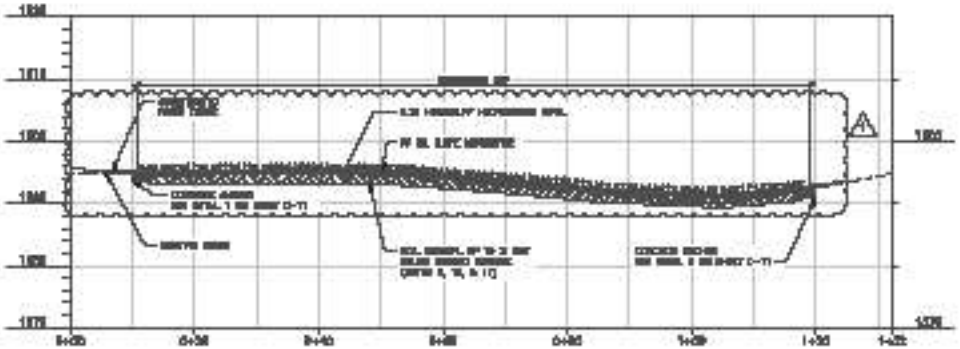

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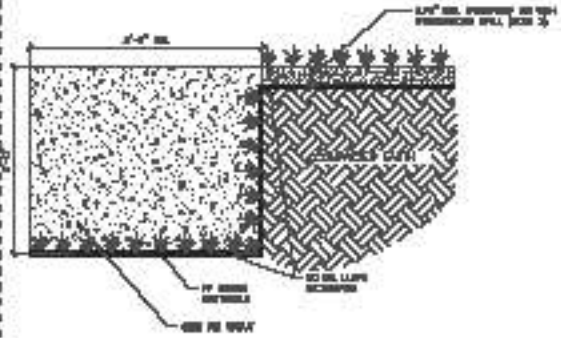
ARCADIS

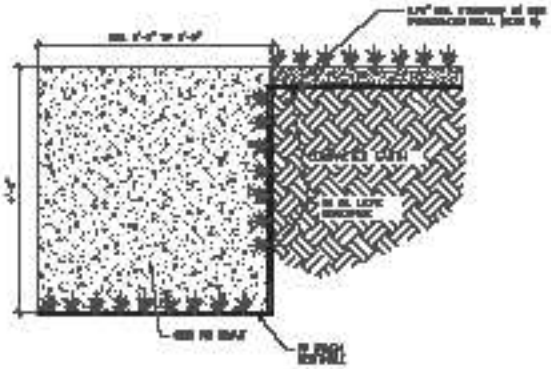
FORMER LIPTON FACILITY
SOIL REMEDIATION

WATERFRONT AREA
CAP DESIGN
CROSS SECTIONS

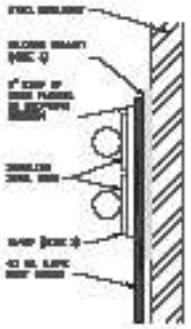
C-10



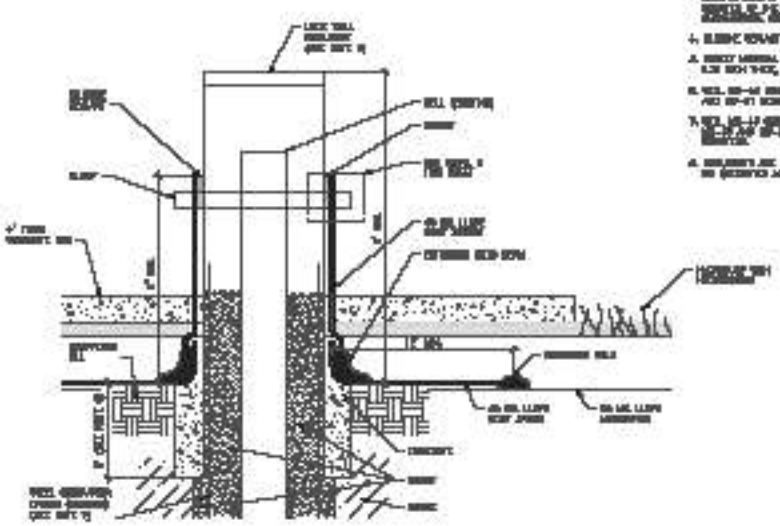
1 HYDROTURF ANCHOR – OUTSIDE OF CHANNEL



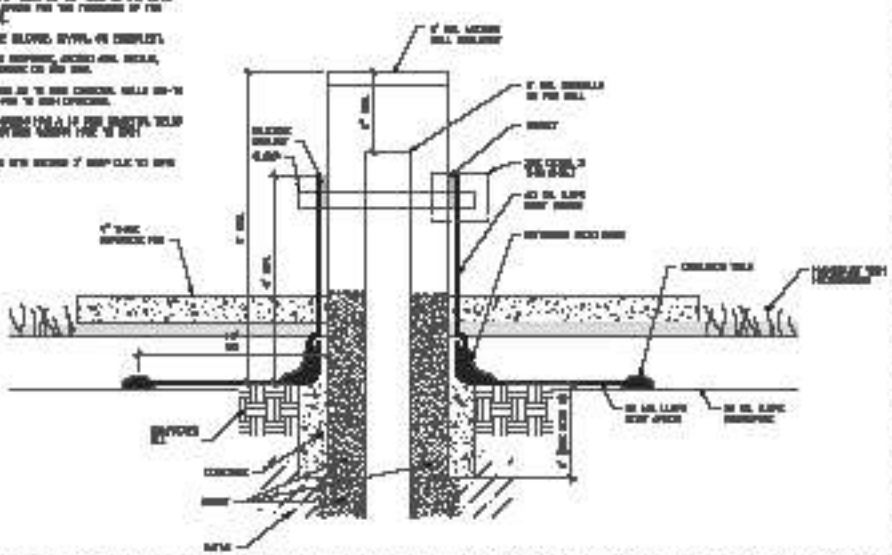
2 HYDROTURF ANCHOR – ACROSS WASH



5 CLAMP DETAIL



3 GROUNDWATER WELL PENETRATION SEAL

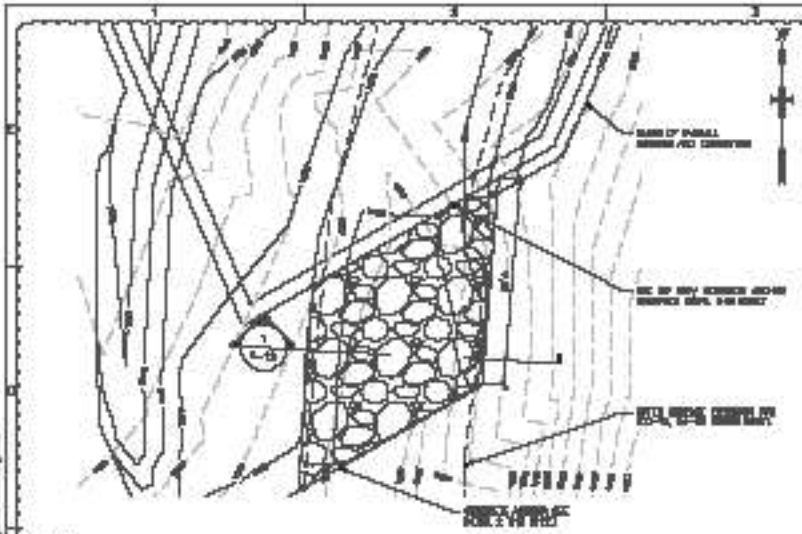


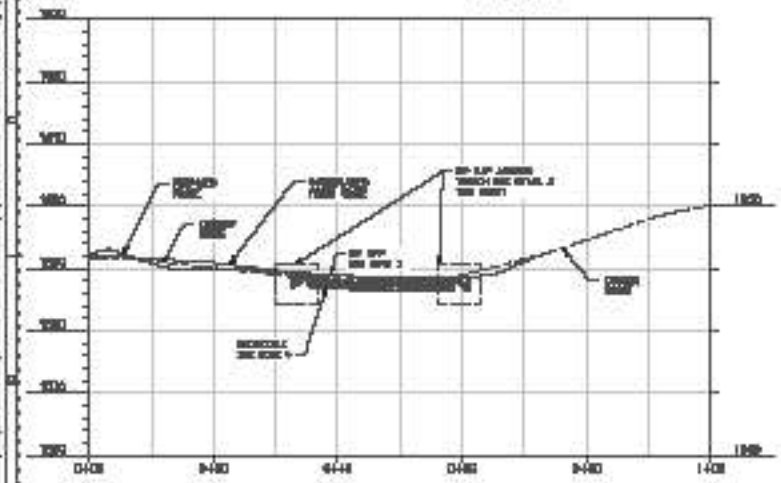
4 MOISTURE MONITORING WELL PENETRATION SEAL

ARCADIS

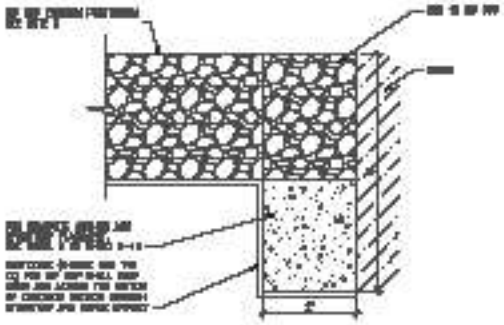
DETAILS

G-11

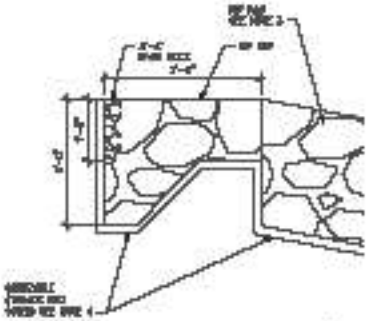




1 SECTION 1



2 RIP RAP CONCRETE ANCHOR INTERFACE DETAIL (DOWNSTREAM)



3 RIP RAP ANCHOR TRENCH (SIDES)

ARCADIS

FORMER UPPER QUALITY SOIL REMEDIATION

DETAILS

C-12