MADERA UNIFIED SCHOOL DISTRICT
1902 Howard Road
Madera CA 93637
(559) 675-4500
(559) 675-1186 Fax
www.madera.k12.ca.us

January 14th, 2015

Addendum No. 2
Playfield Lighting Improvements for Madera High School
& Madera South High School

BID No.101014

NOTICE TO ALL VENDORS:

This Addendum is attached to and made a part of the above entitled specifications for Madera Unified School District unified School District with an BID due date of January 20th, 2015 by 10:00 a.m.

All changes and/or clarifications will appear in bold type and deletions will be struck out within a sentence.

Notice To Bidders: **Additional requirement:**

- **One (1) Original and Three (3) Copies MUST be submitted**

Questions:

1. The Alternate bids for the Ball field lighting project calls for PA Systems materials to be provided and installed. I did not see a specification or detail for these systems. Will one be provided? **Yes**

2. When are Pre-Qualification Packets Due? **Pre-Qualifications Packets are due no later than January 20th, 2015 @ 10:00 a.m.-The packet must be clearly marked with the Bid No and Name**

BASE BID ITEMS:
See Attached:

Base Bid Item

1-01. Contractor shall download all the Bidding documents and addendums from the Madera USD purchasing website.

1-02. Contractor shall start and complete all work at Madera South High School prior to beginning any work at Madera High School. Contractor shall coordinate with the district in order to not affect any baseball activity.

1-03. Add Exhibit "A" for Electrical Work.

1-04. Add Exhibit "B" for additional concrete work on Madera South High School baseball field.

1-05. As the first order of work at Madera High School, Contractor shall remove shade cover, speakers, light fixtures and wires on all existing poles. Contractor shall cut existing poles (in the interior) and reinstall shade cover after completion of all the work.

1-06. See Exhibit "C" for Soil Report.

1-07. Contractor shall disconnect the wiring, remove light fixtures, light poles and footings on the three wooden light poles on the outfield of Madera High School baseball field.

1-08. For all concrete demolition areas, Contractor shall sawcut, remove and reconstruct to the nearest joint.

1-09. Contractor is responsible for coordinating with the District to identify existing utilities around the work area. Contractor is responsible for replacing all existing damaged utilities.

Add Alternative No. 1 Work

2-01. Add Alternative No. 1 work shall include all labor and materials to provide function able PA systems for all 5 fields. Contractor shall provide a $100,000 allowance equipments. All mark up on the equipments shall be included in the Add Alternative No. 1 bid.

Add Alternative No. 2 Work

3-01. Add Exhibit "E" for Additive Alternative No. 2 work.

3-02. Contractor shall remove and salvage existing metal pole. Remove existing footing and re-install with new footing similar to structural. Detail light fixture will be pointed away from the baseball field.

Add Alternative No. 3 Work

4-01. Add Exhibit "F" for Additive alternative No. 3 work.

HARDIN-DAVIDSON ENGINEERING
356 Pollasky Ave. • Suite 200 • Clovis, CA 93612
559.323.4995 tel • 559.323.4928 fax

Date: January 9, 2014

To: **Alan Mok Engineering**
7415 N. Palm Ave. Ste. 101
Fresno, CA 93711

Re: **MHS and MSHS Sports Lighting Projects**
Addendum #1 Electrical Items

Please issue the following addendum items for the subject project:

Summary

The Musco lighting controller requires a separate power panel to feeds for control power, lighting circuits, surge suppressor, and surge suppressor monitoring. The attached revised details reflect this requirement. All work shall conform with the factory Musco drawings and instructions.

Madera High School Project

1. Refer to sheet E1.
   - Replace detail 2/E1 "Electrical Cabinet Pad Mounting Detail" with attached detail 2/E1 "Sports Lighting Controller Mounting Detail".

2. Refer to sheet E4.
   - Replace detail 1/E4 "Single Line Diagram" with attached detail 1/E4 "Single Line Diagram".

3. Refer to sheet E5.
   - Replace detail 1/E5 "Single Line Diagram" with attached detail 1/E5 "Single Line Diagram".

Madera So. High School Project

1. Refer to sheet E1.
   - Replace detail 2/E1 "Electrical Cabinet Pad Mounting Detail" with attached detail 2/E1 "Sports Lighting Controller Mounting Detail".

Exhibit "A"

2. Refer to sheet E5.
    - Replace detail 1/E5 "Single Line Diagram" with attached detail 1/E5 "Single Line Diagram".

3. Refer to sheet E6.
    - Replace detail 1/E6 "Single Line Diagram" with attached detail 1/E6 "Single Line Diagram".

4. Refer to sheet E8.
    - Replace detail 1/E8 "Single Line Diagram" with attached detail 1/E8 "Single Line Diagram".

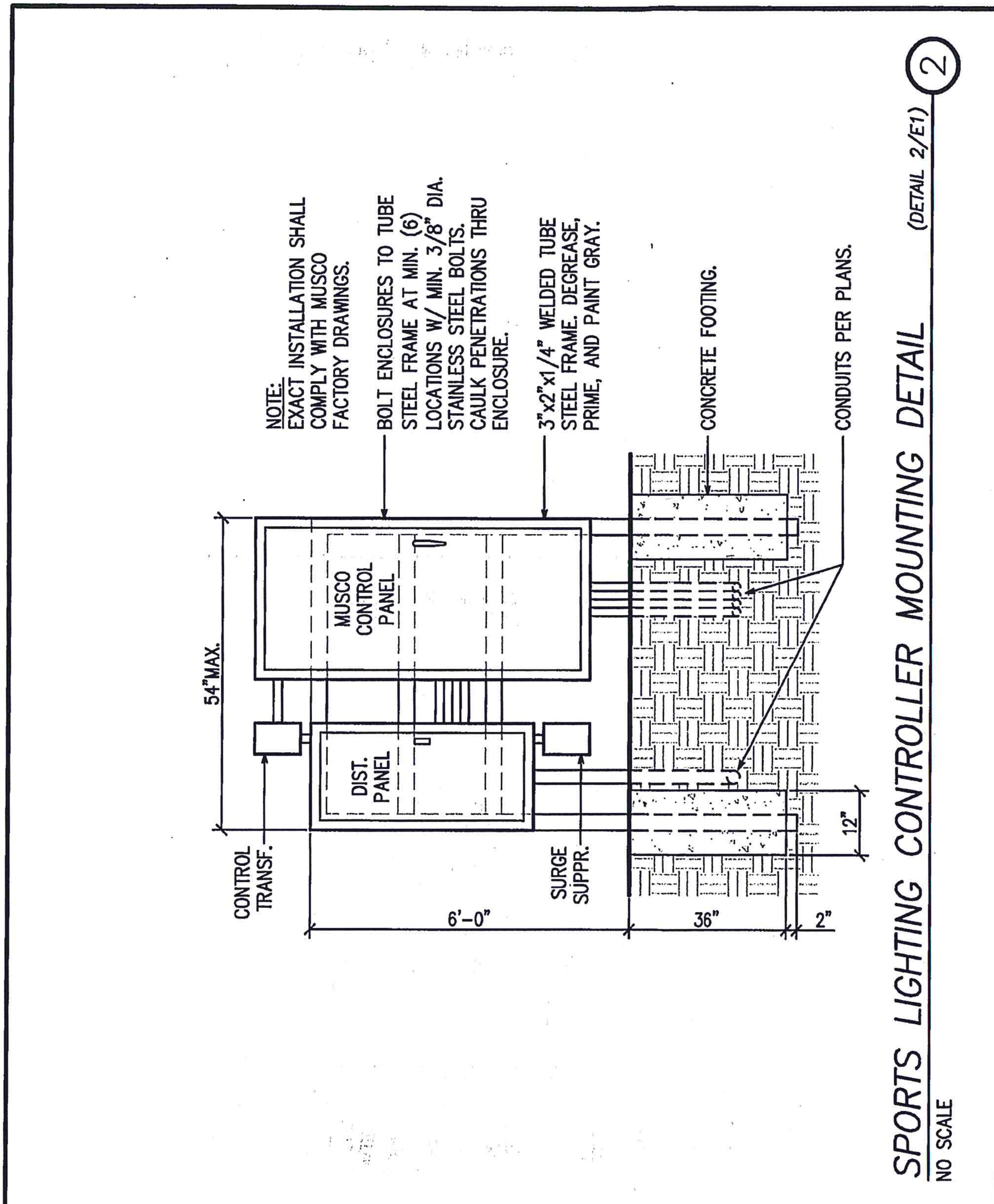
If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

C. Scott Davidson

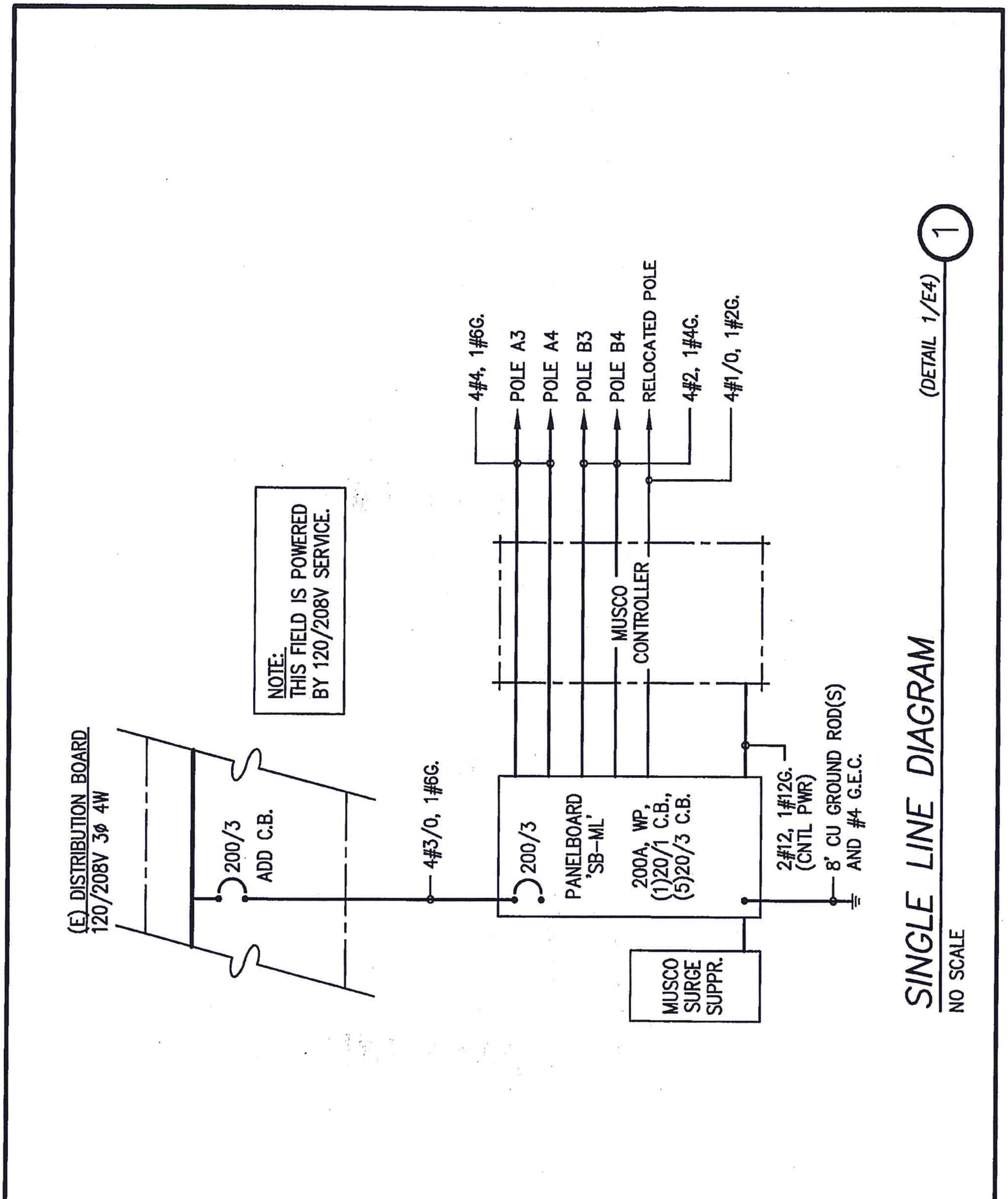
C. Scott Davidson, P.E.

Exhibit "A"



Alan Mok Engineering 7415 N. PALM AVENUE #101 FRESNO, CALIFORNIA 93711 Tel. 559-432-6879 Fax. 559-432-6897 www.alanmokengineering.com	*PLAYFIELD LIGHTING INPROVEMENTS AT MADERA HIGH SCHOOL* ADDEDNUM #2	*PROJECT #:* 214-0130 *DATE:* 1/9/2015 *DRAWN BY:* HDE *CHECKED:* SD *SCALE:* NONE	*SHEET NO:* AD1/E1 *REVISIONS:*

Exhibit "A"



Alan Mok Engineering
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Tel. 559-432-6879
Fax. 559-432-6897
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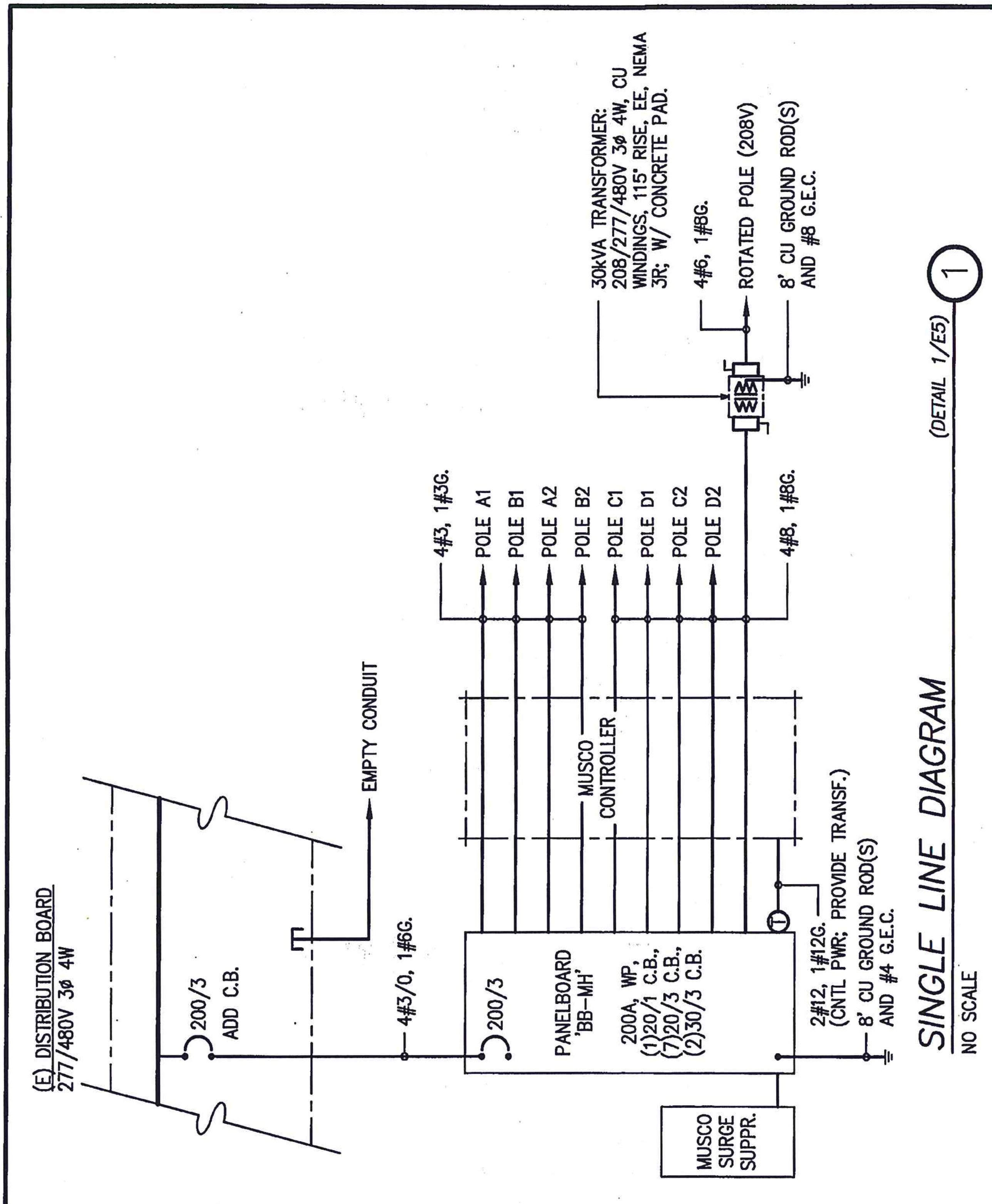
PLAYFIELD LIGHTING INPROVEMENTS AT MADERA HIGH SCHOOL
ADDEDNUM #1

PROJECT #: 214-0130		SHEET NO: AD1/E4
DATE: 1/9/2015		
DRAWN BY: HDE	CHECKED: SD	REVISIONS:
SCALE: NONE		

Exhibit "A"



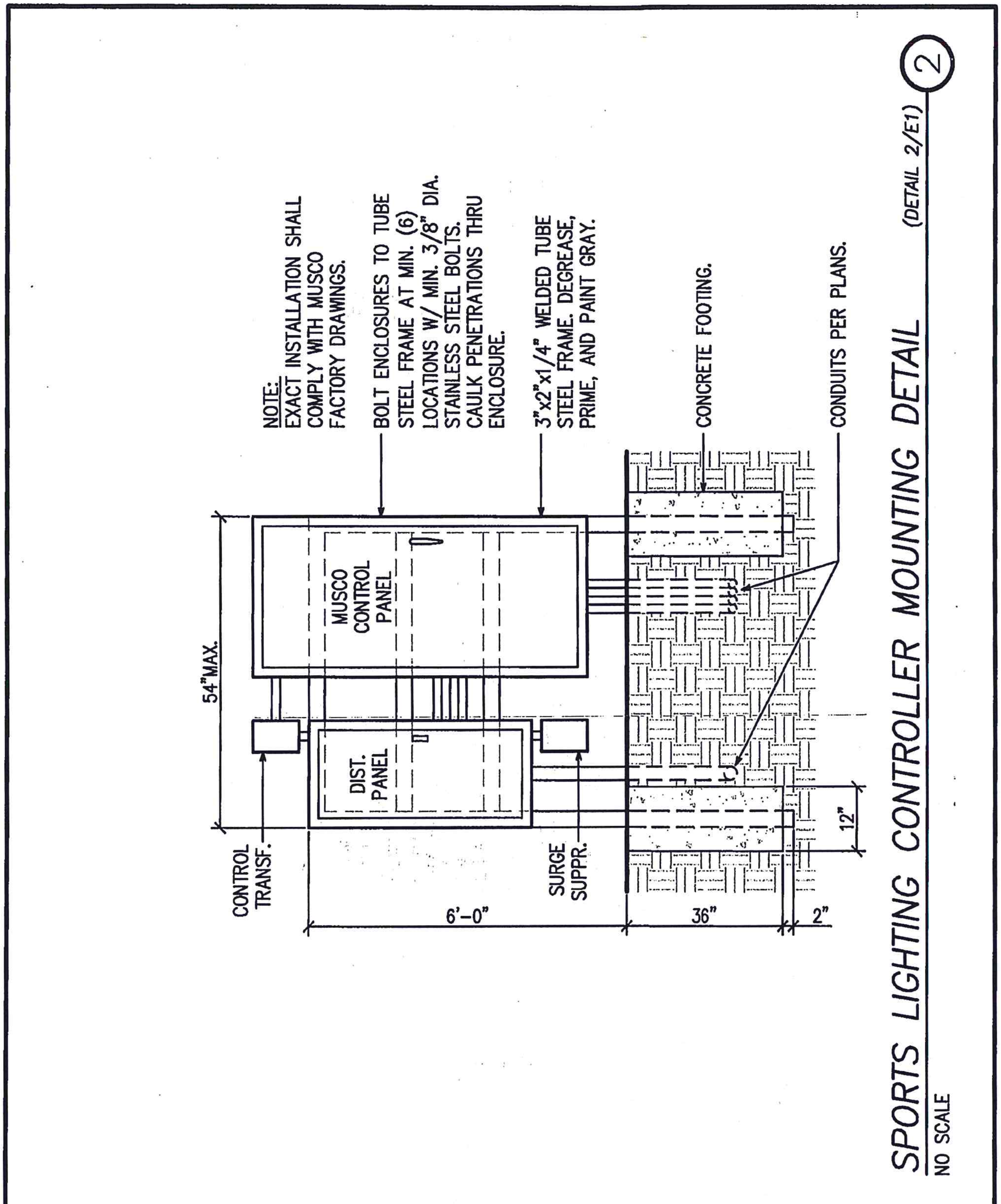
Alan Mok Engineering

7415 N. PALM AVENUE #101
FRESNO, CALIFORNIA 93711
Tel. 559-432-6879
Fax. 559-432-6897
www.alanmokengineering.com

PLAYFIELD LIGHTING
INPROVEMENTS AT
MADERA HIGH SCHOOL
ADDEDNUM #1

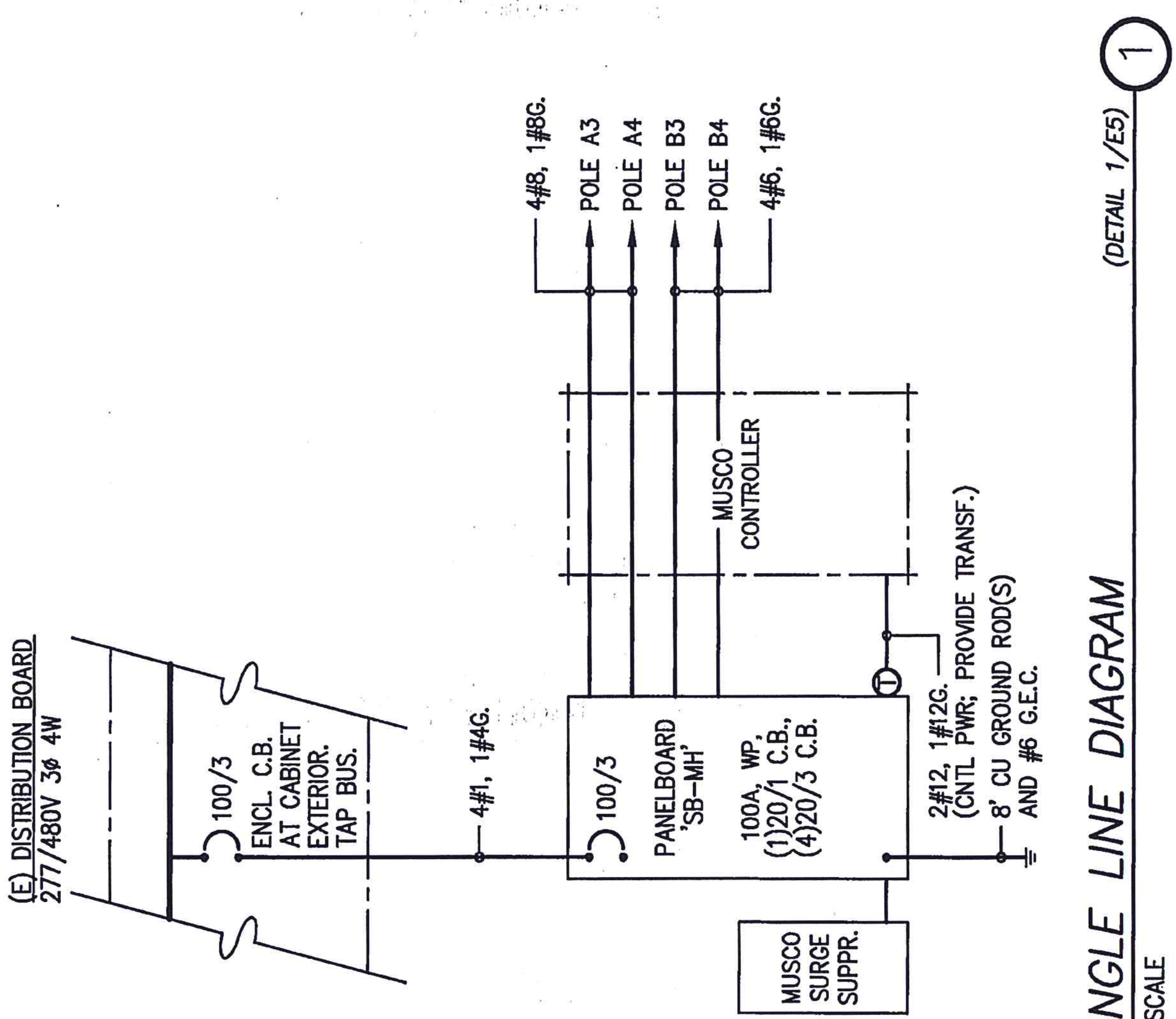
PROJECT #: 214-0130	SHEET NO: AD1/E5
DATE: 1/9/2015	
DRAWN BY: HDE / CHECKED: SD	REVISIONS:
SCALE: NONE	

Exhibit "A"



Alan Mok Engineering 7415 N. PALM AVENUE #101 FRESNO, CALIFORNIA 93711 Tel. 559-432-6879 Fax. 559-432-6897 www.alanmokengineering.com	PLAYFIELD LIGHTING INPROVEMENTS AT MADERA SO. HIGH SCHOOL ADDEDNUM #1	PROJECT #: 214-0130 DATE: 1/9/2015 DRAWN BY: HDE / CHECKED: SD SCALE: NONE	SHEET NO: AD1/E1 REVISIONS:

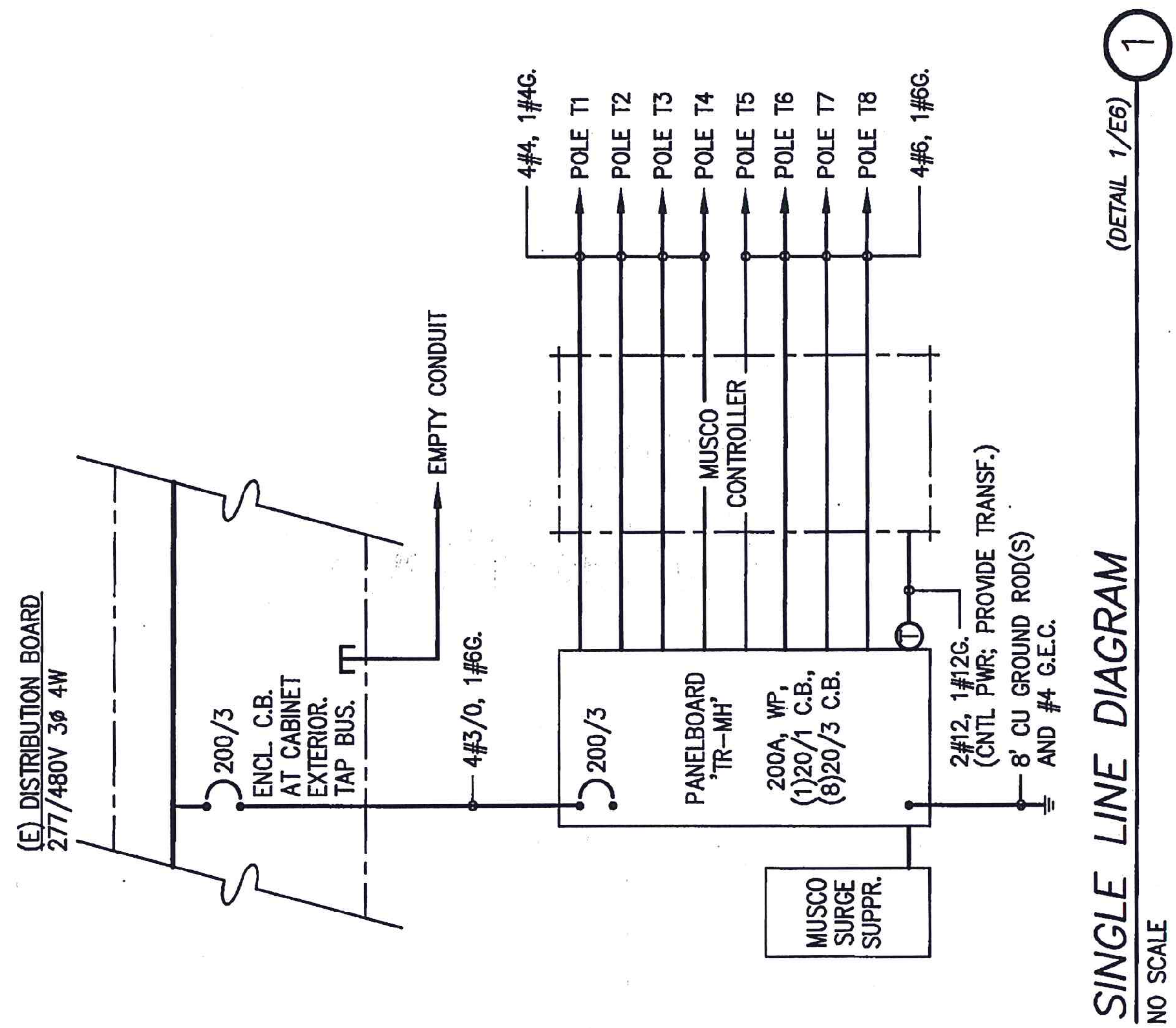
Exhibit "A"



SINGLE LINE DIAGRAM
NO SCALE

Alan Mok Engineering 7415 N. PALM AVENUE #101 FRESNO, CALIFORNIA 93711 Tel. 559-432-6879 Fax. 559-432-6897 www.alanmokengineering.com	*PLAYFIELD LIGHTING INPROVEMENTS AT MADERA SO. HIGH SCHOOL* ADDEDNUM #2	PROJECT #: 214-0130 DATE: 1/9/2015 DRAWN BY: HDE — CHECKED: SD SCALE: NONE	SHEET NO: AD1/E5 REVISIONS:

Exhibit "A"



Alan
Mok
Engineering
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FRESNO, CALIFORNIA 93711
Tel. 559-432-6879
Fax. 559-432-6897
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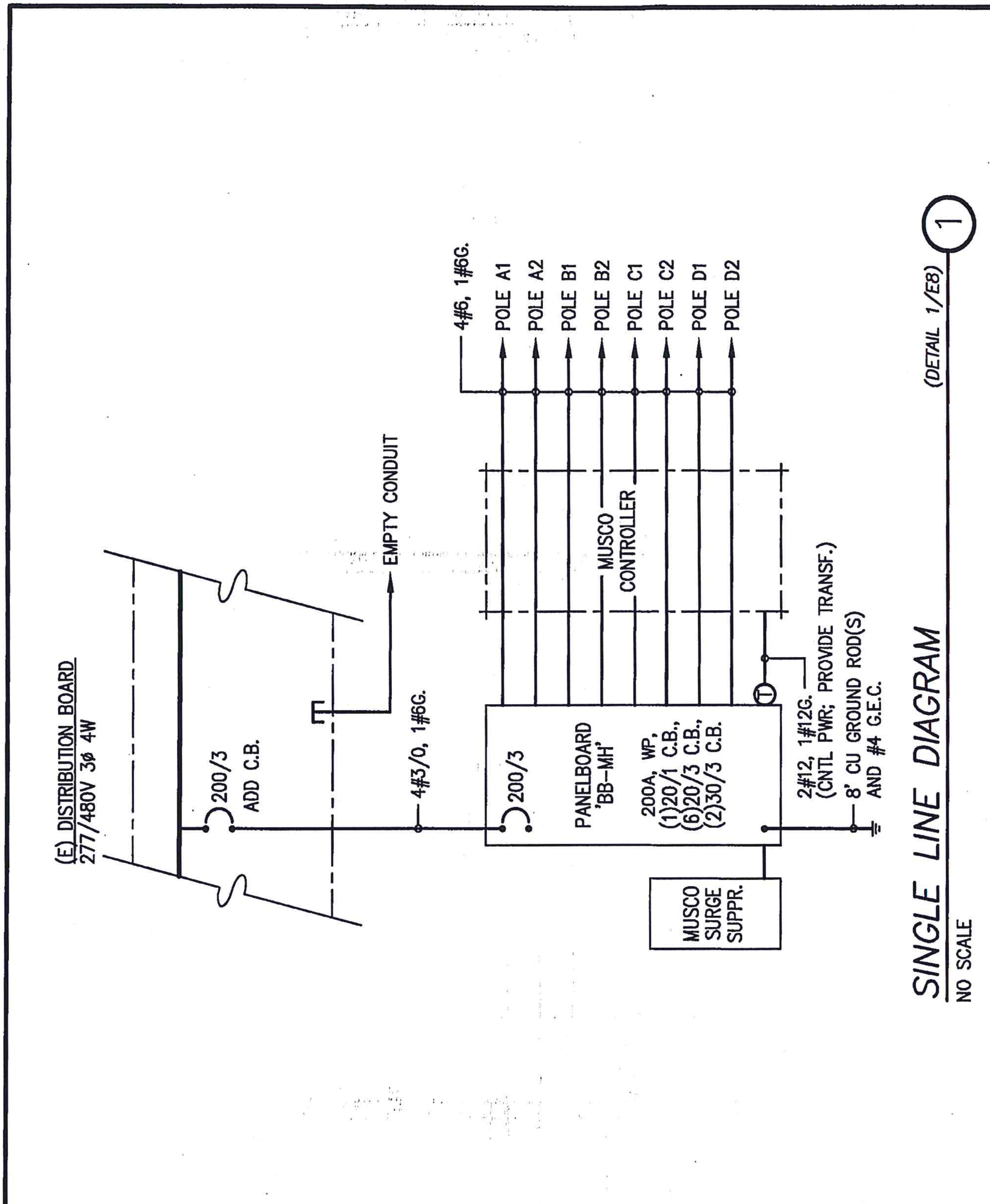
PLAYFIELD LIGHTING INPROVEMENTS AT MADERA SO. HIGH SCHOOL
ADDEDNUM #2

PROJECT #: 214-0130		SHEET NO: AD1/E6
DATE: 1/9/2015		
DRAWN BY: HDE	CHECKED: SD	REVISIONS:
SCALE: NONE		

Exhibit "A"



Alan Mok Engineering
7415 N. PALM AVENUE #101
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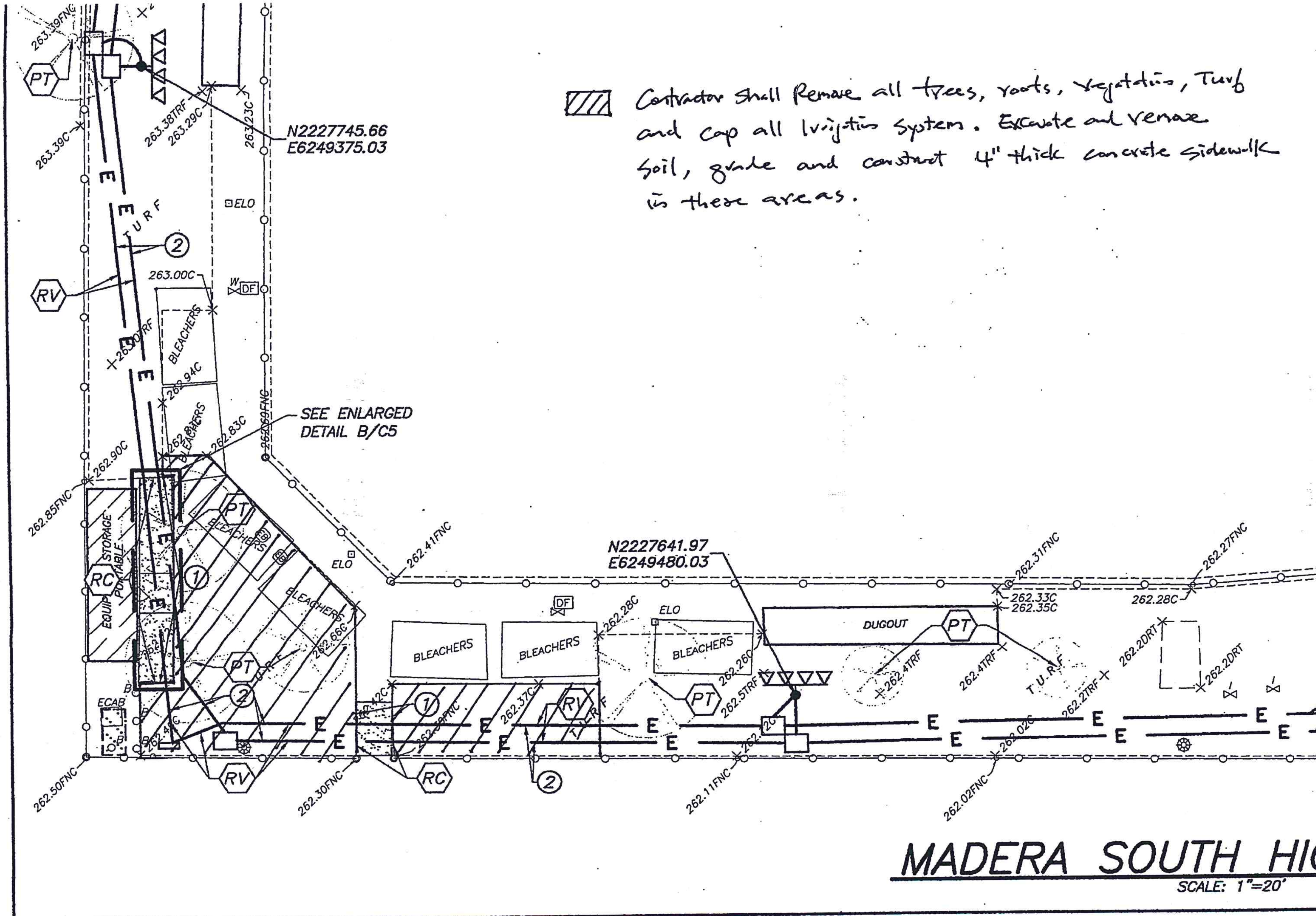
Tel. 559-432-6879
Fax. 559-432-6897
www.alanmokengineering.com

PLAYFIELD LIGHTING INPROVEMENTS AT MADERA SO. HIGH SCHOOL
ADDEDNUM #1

PROJECT #: 214-0130		SHEET NO: AD1/E8
DATE: 1/9/2015		
DRAWN BY: HDE	CHECKED: SD	REVISIONS:
SCALE: NONE		

Exhibit "A"

Contractor shall Remove all trees, roots, vegetation, Turf and cap all Irrigation System. Excavate and remove soil, grade and construct 4" thick concrete sidewalk in these areas.



P: \2014 PROJECTS\214-0130\DRAWINGS\PRODUCTION DRAWINGS\214-0130_SP.DWG

Exhibit "B"

BSK Associates
Engineers & Laboratories

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT

PROPOSED PLAYFIELD LIGHTING IMPROVEMENTS
MADERA HIGH SCHOOL - SOUTH CAMPUS
705 WEST PECAN AVENUE, MADERA, CALIFORNIA

BSK G14-113-11F

PREPARED FOR:

MADERA UNIFIED SCHOOL DISTRICT
1205 SOUTH MADERA AVENUE
MADERA, CALIFORNIA 93637

AUGUST 5, 2014

Engineers, Geologists, Inspectors and Scientists

Exhibit "C"

BSK Associates
Engineers & Laboratories

550 West Locust Avenue
Fresno CA 93650
P 559.497.2880
F 559.497.2886
www.bskassociates.com

TRANSMITTED VIA EMAIL THEN US MAIL

August 5, 2014

BSK G14-113-11F

Ms. Rosalind Cox
Director of Facilities
Madera Unified School District
1205 South Madera Avenue
Madera, California 93637

SUBJECT: Geotechnical Engineering Investigation
Proposed Playfield Lighting Improvements
Madera South High School
705 West Pecan Avenue, Madera, California

Dear Ms. Cox:

BSK Associates is pleased to submit our Geotechnical Engineering Investigation Report for the proposed playfield lighting improvements for Madera South High School Campus. The geotechnical investigation, which included a field exploration, laboratory testing program, engineering analysis, and preparation of this report, was conducted in accordance with BSK's Proposal GF14-10638 dated July 11, 2014. The enclosed report provides geotechnical recommendations for use in preparation of plans and specifications for the subject project.

We appreciate the opportunity to assist you during the design phase of your project and look forward to continuing our relationship on this project through construction. If you have any questions regarding this report, please contact us.

Sincerely,
BSK ASSOCIATES

Jason E. Frank, E.I.T.
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER
LLOYD K. SUEHIRO
No. 66779
Exp. 9/30/14
CIVIL
STATE OF CALIFORNIA

Lloyd K. Suehiro, P.E.
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
HUGO KEVORKIAN
No. 462
Exp.
GEOTECHNICAL
STATE OF CALIFORNIA

Hugo Kevorkian, P.E., G.E.
Principal Geotechnical Engineer

O:\Active\G1411311F - Madera USD South HS Lighting Improvements\Deliverables\Geotechnical Investigation MHS South Light Impr 080514.doc

DISTRIBUTION LIST:

Ms. Rosalind Cox (1 originals + cox_r@madera.k12.ca.us)
Mr. Alan Mok, Alan Mok Engineering (2 original + alan@alanmokengineering.com)
Ms. Vanida Beigy <vanida@alanmokengineering.com>
BSK (eFile)

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GEOTECHNICAL ENGINEERING INVESTIGATION
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MADERA SOUTH HIGH SCHOOL
705 WEST PECAN AVENUE, MADERA, CALIFORNIA

1.0 INTRODUCTION

1.1 General

This report presents the results of our geotechnical investigation for the proposed playfield lighting improvements. The existing Site is located at Madera South High School, Madera, CA. The location of the Site is shown on the Vicinity Map, Figure 1. The project layout and locations of our exploratory borings are shown on the Boring Location Plan, Figures 2.

This investigation was performed for the Madera Unified School District (MUSD, Owner and Client) in general accordance with the scope of services outlined in the BSK Proposal GF14-10638dated July 11, 2014. BSK understands that MUSD has retained Alan Mok Engineering (AME) as Project Civil Engineer.

This report provides a description of the geotechnical conditions at the site and provides specific recommendations for earthwork and foundation design with respect to the planned expansion. In the event that changes occur in the design of the project, this report's conclusions and recommendations will not be considered valid unless the changes are reviewed with BSK and the conclusions and recommendations are modified or verified in writing.

1.2 Project Description

BSK understands that the project improvements will include the installation of Musco Stadium Lighting. The new stadium lights will be supported on pole type foundations. The foundations will have a prefabricated reinforced concrete base which will be embedded in a 17-20-foot deep drilled hole with concrete annular fill.

Based on project plans prepared by AME dated July 4, 2014, the lighting improvements will be constructed in a softball, athletic track, and baseball field within the existing campus. The lighting improvements will include four 60 to 70-feet tall light poles at the softball field, eight 70-feet light poles at the athletic track, and eight 70 to 80-feet light poles at the baseball field. The light poles will be constructed near existing improvements and along the outer perimeter of the softball field, athletic track, and baseball field.

1.3 Purpose and Scope of Services

The purpose of this geotechnical investigation is to provide geotechnical engineering recommendations for use by the project designers during preparation of the project plans and specifications. The scope of the investigation included a field exploration, laboratory testing, engineering analysis, and preparation of this report.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

Our field investigation consisted of a site reconnaissance and subsurface exploration. The test boring drilling performed July 21 though July 22, 2014 included six (6) borings drilled to depths of 26.5 and 31.5 feet below ground surface (bgs). The test borings were drilled using a truck-mounted drill rig with hollow stem auger. The approximate location of the test borings are indicated on Figure 2, Boring Location Plan. Details of the field exploration and the boring logs are provided in Appendix A.

2.2 Laboratory Testing

Laboratory testing of selected samples was performed to evaluate their physical and engineering characteristics and properties. The testing program included: in-situ moisture and density; shear strength, and corrosion potential for the Site.

The in-place moisture and dry density test results are presented on the boring logs in Appendix A. Descriptions of the test methods that were performed, along with other test results, are provided in Appendix B.

3.0 SITE CONDITIONS

3.1 Site Description

The following site description and subsurface conditions describe the general location and surface and subsurface conditions for the Site.

The Site is situated within the southwest quarter of the southwest quarter and the northeast quarter of the southwest quarter of Section 25, Township 11 South, Range 17 East, Mount Diablo Base and Meridian. The coordinates for this Site are 36.941884° North Latitude and -120.073657° West Longitude.

The softball, athletic track, and baseball field is situated on the north and northwest side of the existing Madera High School South Campus. The softball field is situated in athletics complex with four softball playfields. The northwest softball field will receive the lighting improvements. The athletic track is east of the existing softball fields. The baseball field is situated east of the athletic track.

The softball field has existing improvements including bleachers, dugouts, sidewalks, landscaping, and fences. The athletic track has an existing paved track and sidewalk improvements. The baseball field has existing bleachers, dugouts, concrete sidewalks and fences. The fields are relatively flat and ground elevation is approximately 361 to 363 feet above mean sea level.

3.2 Subsurface Conditions

The soil encountered at the site consists of silty sand, silt, clayey sand, sand, silty clay, and sandy silt. The near surface soils consist of medium dense silty sand and medium stiff to stiff silt deposits. Borings B-201 and B-202 encountered, near surface silt underlain by cemented, hard silty clay, with interbedded deposits of medium dense to dense clayey sand and silty sand. Borings B-203 and B-206 encountered, near surface silty sand underlain by deposits of medium dense to dense clayey sand and silty sand with localized deposits of gravelly sand and coarse sand.

The locations of the borings are shown on the Boring Location Map, Figure 2. The boring logs in Appendix A provide a more detailed description of the soils encountered in each boring, including the applicable Unified Soil Classification System symbol.

Groundwater was not encountered in the borings drilled to a maximum depth of 31.5 feet on July 16, 2014. The California Department of Water Resources "Lines of Equal Elevation in Water Wells," Spring 2010, indicates the depth to groundwater exceeds 100 feet bgs. However, fluctuations in the groundwater level or the presence of perched groundwater may occur due to variations in rainfall, seasonal factors, pumping from wells and possibly from other factors that were not evident at the time of our investigation.

3.3 Regional Geology

The Site lies within the geologic province defined as the "Great Valley of California". The Great Valley is an alluvial plain about 50 miles wide and 400 miles long in the central part of California. Its northern part is the Sacramento Valley, drained by the Sacramento River and its southern part is the San Joaquin Valley drained by the San Joaquin River. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic period (about 160 million years ago). (California Department of Conservation, California Geological Survey).

The Site is in the San Joaquin Valley and overlies Quaternary alluvial and marine sediments consisting primarily of alluvium, terrace, playa, and lake deposits of semi-unconsolidated to unconsolidated sands, silts, and clays.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based upon the data collected during this investigation and from a geotechnical engineering standpoint, it is our opinion that there are no soil conditions which would preclude the design and construction of the proposed improvements.

The proposed playfield lights may be supported on precast concrete light poles (musco lights) placed in drilled hole excavations and embedded in normal weight concrete, provided that the recommendations presented herein are incorporated in the design and construction of the project.

4.2 Seismic Design Criteria

There are no known active fault zones within the vicinity of the project site. Based on data collected from the Standard Penetration Resistance Tests (ASTM D 1586) and in accordance with Section 1613.3.2 of the 2013 California Building Code (CBC) and Table 20.3-1 of ASCE 7-10, the Site can be classified as Site Class D (stiff soil profile).

Use of the 2013 California Building Code (CBC) seismic design criteria is considered appropriate and the following parameters are considered applicable for the structural design of light pole improvements.

TABLE 1
2013 CBC SEISMIC DESIGN CRITERIA

Seismic Design Parameter	Value		Reference
MCE Mapped Spectral Acceleration (g)	$S_S = 0.678$	$S_1 = 0.270$	USGS Mapped Value
Amplification Factors (Site Class D)	Fa = 1.258	Fv = 1.860	Table 1613.5.3
Site Adjusted MCE Spectral Acceleration (g)	$S_{MS} = 0.853$	$S_{M1} = 0.502$	Equations 16-36, 37
Design Spectral Acceleration (g)	$S_{DS} = 0.568$	$S_{D1} = 0.335$	Equations 16-38, 39
Design Peak Ground Acceleration	$PGA_M = 0.323$		Equation 11.8-1 (ASCE 7-10)

As shown above, the mapped spectral acceleration parameter at 1 second period (S_1) is less than 0.75, therefore the site lies in Seismic Design Category D as specified in Section 1613.5 of the 2013 CBC.

The site does not lie within a Fault Rupture Hazard Zone as identified by the Alquist-Priolo Fault Zoning Act. The site is not in a Seismic Hazard Zone as specified by the State of California. Based on our subsurface exploration and our knowledge of the geologic setting, there is no significant risk of ground rupture, liquefaction, or significant seismic settlement to occur at the site during a design-level seismic event.

4.3 Soil Corrosivity

Surface soil samples obtained from the Site were tested to evaluation of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts. The test results are presented in Appendix B.

Based on test results, on-site, near-surface soils have low soluble sulfate and soluble chloride contents, a moderate minimum resistivity, and are alkaline. Thus, on-site soils are considered to have a low corrosion potential with respect to buried concrete and a moderate corrosion potential to unprotected metal conduits.

We recommend that Type I/Type II cement be used in the formulation of concrete, and that buried reinforcing steel protection be provided with a minimum concrete cover required by the American Concrete Institute (ACI) Building Code for Structural Concrete, ACI 318, Chapter 7.7. Buried metal conduits must have protective coatings in accordance with the manufacturer's specifications. If detailed recommendations for corrosion protection are desired, a corrosion specialist must be consulted.

4.4 Site Preparation and Earthwork Construction

Although no substantial earthwork is anticipated prior to the installation of the light pole foundations, the following procedures are recommended during site preparation. It should be noted that references to maximum dry density, optimum moisture content, and relative compaction are based on ASTM D 1557-09 (or latest test revision) laboratory test procedures.

1. Within the area of planned improvements such as equipment pads, remove debris, vegetative matter, organic rich topsoil, or other deleterious material to expose a clean soil surface. Materials resulting from demolition activities must be removed from the site and properly disposed. Organic-rich strippings must not be used in engineered fill.

2. Excavated soils, free of organic materials or deleterious substances, may be re-used as compacted engineered fill. Engineered fill must be placed in uniform layers not exceeding 8 inches in loose thickness, moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 90 percent relative compaction. The upper 12 inches of subgrade in asphalt pavement areas must be compacted to at least 95 percent relative compaction.

Earthwork operations should be scheduled as to avoid working during periods of inclement weather. Should these operations be performed during or shortly following periods of inclement weather, unstable soil conditions may result in the soils exhibiting a "pumping" condition. This condition is caused by excess moisture, in combination with compaction, resulting in saturation and zero air voids in the soils. If this condition occurs, the adverse soils will need to be over-excavated to the depth at which stable soils are encountered, and replaced with suitable soils compacted as engineered fill. Alternatively, the Contractor may proceed with grading operations after utilizing an alternative method of soil stabilization, which should be subject to review and evaluation by BSK prior to implementation.

4.5 Pole-Type Foundations

The proposed lighting pole structures will be supported on prefabricated reinforced concrete pier placed in a drilled hole. This type of foundation must be designed in accordance with Section 1807A.3 of the 2013 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 200 psf per foot of embedment be used to develop parameters S_1 and S_3 rather than one of the values given in Table 1806A.2. This value includes a factor of safety of 2 and may be increased as indicated by 1806A.3 and the footnotes to Table 1806A.2. The lateral bearing pressure influences an effective width of 60-inches which is equal to two times the diameter of the pole foundation. Unless the area surrounding the light pole is paved or covered with concrete flatwork, the upper 24 inches of soil should be ignored when calculating the minimum depth of embedment.

An allowable end bearing pressure of 5,000 psf (includes a factor of safety of 3.0) and an allowable average skin friction of 300 psf (includes a factor of safety of 2.0) may be used to support vertical loads applied to pier foundations. A coefficient of friction of 0.4 may be used for lateral sliding. The skin friction within the upper two (2) feet of embedded length must be ignored in unpaved areas. The total settlement of pier foundations designed in accordance with these recommendations should not exceed one-half inch.

Prior to placing the prefabricated reinforced concrete base and concrete backfill, loose or disturbed soils must be removed from the bottom of the drilled excavations using a clean-out bucket or other pre-approved method. A representative of BSK must observe the drilling and clean-out associated with the construction of pole foundations in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

If casing is used, the casing must be gradually removed as concrete is placed in the excavation. The concrete must be placed so that it is at least two feet above the bottom of the casing as the casing is extracted from the excavation. The concrete must be vibrated to reduce voids as the casing is withdrawn. If the casing is left in place rather than extracted as indicated above, the allowable average skin friction for the pole installation must be reduced to 150 psf.

4.6 Temporary Trench Excavation

Soils encountered within the depth explored are generally soils Type C in accordance with OSHA (Occupational Safety and Health Administration). The slopes surrounding or along temporary excavations may be vertical for excavations that are less than 5 feet deep and exhibit no indication of potential caving, but must be no steeper than 1.5H:1V for Type C Soils for excavations that are deeper than 5 feet, up to a maximum depth of 12 feet. Certified trench shields or boxes may also be used to protect workers during construction in excavations that have vertical sidewalls and are greater than 5 feet deep. Temporary excavations for the project construction must be left open for as short a time as possible and must be protected from water runoff. In addition, equipment and/or soil stockpiles must be maintained at least 10 feet away from the top of the excavations. Because of variability in soils, BSK must be afforded the opportunity to observe and document sloping and shoring conditions at the time of construction. Slope height, slope inclination, and excavation depths (including utility trench excavations) must in no case exceed those specified in local, state, or federal safety regulations, (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations).

4.7 Utility Pipe Bedding and Envelope

Pipes and conduits must be bedded and shaded in accordance with the requirements of the pipe manufacturer. Where no specific requirements exist, we recommend a minimum of 6 inches of sand bedding material for pipe installations. For pipe diameters smaller than 12 inches in diameter, the recommended bedding thickness can be reduced to 4 inches. The bedding material and envelope (up to 12 inches above the pipe) must consist of sand with not more than 10 percent passing the #200 sieve, 100 percent passing the ¾ inch sieve.

As an alternative to using sand, the pipe bedding and envelope material may consist of ¾ inch Class 2 Aggregate Base as specified in Section 26 of the Caltrans Standard Specifications, or a sand–cement slurry that contains 1.5 to 2.0 sacks of cement per yard of material and has a 6 inch slump.

Bedding and pipe envelope must be placed in loose thickness not exceeding 8 inches and compacted to at least 90 percent of the maximum dry density. Moisture content of bedding and pipe envelope soils during compaction must be maintained within two percent (2%) of optimum moisture content. Class 2 Aggregate Base, when used for bedding or pipe envelope must be compacted to at least 92 percent of the maximum dry density. Water jetting to attain compaction must not be allowed.

4.8 Trench Backfill and Compaction

Processed on-site soils, which are free of organic material, are suitable for use as trench backfill above the pipe envelope. Native soil with particles less than three inches in the greatest dimension may be incorporated into the backfill and compacted as specified above, providing they are properly mixed into a matrix of friable soils. The backfill must be placed in thin layers not exceeding 8 inches in loose thickness, be well blended and consistent in texture, be moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 90 percent of the maximum dry density. The uppermost 24 inches of trench backfill below pavement sections or slab-on-grade must be compacted to at least 95 percent of the maximum dry density.

We recommend that trench backfill be tested for compliance with the recommended relative compaction and moisture conditions. Field density testing must conform to ASTM Test Methods D1556 or D6938. We recommend that field density tests be performed in the utility trench bedding, envelope and backfill for each one-foot vertical lift, at an approximate longitudinal spacing of not greater than 250 feet. Backfill that does not conform to the criteria specified in this section must be removed and reworked to the desired relative compaction, as applicable over the trench length represented by the failing test so as to conform to BSK recommendations.

4.9 Surface Drainage Control

The control of surface drainage at the project site is an important design consideration. BSK recommends the following:

- Final grading around proposed structures must provide for positive and enduring drainage away from the structures, and ponding of water must not be allowed around or near pole structures.
- Irrigation water should be applied in amounts not exceeding those required to offset evaporation, sustain plant life, and maintain a relatively uniform moisture profile around and below the proposed structures.

5.0 PLANS AND SPECIFICATIONS REVIEW

BSK recommends that it be retained to review the draft plans and specifications for the project, with regard to foundations and earthwork, prior to their being finalized and issued for construction bidding.

6.0 CONSTRUCTION TESTING AND OBSERVATIONS

Geotechnical testing and observation during construction is a vital extension of the geotechnical investigation. BSK recommends that it be retained for those services. Field review during site preparation and grading allows for evaluation of the exposed soil conditions and confirmation or revision of the assumptions and extrapolations made in formulating the design parameters and recommendations. BSK observations should be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. BSK should also be called to the site to observe foundation excavations, prior to placement of reinforcing steel or concrete, in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. BSK should also be called to the site to observe placement of foundation and slab concrete.

If a firm other than BSK is retained for these services during construction that firm should notify the owner, project designers, governmental building officials, and BSK that the firm has assumed the responsibility for all phases (i.e., both design and construction) of the project within the purview of the geotechnical engineer. Notification should indicate that the firm has reviewed this report and any subsequent addenda, and that it either agrees with BSK's conclusions and recommendation, or that it will provide independent recommendations.

7.0 LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test borings performed at the locations shown on Figure 2. The report does not reflect variations which may occur between or beyond the test borings. The nature and extent of such variations may not become evident until construction is initiated. If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-site observations during the excavation period and noting the characteristics of the variations.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observation program during the construction phase. BSK assumes no responsibility for construction compliance with the design concepts or recommendations unless it has been retained to perform the testing and observation services during construction as described above.

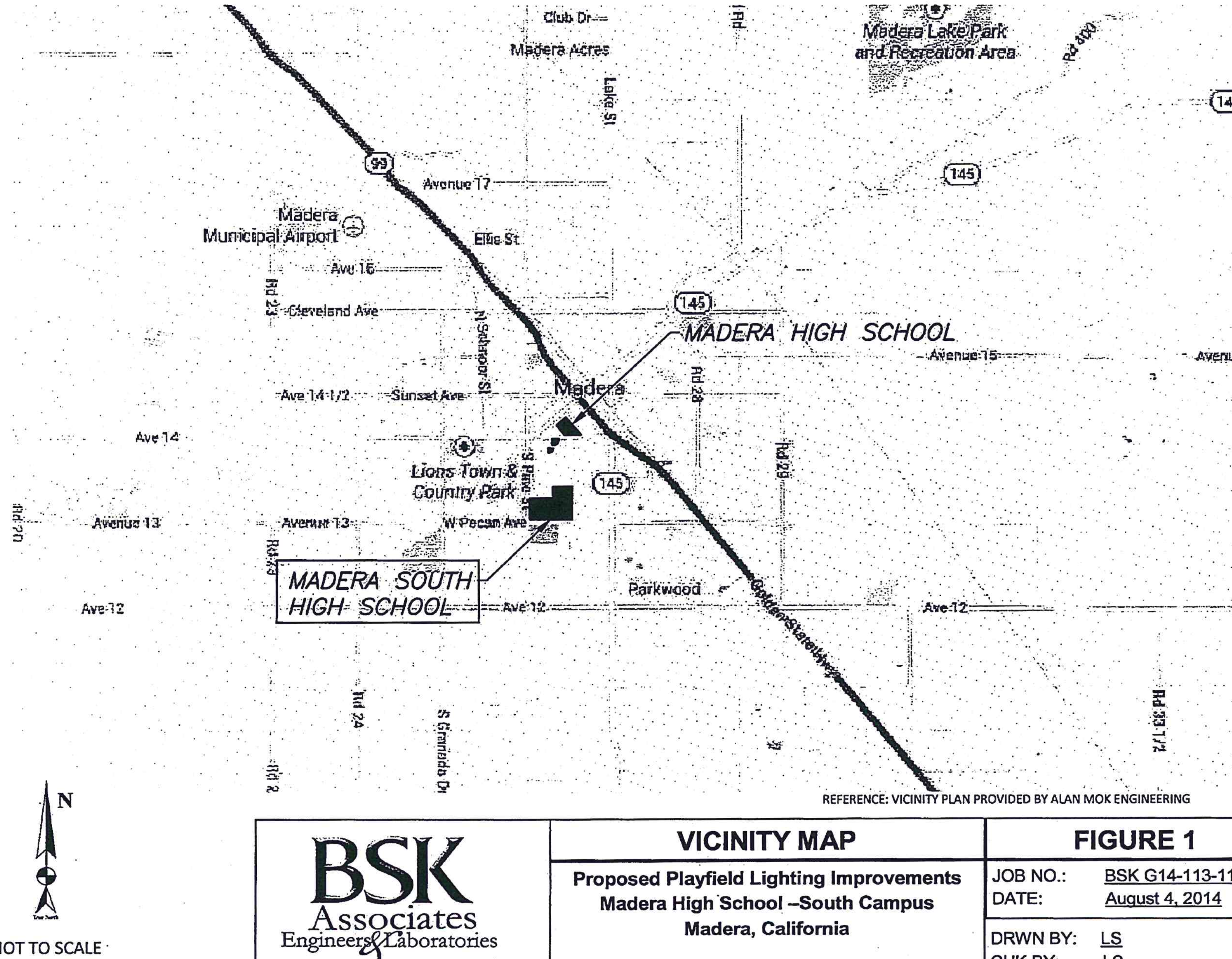
The findings of this report are valid as of the present. However, changes in the conditions of the site can occur with the passage of time, whether caused by natural processes or the work of man, on this property or adjacent property. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, governmental policy or the broadening of knowledge.

BSK has prepared this report for the exclusive use of the Client and members of the project design team. The report has been prepared in accordance with generally accepted geotechnical engineering practices which existed in Madera County at the time the report was written. No other warranties either express or implied are made as to the professional advice provided under the terms of BSK's agreement with Client and included in this report.

BSK ASSOCIATES

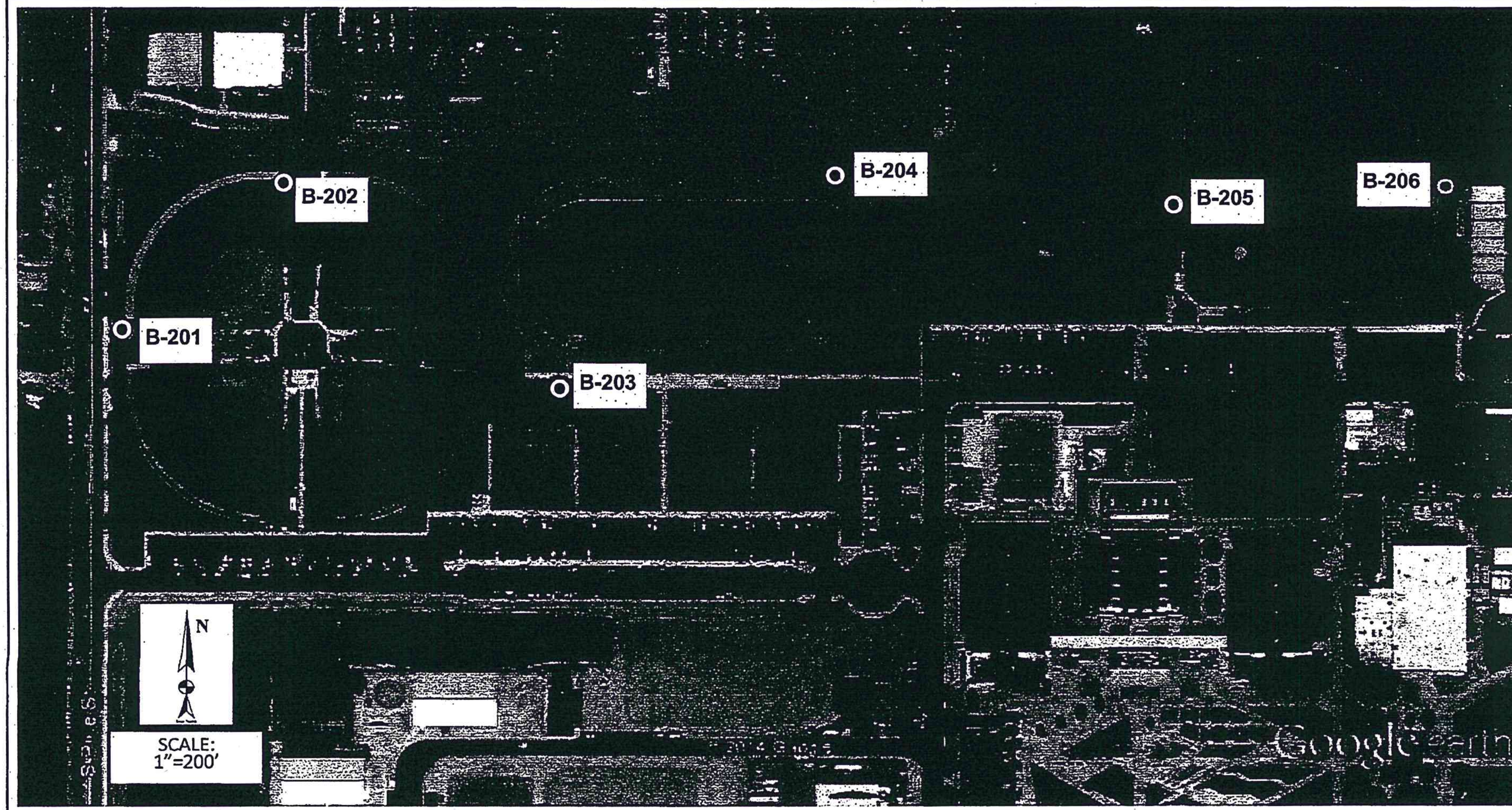
FIGURES

BSK



REFERENCE: VICINITY PLAN PROVIDED BY ALAN MOK ENGINEERING

BSK Associates Engineers & Laboratories	VICINITY MAP	FIGURE 1
	Proposed Playfield Lighting Improvements Madera High School –South Campus Madera, California	JOB NO.: BSK G14-113-11F DATE: August 4, 2014
		DRWN BY: LS CHK BY: LS



REFERENCE: IMAGE FROM GOOGLE EARTH 2014

LEGEND

◉ B-101 **APPROXIMATE LOCATION OF TEST BORINGS**

BSK Associates Engineers & Laboratories

BORING LOCATION PLAN

Proposed Playfield Lighting Improvements
Madera High School –South Campus
Madera, California

FIGURE 2

JOB NO.:	BSK G14-113-11F
DATE:	August 4, 2014
DRWN BY:	LS
CHK BY:	LS

APPENDIX A
Field Exploration

BSK

APPENDIX A

Field Exploration

Exploratory Borings
The field exploration was conducted July 21 through July 22, 2014 included six (6) borings drilled to a maximum depth of 31.5 feet bgs (below ground surface). The test borings were drilled using a truck-mounted drill rig with hollow stem auger. The approximate locations of the test borings are indicated on Figure 2, Boring Location Map.

The soil materials encountered in the test boring were visually classified in the field, and logs were recorded by the staff professional during the drilling and sampling operations. Visual classification of the materials encountered in the test boring was made in general accordance with the Unified Soil Classification System (ASTM: D2487). A soil classification chart is presented herein. Boring logs are presented herein and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff on the basis of observations made at the time of drilling while the actual boundaries between different soil types may be gradual and soil conditions may vary at other locations.

Subsurface samples were obtained at the successive depths shown on the boring logs by driving samplers which consisted of a 2.5 inch inside diameter (I.D.) California Sampler or a 1.4 inch I.D. Standard Penetration Split-Spoon Sampler. The samplers were driven 18 inches using a 140 pound, automatic down-hole hammer dropping 30 inches. The number of blows required to drive the last 12 inches was recorded as the blow count (blows/foot) on the log of borings. The relatively undisturbed soil core samples were capped at both ends to preserve the samples at their natural moisture content. Disturbed soil samples were obtained using the Split-Spoon Sampler (marked X in logs) and were placed and sealed in polyethylene bags. At the completion of the field exploration, the test borings were backfilled with the soil cuttings, as set forth in BSK's proposal.

Table A-1 Consistency of Coarse-Grained Soil versus Sampler Blow Count		
Consistency	SPT Blow Count (#Blows / Foot)	2.5" I.D. California Sampler Blow Count (#Blows / Foot)
Very Loose	<4	<6
Loose	4 – 10	6 – 15
Medium Dense	10 – 30	15 – 45
Dense	30 – 50	45 – 80
Very Dense	>50	>80

Table A-2 Consistency of Fine-Grained Soil versus Sampler Blow Count		
Consistency	SPT Blow Count	2.5" I.D. Cal. Sampler Blow Count
Very Soft	<2	<3
Soft	2 – 4	3 – 6
Medium Stiff	4 – 8	6 – 12
Stiff	8 – 15	12 – 24
Very Stiff	15 – 30	24 – 45
Hard	>30	>45

Note: * - Terzaghi and Peck, 1948

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

	Modified California	RV	R-Value
	Standard Penetration Test (SPT)	SA	Sieve Analysis
	Split Spoon	SW	Swell Test
	Pushed Shelby Tube	TC	Cyclic Triaxial
	Auger Cuttings	TX	Unconsolidated Undrained Triaxial
	Grab Sample	TV	Torvane Shear
	Sample Attempt with No Recovery	UC	Unconfined Compression
CA	Chemical Analysis	(1.2)	(Shear Strength, ksf)
CN	Consolidation	WA	Wash Analysis
CP	Compaction	(20)	(with % Passing No. 200 Sieve)
DS	Direct Shear	∇	Water Level at Time of Drilling
PM	Permeability	▼	Water Level after Drilling(with date measured)
PP	Pocket Penetrometer		

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

BSK Associates Engineers & Laboratories

BSK Associates
Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS South Campus Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: B-201

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0–8			11 (2–3 ft); 7 (5–6 ft)	90.1	19.7			ML	**SILT** Dark brown, fine-grained, moist, loose, micaceous	Softball field
8–13			50-5" (10–11 ft)					CL	**Silty CLAY** Brown, moist, micaceous ...reddish brown, cemented, hard	
13–18			23 (15–16 ft)					SP	**SAND** Light brown, fine to medium-grained, trace coarse, moist, medium dense	
18–26.5			29 (20–21 ft); 23 (25–26 ft)	105.6	16.4			SC	**Clayey SAND** Gray, fine to medium-grained, moist ...dense	
26.5									Boring terminated at 26.5-feet bgs Borehole backfilled with soil cuttings Groundwater not encountered	

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 26.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS South Campus Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: **B-202**

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0–4	2–3		42					SM	**Silty SAND** Brown, fine to medium-grained, moist, trace mica ...dense	Softball field
4–12	5–6		13	94.7	17.4			ML	**SILT** Brown, fine-grained, moist ...increased plasticity ...red brown, cemented, hard	
	10–11		50-6"							Practical sample refusal
12–14								SC	**Clayey SAND** Brown, fine to medium-grained, moist, mica	
14–18	15–16		29					SM	**Silty SAND** Brown, mottled black, fine to medium-grained, moist, dense	
18–26.5	20–21		19					SC	**Clayey SAND** Gray, moist, plastic ...very stiff ...increase in sands, hard	
	25–26		58							
									Boring terminated at 26.5-feet bgs Borehole backfilled with soil cuttings Groundwater not encountered	

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 26.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates
Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS South Campus Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: B-203

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0–11								SM	**Silty SAND** Brown, fine to medium-grained, moist, trace mica	Track
5–6.5	Sample		15	113.0	12.0				...trace mica, medium dense	
10–11.5	Sample		21							
11–18								SM	**Silty SAND/Clayey SAND** Orange brown, fine to medium-grained, moist, medium dense, cementation	
15–16.5	SPT		51						...very dense	
18–21								SP	**SAND** Light tan, fine to medium-grained, moist, trace coarse	
20–21.5	Sample		62							
21–26.5								SM	**Silty SAND** Orange brown, fine to medium-grained, moist, very dense	
25–26.5	SPT		37							

Boring terminated at 26.5-feet bgs
Borehole backfilled with soil cuttings
Groundwater not encountered

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 26.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS South Campus Lighting Improvements

Location: Madera, California

Project No.: G14-113-11F

Logged By: J. Frank

Checked By: L. Suehiro

Boring: B-204

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0								SM	**Silty SAND** Dark brown, fine to medium-grained, moist	Track
2–3			29	107.5	9.1				...dense	
5–6			17	114.4	9.5				...medium dense	
10–11			40/ 5"						...cemented, very dense	Hammer bouncing
12								SM	**Silty SAND** Light brown, fine to coarse-grained, moist, with gravel, dense	
15–16			37	113.0	3.4					
20–21			31					SM	**Silty SAND** Brown, fine to medium-grained, moist, dense	
25–26			36						...trace gravel, dense	
26.5									Boring terminated at 26.5-feet bgs Borehole backfilled with soil cuttings Groundwater not encountered	

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 26.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS South Campus Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: B-206

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0								SM	**Silty SAND** Brown, fine to medium-grained, moist, mica	Baseball field
2–3.5	Modified	Bulk	15	98.6	17.2				...medium dense	
5–6.5	Modified		10	100.3	17.3				...loose	
10–11.5	SPT		9						...less silt diminishing, loose	
12.5–13	Modified		15	97.6	26.0			CL	**Silty CLAY** Brown, moist, stiff, fine grained sand	Soil wet above clay sample
15–16.5	Modified		22						...trace fine to medium-grained sands, very stiff	
19								ML	**Sandy SILT** - olive brown, trace fine to medium-grained sands, very stiff	
20–21.5	SPT		23							
25–26.5	Modified		34					SM	**Silty SAND** Orange brown, fine to medium-grained, trace coarse moist, dense	
30–31.5	SPT		34					ML	**Sandy SILT** Olive and orange interlaced, fine to medium-grained, moist, hard	
31.5									Boring terminated at 31.5-feet bgs Borehole backfilled with soil cuttings Groundwater not encountered	

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/22/14
Date Completed: 7/22/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 31.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

APPENDIX B
Laboratory Testing

BSK

APPENDIX B

Laboratory Testing

The results of laboratory testing performed in conjunction with this project are contained in this Appendix. The following laboratory tests were performed on representative samples in general accordance with the latest applicable standards.

In-Situ Moisture and Density
The field moisture content and in-place dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The field moisture content, as a percentage of dry weight of the soils, was determined by weighing the samples before and after oven drying in accordance with ASTM D2216 test procedures. Dry densities, in pounds per cubic foot, were also determined for undisturbed core samples in accordance with ASTM D 2937 test procedures. Test results are presented on the boring logs in Appendix A.

Direct Shear Test
One direct shear test was performed on test specimens trimmed from a relatively undisturbed soil sample from each site. The 3 point shear test was performed in general accordance with ASTM Test Method D 3080. The test specimens, 2.42 inches in diameter and 1 inch in height, were subjected to shear along a plane at mid-height after allowing for pore pressure dissipation. The results of this test are presented on Figure B-1.

Soil Corrosivity Tests
One soil sample was tested to evaluate the corrosion potential of the on-site soils. The test methods included: EPA Test Methods 300.0 (for soluble sulfate and chlorides) and 9045C (for pH). The test results are summarized in the following tables.

SUMMARY OF CHEMICAL TEST RESULTS

Location	B-201 – B-206 at 0 – 5'
Minimum Resistivity, ohm-cm	1910
pH	8.4
Sulfate, mg/Kg	170
Chloride, mg/Kg	47

BSK Associates Engineers & Laboratories

Direct Shear Test

ASTM D-3080

1415 Tuolumne St.
Fresno, CA 93706
Ph: (559) 497-2868
Fax: (559) 485-6140

FIGURE B-1

Project Name: Proposed Playfield Lighting Improvements, Madera South High School

Project Number: G14-113-11F

Sample Location: B-201 at 5'

Sampled By: JF

Tested By: PB

Lab Tracking ID:

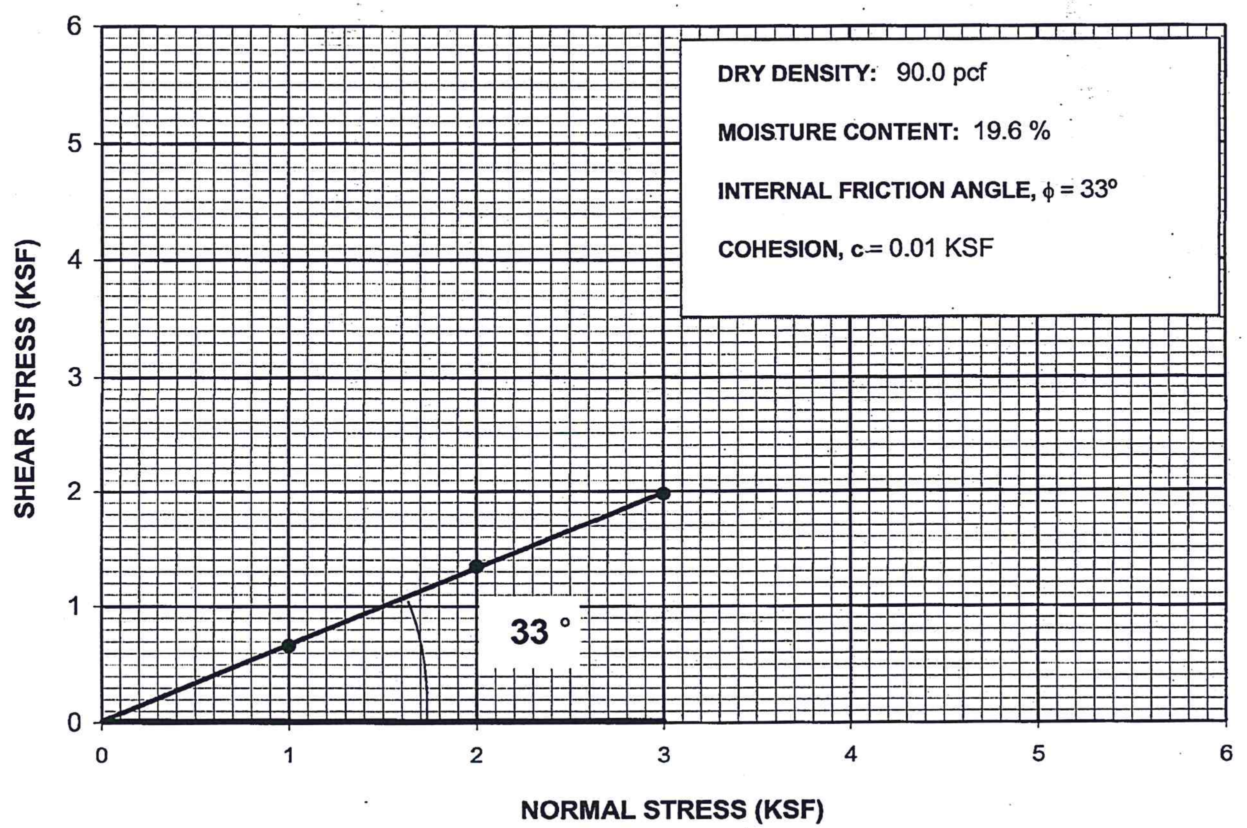
Sample Date: 7/21/2014

Test Date: 7/23/2014

Report Date: 8/4/2014

Sample Description: Silty Sand (SM), brown, moist, fine-grained sand, trace of mica

SHEAR STRENGTH DIAGRAM



BSK Associates
Engineers & Laboratories

GEOTECHNICAL ENGINEERING INVESTIGATION REPORT

PROPOSED PLAYFIELD LIGHTING IMPROVEMENTS
MADERA HIGH SCHOOL
200 SOUTH L STREET, MADERA, CALIFORNIA

BSK G14-113-11F

PREPARED FOR:

MADERA UNIFIED SCHOOL DISTRICT
1205 SOUTH MADERA AVENUE
MADERA, CALIFORNIA 93637

AUGUST 5, 2014

Engineers, Geologists, Inspectors and Scientists

Exhibit "C"

BSK Associates Engineers & Laboratories

550 West Locust Avenue
Fresno CA 93650
P 559.497.2880
F 559.497.2886
www.bskassociates.com

TRANSMITTED VIA EMAIL THEN US MAIL

August 5, 2014 BSK G14-113-11F

Ms. Rosalind Cox, Director of Facilities
Madera Unified School District
1205 South Madera Avenue
Madera, California 93637

SUBJECT: Geotechnical Engineering Investigation
Proposed Playfield Lighting Improvements
Madera High School
200 South L Street, Madera, California

Dear Ms. Cox:

BSK Associates is pleased to submit our Geotechnical Engineering Investigation Report for the proposed playfield lighting improvements for Madera High School Campus. The geotechnical investigation, which included a field exploration, laboratory testing program, engineering analysis, and preparation of this report, was conducted in accordance with BSK's Proposal GF14-10638 dated July 11, 2014. The enclosed report provides geotechnical recommendations for use in preparation of plans and specifications for the subject project.

We appreciate the opportunity to assist you during the design phase of your project and look forward to continuing our relationship on this project through construction. If you have any questions regarding this report, please contact us.

Sincerely,
BSK ASSOCIATES

Jason E. Frank, E.I.T.
Staff Engineer

REGISTERED PROFESSIONAL ENGINEER LLOYD K. SUEHIRO No. 66779 exp 9/30/14 CIVIL STATE OF CALIFORNIA

Lloyd K. Suehiro, P.E.
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER HUGO KEVORKIAN No. 462 Exp. GEOTECHNICAL STATE OF CALIFORNIA

Hugo Kevorkian, P.E., G.E.
Principal Geotechnical Engineer

O:\Active\G1411311F - Madera USD South HS Lighting Improvements\Deliverables\Geotechnical Investigation MHS Light Impr 080514.doc

DISTRIBUTION LIST:

Ms. Rosalind Cox (1 originals + cox_r@madera.k12.ca.us)
Mr. Alan Mok, Alan Mok Engineering (2 original + alan@alanmokengineering.com)
Ms. Vanida Beigy, Alan Mok Engineering (vanida@alanmokengineering.com)
BSK (eFile)

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED PLAYFIELD LIGHTING IMPROVEMENTS
MADERA HIGH SCHOOL
200 SOUTH L STREET, MADERA, CALIFORNIA 93637

1.0 INTRODUCTION

1.1 General

This report presents the results of our geotechnical investigation for the proposed playfield lighting improvements. The existing Site is located at Madera High School, Madera, CA. The location of the Site is shown on the Vicinity Map, Figure 1. The project layout and locations of our exploratory borings are shown on the Boring Location Plan, Figures 2.

This investigation was performed for the Madera Unified School District (MUSD, Owner and Client) in general accordance with the scope of services outlined in the BSK Proposal GF14-10638dated July 11, 2014. BSK understands that MUSD has retained Alan Mok Engineering (AME) as Project Civil Engineer.

This report provides a description of the geotechnical conditions at the site and provides specific recommendations for earthwork and foundation design with respect to the planned expansion. In the event that changes occur in the design of the project, this report's conclusions and recommendations will not be considered valid unless the changes are reviewed with BSK and the conclusions and recommendations are modified or verified in writing.

1.2 Project Description

BSK understands that the project improvements will include the installation of Musco Stadium Lighting. The new stadium lights will be supported on pole type foundations. The foundations will have a prefabricated reinforced concrete base which will be embedded in a 17-20-foot deep drilled hole with concrete annular fill.

Based on project plans prepared by AME dated July 4, 2014, the lighting improvements will be constructed in a softball and baseball field within the existing campus. The lighting improvements will include eight 70 to 80-feet light poles at the baseball field and four 30 to 70-feet tall light poles at the softball field. The light poles will be constructed near existing improvements and along the outer perimeter of the baseball and softball field.

1.3 Purpose and Scope of Services

The purpose of this geotechnical investigation is to provide geotechnical engineering recommendations for use by the project designers during preparation of the project plans and specifications. The scope of the investigation included a field exploration, laboratory testing, engineering analysis, and preparation of this report.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

Our field investigation consisted of a site reconnaissance and subsurface exploration. The test boring drilling performed July 21, 2014 included four (4) borings drilled to depths of 26.5 to 31.5 feet below ground surface (bgs). The test borings were drilled using a truck-mounted drill rig with hollow stem auger. The approximate location of the test borings are indicated on Figure 2, Boring Location Plan. Details of the field exploration and the boring logs are provided in Appendix A.

2.2 Laboratory Testing

Laboratory testing of selected samples was performed to evaluate their physical and engineering characteristics and properties. The testing program included: in-situ moisture and density; shear strength, and corrosion potential.

The in-place moisture and dry density test results are presented on the boring logs in Appendix A. Descriptions of the test methods that were performed, along with other test results, are provided in Appendix B.

3.0 SITE CONDITIONS

3.1 Site Description

The following site description and subsurface conditions describe the general location and surface and subsurface conditions for the Site.

The Site is situated within the northeast quarter of the northwest quarter of Section 25, Township 11 South, Range 17 East, Mount Diablo Base and Meridian. The coordinates for the Site are 36.9524° North Latitude and -120.0677° West Longitude. The baseball field is situated at the southeast corner of Coyote Lane and West Olive Street. The softball diamond is situated approximately 500 feet southwest of the baseball field. The baseball stadium and softball field are situated on the south side of the existing campus. The baseball stadium has existing bleachers, batting cages, dugouts, concrete sidewalks and fences. The softball field has existing improvements including bleachers, dugouts, and fences. The fields are relatively flat and ground elevation is approximately 351 feet above mean sea level.

3.2 Subsurface Conditions

The soils encountered at the site consists of silty sand, clayey sand, silty clay, and sandy silt. The upper 10 to 14 feet consists of medium dense to loose silty sand which are underlain by deposits of dense, weakly cemented clayey sand and dense to medium dense silty sand. Interbedded medium dense sand and silty sand with localized seams of stiff silty clay and sandy silt deposits were encountered below 14 feet.

The locations of the borings are shown on the Boring Location Map, Figure 2. The boring logs in Appendix A provide a more detailed description of the soils encountered in each boring, including the applicable Unified Soil Classification System symbol.

Groundwater was not encountered in the borings drilled to a maximum depth of 31.5 feet on July 16, 2014. The California Department of Water Resources "Lines of Equal Elevation in Water Wells," Spring 2010, indicates the depth to groundwater exceeds 100 feet bgs. However, fluctuations in the groundwater level or the presence of perched groundwater may occur due to variations in rainfall, seasonal factors, pumping from wells and possibly from other factors that were not evident at the time of our investigation.

3.3 Regional Geology

The Site lies within the geologic province defined as "Great Valley of California". The Great Valley is an alluvial plain about 50 miles wide and 400 miles long in the central part of California. Its northern part is the Sacramento Valley, drained by the Sacramento River and its southern part is the San Joaquin Valley drained by the San Joaquin River. The Great Valley is a trough in which sediments have been deposited almost continuously since the Jurassic period (about 160 million years ago). (California Department of Conservation, California Geological Survey).

The Site is in the San Joaquin Valley and overlies Quaternary alluvial and marine sediments consisting primarily of alluvium, terrace, playa, and lake deposits of semi-unconsolidated to unconsolidated sands, silts, and clays.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based upon the data collected during this investigation and from a geotechnical engineering standpoint, it is our opinion that there are no soil conditions which would preclude the design and construction of the proposed improvements.

The proposed playfield lights may be supported on precast concrete light poles (musco lights) placed in drilled hole excavations and embedded in normal weight concrete, provided that the recommendations presented herein are incorporated in the design and construction of the project.

4.2 Seismic Design Criteria

There are no known active fault zones within the vicinity of the project site. Based on data collected from the Standard Penetration Resistance Tests (ASTM D 1586) and in accordance with Section 1613.3.2 of the 2013 California Building Code (CBC) and Table 20.3-1 of ASCE 7-10, the Site can be classified as Site Class D (stiff soil profile).

Use of the 2013 California Building Code (CBC) seismic design criteria is considered appropriate and the following parameters are considered applicable for the structural design of light pole improvements.

TABLE 1
2013 CBC SEISMIC DESIGN CRITERIA

Seismic Design Parameter	Value		Reference
MCE Mapped Spectral Acceleration (g)	$S_S = 0.669$	$S_1 = 0.268$	USGS Mapped Value
Amplification Factors (Site Class D)	Fa = 1.265	Fv = 1.864	Table 1613.5.3
Site Adjusted MCE Spectral Acceleration (g)	$S_{MS} = 0.846$	$S_{M1} = 0.500$	Equations 16-36, 37
Design Spectral Acceleration (g)	$S_{DS} = 0.564$	$S_{D1} = 0.333$	Equations 16-38, 39
Design Peak Ground Acceleration	$PGA_M = 0.32$		Equation 11.8-1 (ASCE 7-10)

As shown above, the mapped spectral acceleration parameter at 1 second period (S_1) is less than 0.75, therefore the site lies in Seismic Design Category D as specified in Section 1613.5 of the 2013 CBC.

The site does not lie within a Fault Rupture Hazard Zone as identified by the Alquist-Priolo Fault Zoning Act. The site is not in a Seismic Hazard Zone as specified by the State of California. Based on our subsurface exploration and our knowledge of the geologic setting, there is no significant risk of ground rupture, liquefaction, or significant seismic settlement to occur at the site during a design-level seismic event.

4.3 Soil Corrosivity

Near surface soil samples obtained from the Site were tested to evaluate of the potential for concrete deterioration or steel corrosion due to attack by soil-borne soluble salts. The test results are presented in Appendix B.

Based on test results, on-site, near-surface soils have low soluble sulfate and soluble chloride contents, a moderate minimum resistivity, and are alkaline. Thus, on-site soils are considered to have a low corrosion potential with respect to buried concrete and a low to moderate corrosion potential to unprotected metal conduits.

We recommend that Type I/Type II cement be used in the formulation of concrete, and that buried reinforcing steel protection be provided with a minimum concrete cover required by the American Concrete Institute (ACI) Building Code for Structural Concrete, ACI 318, Chapter 7.7. Buried metal conduits must have protective coatings in accordance with the manufacturer's specifications. If detailed recommendations for corrosion protection are desired, a corrosion specialist must be consulted.

4.4 Site Preparation and Earthwork Construction

Although no substantial earthwork is anticipated prior to the installation of the light pole foundations, the following procedures are recommended during site preparation. It should be noted that references to maximum dry density, optimum moisture content, and relative compaction are based on ASTM D 1557-09 (or latest test revision) laboratory test procedures.

1. Within the area of planned improvements such as equipment pads, remove debris, vegetative matter, organic rich topsoil, or other deleterious material to expose a clean soil surface. Materials resulting from demolition activities must be removed from the site and properly disposed. Organic-rich strippings must not be used in engineered fill.

2. Excavated soils, free of organic materials or deleterious substances, may be re-used as compacted engineered fill. Engineered fill must be placed in uniform layers not exceeding 8 inches in loose thickness, moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 90 percent relative compaction. The upper 12 inches of subgrade in asphalt pavement areas must be compacted to at least 95 percent relative compaction.

Earthwork operations should be scheduled as to avoid working during periods of inclement weather. Should these operations be performed during or shortly following periods of inclement weather, unstable soil conditions may result in the soils exhibiting a "pumping" condition. This condition is caused by excess moisture, in combination with compaction, resulting in saturation and zero air voids in the soils. If this condition occurs, the adverse soils will need to be over-excavated to the depth at which stable soils are encountered, and replaced with suitable soils compacted as engineered fill. Alternatively, the Contractor may proceed with grading operations after utilizing an alternative method of soil stabilization, which should be subject to review and evaluation by BSK prior to implementation.

4.5 Pole-Type Foundations

The proposed lighting pole structures will be supported on prefabricated reinforced concrete pier placed in a drilled hole. This type of foundation must be designed in accordance with Section 1807A.3 of the 2013 CBC. However, it is recommended that an allowable lateral soil bearing pressure of 200 psf per foot of embedment be used to develop parameters S_1 and S_3 rather than one of the values given in Table 1806A.2. This value includes a factor of safety of 2 and may be increased as indicated by 1806A.3 and the footnotes to Table 1806A.2. The lateral bearing pressure influences an effective width of 60-inches which is equal to two times the diameter of the pole foundation. Unless the area surrounding the light pole is paved or covered with concrete flatwork, the upper 24 inches of soil should be ignored when calculating the minimum depth of embedment.

An allowable end bearing pressure of 5,000 psf (includes a factor of safety of 3.0) and an allowable average skin friction of 300 psf (includes a factor of safety of 2.0) may be used to support vertical loads applied to pier foundations. A coefficient of friction of 0.4 may be used for lateral sliding. The skin friction within the upper two (2) feet of embedded length must be ignored in unpaved areas. The total settlement of pier foundations designed in accordance with these recommendations should not exceed one-half inch.

Prior to placing the prefabricated reinforced concrete base and concrete backfill, loose or disturbed soils must be removed from the bottom of the drilled excavations using a clean-out bucket or other pre-approved method. A representative of BSK must observe the drilling and clean-out associated with the construction of pole foundations in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report.

If casing is used, the casing must be gradually removed as concrete is placed in the excavation. The concrete must be placed so that it is at least two feet above the bottom of the casing as the casing is extracted from the excavation. The concrete must be vibrated to reduce voids as the casing is withdrawn. If the casing is left in place rather than extracted as indicated above, the allowable average skin friction for the pole installation must be reduced to 150 psf.

4.6 Temporary Trench Excavation

Soils encountered within the depth explored are generally soils Type C in accordance with OSHA (Occupational Safety and Health Administration). The slopes surrounding or along temporary excavations may be vertical for excavations that are less than 5 feet deep and exhibit no indication of potential caving, but must be no steeper than 1.5H:1V for Type C Soils for excavations that are deeper than 5 feet, up to a maximum depth of 12 feet. Certified trench shields or boxes may also be used to protect workers during construction in excavations that have vertical sidewalls and are greater than 5 feet deep. Temporary excavations for the project construction must be left open for as short a time as possible and must be protected from water runoff. In addition, equipment and/or soil stockpiles must be maintained at least 10 feet away from the top of the excavations. Because of variability in soils, BSK must be afforded the opportunity to observe and document sloping and shoring conditions at the time of construction. Slope height, slope inclination, and excavation depths (including utility trench excavations) must in no case exceed those specified in local, state, or federal safety regulations, (e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926, or successor regulations).

4.7 Utility Pipe Bedding and Envelope

Pipes and conduits must be bedded and shaded in accordance with the requirements of the pipe manufacturer. Where no specific requirements exist, we recommend a minimum of 6 inches of sand bedding material for pipe installations. For pipe diameters smaller than 12 inches in diameter, the recommended bedding thickness can be reduced to 4 inches. The bedding material and envelope (up to 12 inches above the pipe) must consist of sand with not more than 10 percent passing the #200 sieve, 100 percent passing the ¾ inch sieve.

As an alternative to using sand, the pipe bedding and envelope material may consist of ¾ inch Class 2 Aggregate Base as specified in Section 26 of the Caltrans Standard Specifications, or a sand–cement slurry that contains 1.5 to 2.0 sacks of cement per yard of material and has a 6 inch slump.

Bedding and pipe envelope must be placed in loose thickness not exceeding 8 inches and compacted to at least 90 percent of the maximum dry density. Moisture content of bedding and pipe envelope soils during compaction must be maintained within two percent (2%) of optimum moisture content. Class 2 Aggregate Base, when used for bedding or pipe envelope must be compacted to at least 92 percent of the maximum dry density. Water jetting to attain compaction must not be allowed.

4.8 Trench Backfill and Compaction

Processed on-site soils, which are free of organic material, are suitable for use as trench backfill above the pipe envelope. Native soil with particles less than three inches in the greatest dimension may be incorporated into the backfill and compacted as specified above, providing they are properly mixed into a matrix of friable soils. The backfill must be placed in thin layers not exceeding 8 inches in loose thickness, be well blended and consistent in texture, be moisture conditioned to within 2 percent of optimum moisture content, and compacted to at least 90 percent of the maximum dry density. The uppermost 24 inches of trench backfill below pavement sections or slab-on-grade must be compacted to at least 95 percent of the maximum dry density.

We recommend that trench backfill be tested for compliance with the recommended relative compaction and moisture conditions. Field density testing must conform to ASTM Test Methods D1556 or D6938. We recommend that field density tests be performed in the utility trench bedding, envelope and backfill for each one-foot vertical lift, at an approximate longitudinal spacing of not greater than 250 feet. Backfill that does not conform to the criteria specified in this section must be removed and reworked to the desired relative compaction, as applicable over the trench length represented by the failing test so as to conform to BSK recommendations.

4.9 Surface Drainage Control

The control of surface drainage at the project site is an important design consideration. BSK recommends the following:

- Final grading around proposed structures must provide for positive and enduring drainage away from the structures, and ponding of water must not be allowed around or near pole structures.
- Irrigation water should be applied in amounts not exceeding those required to offset evaporation, sustain plant life, and maintain a relatively uniform moisture profile around and below the proposed structures.

5.0 PLANS AND SPECIFICATIONS REVIEW

BSK recommends that it be retained to review the draft plans and specifications for the project, with regard to foundations and earthwork, prior to their being finalized and issued for construction bidding.

6.0 CONSTRUCTION TESTING AND OBSERVATIONS

Geotechnical testing and observation during construction is a vital extension of the geotechnical investigation. BSK recommends that it be retained for those services. Field review during site preparation and grading allows for evaluation of the exposed soil conditions and confirmation or revision of the assumptions and extrapolations made in formulating the design parameters and recommendations. BSK observations must be supplemented with periodic compaction tests to establish substantial conformance with these recommendations. BSK must also be called to the site to observe foundation excavations, prior to placement of reinforcing steel or concrete, in order to assess whether the actual bearing conditions are compatible with the conditions anticipated during the preparation of this report. BSK must also be called to the site to observe placement of foundation and slab concrete.

If a firm other than BSK is retained for these services during construction that firm should notify the owner, project designers, governmental building officials, and BSK that the firm has assumed the responsibility for all phases (i.e., both design and construction) of the project within the purview of the geotechnical engineer. Notification should indicate that the firm has reviewed this report and any subsequent addenda, and that it either agrees with BSK's conclusions and recommendation, or that it will provide independent recommendations.

7.0 LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test borings performed at the locations shown on Figure 2. The report does not reflect variations which may occur between or beyond the test borings. The nature and extent of such variations may not become evident until construction is initiated. If variations then appear, a re-evaluation of the recommendations of this report will be necessary after performing on-site observations during the excavation period and noting the characteristics of the variations.

The validity of the recommendations contained in this report is also dependent upon an adequate testing and observation program during the construction phase. BSK assumes no responsibility for construction compliance with the design concepts or recommendations unless it has been retained to perform the testing and observation services during construction as described above.

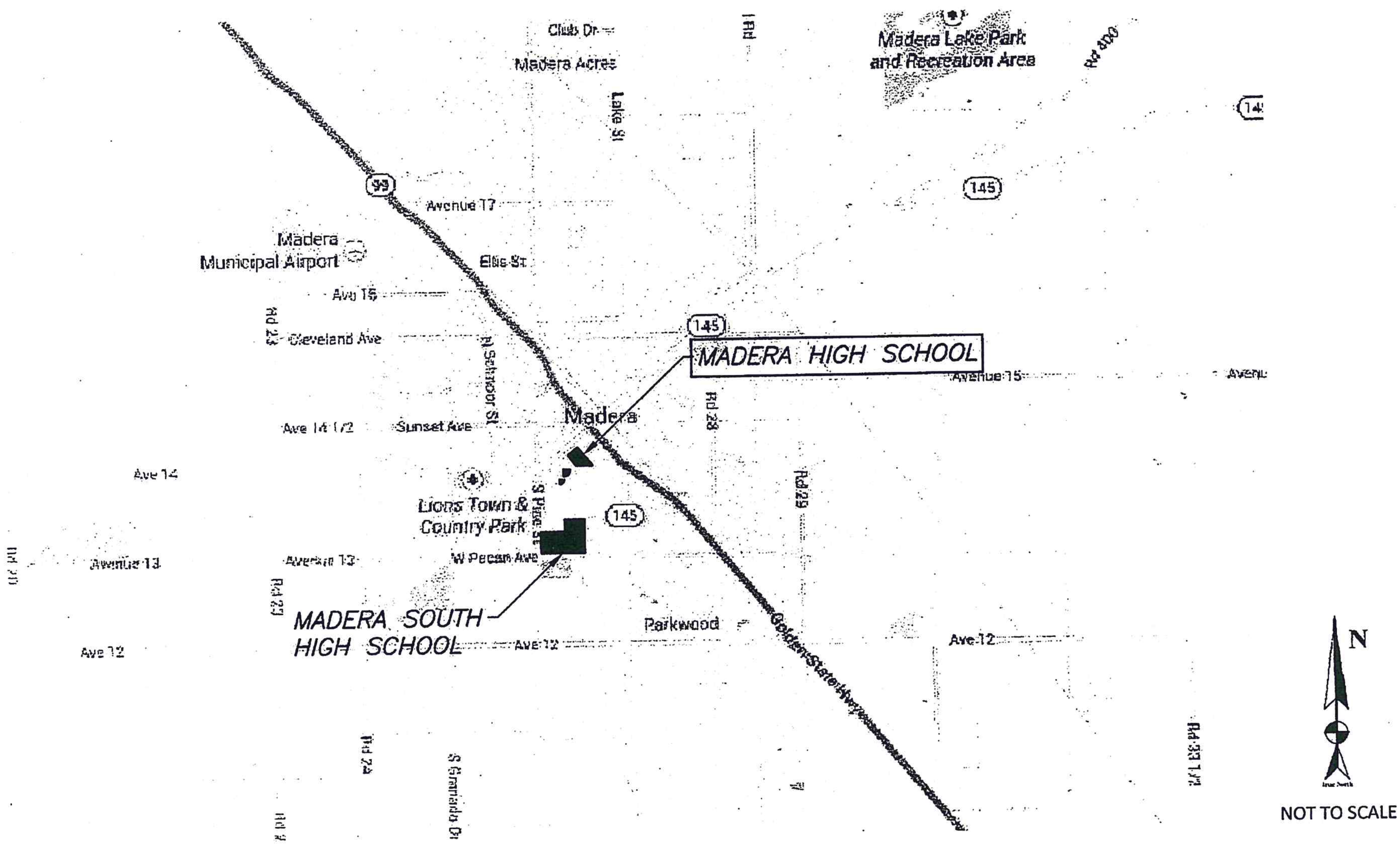
The findings of this report are valid as of the present. However, changes in the conditions of the site can occur with the passage of time, whether caused by natural processes or the work of man, on this property or adjacent property. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, governmental policy or the broadening of knowledge.

BSK has prepared this report for the exclusive use of the Client and members of the project design team. The report has been prepared in accordance with generally accepted geotechnical engineering practices which existed in Madera County at the time the report was written. No other warranties either express or implied are made as to the professional advice provided under the terms of BSK's agreement with Client and included in this report.

BSK ASSOCIATES

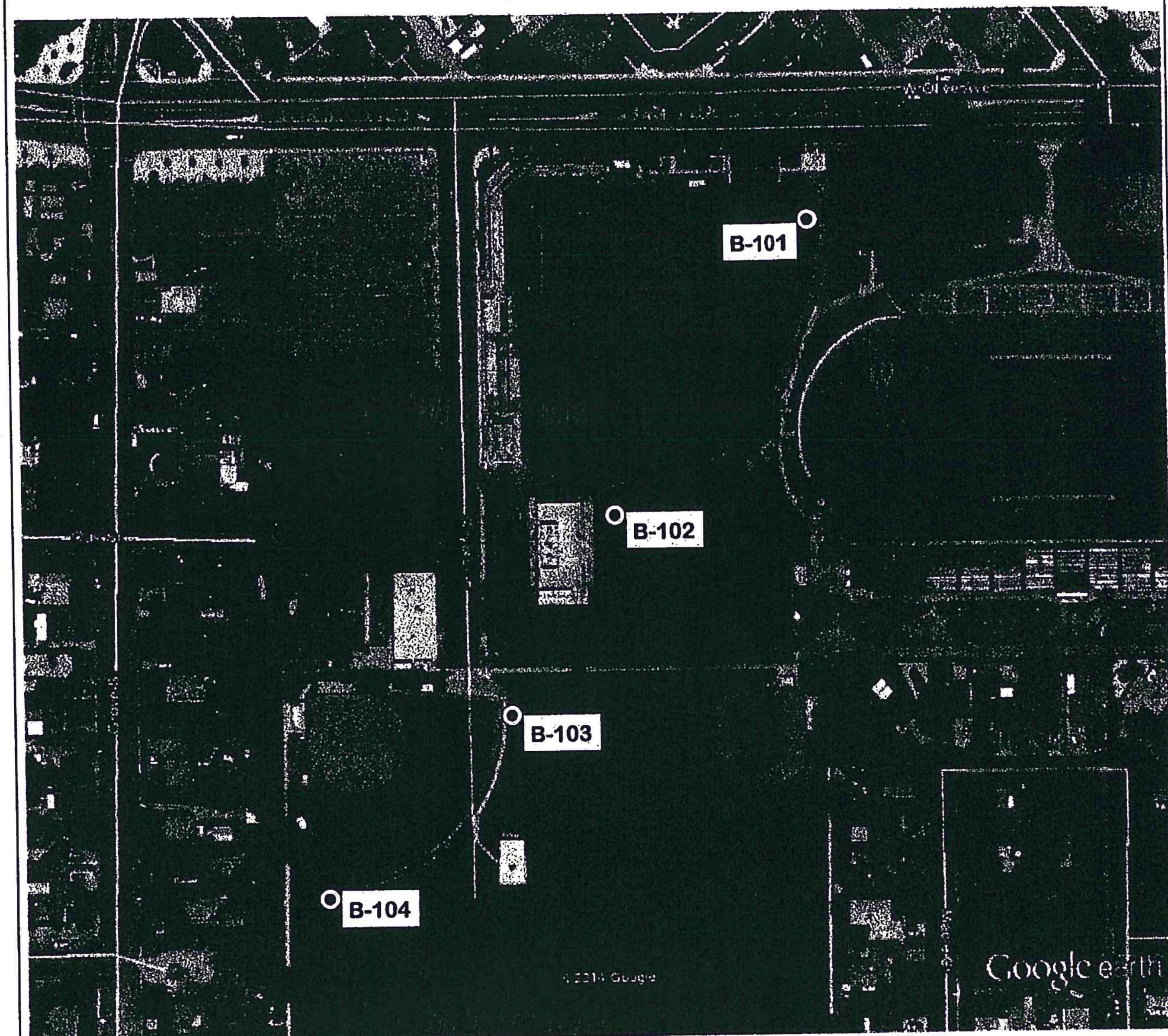
FIGURES

BSK



REFERENCE: VICINITY PLAN FROM ALAN MOK ENGINEERING

BSK Associates Engineers & Laboratories	VICINITY MAP	FIGURE 1
	Proposed Playfield Lighting Improvements Madera High School Madera, California	JOB NO.: BSK G14-113-11F DATE: August 4, 2014 DRWN BY: LS CHK BY: LS



REFERENCE: IMAGE FROM GOOGLE EARTH 2014

LEGEND

B-101 ◉ APPROXIMATE LOCATION OF TEST BORINGS

N

SCALE: 1"=200'

BSK Associates Engineers & Laboratories	**BORING LOCATION PLAN**	**FIGURE 2**
	Proposed Playfield Lighting Improvements **Madera High School** **Madera, California**	JOB NO.: BSK G14-113-11F DATE: August 4, 2014
		DRWN BY: LS CHK BY: LS

APPENDIX A

Field Exploration

Exploratory Borings

The field exploration conducted July 21, 2014 included four (4) borings drilled to a maximum depth of 31.5 feet bgs (below ground surface). The test borings were drilled using a truck-mounted drill rig with hollow stem auger. The approximate locations of the test borings are indicated on Figure 2, Boring Location Map.

The soil materials encountered in the test boring were visually classified in the field, and logs were recorded by the staff professional during the drilling and sampling operations. Visual classification of the materials encountered in the test boring was made in general accordance with the Unified Soil Classification System (ASTM: D2487). A soil classification chart is presented herein. Boring logs are presented herein and should be consulted for more details concerning subsurface conditions. Stratification lines were approximated by the field staff on the basis of observations made at the time of drilling while the actual boundaries between different soil types may be gradual and soil conditions may vary at other locations.

Subsurface samples were obtained at the successive depths shown on the boring logs by driving samplers which consisted of a 2.5 inch inside diameter (I.D.) California Sampler or a 1.4 inch I.D. Standard Penetration Split-Spoon Sampler. The samplers were driven 18 inches using a 140 pound, automatic down-hole hammer dropping 30 inches. The number of blows required to drive the last 12 inches was recorded as the blow count (blows/foot) on the log of borings. The relatively undisturbed soil core samples were capped at both ends to preserve the samples at their natural moisture content. Disturbed soil samples were obtained using the Split-Spoon Sampler (marked X in logs) and were placed and sealed in polyethylene bags. At the completion of the field exploration, the test borings were backfilled with the soil cuttings, as set forth in BSK's proposal.

Table A-1 Consistency of Coarse-Grained Soil versus Sampler Blow Count		
Consistency	SPT Blow Count (#Blows / Foot)	2.5" I.D. California Sampler Blow Count (#Blows / Foot)
Very Loose	<4	<6
Loose	4 – 10	6 – 15
Medium Dense	10 – 30	15 – 45
Dense	30 – 50	45 – 80
Very Dense	>50	>80

Table A-2 Consistency of Fine-Grained Soil versus Sampler Blow Count		
Consistency	SPT Blow Count	2.5" I.D. Cal. Sampler Blow Count
Very Soft	<2	<3
Soft	2 – 4	3 – 6
Medium Stiff	4 – 8	6 – 12
Stiff	8 – 15	12 – 24
Very Stiff	15 – 30	24 – 45
Hard	>30	>45

Note: * - Terzaghi and Peck, 1948

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

	Modified California	RV	R-Value
	Standard Penetration Test (SPT)	SA	Sieve Analysis
	Split Spoon	SW	Swell Test
	Pushed Shelby Tube	TC	Cyclic Triaxial
	Auger Cuttings	TX	Unconsolidated Undrained Triaxial
	Grab Sample	TV	Torvane Shear
	Sample Attempt with No Recovery	UC	Unconfined Compression
CA	Chemical Analysis	(1.2)	(Shear Strength, ksf)
CN	Consolidation	WA	Wash Analysis
CP	Compaction	(20)	(with % Passing No. 200 Sieve)
DS	Direct Shear	▽	Water Level at Time of Drilling
PM	Permeability	▼	Water Level after Drilling(with date measured)
PP	Pocket Penetrometer		

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

BSK Associates
Engineers & Laboratories

BSK Associates
Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: B-101

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	USCS	MATERIAL DESCRIPTION	REMARKS
0–8							SM	**Silty SAND** Brown, fine to medium-grained, moist, slightly plastic, micaceous	Baseball field
2–3.5	■	✋	8	97.5	15.4				
5–6.5	■		8	94.5	14.8			...increase in sands	
8–20							SC	**Clayey SAND** Brown, fine to medium-grained, moist, very dense	
10–11.5	■		57	105.2	19.6				
15–16.5	⧗		44						
20–25							SP	**SAND** Light brown, fine to coarse-grained, moist, dense, some silt	
20–21.5	■		48	107.0	5.7				
25–26							CL	**Silty CLAY** Red orange, mottled green, hard, moist, some fine sands	
25–26.5	⧗		34						
26–30							SM	**Silty SAND** Red brown, fine to medium-grained, moist, dense	
30–31.5	■		48				SC	**Clayey SAND** Gray moist, very dense	

Boring terminated at 31.5-feet bgs
Borehole backfilled with soil cuttings
Groundwater not encountered

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 31.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates
Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: **B-102**

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0–9								SM	**Silty SAND** Brown, fine to medium-grained, moist, organics, medium dense	Baseball field
2–3.5			21							
5–6.5			20	104.4	3.0					
9–14								SC	**Clayey SAND** Red orange, moist, very dense, slight cementation	
10–11.5			50-5"							
14–24								SM	**Silty SAND** Brown, fine to medium-grained, moist, trace mica	
15–16.5			13							
20–21.5			43	111.8	19.6				...gray brown, moist, hard, fine grained	
24–28								SP	**SAND** Light brown, fine to medium-grained, moist, medium dense, trace coarse	
25–26.5			28							
28–30								SM	**Silty SAND** Red orange, fine to medium-grained, trace clay, very dense ...gray brown, moist, trace clay	
30–31.5			49							
									Boring terminated at 31.5-feet bgs Borehole backfilled with soil cuttings Groundwater not encountered	

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 31.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: **B-103**

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0								SM	**Silty SAND** Brown, fine to medium-grained, moist, trace organics	Softball field
2–3			15	104.3	4.9				...medium dense	
5–6			16	109.9	3.8				...trace coarse	
10–11			26						...increase in clay content	
14								SP	**SAND** Light brown, fine to medium-grained, moist	
15–16			57					SM	**Silty SAND** Red orange, mottled gray, fine to medium-grained, trace clay, moist, very dense	
20–21			26					ML	**Sandy SILT** Gray, fine-grained, moist, trace clay, very stiff, mica	
24								SP	**SAND** Light brown, fine to coarse-grained, moist, medium dense	
25–26			28							
26.5									Boring terminated at 26.5-feet bgs Borehole backfilled with soil cuttings Groundwater not encountered	

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 26.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

BSK Associates Engineers & Laboratories

BSK Associates
550 West Locust Avenue
Fresno CA 93650
Telephone: 559-497-2880
Fax: 559-497-2886

Project: Madera HS Lighting Improvements
Location: Madera, California
Project No.: G14-113-11F
Logged By: J. Frank
Checked By: L. Suehiro

Boring: **B-104**

Depth (Feet)	Samples	Bulk Samples	Penetration Blows / Foot	In-Situ Dry Density (pcf)	In-Situ Moisture Content (%)	% Passing No. 200 Sieve	Graphic Log	USCS	MATERIAL DESCRIPTION	REMARKS
0–14								SM	**Silty SAND** Brown, fine to medium-grained, moist, coarse	Softball field
2–3	■		10	102.2	9.3				...loose	
5–6	■		9							
10–11	■		14	107.5	16.4				...medium dense	
14–24								SC	**Clayey SAND** Brown, fine to medium-grained, moist, very stiff	
15–16	⧗		24							
20–21	■		50-6"						...olive brown, mottled orange, very dense	
24–26.5								ML	**Sandy SILT** Gray, moist, very stiff	
25–26.5	⧗		27							

Boring terminated at 26.5-feet bgs
Borehole backfilled with soil cuttings
Groundwater not encountered

Drilling Contractor: Dave's Drilling
Drilling Method: Hollow Stem Auger
Drilling Equipment: Mobile BK-81
Date Started: 7/21/14
Date Completed: 7/21/14

Surface Elevation:
Sample Method: 2.4-inch I.D. Modified & 1.5-inch I.D. SPT Split Spoon
Groundwater Depth: Not Encountered
Completion Depth: 26.5 Feet
Borehole Diameter: 8-inch

* See key sheet for symbols and abbreviations used above.

APPENDIX B
Laboratory Testing

BSK

BSK Associates Engineers & Laboratories

1415 Tuolumne St.
Fresno, CA 93706
Ph: (559) 497-2868
Fax: (559) 485-6140

Direct Shear Test

ASTM D-3080

FIGURE B-1

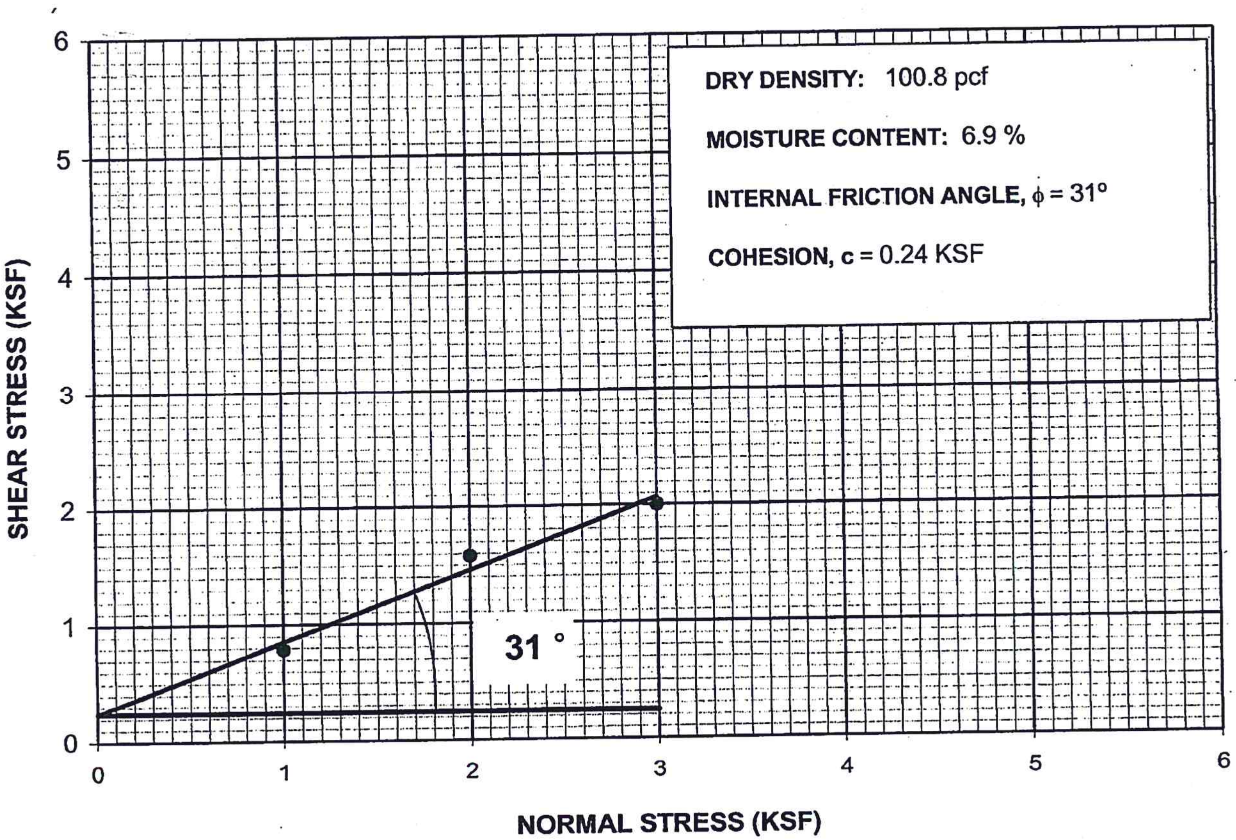
Project Name: Proposed Playfield Lighting Improvements, Madera High School
Project Number: G14-113-11F
Sample Location: B-104 at 5'

Sampled By: JF
Tested By: PB
Lab Tracking ID:

Sample Date: 7/21/2014
Test Date: 7/23/2014
Report Date: 8/4/2014

Sample Description: Silty Sand (SM), brown, moist, fine to medium-grained, trace of mica

SHEAR STRENGTH DIAGRAM



DRY DENSITY: 100.8 pcf

MOISTURE CONTENT: 6.9 %

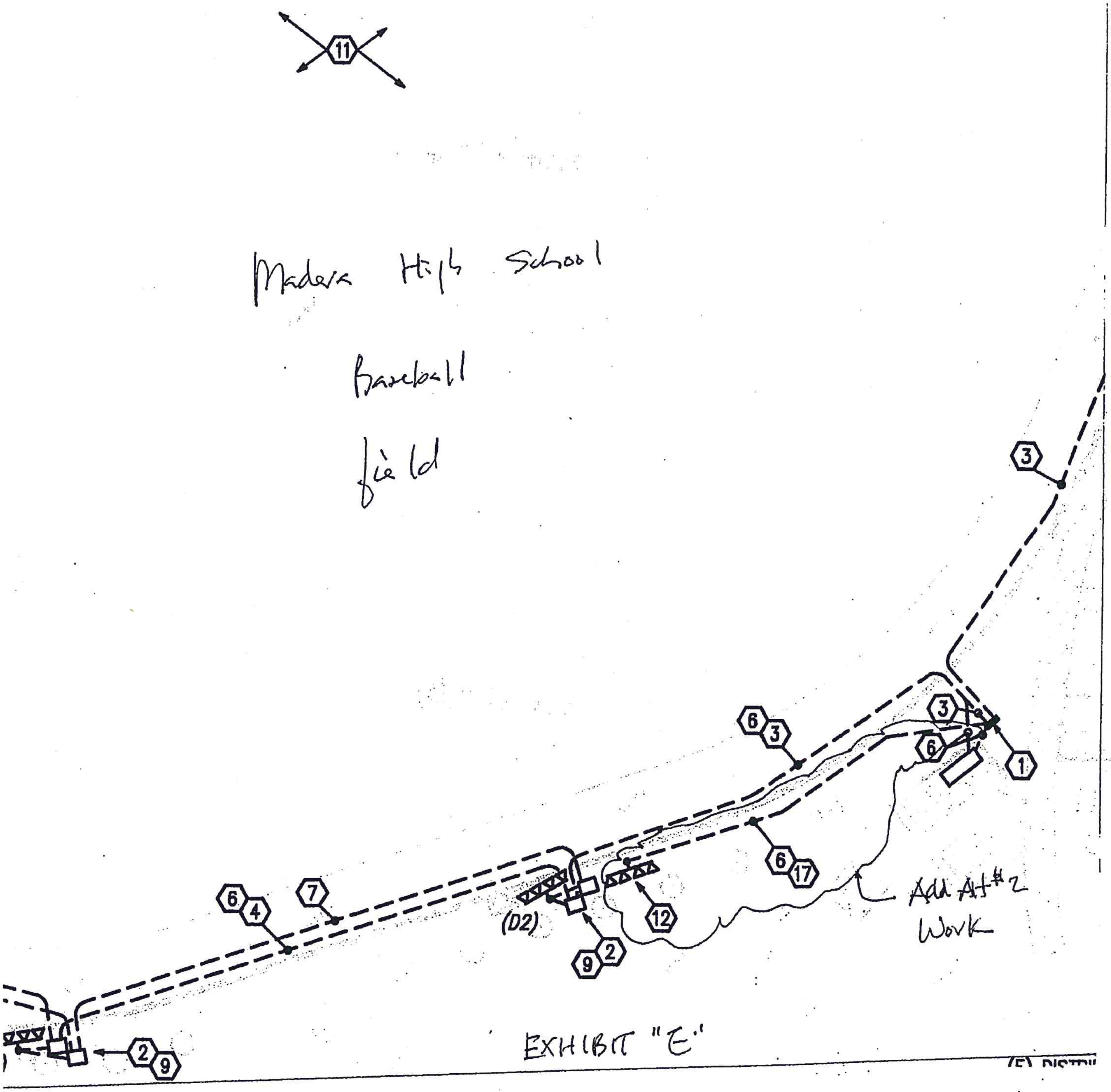
INTERNAL FRICTION ANGLE, ϕ = 31°

COHESION, c = 0.24 KSF

DRAWING KEY NOTES ①

1. SPORTS LIGHTING CONTROLLER & PEDESTAL RACK.
2. (2) B1730 PULLBOX WITH BOLT-DOWN, INCIDENTAL TRAFFIC COVERS (POWER, SIGNAL)
3. (4) 2"C. (POWER)
4. (3) 2"C. (POWER)
5. (2) 2"C. (POWER)
6. 2"C. (POWER)
7. 2"C (SIGNAL)
8. B1730 PULLBOX WITH BOLT-DOWN, INCIDENTAL TRAFFIC COVER (SIGNAL)
9. RUN 2"C. (POWER) AND 1 1/2"C. (SIGNAL) INTO CAISSON AND UP INTO POLE.
10. HAND EXCAVATION REQUIRED THROUGHOUT THIS AREA.
11. REMOVE FROM BASEBALL FIELD EXISTING SPORT LIGHT FIXTURES, OVERHEAD LINES, AND CONTROLS. CAREFULLY ENSURE POWER TO OTHER SYSTEMS UNRELATED TO THE SPORTS LIGHTS ARE NOT REMOVED.
12. BASE BID: REMOVE (E) LIGHT POLE.
ALTERNATE #2: ~~ROTATE~~ ReInstall EXISTING LIGHT POLE with new footing TO POINT AT DISCUSS/JAVELIN FIELD. PROVIDE TRANSFORMER ADJACENT POLE; BRING POWER CONDUIT INTO POLE. RE-AIM FIXTURES PER MUSCO.
13. REMOVE EXISTING CONCRETE AND REPLACE. SEE CIVIL DWGS.
14. BASE BID: REMOVE (E) LIGHT POLE AT LOCATION OF NEW LIGHT POLE.
ALTERNATE #3: REMOVE EXISTING LIGHT POLE AT LOCATION OF NEW LIGHT POLE AND INSTALL AT SOCCER FIELD. SEE SHEET E10.
15. EXISTING DISTRIBUTION BOARD. ADD CIRCUITS PER SINGLE LINE DIAGRAM.
16. ALTERNATE #1: PROVIDE PA SYSTEM PEDESTAL ADJACENT TO BOX. RUN PA CABLING TO POLES EQUIPPED WITH SPEAKERS. INSTALL (2) SPEAKERS EA. FACING SIDELINES AT 'A' AND 'B' POLES.
17. ALTERNATE #2 ITEM.

EXHIBIT "E"


Madera High School
Baseball
field
Add Alt #2
Work
(D2)
EXHIBIT "E"

DRAWING KEY NOTES ①

1. SPORTS LIGHTING CONTROLLER & PEDESTAL RACK.
2. (2) B1730 PULLBOX WITH BOLT-DOWN, INCIDENTAL TRAFFIC COVERS (POWER, SIGNAL)
3. (3) 2"C. (POWER)
4. (2) 2"C. (POWER)
5. 2"C. (POWER)
6. 2"C (SIGNAL)
7. B1730 PULLBOX WITH BOLT-DOWN, INCIDENTAL TRAFFIC COVER
8. RUN 1 1/2"C. (POWER) AND 1 1/2"C. (SIGNAL) INTO CAISSON AND UP INTO POLE.
9. INSTALL RELOCATED LIGHT POLE FROM BASEBALL FIELD. PROVIDE NEW CAISSSON AND RUN CONDUIT IN FROM PULL BOX. RE-AIM FIXTURES PER MUSCO.
10. EXISTING DISTRIBUTION BOARD. ADD NEW CIRCUIT TO BOARD. SEE SINGLE LINE DIAGRAM.
11. REMOVE EXISTING CONCRETE AND REPLACE. SEE CIVIL DWGS.
12. 3"C. (POWER)
13. ALTERNATE #1: PROVIDE PA SYSTEM PEDESTAL ADJACENT TO BOX. RUN PA CABLING TO POLES EQUIPPED WITH SPEAKERS. INSTALL (2) SPEAKERS EA. FACING SIDELINES AT 'A' POLES.
14. ALTERNATE #3 ITEM.

Exhibit "F

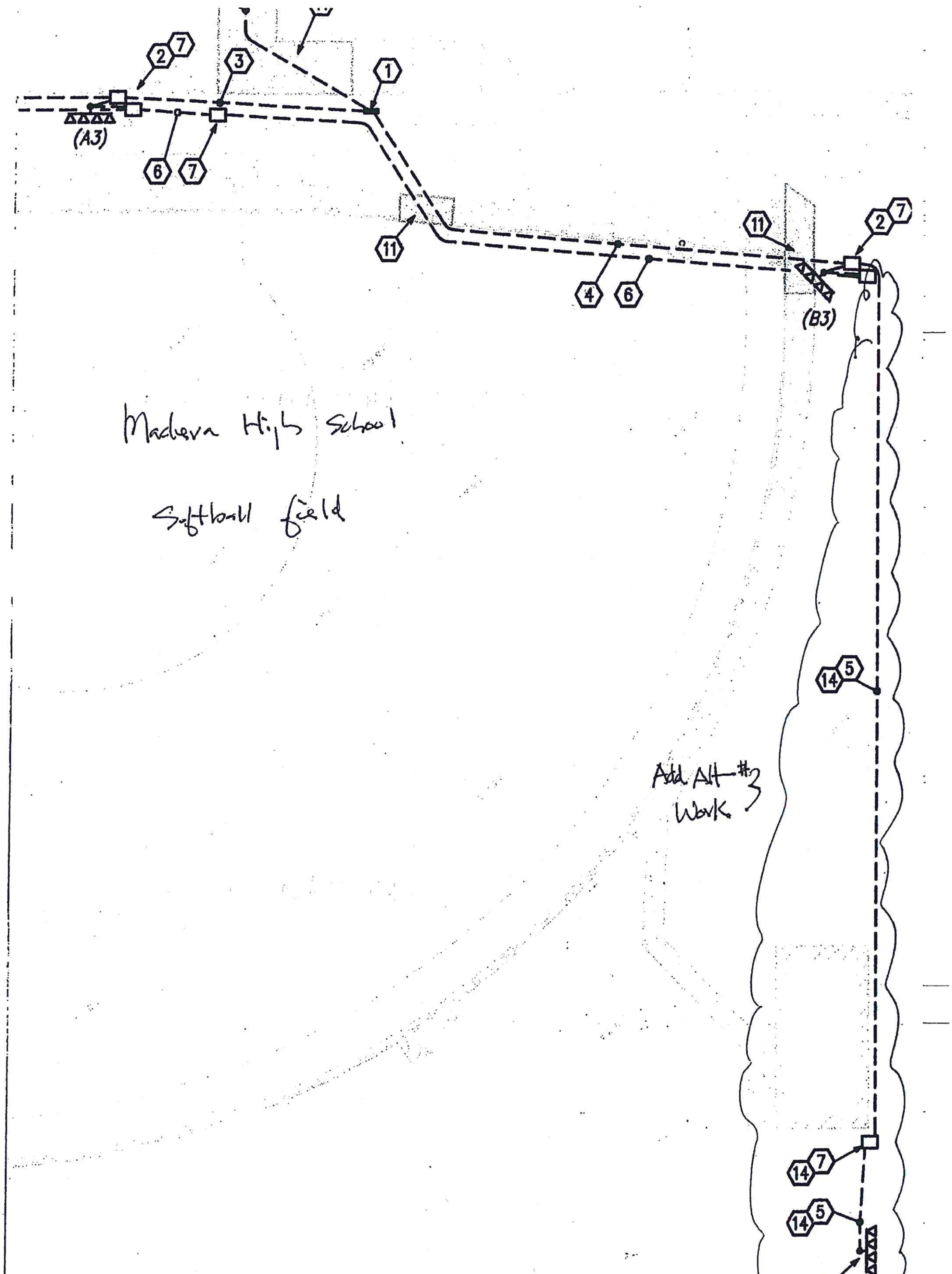

Madera High School
Softball field
Add Alt #3
Work
(A3)
(B3)
1
2
3
4
5
6
7
9
11
14

Exhibit "E"