CITY OF PETALUMA

POST OFFICE BOX 61
PETALUMA, CA 94953-0061

Public Works & Utilities

City Engineer
11 English Street
Petaluma, CA 94952
Phone (707) 778-4303

Environmental Services
Ellis Creek Water
Recycling Facility
3890 Cypress Drive
Petaluma, CA 94954
Phone (707) 776-3777
Fax: (707) 656-4067

Parks & Facility Maintenance
840 Hopper St. Ext.
Petaluma, CA 94952
Phone (707) 778-4303
Fax (707) 206-6065

Transit Division
555 N. McDowell Blvd.
Petaluma, CA 94954
Phone (707) 778-4421

Utilities & Field Operations
202 N. McDowell Blvd.
Petaluma, CA 94954
Phone (707) 778-4546
Fax (707) 206-6034

E-Mail: publicworks@cityofpetaluma.org

ADDENDUM NO. 4

Petaluma Community Sports Fields Baseball Diamond Project
City Project Number C14501607

June 3, 2021

This Addendum No. 4 modifies the Bidding Documents for the Petaluma Community Sports Fields Baseball Diamond C14501607 project. This Addendum shall become part of the Contract and all provisions of the Contract shall apply thereto. Bidders shall acknowledge all Addendums in the Bid Schedule.

BID SCHEDULE – REVISION

1. Revised Bid Schedule. Changes are tracked in red.
   Revised Bid Schedule is attached to this Addendum and shall be incorporated in the bid documents.

SPECIAL PROVISION – REVISION

1. Revised Special Provision, Section 3-14 and Section 3-22. Changes are tracked in red.
   Revised Special Provision is attached to this Addendum and shall be incorporated in the bid documents.

DRAWING PLAN - REVISION

1. Drawing Sheet S4.1 was **revised** and **posted** in the City website.
   Revised S4.1 shall be incorporated in the bid documents.

CLARIFICATION TO CONTRACTORS – QUESTION AND RESPONSE

Question #1: Irrigation legend on sheet L3.5 shows lateral line size as note. However, some places on plans (see image below for example) do not show the size for lateral line. Please advised.

Response #1: All irrigation lateral line shall be 1" dia. unless otherwise noted on the plans. No lateral pipe flow shall exceed 5 FPS.

Question #2: Please provide a vectorized PDF set of plans.

Response #2: The vectorized PDF set of plans are **posted** in the City website with this Addendum.

Question #3: Please provide Geotech report.

Response #3: Refer to Appendix 1 of the Technical Specifications for the Geotechnical

Design Recommendation. Attached in this Addendum is the Supplemental Geotechnical Soils Report dated 2008.

Question #4: Areas outlined do not show size for lateral pipes, are we to assume same size as the controller it's attached to? Also, the location of the controller points to a blank location. Please Clarify. (See attached)

Response #4: Size lateral pipes starting at 1" until larger sizes are noted on the plan. No lateral pipe flow shall exceed 5 FPS. On Sheet L3.2, the controller symbol is pointing to the planting area. Controller shall be pedestal mounted at the planting area per Detail 4/L3.9 with the exact placement to be approved by the City (Sheet Note 1/L3.2).

Question #5: Please provide the Supplementary General Conditions as reference in Article 12.2- Extensions of Contract Times for Delay due to Weather.

Response #5: Special Provision was revised to include the provisions for Adverse Weather Delays.

Question #6: Please clarify FG for the turf field- Page C2.1 shows FG at 99.5, but Detail TSC on C5.1 shows the SDCO Rim at 99.5 and the turf at FG.

Response #6: Maintain the FG of 99.5 at the top of the infill section of the synthetic turf section. The given SDCO rim elevation was used to determine the typical subdrain depth. The final SDCO rim elevation should be adjusted to the bottom of the infill section to avoid a tripping hazard.

Question #7: Please clarify detail/dimensions of the thickened edge on the concrete pavement. Detail 1/L1.5 refers to Civil drawings, but there are no civil details of thickened edges. Also clarify intention where to provide thick edges.

Response #7: Provide and install thickened edge where concrete pavement is adjacent to soil, such as vacant or landscaped areas, to provide a lateral cutoff from the aggregate base. Also provide and install where the concrete edge is adjacent to synthetic turf or synthetic landscape turf such as the upper seating area. See Detail 1/L1.5 for dimensions. Provide and install continuous #3 rebar as reinforcement similar to Detail FC/C6.1.

Question #8: Please clarify if there are vertical curbs or curb & fall away gutters at parking lot landscape approaches/islands on Bid Alternate 2.

Response #8: All curb and section callouts for the Bid Alt 2 are on sheet C1.1. The typical section and details including curb and gutter locations, see sheets C5.1 & C6.1.

Question #9: Please clarify the contrasting quantities provided on planting plan L4.2 (shrubs and sod) and bid schedule. Which one to follow?

Response #9: See attached revised Bid Schedule. Plant/sod quantities for base bid and bid alternate 2 add up to the totals shown on L4.2.

Question #10: Please provide detail for the wall and footing for the ramp wall near backstop.

Response #10: The wall and footing at the ramp will be the same as the Concrete Retaining Wall detailed in 1/S4.1.

Question #11: Please provide detail for the control joint mentioned in Note 2 detail 1/S4.1

Response #11: See added details 8 & 9 on revised Sheet S4.1 as attached in this Addendum.

Question #12: Detail 4/S4.1 shows sleeves for fence post, however, most of the retaining wall in plan sheets shows detail 7/L1.5 post in wall without sleeve but the post goes into the fence footing. Please clarify if sleeves are still required.
Response #12: 4/S4.1 is only applicable to non-screened fences less than 8' high. See 3' High Fence, Detail 1/L1.6.

Question #13: Detail S 2&8/L1.5 shows dowel from retaining wall to concrete pavement. Please provide dowel dimensions and spacing.

Response #13: For flush curb (2/L1.5) expansion joint, provide and install Speed Dowel (PSD09/#4TX) @ 16" oc W/ #4x18" where adjacent to concrete pavement. For wall at synthetic turf (8/L1.5) expansion joint, provide and install 1/2 dia. x 10" smooth rod @16" o.c. for 8" wall, and Speed Dowel (PSD09/#4TX) @ 16" o.c. W/ #4x18" for 12" and 14" wall.

Question #14: Detail S 2&8/L1.5 shows dowel from retaining wall to concrete pavement. Is it required for the vertical curb, and curb and gutter, too? If so, please provide dowel dimensions and spacing.

Response #14: The curb and gutter to sidewalk interface is per the city standards. If they are poured monolithically there is no need for dowels. If they are poured separately then they will need 12” long #4 rebar dowels installed at 4’ spacings.

Question #15: Please provide bid item no. for Vertical Curbs, curb ramps, and stairs.

Response #15: Vertical Curbs shall be included in line item for Concrete Curb and Gutter. Curb Ramps shall be included with Pedestrian Concrete Pavement or Driven Concrete Pavement as applicable. See revised Bid Schedule with line item added for Stairs.

Question #16: Most of our take-off quantities in the concrete except for the retaining walls differs from your quantities by about 25%. Please clarify.

Response #16: Quantities have been revised. Refer to the attached revised Bid Schedule.

Question #17: Please provide details for the expansion joints, none is provided in drawings

Response #17: See detail CF/C6.1 for site walkways and City of Petaluma Standard Detail 202 for curb, gutter, and sidewalk expansion joints and weakened planes.

Question #18: What is the elevation tolerance the class 2 permeable and drain rock has to be graded to for acceptance by the turf subcontractor.

Response #18: Finish surface of aggregate base shall be 0 to -0.05-feet from the elevations on the Drawings. Contractor shall measure and plot the surface grade of the aggregate using a laser grade elevation stick or similar device to ensure site/slope accuracy for approval by the Engineer. Aggregate surface shall not exceed a tolerance of ¼” over 10’. Contractor shall verify using a

stringline method combined with a taper gage to identify and correct localized areas of deviation within the overall field.

Question #19: It states you must have 50 cork infill fields in California. From looking at this and the specs this seems like a sole source which will drive up the cost and to keep out any competitors. We are a certified cork installer and can get you a letter from the supplier if needed. Please clarify.

Response #19: The Contractor should refer to the Instructions to Bidders, list substitutes on the List of Material Suppliers and Material Guarantee form, and provide Quality Assurance, Product Data, Samples, Product Certification, List of Installations, Warranty, and Testing Certification submittals listed in Technical Specification Sections 32 1813 and 32 1814, pursuant to Section 6.3 of the General Conditions.

Question #20: The bid item for dugout railing calls for 4ea. There are only 2 dugouts. Are there railings elsewhere?

Response #20: The Bid Schedule was revised to correct the quantities. Refer to the attached revised Bid Schedule.

This Addendum No. 4 shall become part of the Contract and all provisions of the Contract shall apply thereto. Bidders shall acknowledge all Addendums in the Bid Schedule.

All other items of the documents shall remain unchanged**. A signed copy of this Addendum and the attached acknowledgement form shall be attached to the bid proposal. Failure to do so may cause rejection of your bid as being non-responsive.**

Bids will be emailed into the City Clerk, and original copies of the sealed bids will be mailed in.

Bid Opening Date is on June 10, 2021.

City of Petaluma,

_____

Ken Eichstaedt, P.E. T.E.
Senior Traffic Engineer
Public Works & Utilities Department

ADDENDUM NO. 4

PETALUMA COMMUNITY SPROTS FIELDS BASEBALL DIAMOND PROJECT
City Project Number C14501607

June 3, 2021

ACKNOWLEDGEMENT

Receipt of Addendum No. 4 is hereby acknowledged by _____
(Contractor's Name)

on the _____ day of _____, 2021.

By: _____
Signature

_____
Title

_____
Company

Bid Schedule

City of Petaluma
Petaluma Community Sports Fields
Baseball Diamond

General Instructions to Bidders: The following sheets consist of the Base Bid. The bidder shall submit a bid proposal for the Base Bid in order for the bid to be valid and accepted by the Owner. The Basis for Award is the Base Bid.

BASE BID

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Item Total Cost
001	Mobilization	1	LS		
002	Traffic Control	1	LS		
003	Erosion Control and Sediment Control and Stormwater Management and SWPPP	1	LS		
004	Clearing and Demolition	1	LS		
005	Earthwork	13,000	CY		
006	Lime Treatment, 18″	22,340	SY		
007	Construction Staking	1	LS		
008	4″ HDPE Storm Drain	109	LF		
009	6″ HDPE Subdrain	2,020	LF		
010	6″ HDPE Storm Drain	285	LF		
011	8″ HDPE Storm Drain	325	LF		
012	12″ Class V RCP Storm Drain	100	LF		
013	12″ HDPE Storm Drain	115	LF		
014	12″ Perforated HDPE Storm Drain	395	LF		
015	18″ HDPE Storm Drain	780	LF		
016	24″ HDPE Storm Drain	370	LF		
017	Catch Basin	3	EA		
018	Yard/Field Drain	5	EA		
019	Trench Drain	175	LF		
020	Storm Drain Cleanout	2	EA		
021	Storm Drain Concrete Inlet	2	EA		

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Item Total Cost
022	24″ Drop Inlet	2	EA		
023	36″ Drop Inlet	1	EA		
024	12″ Grate Inlet	1	EA		
025	18″ Grate Inlet	1	EA		
026	24″ Grate Inlet	1	EA		
027	12″ Trench Drain Grate Inlet	4	EA		
028	12″ Storm Drain Concrete Outfall	3	EA		
029	12″ Storm Drain Outfall Flag Gate	1	EA		
030	24″ Storm Drain Concrete Outfall	1	EA		
031	Sanitary Sewer Lateral	135	LF		
032	Water Service Lateral	1	EA		
033	Asphalt Concrete	700	TON		
034	Parking Lot Striping and Signage	1	LS		
035	Class II Aggregate Base	600	CY		
036	Concrete Swale	343	LF		
037	Concrete Curb and Gutter	1,310	LF		
038	Flush Curb	1,260	LF		
039	Pedestrian Concrete Pavement	14,155	SF		
040	Asphalt Pavement at Future Bleachers	150	TON		
041	Driven Concrete Pavement	5,280	SF		
042	Retaining Wall 8″ wide	290	LF		
043	Retaining Wall 12″-14″ wide	590	LF		
044	Synthetic Turf System	1	LS		
045	Brock PowerBase YSR	127,000	SF		
046	Synthetic Turf Field Drain Rock/Base Material	1,000	CY		
047	Synthetic Turf Field Permeable Class II Aggregate/Base Material	2,500	CY		
048	Field Section Geotextile Fabric	14,100	SY		
049	Field Section Stego Wrap Liner	2,140	SY		
050	Header Board	1,700	LF		

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Item Total Cost
051	Lighting Conduit - Site	1	LS		
052	Lighting Conduit – Sports Field	1	LS		
053	Dugout Roof	2	EA		
054	CMU Wall at Dugout	150	LF		
055	Dugout Railing with Fence and Padding	1	LS		
056	Barrier Netting	390	LF		
057	Backstop (tie-back)	1	EA		
058	Foul Poles (Custom Left, Standard Right)	1	Set of 2		
059	Bases	1	LS		
060	Anchor Kit for Bases in Synthetic Turf	1	LS		
061	Backstop Pads	1	LS		
062	Chain Link Top Rail Cap	700	LF		
063	3′ Chain Link Fencing	140	LF		
064	8′ Chain Link Fencing	1,550	LF		
065	8′ Chain Link Single Gate	4	EA		
066	8′ Chain Link Single Maintenance Gate	1	EA		
067	8′ Chain Link Gate in 12′ Fence	2	EA		
068	8′ Chain Link Double Entry Gate	3	EA		
069	8′ Chain Link Dbl. Maintenance Gate	1	EA		
070	12′ Chain Link Fencing	295	LF		
071	12′ Chain Link Dbl. Maintenance Gate	1	EA		
072	Railing/Handrail	350	LF		
073	Flagpole	1	LS		
074	Removal of Lime Treatment for Planting	1	LS		
075	Soil Preparation	20,000	SF		
076	Mulch	325	CY		
077	Root Barrier	435	LF		
078	Irrigation System	20,000	SF		
079	Tree (24″ box)	18	EA		

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Item Total Cost
080	Bioretention Area	5,550	SF		
081	No Mow Sod	14,000	SF		
082	Shrubs (5 gallon)	77	EA		
083	Shrubs (1 gallon)	878	EA		
084	Landscape Maintenance Period	3	MONTH		
085	Wetlands Mitigation	1	LS		
086	Localized Removal of Soft Soil, Per Foot Depth, and Replacement	1,000	SF		
087	Stairs	1	LS		

TOTAL BASE BID $ _____

BID ALTERNATE 1

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Item Total Cost
088	Lighting - Site	1	LS		
089	Lighting – Sports Field	1	LS		

BID ALTERNATE 2

Item No.	Item Description	Estimated Quantity	Unit of Measure	Unit Cost	Item Total Cost
090	Earthwork	2,650	CY		
091	Lime Treatment, 18"	4,500	SY		
092	18" HDPE Storm Drain	340	LF		
093	Catch Basin	2	EA		
094	Asphalt Concrete	500	TON		
095	Parking Lot Striping and Signage	1	LS		
096	Class II Aggregate Base	430	CY		
097	Concrete Swale	542	LF		
098	Concrete Curb and Gutter	850	LF		
099	Pedestrian Concrete Pavement	11,770	SF		
100	Concession Area Pavement Asphalt	120	TON		
101	Driven Concrete Pavement	4,180	SF		
102	Synthetic Landscape Turf System with Aggregate Base	3,800	SF		
103	Synthetic Landscape Turf Header	325	LF		
104	Lighting - Site	1	LS		
105	Soil Preparation	10,000	SF		
106	Root Barrier	480	LF		
107	Irrigation System	10,000	SF		
108	Tree (24" box)	10	EA		
109	No Mow Sod	3,030	SF		
110	Shrubs (15 gallon)	18	EA		
111	Shrubs (5 gallon)	103	EA		
112	Shrubs (1 gallon)	224	EA		
113	Landscape Maintenance Period	3	MONTH		
114	AC and Subgrade Repair	1,000	SF		
115	Mulch	1	LS		

*Note: In case of error in extension of price into the total price column, the unit price will govern.

Total Amount of Bid (written in words) is:

_____ Dollars and

_____ Cents

In the event of discrepancy between words and figures, the words shall prevail.

$_____
Figures

Note: **The award of the contract shall be awarded to the lowest price of the <u>Base Bid.</u>**

_____ _____
Address of Bidder Signature of Bidder

_____ _____
City Name of Bidder (Print)

_____ _____
Telephone Number of Bidder Fax Number of Bidder

_____
Contractor's License Number License's Expiration Date

Addendum Acknowledgement

Addendum No. 1 Signature Acknowledging Receipt:_____ Date:_____

Addendum No. 2 Signature Acknowledging Receipt:_____ Date:_____

Addendum No. 3 Signature Acknowledging Receipt:_____ Date:_____

Addendum No. 4 Signature Acknowledging Receipt:_____ Date:_____

SECTION III.

SPECIAL PROVISIONS

3-1. DESCRIPTION OF WORK – Soil lime treatment, installation of storm drain system (4" HDPE, 6" HDPE, 12" RCP, 12" HDPE, 18" HDPE and 24" HDPE, catch basin/inlet, cleanout, trench drain, 12" and 24" outfall), sanitary sewer lateral, water service lateral, AC paving, parking lot striping and signage, concrete curb and gutter, pedestrian concrete walkway, electrical lighting conduits, fencing, railing, bio-retention area, synthetic landscape turf system, irrigation system, planting trees, shrubs and sod, and wetlands mitigation.

3-2. ORDER OF PRECEDENCE OF CONTRACT DOCUMENTS – If the CONTRACTOR discovers any errors, omissions, discrepancies, or conflicts in the Contract, he/she shall immediately inform the ENGINEER in writing. The ENGINEER will promptly resolve such matters by issuing addenda or change orders. Failure or delay to act on the part of the ENGINEER shall not constitute a waiver of any right afforded the CITY or the ENGINEER by the Contract or marker prior to authorization by the CITY shall be at the CONTRACTOR'S risk.

Unless otherwise noted below, conflicts or inconsistencies between parts of the Contract will be resolved by the ENGINEER with a change order or an addendum, if required. Addenda and change orders bearing the most recent date shall prevail over addenda or change orders bearing earlier dates. Any reference to addenda-changed specifications or drawings shall be considered to have been changed accordingly.

In resolving conflicts, errors, or discrepancies, the order of precedence shall be as follows:

1) Change Orders/Addenda (most recent in time takes precedence)
2) Agreement and Bond Forms
3) Special Provisions
4) Technical Specifications
5) Standard Specifications (Current Caltrans Standard Specifications)
6) Drawings
7) General Conditions
8) Instructions to Bidders
9) CONTRACTOR'S Bid (Bid Form)
10) Notice Inviting Bids
11) Permits from other agencies as may be required by law.

3-3. COOPERATION - Attention is directed to Sections 5-1.20, "Coordination with Other Entities", and 5-1.36D, "Non-highway Facilities", of the Standard Specifications and these special provisions.

The CONTRACTOR shall not adjust gas, electric, television cable, telephone, and Sonoma County structures. The CONTRACTOR will notify each agency who will be in turn adjust their own structures at least seven (7) working days prior to covering/burying these facilities at no cost to the CITY. Failure to do so shall result in the CONTRACTOR being liable for the utility agencies' claims.

3-4. OBSTRUCTIONS - Attention is directed to Sections 5-1.36D, "Non-highway Facilities", and 15, "Existing Facilities", of the Standard Specifications and these special provisions.

The CONTRACTOR's attention is directed to the existence of certain underground facilities that may require special precautions be taken by the CONTRACTOR to protect the health, safety and welfare of workmen and of the public. Facilities requiring special precautions include, but are not limited to: conductors of petroleum products, oxygen, chlorine and toxic or flammable gases; natural gas in pipelines greater than 6 inches in diameter or pipelines operating at pressures greater than 60 psi (gage); underground electric supply system conductors or cables either directly buried or in duct or conduit which do not have concentric neutral conductors or other effectively grounded metal shields or sheaths; and underground electrical conductors with potential to ground of more than 300 volts.

The CONTRACTOR shall notify the ENGINEER and the appropriate regional notification center for operators of subsurface installations at least 5 working days prior to performing any excavation or other work close to any underground pipeline, conduit, duct, wire or other structure. Regional notification centers include but are not limited to the following:

Underground Service Alert
Northern California (USA)
Telephone: 1 (800) 227-2600

If the CONTRACTOR's certain operation is delayed, in the opinion of the ENGINEER, by the discovery of an underground utility not indicated on the plans or not marked by USA, the CONTRACTOR shall be paid a fair and reasonable compensation for the actual loss. Actual loss shall be understood to include no items of expense other than idle time of equipment exclusively used in such operation and necessary payments for idle time of labor exclusively required for such operation only, determined as follows:

1) Compensation for idle equipment shall be applied at the reduced Caltrans' Equipment Rental Rates where the right of way delay factor for each classification of equipment shall be applied to such equipment rental rate. No markup shall be applied for overhead or profit.

2) Compensation for idle time of labor shall be actual wages paid to the workers. No markup shall be added for overhead and profit.

3) The time for which such compensation will be paid will not exceed eight (8) hours for each incident.

4) The CONTRACTOR shall be granted an extension of time for the delay.

5) No monetary compensation will be allowed for delays due to utilities indicated on the plans or marked by USA.

3-5. MAINTAINING TRAFFIC – Attention is directed to Sections 7-1.03, "Public Convenience", 7-1.04, "Public Safety", and 12, "Temporary Traffic Control", of the Standard Specifications and the City of Petaluma Traffic Control Design and Construction Standards Series 700. Nothing in these special provisions shall be construed as relieving the CONTRACTOR from his/her responsibility as provided in said Section 7-1.04. The CONTRACTOR shall not obstruct parking in front of the soccer fields without prior City approval.

The Contractor will minimize disruption to all traffic (vehicular, transit, bicycle, and pedestrians) during the allowed work window. During construction, bicyclists will either share the road with vehicular traffic in a signed detour or be provided separate access. In addition, pedestrian access will be maintained at all times during construction. The Contractor shall provide temporary pedestrian curb ramps and clearly mark the temporary crosswalks. The pedestrian path shall be clear of any debris and meet ADA requirements. Driveway access to schools, residents, and businesses will also be maintained at all times.

Lane closures shall conform to the provisions in the section of these special provisions entitled, "Traffic Control System for Lane Closure".

At least five (5) working days prior to beginning of each phase of construction (i.e., piping installation, paving, pavement repair, concrete construction, etc.), the CONTRACTOR shall:

A. Notify all adjacent residents, businesses, City of Petaluma Police and Fire, Green Waste Recovery (residential refuse service company), Waste Management Company (industrial refuse service company), and Petaluma Transit by written notices detailing the type, limits, date and the hours of work. Details of the notice shall be submitted to the ENGINEER for review and approval at least five (5) days prior to delivering these notices.

B. Where required, post streets with temporary "No Parking/Tow Away" signs at 100-foot intervals at least 72 hours in advance. These signs shall be furnished by the CONTRACTOR and shall state the date; day of week and hour parking is prohibited.

Illuminated traffic cones when used during the hours of darkness shall be affixed or covered with reflective cone sleeves as specified in Section 12-3.10, "Traffic Cones", of the Standard Specifications.

Full compensation for temporary delineation shall be considered as included in the prices paid for the contract in terms of work which obliterated the existing delineation and no separate payment will be made therefore.

When working in or blocking any intersection, the CONTRACTOR shall provide flag persons to direct traffic at that intersection. This is in addition to other required flag persons.

Personal vehicles of the CONTRACTOR's employees shall not be parked on the traveled way, including any section closed to public traffic. The CONTRACTOR, at all times, shall provide flag person(s) to direct delivery trucks and CONTRACTOR's vehicles entering or leaving the public traffic.

The CONTRACTOR shall notify the City of Petaluma of his/her intent to begin work at least 5 days before work is begun. The CONTRACTOR shall cooperate with local authorities relative to handling traffic through the area and shall make his/her own arrangements relative to keeping the working area clear of parked vehicles.

Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25-foot intervals to a point not less than 25 feet past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A C23 (Road Work Ahead) or C24 (Shoulder Work Ahead) sign shall be mounted on a telescoping flag tree with flags. The flag tree shall be placed where directed by the ENGINEER.

A minimum of one (paved) reversible traffic lane, not less than 10 feet wide, shall be open for use by public traffic in with minimal delays, flaggers, adequate traffic control, and signing. ***Flashing arrow boards shall be required for any lane closures***.

Day work: No work and/or preparation of work shall be performed between 5:00 p.m. and 7:00 a.m. unless approved by the ENGINEER in writing, except work required under said Sections 7-1.03 and 7-1.04 of the Standard Specifications or specified elsewhere in the special provisions.

Night work: No work and/or preparation of work shall be performed between 5:00 a.m. and 10:00 p.m. unless approved by the ENGINEER in writing, except work required under said Sections 7-1.03 and 7-1.04 of the Standard Specifications or specified elsewhere in the special provisions.

Except as otherwise provided, the full width of the traveled way shall be open for use by public traffic on Saturdays, Sundays, after 4:00 p.m. on Fridays, on designated legal holidays, during the holiday shutdown period (in applicable areas), and when construction operations are not actively in progress.

Designated legal holidays and the holiday shutdown period are outlined in "Hours of Work" of these Special Provisions.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the CONTRACTOR if in the opinion of the ENGINEER public traffic will be better served and the work expedited. Such deviations shall not be adopted until the ENGINEER has indicated his/her written approval. All other modifications will be made by contract change order.

The City of Petaluma Traffic Control Design and Construction Standards (Series 700) shown elsewhere in these specifications are guidelines only. The CONTRACTOR is not relieved from his/her responsibility for submitting his/her own traffic control plan.

The CONTRACTOR's failure to comply with the requirements of this section will be sufficient cause for the ENGINEER to suspend work at no cost to the City.

All costs involved for completing all work described in this section shall be considered to be included in the contract price paid for Traffic Control System and no additional compensation shall be allowed therefore.

CONTRACTOR shall maintain public access along the trail for safe public access.

3-6. WATERING - Watering shall conform to the provisions in Section 17, "Watering", of the Standard Specifications except that full compensation for developing water supply shall be considered as included in the prices paid for various contract items for work involving the use of water and no separate payment will be made therefore. The application of water for dust control will not be considered as extra work under any circumstances. Water can be purchased from the City at current rates provided that the CONTRACTOR meters the water so used with a City furnished meter (a deposit will be required) and a CONTRACTOR furnished valve assembly.

3-7. PROGRESS SCHEDULE - The CONTRACTOR shall submit a schedule which includes all major tasks and milestones to the City of Petaluma, Public Works and Utilities Department for review **at least** ten (10) working days prior to start of work.

After beginning of work, updated schedules shall be submitted. No progress payments will be processed without accepted updated schedules.

Payment for the original schedule and updated, weekly schedules shall be considered to be included in the various items of work and no additional compensation will be allowed therefore.

3-8. SUPERINTENDENCE - The CONTRACTOR shall designate in writing and submit to the Project Engineer two (2) working days before starting work, an authorized representative who shall have the authority to represent and act for the CONTRACTOR for the duration of the contract. Any change in the designation shall require prior approval of the ENGINEER.

When the CONTRACTOR is comprised of two (2) or more persons, firms, partnerships or corporations functioning on a joint venture basis, said CONTRACTOR shall designate in writing before starting work, the name of one authorized representative who shall have the authority to represent and act for the CONTRACTOR.

Said authorized representative shall be present at the site of work at all times while work is actually in progress on the contract. When work is not in progress and during periods when work is suspended, arrangements acceptable to the ENGINEER shall be made for any emergency work, which may be required.

If work is in progress and the authorized representative is not on site, the City reserves the right to stop the work at no cost to the City.

Once the work begins, the Superintendent shall keep the ENGINEER informed of the CONTRACTOR's daily schedule. The ENGINEER shall have at least twenty-four (24 hour advance notice of all work, on a daily basis, including SUBCONTRACTOR's work. If the CONTRACTOR fails to notify the ENGINEER, the ENGINEER reserves the right to stop the work at no cost to the City.

In the case of urgency or emergency where the CONTRACTOR's authorized representative is not present on any particular part of the work and where the ENGINEER wishes to give notification or direction, it will be given to and be obeyed by the superintendent or foreperson who may have charge of the particular work or it will be given to and be obeyed by any worker in the area should the superintendent or foreperson not be immediately available.

All costs involved in superintendence shall be included in the contract prices paid for various items of work and no additional payment will be allowed therefore.

3-9. SAFETY REQUIREMENT - The CONTRACTOR shall comply with all CAL/OSHA safety requirements. It shall be the CONTRACTOR's sole responsibility for making sure these safety requirements are met and the CONTRACTOR shall fully assume all liabilities for any damages and/or injuries resulting from his or her failure to comply with the safety requirements. Failure on the City's part to stop unsafe practices shall, in no way, relieve the CONTRACTOR of his/her responsibility.

The CONTRACTOR shall first call City of Petaluma Emergency Center at 911, from a regular telephone, and (707) 762-2727 or from a cellular phone (707) 762-4545, if any gas lines or electrical power lines are broken or damaged.

3-10. PROJECT AND CONSTRUCTION AREA SIGNS – Project sign and construction area signs shall be furnished, installed, maintained, and removed when no longer required in accordance with the provisions in Section 12, “Construction Area Traffic Control Devices”, of the Standard Specifications.

Two (2) project signs with a minimum dimension of 3’X4’X3/4” plywood bolted to an A-frame barricade shall be furnished, installed and moved from site to site by the

Contractor. Letters and numbers shall be black on a white background. The sign information shall be as shown below:

CITY OF PETALUMA (4" LETTERS)

PROJECT: PETALUMA COMMUNITY SPORTS FIELDS BASEBALL DIAMOND PROJECT

FUNDING: PARKLAND IMPACT FUNDS & DONATIONS (3" LETTERS)

PROJECT MANAGER: KEN EICHSTAEDT (3" LETTERS)

PHONE: 707-210-2266

The signs shall be approved prior to fabrication and posted as directed by the Engineer.

Construction area signs will be installed prior to start of construction and maintained in place for the duration of the project by the CONTRACTOR. When installed, the signs shall not extend beyond the street curb alignment into the travel way. Signs shall be repaired or replaced at no cost to the City of Petaluma, if damaged or stolen. The CONTRACTOR shall remove the signs and posts at the completion of the project and with prior approval of the ENGINEER.

All costs involved in purchasing and installing construction area and project signs shall be considered as included in the Lump Sum price paid for Traffic Control System.

3-11. PROJECT APPEARANCE – The CONTRACTOR shall maintain a neat appearance to the work area.

When practicable, debris developed during construction shall be disposed of concurrently with its removal. It is anticipated that all material excavated on the site can remain on the site as directed by the CITY. Stockpiling on the street shall not be allowed. The CONTRACTOR shall apply for a "stockpiling" permit from the City's Community Development Department prior to stockpiling more than fifty (50) cubic yards of materials on private property. The CONTRACTOR shall solely be responsible for securing staging and/or stockpiling areas.

The CONTRACTOR shall provide dust control as often as required during the construction, and shall clean the roads/streets with street sweepers at least once a day at the end of each working day or more often if safety or appearance conditions warrant. Failure to maintain dust control, street cleaning and/or any required work specified in this section shall result in the City performing the work with other forces and back charge the CONTRACTOR for the costs.

Full compensation for conforming to the provisions in this section, not otherwise provided for, shall be considered as included in prices paid for the various contract items of work involved and no additional compensation will be allowed therefore.

3-12. RESPONSIBILITY FOR DAMAGE - The CONTRACTOR shall indemnify, hold harmless, release and defend the City of Petaluma, its officers, officials, employees and agents from and against any and all liabilities, claims, demands, losses, damages, expenses, costs (including without limitation costs and fees of litigation) of every nature arising out of or in connection with the activities of the CONTRACTOR, his/her subcontractors, employees and agents, except such loss or damage which was caused by the sole negligence or willful misconduct of the CITY, its employees or agents. The CITY may retain so much of the money due the CONTRACTOR as shall be considered necessary, until disposition has been made of claims or suits for damages as aforesaid.

3-13. GUARANTEE OF WORK - Neither the final certificate of payment nor any provision in the contract nor partial or entire use of the improvements embraced in this contract by the City or the public shall constitute an acceptance of work not done in accordance with the contract or relieve the CONTRACTOR of liability in respect to any warranties or responsibility for faulty materials or workmanship. The CONTRACTOR's attention is directed to Article 5, "Bonds and Insurance", of the General Conditions.

3-14. NOTICE TO PROCEED, BEGINNING OF WORK, CONTRACT TIME, TIME OF COMPLETION, AND LIQUIDATED DAMAGES – Article 2.3, "Commencement of Contract Times; Notice To Proceed" of the General Conditions is amended to read:

The CONTRACTOR shall begin work within ten (10) working days from the date of Notice To Proceed (NTP) and shall diligently prosecute the same to completion before the expiration of total allocated working days as specified in the Construction Agreement and/or Invitation to Bid, from the date of starting work. The CONTRACTOR shall complete all of the work directed by the ENGINEER in all parts and requirements within the time set forth. A working day is defined in these specifications.

The CONTRACTOR is on notice that it may take approximately eight (8) weeks from the bid opening to obtain the City Council's award of the contract, to process the construction agreement, and to issue the Notice to Proceed.

The CONTRACTOR shall pay to the City of Petaluma the sum of $1,500 per day for each and every *calendar day's* delay in finishing the work in excess of the number of days prescribed above (and/or in excess of the number of days prescribed for any scheduled operations or works described in the Special Provisions).

Adverse Weather Delays: 1. Adverse weather shall not be a prima facie reason for the granting of a non-compensable time extension, and Contractor shall make every effort to continue work under prevailing conditions. Such efforts by Contractor shall include, but are not limited to, providing temporary gravel roads; installing a rain dewatering system; protecting interior and exterior areas exposed to rain, wind, and extreme temperatures; and providing temporary heat where required for Work to proceed without delay. 2. The City may classify an adverse weather day as a non-compensable Unavoidable Delay, provided Contractor made efforts to work during adverse weather and to avoid the impacts of adverse weather to its schedule. If such an event occurs, and Contractor is prevented by adverse weather or conditions from proceeding with at least 75 percent of

the scheduled labor, material and equipment resources for at least 5 hours per work day on activities shown as critical on the most current and City-approved progress schedule update, the delay will be classified as an Unavoidable Delay, and Contractor will be granted a non-compensable time extension. 3. Regardless of the type and severity of the adverse weather, Contractor shall be responsible for all costs of its efforts to mitigate the impacts of adverse weather to its schedule during the Contract Time. 4. Adverse weather shall mean rain, windstorm, flood, or other natural phenomenon occurring at the Site which exceed the anticipated number of days of inclement weather as provided herein and which are proven by Contractor to be detrimental to the progress of the Work. Contractor shall plan the Work to allow for the following number of days of inclement weather during normal working hours:

Month	Rain Days	Month	Rain Days
January	3	July	0
February	3	August	0
March	3	September	0
April	1	October	1
May	0	November	3
June	0	December	3

a. Contractor's progress schedule shall incorporate prudent allowance for the anticipated number of days of inclement weather specified herein. b. The Contract Time allowed for completion of Work specified in Contract Time and Liquidated Damages is predicated on the anticipated number of days of inclement weather specified herein. c. Contractor shall not be entitled to receive a time extension related to weather until the anticipated number of days specified herein for the month of occurrence of the inclement weather event has been exceeded. d. In the event that there are months with less than the anticipated number of inclement weather days specified herein, the City reserves the right to transfer the unused inclement weather days to other months of the Contract Time for which Contractor has requested a time extension because of adverse weather. e. In the event that there is a month with more than the anticipated number of inclement weather days specified herein, and Contractor has requested a time extension because of adverse weather, the City reserves the right to transfer unused inclement weather days from other months of the Contract Time to the month in question. Contractor shall not be entitled to receive a time extension related to weather until the anticipated number of days specified herein for the month of occurrence of the inclement weather event, plus any inclement weather days transferred by the City from other months of the Contract Time, has been exceeded.

A working day is defined as any day, except as follows:

a. Saturdays, Sundays, and legal holidays
b. Days on which the CONTRACTOR is prevented by inclement weather or conditions resulting immediately therefrom adverse to the current controlling operation or operations, as determined by the ENGINEER, from proceeding with at least 75 percent of the normal labor and equipment force engaged on that operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations.

Should the CONTRACTOR prepare to begin work at the regular starting time of any day on which inclement weather, or the conditions resulting from the weather, or the condition of the work, prevents the work from beginning at the usual starting time and the crew is dismissed as a result thereof and the CONTRACTOR does not proceed with at least 75 percent of the normal labor and equipment force engaged in the current controlling operation or operations for at least 60 percent of the total daily time being currently spent on the controlling operation or operations, the CONTRACTOR will not be charged for a working day whether or not conditions should change thereafter during that day and the major portion of the day could be considered to be suitable for those construction operations.

Determination that a day is a non-working day by reason of inclement weather or conditions resulting immediately therefrom shall be made by the ENGINEER. The CONTRACTOR will be allowed 10 days from the issuance of the weekly statement of working days in which to file a written protest setting forth in what respects the CONTRACTOR differs from the ENGINEER; otherwise, the decision of the ENGINEER shall be deemed to have been accepted by the CONTRACTOR as correct. The ENGINEER will furnish the CONTRACTOR a weekly statement showing the number of working days charged to the contract for the preceding week, the number of working days of time extensions being considered or approved, the number of working days originally specified for the completion of the contract, and the number of working days remaining to complete the contract and any time extensions thereof.

3-15. HOURS OF WORK

Weekdays – Weekdays (Monday through Friday) hours shall be from 7:00 a.m. to 5:00 p.m. for all required work except those hours approved by the City of Petaluma or specified in "Order of Work" Section of these special provisions. Work hours for County of Sonoma and Caltrans right of way shall be governed by their respective permit conditions.

Night Hours – Other than emergency work, there will be no night hours allowed on this project.

Liquidated Damages in the sum of Fifteen Hundred Dollars ($1,500) per day will be assessed against the CONTRACTOR if he fails to comply with any of the daily conditions or operations such as maintaining erosion control facilities, job site/street cleanliness and daily cleanup and traffic control and flagging, as described in the General Conditions, these Special Provisions, and the Technical Specifications.

If the CONTRACTOR closes a street or sidewalk without prior notice and approval of the ENGINEER within 24 hours, the associated operation will be shutdown at the CONTRACTOR's expense.

Holidays - Designated legal holidays are: January 1st, the third Monday in January, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, the second Monday in October, November 11th, Thanksgiving Day, the day

after Thanksgiving, December 24th and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday. When November 11th falls on a Saturday, the preceding Friday shall be a designated legal holiday. The Contractor shall not work on the legal holidays unless approved in writing by the Engineer.

Holiday Shutdown - No work shall be allowed to be performed in the business district (defined by the map on the City of Petaluma web site at **http://cityofpetaluma.net/cdd/pdf/boundaries.pdf**) between Thanksgiving Day, the day after Thanksgiving, and December 25th thru January 3rd of the following year.

3-16. RECORD ("AS-BUILT") DRAWINGS – The CONTRACTOR shall furnish Record Drawings of the complete project and procure from the Director of Public Works a full sized set of Contract Drawings. Construction drawings shall be on the construction site at all times while the work is in progress. Drawings shall show approved substitutions, if any, of material including manufacturer's name and catalog number. The Drawings shall be to scale and all indications shall be neat and legible. All information noted on the CONTRACTOR's job-site print shall be transferred to the Record Drawings by CONTRACTOR and all indications shall be recorded in a neat, legible and orderly way. The Record Drawings shall be signed by the CONTRACTOR and turned over to the Director of Public Works before the final acceptance of the project. If the CONTRACTOR fails to provide the City with an acceptable "Record Drawings", the City shall deduct $2,000 from the amount due CONTRACTOR.

3-17. NOTICE OF POTENTIAL CLAIM - If for any reason the CONTRACTOR deems that additional compensation is due him/her for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized extra work, a Notice of Potential Claim shall be made. The CONTRACTOR shall give the ENGINEER a written Notice of Potential Claim for such additional compensation before work begins on the items on which the claim is based. The notice shall set forth the reasons for which the CONTRACTOR believes additional compensation will or may be due and the nature of the costs involved. The CONTRACTOR shall afford the ENGINEER every opportunity and facility for keeping records of the actual cost of the work. The CONTRACTOR shall keep records of the disputed work in accordance with Contract General Conditions, Section 11.3, "Cost of Work (Based on Time and Materials)."

If such notification is not given or the ENGINEER is not afforded proper opportunity by the CONTRACTOR for keeping strict account of actual cost as required, then the CONTRACTOR hereby agrees to waive any claim for such additional compensation. Such notice by the CONTRACTOR and the fact that the ENGINEER has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the CONTRACTOR shall, within 10 calendar days, submit his/her written claim to the ENGINEER who will present it to the City for consideration in accordance with local laws or ordinances. The CONTRACTOR is directed to Section 17.20 "Resolution of Construction Claims" of the General Conditions.

Any claim for overhead type expenses or costs, in addition to being certified as stated above, shall be supported by an audit report of an independent Certified Public Accountant. Any claim for overhead shall also be subject to audit by the City at its discretion.

Any costs or expenses incurred by the City in reviewing or auditing any claims that are not supported by the CONTRACTOR's cost accounting or other records shall be deemed to be damages incurred by the City within the meaning of the California False Claims Act.

Nothing in this subsection shall be construed as a waiver of the CONTRACTOR's right to dispute final payment based on differences in in-place quantity measurements or computations of unit priced pay items.

3-18. PAYMENT FOR MATERIALS ON HAND - At the discretion of the ENGINEER, partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications. Such delivered costs of stored or stockpile materials may be included in the next partial payment after the following conditions are met:

1. The material has been stored or stockpiled and protected at the sole expense of the CONTRACTOR at a location acceptable to the City and in a manner acceptable to the ENGINEER.

2. The CONTRACTOR has furnished the ENGINEER with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

3. The CONTRACTOR has furnished the ENGINEER with satisfactory evidence that the material and transportation costs have been paid.

4. The CONTRACTOR has furnished the City legal title (free of liens or encumbrances of any kind) to the material so stored or stockpiled.

5. The CONTRACTOR has furnished the City evidence that the material so stored or stockpiled is insured against loss by damage to or disappearance of such materials at anytime prior to use in the work.

6. The CONTRACTOR shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

It is understood and agreed that the transfer of title and the City's payment for such stored or stockpiled materials shall in no way relieve the CONTRACTOR of his/her responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications. In no case will the amount of partial payments for materials on hand exceed 70% of the contract price for the contract items in which the material is intended to be used.

3-19. ACCESS TO DRIVEWAYS – All accesses for the sports fields, local businesses and residents shall be maintained at all times. Temporary ramps will be required each night for access to driveways for residences and commercial access. The Contractor shall coordinate with each driveway user as needed.

3-20. ARCHAEOLOGICAL MONITORING – In the event that archaeological materials are found during construction, CONTRACTOR shall notify the ENGINEER immediately and shall temporarily cease work in the area until a determination or investigation of the site can be made by a qualified archaeologist. Archaeologist services shall be provided by the City at no cost to the CONTRACTOR.

3-21. BIOLOGICAL MONITORING – The CITY will be providing biological monitoring as deemed necessary. The CONTRACTOR shall notify the ENGINEER immediately for any biological disturbance.

3-22. STORM WATER MANAGEMENT, AND SEDIMENT AND EROSION CONTROL – CONTRACTOR shall prepare storm water management, and sediment and erosion control measures for implementation and shall maintain these measures during the construction period as required by the Regional Water Quality Control Board (RWQCB) permit **and in compliance with the San Francisco Regional Water Quality Control Board Clean Water Act Section 401 Water Quality Certification for the Petaluma Community Sports Field. (Appendix 5 of Technical Specifications)**.

Because the area to be disturbed by construction activities is more than one acre, the CONTRACTOR shall be required to file a Notice of Intention (NOI), pay the fee, prepare the SWPPP, BMP, etc. as required by RWQCB permit.

Storm water management, and sediment and erosion control shall include, but not be limited to fiber rolls (sediment logs or wattles), straw bales, drain rock, check dams, silt fencing, siltation basins and as required for construction conditions. Measures shall be submitted to the ENGINEER for review seven (7) days prior to start of construction. The CONTRACTOR shall be responsible for providing the measures that would comply with the RWQCB.

The CONTRACTOR shall also place drain rock bags around storm drain inlets/catch basins, and install drain rock check dams at 50-foot intervals within 100 feet upstream from the inlets/catch basins.

The CONTRACTOR shall comply with all Federal, State and local regulations and ordinances governing storm water pollution prevention.

If required, the CONTRACTOR shall file a Notice of Intent (NOI) with the RWQCB, and shall comply with the National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Association with Construction Activity requirements. The CONTRACTOR shall prepare and implement a Storm Water Pollution Plan (SWPPP). Resources used in developing the SWPPP shall include the "California Storm Water Best Management Practice Handbook for Construction Activity," and the San Francisco Bay Regional Water Quality Control Board's

"Information on Erosion and Sediment Controls for Construction Projects." The SWPPP shall be submitted for review and acceptance prior to start of work. The CONTRACTOR shall have an accepted and implemented SWPPP as part of Mobilization. The SWPPP shall, at a minimum, include Best Management Practices (BMPs), acceptable to the City, **incorporate the requirements of the Section 401 Water Quality Certification for Construction elements (not Monitoring and Reporting) and can build upon and incorporate the draft SWPP (Appendix 1). The SWPPP shall** address the following:

1. Housekeeping
2. Waste Containment and Control.
3. Minimizing Disturbed Areas.
4. Stabilize Disturbed Areas.
5. Protect Slopes and Channels.
6. Control Site Perimeter.
7. Control of Internal Erosion.
8. Disposal of Storm Water and Ground Water
9. Sediment Control.
10. Liquid Waste Management.
11. Concrete Waste Management.
12. Hazardous Waste Management.
13. Employee and SUBCONTRACTOR Training.
14. Vehicle and Equipment Fueling and Maintenance.
15. Spill Prevention and Control.
16. Contaminated Soil Management.
17. Sawcutting.
18. Paving and Asphalt Work.
19. Street Cleaning.
20. Dust Control

In the construction of concrete pathway, employ and utilize the required best management practices such as installation of temporary silt fence, and catch basin protection, and fully observe all local, state, and federal regulations.

All costs involved for completing all work described in this section shall be considered to be included in the contract price paid under **Erosion Control and Sediment Control and Stormwater Management and SWPPP**, and no additional compensation shall be allowed therefore.

3-23. ITEM INCREASES AND DECREASES -

Increased or Decreased Quantities

Increases or decreases in the quantity of a contract item of work will be determined by comparing the total pay quantity of that item of work with the ENGINEER's Estimate therefor.

If the total pay quantity of any item of work required under the contract varies from the ENGINEER's Estimate therefore by 25 percent or less for increases and 25 percent or less for decreases, payment will be made for the quantity of work of the item performed at the contract unit price.

If the total pay quantity of any item of work required under the contract varies from the ENGINEER's Estimate therefor by more than 25 percent for increases and 25 percent for decreases, in the absence of an executed contract change order specifying the compensation to be paid, the compensation payable to the CONTRACTOR will be determined in accordance with the following sections.

Increases of More Than 25 Percent

Should the total pay quantity of any item of work required under the contract exceed the ENGINEER's Estimate therefore by more than 25 percent, the work in excess of 125 percent of the estimate and not covered by an executed contract change order specifying the compensation to be paid therefor will be paid for by adjusting the contract unit price based upon a force account analysis.

The adjustment of the contract unit price will be the difference between the contract unit price and the actual unit cost which will be determined as hereinafter provided, of the total pay quantity of the item. If the costs applicable to the item of work include fixed costs, the fixed costs will be deemed to have been recovered by the CONTRACTOR by the payments made for 125 percent of the ENGINEER's Estimate of the quantity for the item, and in computing the actual unit cost, the fixed costs will be excluded. Subject to the above provisions, the actual unit cost will be determined by the ENGINEER in the same manner as if the work were to be paid for on a force account basis.

When the compensation payable for the number of units of an item of work performed in excess of 125 percent of the ENGINEER's Estimate is less than $5,000 at the applicable contract unit price, the ENGINEER reserves the right to make no adjustment in the

contract unit price if the ENGINEER so elects, except that an adjustment will be made if requested in writing by the CONTRACTOR.

Decreases of More Than 25 Percent

Should the total pay quantity of any item of work required under the contract be less than 25 percent of the ENGINEER's Estimate therefore, an adjustment in compensation pursuant to this Section will not be made unless the CONTRACTOR so requests in writing. If the CONTRACTOR so requests, the quantity of the item performed, unless covered by an executed contract change order specifying the compensation payable therefor, will be paid for by adjusting the contract unit price based upon a force account analysis. In no case shall the payment for that work be less than that which would be made at the contract unit price.

The adjustment of the contract unit price will be the difference between the contract unit price and the actual unit cost, which will be determined as hereinafter provided, of the total pay quantity of the item, including fixed costs. The actual unit cost will be determined by the ENGINEER in the same manner as if the work were to be paid for on a force account basis; or the adjustment will be as agreed to by the CONTRACTOR and the ENGINEER.

The payment for the total pay quantity of the item of work will in no case exceed the payment which would be made for the performance of 25 percent of the ENGINEER's Estimate of the quantity for the item at the original contract unit price.

3-24. EXISTING WATER VALVES, MONUMENTS AND MANHOLES – The City shall have access at all times to water valves, monuments, and manholes except immediately following a construction operation as noted below.

Prior to placement of paving, all manholes, monuments, and valves covered by paving, shall be clearly marked in white paint before the close of that work day. Throughout the construction process, the CITY shall have access to manholes, monuments, and valves within 48 hours of any operation affecting the manholes, monuments and valves.

A penalty of Fifty Dollars ($50) per each valve, monument, and manhole that is not raised, or that the CITY is not provided easy access to, will be assessed against the contractor for each calendar day.

3-25. WAGE RATES - The General Prevailing Wage Determination Made by the Director of Industrial Relations Pursuant to California Labor Code Part 7, Chapter 1, Article 2, Sections 1770, 1773 and 1773.2. The CONTRACTOR can download this information from the web site: http://www.dir.ca.gov/dlsr/PWD/

The most current prevailing wage rates available at the time of bid opening shall be used.

3-26. STAGING AREA – It is the responsibility of the Contractor to provide a staging area for equipment and materials. The site and hauling route shall be submitted to the City for

approval prior to the commencement of work. The Contractor shall obtain written confirmation from property owners for use of the site.

3-27. COORDINATION WITH PG&E – CONTRACTOR shall coordinate the work schedule with PG&E and the City of Petaluma 2 weeks prior to commencement of work. Delays claims or request for additional compensation will not permitted due to PG&E operations or for time waiting on PG&E to determined abandoned facilities or PG&E encounters. All coordination, down time, and work associated with the PG&E shall be considered as included in other items of work and shall be included in prices paid for various contract items of work involved and no additional compensation will be allowed therefor.

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GEOTECHNICAL INVESTIGATION
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

September 30, 2008

Project No. 1206.04

Prepared For:
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495 Tesconi Circle
Santa Rosa, CA 95401-4619

CERTIFICATION

MILLER PACIFIC ENGINEERING GROUP
(a California corporation)

REVIEWED BY

Nathaniel R. Swanson
Staff Geologist

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Geotechnical Engineer No. 2686
(Expires 12/31/08)

GEOTECHNICAL INVESTIGATION
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

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GEOTECHNICAL INVESTIGATION
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

I. INTRODUCTION

This report summarizes Miller Pacific Engineering Group's (MPEG) geotechnical investigation for the planned East Washington Park Sports Complex development in Petaluma, California. As shown on the Site Location Map, Figure 1, the project site is located about 0.5 miles southwest of the intersection of Adobe Road and East Washington Street in eastern Petaluma. The project will include new baseball diamonds and soccer fields, several ancillary structures, field lights, paved roads, flatwork, paths and landscaping on an approximately 23 acre, undeveloped parcel. The development area will occupy the entire extent of the parcel, as shown on Figure 2.

The purpose of our geotechnical investigation is to explore subsurface conditions and develop geotechnical criteria for design of the new sports fields, ancillary structures and other site improvements. The scope of our geotechnical investigation included review of readily-available geotechnical and geologic data, subsurface exploration with 11 exploratory borings, laboratory testing, engineering evaluation, and development of recommendations appropriate for the project and site. In accordance with our proposal letter dated June 12, 2008, MPEG is providing the following services:

1. Subsurface exploration within the project site with eleven borings;
2. Laboratory testing of select samples to determine the engineering properties of the soils; and,
3. A geotechnical report that contains;
    - Review of available geologic and geotechnical reference data,
    - Results of subsurface exploration and laboratory testing,
    - Evaluation of the pertinent geologic hazards and geotechnical conditions,
    - Design-level recommendations for;
        i. General site grading and subgrade preparation,
        ii. Synthetic turf field subgrade preparation and design parameters for the permeable rock drainage system underlying the turf material (Appendix B),
        iii. Vehicular, pedestrian and track pavement sections,
        iv. Exterior and interior concrete slabs, and
        v. Foundations for small buildings, dugouts, bleachers, backstops, foul poles, and lighting.

Appendix B of this report includes specifications and recommended details for subdrainage of synthetic turf fields.

We will remain available for consultation with the Design Team throughout the design process. Our services during bidding and construction will be provided under a separate agreement.

II. PROJECT DESCRIPTION

The planned East Washington Park project will include three natural-turf baseball diamonds, three synthetic-turf soccer fields, a BMX bicycle area, approximately 2,300 linear feet of paved roadway with three roundabouts, widening of East Washington Street, a restroom/concession/storage structure (1,000 sq. ft.), a restroom/concession structure (840 sq. ft.), a restroom (123 sq. ft.), a maintenance building (860 sq. ft), a trash enclosure (340 sq. ft.), a gazebo, six dugouts, shade structures, foul poles, field lights, approximately 3,500 linear feet of asphalt-concrete (AC) paved pathways, exterior concrete flatwork for terraces and sidewalks, and landscaping. The locations of these various improvements are shown on Figure 2.

III. SITE CONDITIONS

A. Regional Geology

The site is located within the Coast Range Geomorphic Province of California. The regional bedrock geology consists of complexly folded, faulted, sheared, and altered sedimentary, igneous, and metamorphic rock of the Jurassic-Cretaceous age (65-190 million years ago) Franciscan Complex.

The regional topography is characterized by northwest-southeast trending mountain ridges and intervening valleys that reflect the geologic structure of the same orientation. Extensive faulting, folding and erosion/deposition continuing through late Tertiary formed the valley area surrounding the project site, and the Sonoma Mountains to the east. Fault activity is presently concentrated along the San Andreas Fault zone, a complex group of generally parallel, northwesterly trending faults. This zone includes the active Rodgers Creek Fault that traverses through the Sonoma Mountains.

Geologic mapping of the area by the California Division of Mines and Geology (CDMG, 1980) indicates that the project site is underlain by late Holocene outer-edge alluvial fan deposits consisting mainly of fine sand, silt, and silty clay. Near surface soil in this area is known locally as “Adobe” which is clayey and is commonly highly expansive in nature.

B. Surface Conditions

The project site is located approximately one half-mile southwest of the intersection of Adobe Road and East Washington Street in Petaluma on the southeast side of East Washington Street. The existing site consists of three low alluvial tongues, each approximately 10 feet tall and gently sloping to the southwest. The three tongues are separated by two narrow, natural swales that also slope to the southwest. The central swale within the site is delineated as a wetland. The site is blanketed by dark brown, high plasticity clay that, at the time of our exploration (July 2008), had undergone extensive desiccation shrinkage. Surface cracks up to six inches wide and three feet deep were observed.

C. Field Exploration and Laboratory Testing

We explored subsurface conditions in the planned improvement area with 11 auger borings to depths between 4.5 to 15.0 feet on July 30, 2008. The boring locations are shown on Figure 2. The soils encountered in our borings were logged and samples were obtained for laboratory testing. The subsurface exploration program is discussed in more detail in Appendix A. A Soil Classification Chart is shown on Figure A-1. The boring logs are presented on Figures A-2 through A-12 of Appendix A.

Laboratory testing of samples from the exploratory borings included moisture content, dry density, unconfined compression, and plasticity. The results of the moisture content, dry density, and unconfined compression tests are presented on the boring logs. The plasticity test results are presented on Figure A-13. The laboratory testing program also is discussed in more detail in Appendix A.

D. Subsurface Conditions

Our subsurface exploration generally confirms the mapped local geologic conditions. The soils within the project site generally consist of high plasticity silty clay (Adobe) from depths of 1.5 to 9 feet below the ground surface, underlain by stiff, low to medium plasticity sandy clay. Lenses of silty and clayey sand were encountered in Boring 3. Our past experience, as well as current site observation and laboratory testing, indicate that the Adobe clay is moderately to highly expansive (will undergo large volume changes with seasonal changes in moisture content).

Groundwater was not observed in any of the borings we excavated. However, groundwater levels can fluctuate seasonally and we performed drilling during the summer season when groundwater levels are generally very low. We anticipate that surface water infiltration can become temporarily perched on top of relatively low permeability clayey soil layers following extended rains.

E. Seismicity and Other Hazards

The site is located within a seismically active area and will therefore experience the effects of future earthquakes. Earthquakes are the product of the build-up and sudden release of strain along a “fault” or zone of weakness in the earth's crust. Stored energy may be released as soon as it is generated or it may be accumulated and stored for long periods of time. Individual releases may be so small that they are detected only by sensitive instruments, or they may be violent enough to cause destruction over vast areas.

Faults are seldom single breaks in the earth's crust but typically are braids of breaks that comprise shatter or shear zones which link to form networks of major and minor faults. Within the Bay Area, faults are concentrated along the San Andreas Fault zone. The movement between rock formations along either side of a fault may be horizontal, vertical, or a combination and is radiated outward in the form of energy waves. The amplitude and frequency of earthquake ground motions partially depends on the material through which it is moving. The earthquake force is transmitted through hard rock in short, rapid vibrations, while this energy movement becomes a long, high-amplitude motion when moving through soft ground materials, such as bay mud.

An “active” fault is one that shows displacement within the last 11,000 years and, therefore, is

considered more likely to generate a future earthquake than a fault that shows no sign of recent rupture. The locations of the currently known active faults relative to the project site are shown on Figure 3. The closest active fault that could produce significant seismic shaking is the Rodgers Creek fault located approximately 3 miles northeast of the site.

Probability of Future Earthquakes: To evaluate earthquake probability in this region, the USGS has assembled a group of researchers into the "Working Group on California Earthquake Probabilities" to estimate the probabilities of earthquakes on active faults. Potential sources were analyzed considering fault geometry, geologic slip rates, geodetic strain rates, historic activity, and micro-seismicity, to arrive at estimates of probabilities of earthquakes with a Moment Magnitude greater than 6.7 by 2032.

The probability studies focus on seven "fault systems" within the Bay Area. Fault systems are composed of different, interacting fault segments capable of producing earthquakes within the individual segment or in combination with other segments of the same fault system. The probabilities for the individual fault segments in the San Francisco Bay Area are presented on Figure 3.

In addition to the seven fault systems, the studies included probabilities of "background earthquakes." These earthquakes are not associated with the identified fault systems and may occur on lesser faults (i.e., West Napa) or previously unknown faults (i.e., the 1989 Loma Prieta and 2000 Napa/Mt. Veeder Earthquake). When the probabilities on all seven fault systems and the background earthquakes are combined mathematically, there is a 62 percent chance for a magnitude 6.7 or larger earthquake to occur in the Bay Area by the year 2032. Smaller earthquakes (between magnitudes 6.0 and 6.7), capable of considerable damage depending on proximity to urban areas, have about an 80 percent chance of occurring in the Bay Area by 2032 (USGS, 2002).

Additional studies by the USGS regarding the probability of large earthquakes in the Bay Area are on going. These current evaluations include data from additional active faults and updated geological data.

Fault Surface Rupture: Under the Alquist-Priolo Special Studies Zone Act[1], the California Division of Mines and Geology (CDMG) produced 1:24,000 scale maps showing all known active faults and defining zones within which special fault studies are required. Based on currently available published geologic information, the project site is not located within an

[1] The Alquist Priolo Earthquake Fault Zoning Act prohibits placing most structures for human occupancy across traces of active faults. These fault zones are shown on maps issued by the Department of Conservation's Division of Mines and Geology.

Alquist-Priolo Special Studies Zone. The potential for fault surface rupture is therefore considered to be low.

Seismic Shaking: The site will likely experience seismic ground shaking similar to other areas in the seismically active San Francisco Bay Area. Earthquakes along several active faults in the region, as shown on Figure 3, could cause moderate to strong ground shaking at the site. The intensity of earthquake ground motions will depend on the characteristics of the generating fault, distance to the fault and rupture zone, earthquake magnitude, earthquake duration, and site-specific geologic conditions. Medium stiff to stiff soils underlie the site to the depths explored. Empirical attenuation equations developed for stiff soil sites provide approximate estimates of median peak site accelerations. A summary of the principal active faults affecting the site, their closest distance, moment magnitude of characteristic earthquake and probable peak ground accelerations which an earthquake on the fault could generate at the site, are shown in Table A.

TABLE A
ESTIMATED PEAK GROUND ACCELERATION
FOR PRINCIPAL ACTIVE FAULTS
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

Fault	Moment Magnitude for Characteristic Earthquake	Closest Estimated Distance	Median Peak Ground Acceleration
Rodgers Creek	7.0	3 km	0.48g
San Andreas	7.8	27 km	0.19g
Hayward North	6.4	25 km	0.13g
West Napa	6.5	25 km	0.13g
Maacama South	6.9	35 km	0.11g

References: Sources: USGS (2008), Abrahamson and Silva (1997)

The potential for strong seismic shaking at the project site is high. Due to its close proximity, the Rodgers Creek Fault (approximately 4 kilometers to the northeast) presents the highest potential for severe ground shaking. The most significant adverse impact associated with strong seismic shaking is potential damage to structures and improvements.

Minimum mitigation measures should include designing the structures and foundations in accordance with the most recent (2007) California Building Code. Recommended seismic coefficients are provided in Section IV-C of this report.

Liquefaction Potential and Related Impacts: Liquefaction refers to the sudden, temporary loss of soil shear strength during strong ground shaking. Liquefaction-related phenomena can include ground settlement, flow failure, and lateral spreading. These phenomena can occur where there are saturated, loose, granular deposits. Based on our subsurface exploration and laboratory testing, the alluvial soils at the site contain relatively high percentages of fine-grained material (silts and clays) and/or are relatively stiff/dense. Therefore, liquefaction potential at the site is considered to be low.

Expansive Soil: Clays and silts of moderate to high plasticity, when located near the ground surface, can exhibit expansive characteristics (shrinking and swelling with seasonal drying and wetting cycles) that can be detrimental to lightly-loaded structures and flatwork. Our exploration encountered up to 9 feet of plastic, potentially expansive soils near the ground surface. Based on our exploration, laboratory testing, and experience in the area, we judge that the near-surface soils at the site pose a significant hazard to site development due to expansive soil shrink/swell.

Mitigation options for expansive soils can include proper site preparation (through moisture conditioning), lime treatment, or the use of select fill to minimize potential damage from expansive soils. Geotechnical recommendations for site preparation and foundation design are provided in Sections IV-D and IV-E, respectively.

Flooding: The development area is not within a FEMA 100-year flood zone. The project Civil Engineer is responsible for site drainage and should evaluate flooding potential and provide appropriate mitigation.

Other Commonly Considered Hazards: Because the site is relatively flat and is not located at the base of a slope where an offsite landslide event would impact the project area, landsliding/slope stability, lurching, and ground cracking are not considered a significant risk. The site is not located in close proximity to any large bodies of water. Therefore seiche and tsunamis do not pose a significant risk.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

Based on our current investigation and previous experience with similar sites and projects, we conclude that the site is suitable for the planned improvements. New structures can be safely supported on conventional spread footings provided that the pads are properly prepared to mitigate the expansive soil conditions as discussed below. New "pole" or sign structures and field lights can be safely supported on drilled piers. The primary geotechnical concerns relative to site development are near-surface expansive soil and appropriate foundation design to resist strong seismic ground shaking. The potential for strong seismic ground shaking at the site was discussed in an earlier section. Site expansive soil conditions are discussed in more detail below. Design recommendations for these and other geotechnical issues are provided in the sections that follow.

B. Expansive Soil

Expansive soils tend to swell (heave) and shrink when they are alternately wetted and dried, respectively. This shrink/swell cycle can be very damaging to structures founded in expansive clay soil. As encountered in our borings, near surface soils of high plasticity clay with a potential for expansion blanket the entire project site from 1.5 to 9 feet deep.

On synthetic turf athletic fields, the potential impact of near surface expansive subgrade soils is the development of visible undulations of the synthetic turf surface over time. This condition does not make the field unplayable or affect its ability to drain and support the weight of athletic activities. The primary issues raised by this condition are aesthetics and long-term conformance to specified finished grade tolerances. For natural turf fields, we judge that near surface expansive subgrade soils can be sufficiently mitigated by consistent irrigation of the natural turf, which should minimize the negative aesthetic effects of undulating surfaces.

For new structures, pavements, flatwork, and synthetic fields, two basic options are commonly employed to mitigate expansive near-surface soil:

1) Improvement of the near-surface expansive soils by either addition of lime or cement (Treatment), or replacement with non-expansive import fill (Select Fill); or,

2) Use of drilled pier and grade beam foundation systems to gain foundation support for new structures below the unstable near-surface expansive soils. This option would not mitigate the hazard to flatwork or pavement

Based on our understanding of site conditions and planned development, we judge that improving the near-surface expansive soil by means of Lime Treatment will provide more value to the project than using drilled pier foundations or select fill for the following reasons:

- Improved near-surface soil (either Select Fill or Treated on-site clays) will allow for the use of more conventional, and less costly, shallow spread footings instead of drilled piers;

- Improving the near surface expansive soil will provide a much improved pavement subgrade condition (higher R-value) which will allow a reduced pavement section. Depending in the total area of pavement for driveways and parking areas, this could result in significant cost savings to the project.

- Improved near-surface soil will provide a more planar surface over the life of the synthetic turf field by reducing differential shrink/swell of subgrade soils.

- If construction is performed from late fall to mid spring, wet soil conditions from seasonal rains are likely. Wet soil conditions can make site preparation and grading difficult or impossible. Treatment with lime not only mitigates expansive potential of near-surface soils, but also can mitigate wet soil conditions and allow construction to proceed through the wet season, providing added flexibility to the construction schedule.

C. Seismic Design

The site will experience strong ground shaking similar to other areas of the seismically active San Francisco Bay Region. Mitigation of ground shaking includes seismic design of the structure in conformance with the provisions of the most recent version of the California Building Code (2007). Based on the interpreted subsurface conditions, we recommend the CBC coefficients and site values shown in Table B below for use in equations 30A-4 through 30A-8 to calculate the design base shear of the new construction.

TABLE B
2007 CBC FACTORS
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

Factor Name	Coefficient	CBC Table	Site Specific Value
Site Class[1]	$S_{A,B,C,D,E, or F}$	1613.5.2	S_D
Site Coefficient	F_a	1613.5.3 (1)	1.0
Site Coefficient	F_v	1613.5.3 (2)	1.5
Spectral Acc. (short)	S_s	1613.5.1	1.7 g
Spectral Acc. (1-sec)	S_1	1613.5.1	0.7 g

(1) Site Class C Description: Stiff soil profile with shear wave velocities between 600 and 1,200 fps, Standard Penetration Test N values between 15 and 50, and undrained shear strength between 1,000 and 2,000 psf.

Probabilistic Seismic Hazard Analysis – Probabilistic Seismic Hazard Analysis (PSHA) analyzes all possible earthquake scenarios while incorporating the probability of each individual event to occur. The probability is determined in the form of the recurrence interval, which is the average rate at which an earthquake of some size will be exceeded. Therefore, the design earthquake is not solely dependent on the fault with the closest distance to the site and/or the largest magnitude, but rather the probability of given seismic events of occurring.

Utilizing USGS data we calculated the PGA_{DBE} listed below in Table C. The ground motion given by the USGS Earthquake Seismic Hazards program is for rock and alluvial sites.

TABLE C
PROBABILISTIC SEISMIC HAZARD ANALYSIS
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

	Percent Chance of Exceedance	Statistical Return Period	Peak Ground Acceleration, Rock	Peak Ground Acceleration, Alluvium
PGA_{DBE}	10% in 50 years	475 years	0.578g	0.578g

Site Coordinates (Lat., Long.): N38.264, W122.610
Reference: USGS (2002)

D. Site Grading

1. General – Depending on time of construction, wet subgrade soils may be encountered. In warm weather, soils in these areas can typically be over-excavated, spread out and air-dried to a suitable moisture content before replacing and re-compacting. During the rainy season, however, this is usually not feasible due to cool and wet weather conditions. Therefore, the owner should anticipate some remediation of soft and saturated soils will be required if grading occurs during the months of October to May. These remediation measures typically consist of replacement with a suitable fill material or in-place treatment using soil additives such as lime or cement.

If near-surface soils are dry and desiccated, subgrade should be moisture conditioned for a minimum of two weeks prior to grading to swell the surface clay soils. This initial moisture conditioning should sufficiently moisten the clay soils to depths at which seasonal moisture fluctuations do not commonly occur, at approximately three feet below the surface. We should be on-site to observe as many as 10 shallow test pit excavations up to four feet deep in order to verify that native soils have been moisture conditioned to above optimum moisture content[2].

2. Limits of Soil Improvements - Recommendations for improving near surface soils are intended for structural areas and not areas of landscaping or natural turf fields. The limits of improvement should be as follows:

a. Five feet beyond the edge of new building foundations and to a minimum depth of 18 inches below bottom of footing or 30 inches below finished subgrade.
b. Three feet beyond the edge of synthetic turf fields, and pavement or flatwork, and to a depth of 18 inches below finished subgrade.

3. Surface Preparation - Clear all structures, concrete slabs, asphalt pavement, over-size debris, and organic matter from areas where improvements are planned. Existing concrete foundations, slabs or asphalt pavements should be removed where they conflict with new grades and foundations because “hard points” and reflection cracking are expected if new structures are located over old improvements.

Any construction debris or abandoned utilities encountered during site grading should be removed from the site. Excavations to remove oversized materials or old improvements should be

[2] Optimum moisture content refers to the water content at which the soil can be compacted to the maximum dry density, as determined by laboratory test procedure (ASTM 1557).

backfilled with compacted fill in accordance with subsequent sections of this report. Utilities may be abandoned in place in many cases provided low-strength cement grout completely fills any void in the utility and they are of a sufficient depth below new improvements.

Excavate loose or saturated soils to expose firm, suitably moist, natural soils. Following clearing, stripping and required excavations, the exposed soils within the building areas (extending to 5 feet beyond perimeter footings and 3 feet beyond exterior slabs or pavements) should be scarified to a depth of 8-inches, moisture conditioned to 2 to 3 percent above optimum moisture content, and compacted to at least 90 percent relative compaction. Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density, as determined by laboratory test procedure (ASTM 1557-92). Optimum moisture is the water content, by percent of dry soil weight that corresponds to maximum dry density.

4. Fill Materials - The on-site near surface materials will not be suitable for use as Select Fill in structural areas unless treated in the manner described below. Imported fill may also be considered if it meets the criteria below.

5. Soil Treatment - Where soil treatment is planned to mitigate expansive soil conditions the soil treatment shall: (1) be composed of high calcium or dolomitic quicklime in conformance to the most recent Caltrans Standard Specification; (2) placed at a treatment rate of 5 percent by dry unit weight of existing soil (assume 110 pcf); and (3) placed in a manner conforming to the most recent Caltrans Standard Specification. Section 24: Lime Stabilization, from the 2006 CalTrans Standards Specifications manual is included in Appendix C for reference.

6. Imported Select Fill - If imported fill is used to raise building site grades, it shall be free of organic matter, have a Liquid Limit of less than 40, a Plasticity Index of less than 20, have a minimum R-value of 40, and conform to the gradation limits in Table D.

TABLE D
IMPORTED FILL GRADATION LIMITS
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

Particle Size	Percent Finer by Dry Weight
4 inch	100
No. 4 sieve	20 - 100
No. 200 sieve	0 - 50

7. Compaction - Treated on-site soils and imported Select Fill used as fill and backfill should be conditioned to near the optimum moisture content. Properly moisture conditioned and cured materials should subsequently be placed in loose horizontal lifts, typically 8 inches thick or less, and uniformly compacted to a minimum of 90 percent relative compaction to produce a firm non-yielding surface. With appropriate equipment, Treated on-site soils can be compacted in lifts as thick as 18-inches. Regular wetting of subgrade surfaces shall be performed to maintain this moisture condition until pavements, flatwork, or other final improvements have been installed. Subgrades consisting of onsite clayey soils shall not be permitted to dry beyond the range specified above prior to placing of pavements and concrete slabs on grade.

8. Cut and Fill Slope Construction - If minor cut or fill slopes are planned to level the building area, the slopes should be limited to 2:1 (horizontal:vertical).

E. Foundation Design

Provided site preparation and grading are preformed in accordance with the recommendations above, new building loads should be supported on shallow spread footings bearing on at least 18 inches of non-expansive site soils, import Select Fill or lime treated on-site clay soil. Footings should be designed with the values in Table E. New pole or sign structures can be supported on drilled pier foundations designed in accordance with the criteria presented in Table E, below.

TABLE E
FOUNDATION DESIGN CRITERIA
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

Shallow Footings

Minimum Width[1]:	12 inches
Minimum Embedment[2]:	12 inches
Allowable bearing pressure[3]:	
Dead plus live loads:	3,000 psf
Total design loads:	3,500 psf
Base friction coefficient:	0.35
Lateral Passive Resistance[4]:	350 pcf
Modulus of Subgrade Reaction, $k_{s:}$	250 pci

Drilled Piers for Pole Structures Only

Minimum Pier Diameter:	12 inches
Minimum Embedment[5]:	5 feet
Skin Friction, f_s:	700 psf
Uplift capacity:	0.8 x Skin Friction
Lateral Passive Resistance[6,7]:	350 pcf

(1) Size foundations to maintain uniform bearing pressures.
(2) Footing depths will be verified during construction.
(3) Uniform rectangular pressure distribution.
(4) Equivalent fluid pressure. Neglect upper 6-inches unless foundations are confined by concrete slabs or asphalt pavements.
(5) Depths will need to be verified in the field and may require deepening upon inspection.
(6) Apply values over an effective width of 2-pier diameters
(7) Equivalent fluid pressure. Neglect where horizontal distance to slope face is less than 3-pier diameters from edge of pier.

F. Concrete Slabs-on-Grade

For interior concrete floor slabs, we recommend they be at least 5 inches thick and that they be reinforced with steel reinforcing bars (not wire mesh). We also recommend crack control joints in both directions and that the reinforcing bars extend through the control joints. The Structural Engineer should design the concrete slab floors.

Interior concrete slabs should also be underlain by at least 4 inches of clean, open-graded (¾-inch) aggregate to act as a capillary moisture break. Where moisture vapor would be detrimental to the interior floor covering, a vapor barrier consisting of a minimum 10-mil plastic sheeting shall cover the base rock. The vapor barrier should meet the requirements of ASTM

E-1745. To aid concrete curing and protect the vapor barrier from puncture, cover the membrane with about 2 inches of sand.

Exterior concrete slabs should be at least 4 inches thick and reinforced as described above for interior slabs. Exterior concrete slabs may be placed directly on compacted Select Fill or Treated on-site clay soil. For improved performance, a 4-inch section of Class II AB compacted to a minimum of 92% relative compaction can be placed beneath exterior concrete slabs.

G. Underground Utilities

Trench excavations having a depth of 5 feet or more must be excavated and shored in accordance with OSHA regulations. Pursuant to OSHA classifications, near-surface alluvial clay soil are Type B, granular alluvial soil below the near-surface clay are Type C. Bedding materials for utility pipes should be well graded sand with 90 to 100 percent of particles passing the No. 4 sieve and no more than 5 percent finer than the No. 200 sieve. Provide the minimum bedding beneath the pipe in accordance with the manufacturer's recommendation, typically 3 to 6 inches.

Import Select Fill or Treated on-site soil may be used as compacted trench backfill above the pipe and bedding material. The backfill materials should be placed in uniform lifts (four to eight inches depending upon the size of compaction equipment), moisture conditioned to near optimum moisture content and compacted to a minimum of 90 percent relative compaction. The upper six inches within pavement areas should be additionally compacted to at least 95 percent relative compaction during subgrade preparation. Outside of pavement and building areas, the compaction can be reduced to 85 percent. Jetting for compaction of trench backfill is not permitted.

H. Surface Drainage

Careful consideration should be given to design of finished grades at the site. We recommend that the building areas be raised slightly and that the adjoining landscaped areas be sloped downward at least 0.25 feet for 5 feet (5 percent) from the perimeter of building foundations. Where hard surfaces, such as concrete or asphalt adjoin foundations, slope these surfaces at least 0.10 feet in the first 5 feet (2 percent). Site drainage improvements should be connected into the existing City storm drainage system if possible.

I. Subsurface Drainage

As described in Section III-B, Surface Conditions, two southwest-sloping natural drainage swales exist on the site; one is delineated as a wetland. If fill is to be placed within these swales, sub-drains should be installed to carry water that seasonally occupies these drainage swales to an appropriate storm drain, preventing natural water flow from destabilizing fill that may placed within

these swales during grading. We recommend that perforated pipes be installed along the alignment of drainage swales or at the heads of drainage swales per Figure 4 to transport water to the storm drain system.

J. Pavement Design

For preliminary planning, flexible asphalt pavements supported on un-treated clay soil or lime treated clay soil/Select Fill subgrade should be designed for Traffic Indices (TI) of 4.0, 5.0, or 6.0 as shown in Table F. These values are based on an assumed R-value of 50 for the Treated clay soil or Select Fill, and an R-value of 5 for the untreated clay soil. The upper six inches of pavement subgrade should be compacted to a minimum of 95 percent relative compaction. During construction, we must test the subgrade soil to verify the R-value condition.

TABLE F
ASPHALT PAVEMENT THICKNESS
EAST WASHINGTON PARK
PETALUMA, CALIFORNIA

	Untreated Soil		Treated Soil or Select Fill		
Traffic Index	Asphalt Concrete(1) (inches)	Aggregate Base(2) (inches)	Asphalt Concrete(1) (inches)	Aggregate Base(2) (inches)	Treatment Depth(3) (inches)
4.0	2.5	8.0	2.5	6.0	18.0
5.0	2.75	10.5	2.75	6.0	18.0
6.0	3.25	13.0	3.25	6.0	18.0

(1) Asphalt concrete shall conform to asphalt concrete criteria presented in the Caltrans Standard Specifications (2006). Asphalt concrete shall be placed in layers not exceeding 2.5 inches in thickness and compacted to a minimum of 95% relative compaction
(2) Aggregate Base shall conform to Class 2 Aggregate Base criteria in the CalTrans Standard Specifications (2006).
(3) Lime-treated subgrade materials shall have a minimum R-value of 50.

Following installation and backfill compaction for underground utilities, the pavement subgrade should be further compacted by rolling to provide a firm unyielding surface compacted to at least 95 percent relative compaction at near-optimum moisture content. The subgrade soils should be maintained moist until completion of the entire pavement surface. The aggregate material should be placed in uniform lifts not exceeding six inches in thickness, and in a manner to prevent segregation. The aggregate should similarly be moisture conditioned to near-optimum moisture content, and rolled to provide a smooth unyielding surface compacted to at least 95 percent relative compaction.

V. SUPPLEMENTAL GEOTECHNICAL SERVICES

We must review the plans and specifications for the project when they are nearing completion to confirm that the intent of our geotechnical recommendations has been incorporated and provide supplemental recommendations, if needed.

During construction, we must observe and test site grading (in particular lime treatment of expansive soils or import, and compaction of select fill) and surface drainage. We also need to observe foundation excavations for the structures and associated improvements to confirm that the soils encountered during construction are consistent with the design criteria. These construction services will be provided under a separate agreement.

VI. LIMITATIONS

This report has been prepared in accordance with generally accepted geotechnical engineering practices in the San Francisco Bay Area at the time the report was prepared. This report has been prepared for the exclusive use of Winzler & Kelly Consulting Engineers and/or its assignees specifically for this project. No other warranty, expressed or implied, is made. Our evaluations and recommendations are based on the data obtained during our subsurface exploration program and our experience with soils in this geographic area.

Our approved scope of work did not include an environmental assessment of the site. Consequently, this report does not contain information regarding the presence or absence of toxic or hazardous wastes.

The evaluations and recommendations do not reflect variations in subsurface conditions that may exist between boring locations or in unexplored portions of the site. Should such variations become apparent during construction, the general recommendations contained within this report will not be considered valid unless MPEG is given the opportunity to review such variations and revise or modify our recommendations accordingly. No changes may be made to the general recommendations contained herein without the written consent of MPEG.

We recommend that this report, in its entirety, be made available to project team members, contractors, and subcontractors for informational purposes and discussion. We intend that the information presented within this report be interpreted only within the context of the report as a whole. No portion of this report should be separated from the rest of the information presented herein. No single portion of this report shall be considered valid unless it is presented with and as an integral part of the entire report.

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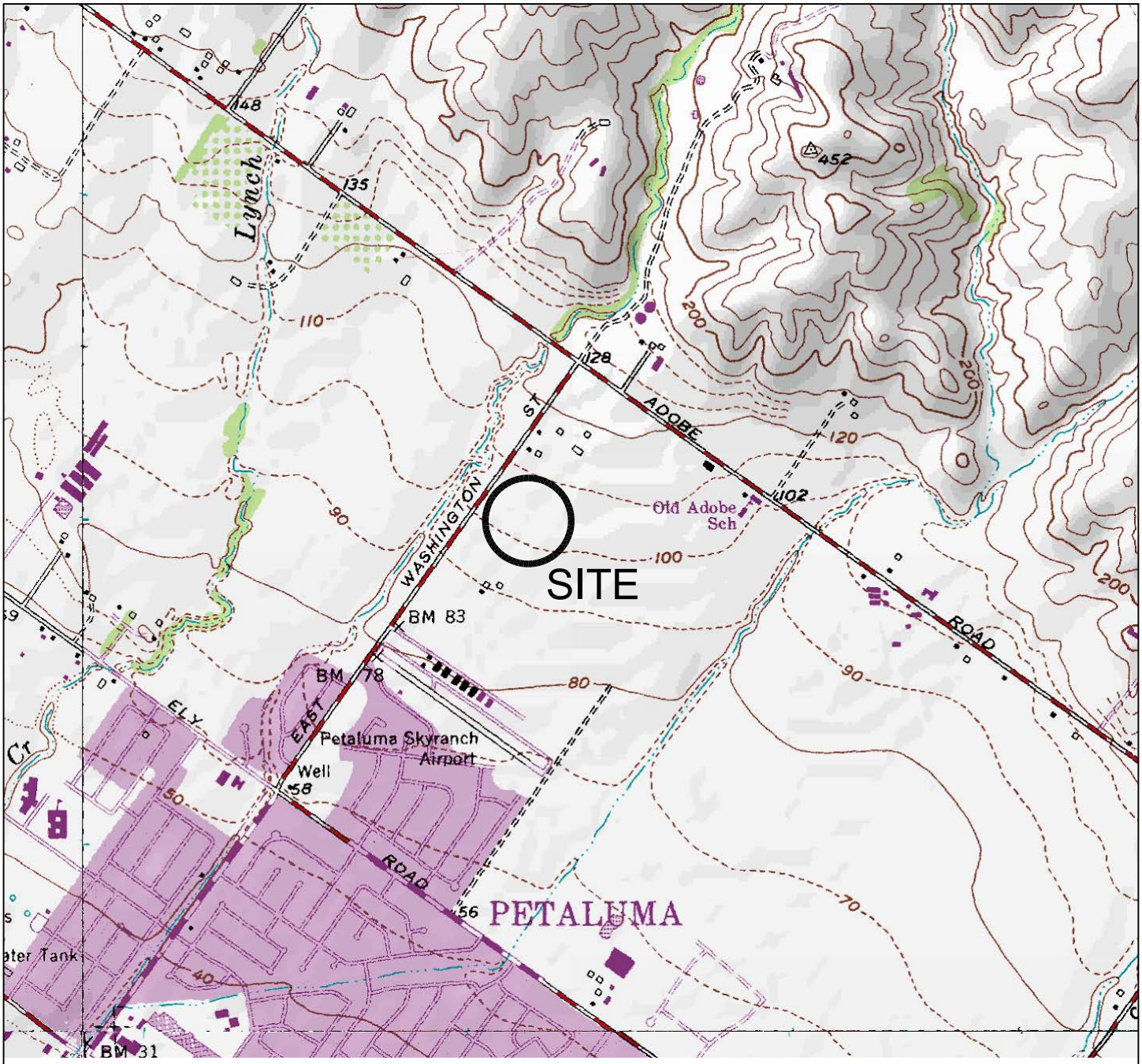

SITE LOCATION

SCALE

0 1000 2000 4000 FEET

0 500 1000 METERS

NORTH

REFERENCE: DeLorme 3D TopoQuads, 2002

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ENGINEERING GROUP

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FILE: 1206.04 SM.dwg

SITE LOCATION MAP

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed N/A
Drawn NRS
Checked

1
FIGURE

Approximate Location of Boring by MPEG, July 30, 2008

NORTH

SCALE

0 75 150 300 FEET

REFERENCE: Winzler & Kelly Consulting Engineers, 2008

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FILE: 1206.04 SP.dwg

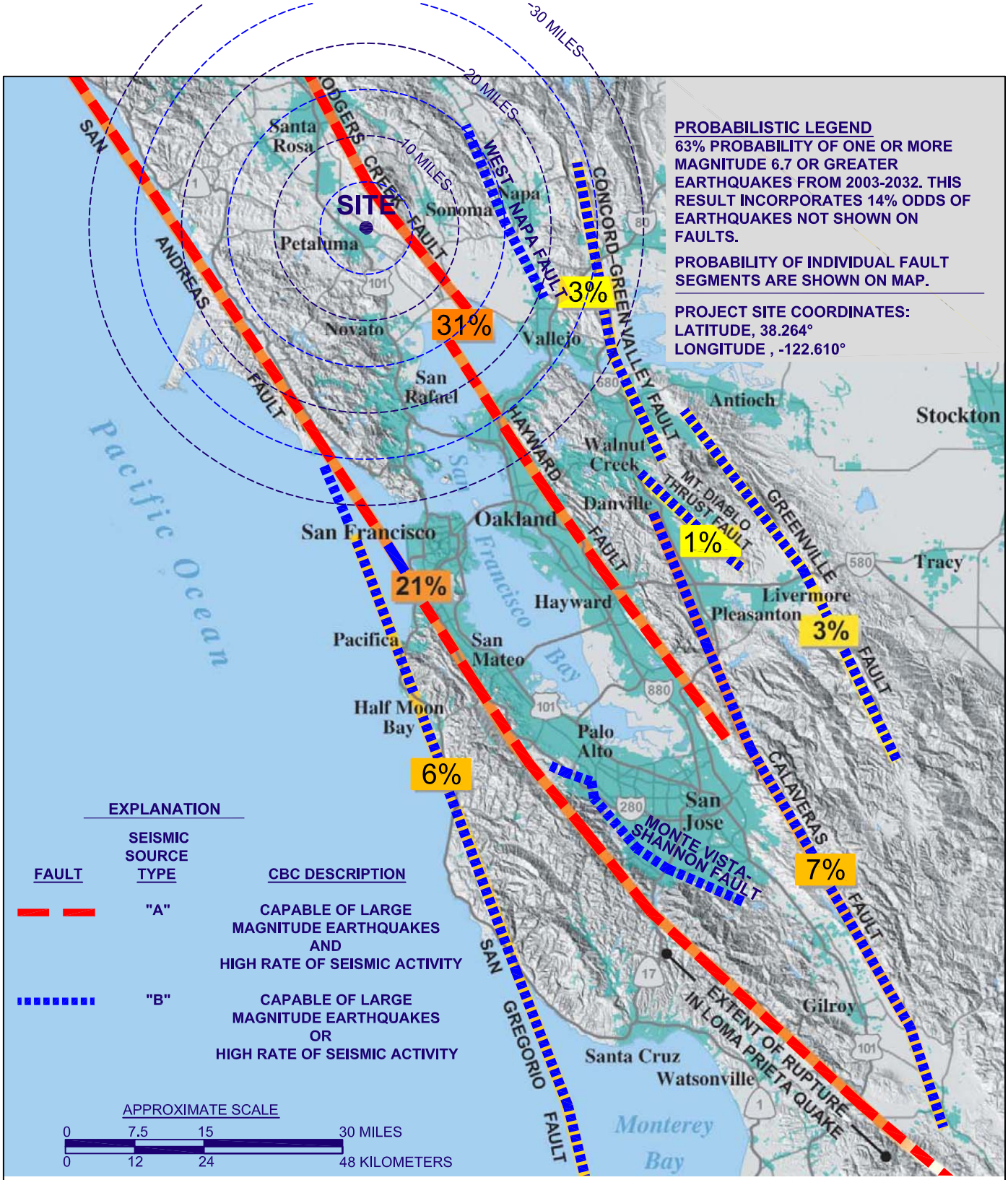
SITE PLAN

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed N/A
Drawn NRS
Checked

2
FIGURE



REFERENCES:

1) REVISED 2002 CALIFORNIA PROBABILISTIC SEISMIC HAZARD MAPS, CGS, 2003.

2) ACTIVE FAULT MAP MODIFIED FROM SUMMARY OF EARTHQUAKE PROBABILITIES IN THE S.F. BAY REGION, 2002 - 2031, THE WORKING GROUP ON CALIFORNIA EARTHQUAKE PROBABILITIES, 2003.

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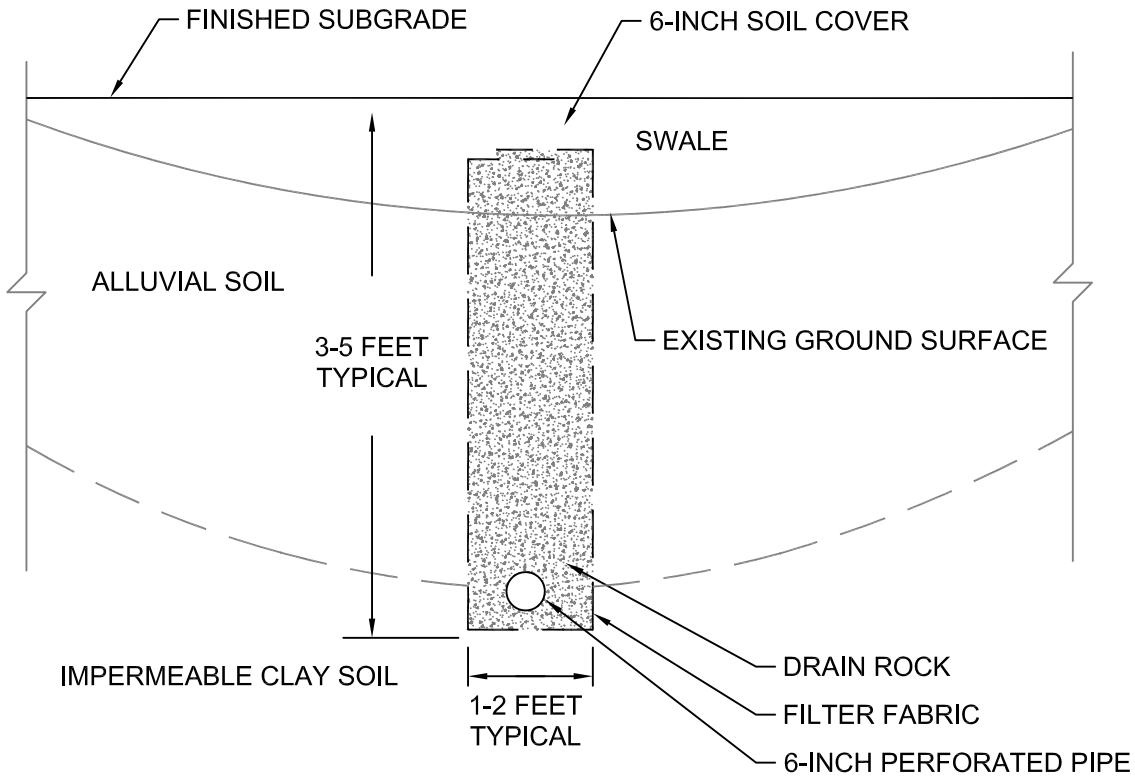
ACTIVE FAULT MAP

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

3
FIGURE



NOTES:

(1) PIPE TO BE 4-INCH DIAMETER, PERFORATIONS DOWN, S=0.02 MIN., WITH TIGHT PIPE TO GRAVITY DISCHARGE

(2) FILTER FABRIC TO BE MIRAFI 140N

(3) PERMEABLE MATERIAL TO BE CALTRANS CLASS 1A OR 1B

(4) USE SWEEPS FOR ALL SUBDRAIN BENDS/ELBOWS

TYPICAL DETAIL TRENCH SUBDRAIN

(NO SCALE)

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FILE: 1206.04 Subdrain.dwg

TYPICAL DETAIL TRENCH SUBDRAIN

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed NRS
Drawn NRS
Checked

4
FIGURE

APPENDIX A
SUBSURFACE EXPLORATION AND LABORATORY TESTING

1.0 Subsurface Exploration

We explored subsurface conditions at the site by drilling eleven test borings on July 30, 2008 at the locations shown on Figure 2. Test borings were drilled to maximum depths of 4.5 to 15 feet using 6-inch diameter continuous flight solid augers mounted on an all-terrain drill rig.

The soils encountered were logged and identified by our field geologist in general accordance with ASTM Standard D 2487, "Field Identification and Description of Soils (Visual-Manual Procedure)." This standard is briefly explained on Figure A-1, Soil Classification Chart and Key to Log Symbols. The boring logs are presented on Figures A-2 through A-12.

We obtained “undisturbed” samples from our borings using a 3-inch diameter, split-barrel modified California sampler with 2.5 by 6-inch brass tube liners, and disturbed samples using a 2-inch diameter Standard Penetration Test sampler and no liners. The sampler was driven with a 140-pound hammer falling 30 inches. The number of blows required to drive the samplers 18 inches was recorded and is reported on the boring logs as blows per foot for the last 12 inches of driving. The samples obtained were examined in the field, sealed to prevent moisture loss, and transported to our laboratory.

2.0 Laboratory Testing

We conducted laboratory tests on selected intact samples to verify field identifications and to evaluate engineering properties. The following laboratory tests were conducted in accordance with the ASTM standard test method cited:

- Laboratory Determination of Water (Moisture Content) of Soil, Rock, and Soil-Aggregate Mixtures, ASTM D 2216;
- Density of Soil in Place by the Drive-Cylinder Method, ASTM D 2937;
- Atterberg Limits (Plasticity), ASTM D 4318; and,
- Unconfined Compressive Strength of Cohesive Soil, ASTM D 2166.

The moisture content, dry density, unconfined compression, and Atterberg Limits test results are shown on the exploratory Boring Logs. The Atterberg Limits tests are summarized on Figure A-13.

The exploratory boring logs, description of soils encountered and the laboratory test data reflect conditions only at the location of the boring at the time they were excavated or retrieved. Conditions may differ at other locations and may change with the passage of time due to a variety of causes including natural weathering, climate and changes in surface and subsurface drainage.

MAJOR DIVISIONS		SYMBOL	DESCRIPTION
COARSE GRAINED SOILS over 50% sand and gravel	CLEAN GRAVEL	GW	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines
	GRAVEL with fines	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	CLEAN SAND	SW	Well-graded sands or gravelly sands, little or no fines
		SP	Poorly-graded sands or gravelly sands, little or no fines
	SAND with fines	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS over 50% silt and clay	SILT AND CLAY liquid limit <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, gravely clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silt-clays of low plasticity
	SILT AND CLAY liquid limit >50%	MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
HIGHLY ORGANIC SOILS		PT	Peat, muck, and other highly organic soils
ROCK			Undifferentiated as to type or composition

KEY TO BORING AND TEST PIT SYMBOLS

CLASSIFICATION TESTS

AL	ATTERBERG LIMITS TEST
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

STRENGTH TESTS

TV	FIELD TORVANE (UNDRAINED SHEAR)
UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress

SAMPLER TYPE

- MODIFIED CALIFORNIA
- STANDARD PENETRATION TEST
- THIN-WALLED / FIXED PISTON
- HAND SAMPLER
- ROCK CORE
- X DISTURBED OR BULK SAMPLE

SAMPLER DRIVING RESISTANCE

Modified California and Standard Penetration Test samplers are driven 18 inches with a 140-pound hammer falling 30 inches per blow. Blows for the initial 6-inch drive seat the sampler. Blows for the final 12-inch drive are recorded onto the logs. Sampler refusal is defined as 50 blows during a 6-inch drive. Examples of blow records are as follows:

- 25 sampler driven 12 inches with 25 blows after initial 6-inch drive
- 85/7" sampler driven 7 inches with 85 blows after initial 6-inch drive
- 50/3" sampler driven 3 inches with 50 blows during initial 6-inch drive or beginning of final 12-inch drive

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the excavation location during the time of exploration. Subsurface rock, soil or water conditions may vary in different locations within the project site and with the passage of time. Boundaries between differing soil or rock descriptions are approximate and may indicate a gradual transition.

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SOIL CLASSIFICATION CHART

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Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
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Checked

A-1
FIGURE

BORING 1

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 108-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
				14.0		0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches
			50							
			62	23.6	100	1				
		6300 UC	67/9"	24.1	100		5			SILTY CLAY (CL) medium brown, moist, very stiff, medium to high plasticity
						2				
			58/7"	17.5	110					SANDY CLAY (CL) tan-brown, slightly moist, very stiff, low to medium plasticity, trace fine grained gravel
						3	10			
			64	27.8	93	4				
							15			Bottom of boring at 14.5 feet No groundwater encountered
						5				
						6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-2
FIGURE

BORING 2

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 105-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
			30	16.5		0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches
			38	21.8		1				grades to moist
			36	22.3			5			Bottom of boring at 5.0 feet No groundwater encountered
						2				
						3	10			
						4				
							15			
						5				
						6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-3
FIGURE

BORING 3

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 101-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			25	12.5		0 / 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches
			56/9"	16.2	107	1			CLAYEY SAND (SC) light brown, moist, dense, fine to medium-grained sand
			62/9"	23.4	95	5			SANDY CLAY (CL) light to medium brown, moist, very stiff, low to medium plasticity
			37/9"	26.7		2 / 10			
			41	13.1		3 / 15			SAND w/ GRAVEL (SM) tan, slightly moist, dense, fine to coarse grained
						4 / 20			Bottom of boring at 14.5 feet No groundwater encountered
						5			
						6			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
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Project No. 1206.04 Date: 9/22/08

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A-4
FIGURE

BORING 4

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 102-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			40	17.5		0 / 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, trace sand
			65	15.6		1			grades to slightly moist
						5			Bottom of boring at 4.5 feet No groundwater encountered
						2			
						3 / 10			
						4			
						15			
						5			
						6 / 20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-5
FIGURE

BORING 5

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 100-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
			53	13.7		0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches
			53/7"	17.0	93	1	5			SANDY CLAY (CL) medium brown, slightly moist, very stiff, medium plasticity
			61/9"	20.2	99	2	10			
			58	21.3	104	3	15			Bottom of boring at 14.5 feet No groundwater encountered
						4	20			
						5				
						6				

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

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Designed
Drawn NRS
Checked

A-6
FIGURE

BORING 6

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 98-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
			25	12.7		0	0			SILTY CLAY (CH) dark brown, moist, very stiff, high plasticity
		6300 UC	55/9"	20.2	106	1	5			SANDY CLAY (CL) medium brown, moist, very stiff, medium plasticity
			63/9"	19.0	108	3	10			
			50/10"	21.8	102	4				
							15			Bottom of boring at 14.5 feet No groundwater encountered
						5				
						6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-7
FIGURE

BORING 7

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 95-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
			18	26.9		0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity
										grades to moist
			58	25.4		1				
							5			Bottom of boring at 4.5 feet No groundwater encountered
						2				
						3	10			
						4				
							15			
						5				
						6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
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A-8
FIGURE

BORING 8

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 99.5-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			18	18.4		0 / 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches
			36	28.1	90	1 / 5			SILTY CLAY (CL) medium brown, moist, very stiff, medium to high plasticity
			52/6"	15.5	113	2 / 10			SANDY CLAY (CL) tan-brown, slightly moist, very stiff, low to medium plasticity, trace fine grained gravel
			49	21.7		3 / 15			Bottom of boring at 14.5 feet No groundwater encountered
						4 / 20			
						5 /			
						6 /			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

East Washington Park
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Designed
Drawn NRS
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A-9
FIGURE

BORING 9

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 100-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
						0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity
			30	15.9		1				SANDY CLAY (CL) medium brown, slightly moist to moist, very stiff, low to medium plasticity
			32/9"	19.0			5			
						2				Bottom of boring at 4.5 feet No groundwater encountered
						3	10			
						4				
							15			
						5				
						6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-10
FIGURE

BORING 10

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 101-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (3)	
			45	13.3		0	0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity, rootlets present in upper 6 inches
		8500 UC	57	19.0	103	1	5			SILTY CLAY (CL) medium brown, moist, very stiff, medium to high plasticity
			60/9"	16.7	96	2 3	10			SANDY CLAY (CL) tan-brown, slightly moist, very stiff, low to medium plasticity, trace fine grained gravel
			67	25.4	103	4	15			Bottom of boring at 14.5 feet No groundwater encountered
						5 6	20			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
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BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

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Checked

A-11
FIGURE

BORING 11

EQUIPMENT: Track-mounted AT-300
6" solid flight augers

DATE: 7/30/08

ELEVATION: 103.5-Feet*

*REFERENCE: Site Plan, Winzler & Kelly, 2008

OTHER TEST DATA	OTHER TEST DATA	UNDRAINED SHEAR STRENGTH psf (1)	BLOWS PER FOOT	MOISTURE CONTENT (%)	DRY UNIT WEIGHT pcf (2)	DEPTH meters / feet	SAMPLE	SYMBOL (3)	
			30	16.4		0 / 0			SILTY CLAY (CH) dark brown, dry to slightly moist, very stiff, high plasticity
			53/9"	19.8		1 / 5			grades to moist
						2 / 10			Bottom of boring at 4.8 feet No groundwater encountered
						3 / 15			
						4 / 20			
						5 /			
						6 /			

NOTES: (1) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m^3 = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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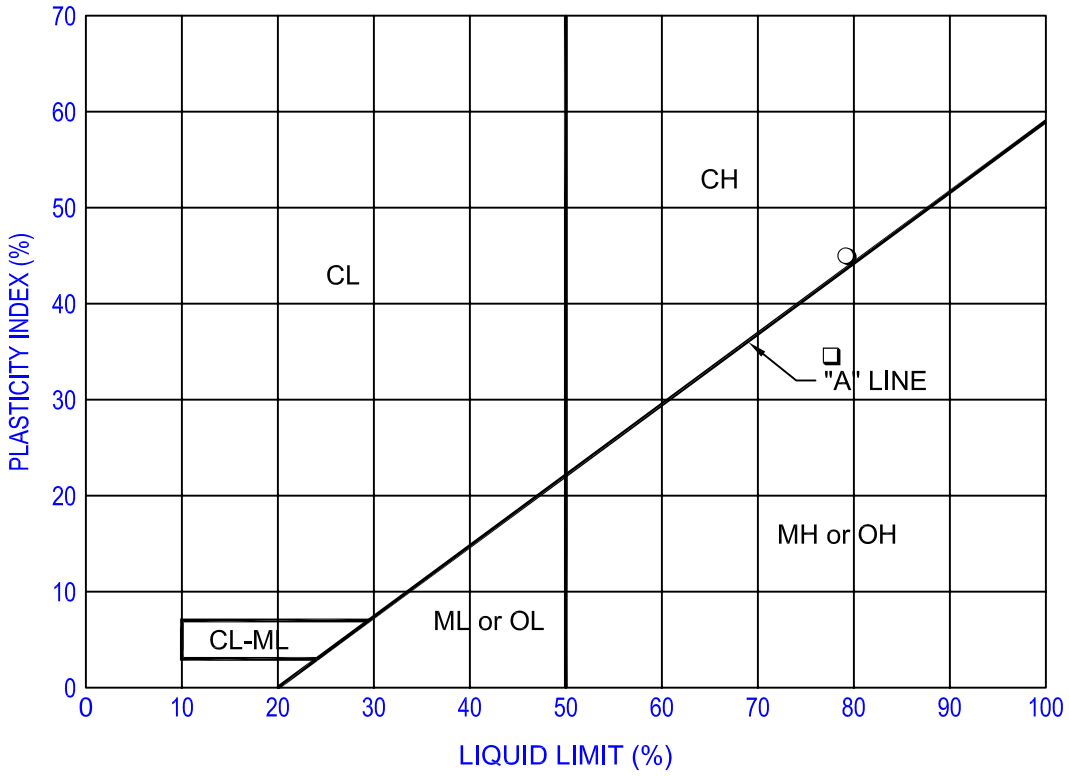
BORING LOG

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-12
FIGURE



SYMBOL	SAMPLE SOURCE	CLASSIFICATION	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	PLASTICITY INDEX (%)
❑	BORING 6 1 to 2.5 Feet	CLAYEY SILT (MH) dark brown	77	43	34
❍	BORING 11 2 to 2.5 Feet	SILTY CLAY (CH) dark brown	79	34	45

REFERENCE: Liquid Limit, Plastic Limit, and Plasticity Index of Soils, ASTM D 4318

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FILE: 1206.04 PI.dwg

PLASTICITY CHART

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed
Drawn NRS
Checked

A-13
FIGURE

APPENDIX B
SPECIFICATIONS AND DETAILS FOR SUBDRAINAGE OF SYNTHETIC TURF FIELDS

SECTION 02790
PERMEABLE BASE FOR SYNTHETIC TURF SYSTEM

PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The Contractor's scope of work includes site preparation, excavation, disposal of excess or unsuitable material, subgrade grading, installation of subsurface drain pipe and perimeter header, and the selection, purchase, grading and compaction of top and bottom rock in accordance with the lines, grades, and cross-sections shown on the drawings.

1.02 QUALITY ASSURANCE

A. Reference Standards - ASTM: American Society for Testing and Materials.

B. Contractor's Materials Testing Agency Qualifications: An independent testing agency qualified to conduct soil materials and rock-definition testing that complies with ASTM E329 or D3740 and has personnel with at least 5 years of experience performing the following ASTM standard test methods and practices;

1. D75: Standard Practice of Sampling Aggregates.
2. C125: Standard Terminology Relating to Concrete and Concrete Aggregates
3. C131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
4. C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
5. C702: Standard Practice for Reducing Samples of Aggregate to Testing Size.
6. D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
7. D2434: Standard Test Method for Permeability of Granular Soils (Constant Head).
8. D4253: Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
9. D5821: Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate

C. Owner's Testing Agency shall review Contractor's submittals under this specification and recommend action as defined under Section 01300 - Submittals.

D. The Owner shall reject material delivered to the site not meeting specifications. All material rejected by the Owner shall be removed from the site and replaced with suitable material at the Contractor's expense.

1.03 SUBMITTALS

A. Submittals prior to installation:

1. Submit five (5) copies of product data on pipe, pipe accessories, filter fabric and separation fabric.

2. Submit five (5) copies of certification signed by Contractor's Materials Testing Agency stating they meet the qualifications presented in Article 1.2.B - Quality Assurance.

3. CalTrans Class 1B permeable material: submit five (5) copies of certification signed by Contractor's Rock Manufacturer stating material supplied to the project meets the requirements as specified in the Standard Specifications.

4. Bottom and Top Rock: The following items shall be submitted as a complete package. Failure to submit all items listed below will result in the submittal being returned to the Contractor as incomplete.

    a. Submit one (1) sample each, sealed five-gallon container of bottom and top rock materials.

    b. Submit five (5) copies of certification signed by Contractor's Rock Manufacturer stating that the submittal samples where prepared and tested within the last 60 days by the rock manufacturer and meet the gradation requirements specified in Paragraph 2.06.B.1 or 2.06.C.1. Certification shall list specified gradation requirements and show results of gradation test conducted in accordance with ASTM C136.

    c. Submit five (5) copies of report signed by Contractor's Materials Testing Agency certifying that submittal samples meet all specified requirements as listed in Paragraph 2.06, CRUSHED STONE. The report must present test results performed in accordance with the following ASTM standard test methods and practices:

        i. C131: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

        ii. C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

        iii. D2434: Standard Test Method for Permeability of Granular Soils (Constant Head).

        iv. D4253: Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

    d. Additional reporting requirements for this submittal:

        i. Description of ASTM D2434 testing apparatus and procedure used to prepare samples for testing.

B. Submittals during construction:

1. For every 700 tons of bottom rock material produced, submit five (5) copies of certificate of compliance signed by Contractor stating that a quality control sample was

collected, prepared, and tested by the Contractor's Rock Manufacturer and/or Contractor's Materials Testing Agency and meets the specified gradation requirements. Certification shall report specified gradation requirements and results of gradation test conducted in accordance with ASTM C136. This submittal shall be received and approved by the Owner prior to delivery of the material to the site.

2. For every 400 tons of top rock material produced, submit five (5) copies of certificate of compliance signed by Contractor stating that a quality control sample was collected, prepared, and tested by the Contractor's Rock Manufacturer and/or Contractor's Materials Testing Agency and meets the specified gradation requirements. Certification shall report specified gradation requirements and results of gradation test conducted in accordance with ASTM C136. This submittal shall be received and approved by the Owner prior to delivery of the material to the site.

3. Submit certification signed by the Contractor's Synthetic Turf Installer stating that they have visited the site and observed the initial placement and compaction of top rock and find the surface suitable to install the synthetic turf. This submittal shall be received and approved by the Owner prior to acceptance of the work.

1.04 MATERIAL TESTING AND INSPECTION DURING CONSTRUCTION

A. The Owner’s Testing Agent will be present intermittently to observe the Contractor's operation, to perform tests and measurements. Such observations, tests, measurements shall not alter the requirements of the drawing or specifications nor imply any superintendence or control of the Contractor’s operation, nor warranty the Contractor’s work.

B. Submittal samples shall be held by Owner’s Testing Agent for possible testing until completion of construction.

C. During construction, the Contractor shall perform his own inspection of and testing by Contractor's Materials Testing Agency or Rock Manufacturer on rock materials to the degree he deems necessary for him to assure compliance of the rock materials with the specifications. This inspection and testing shall be in addition to that which is specifically required by this specification.

D. Contractor's Materials Testing Agency shall be required to conduct the following tests during construction:

1. If ASTM C136 test results conducted by the Contractor's Rock Manufacturer on a quality control sample as defined in Article 1.03 - B indicates a difference of 10% or greater passing the no. 4 sieve size from the test results of the approved bottom rock submittal sample, ASTM D2434 testing shall be conducted on the material to confirm that the material meets the minimum permeability requirement.

2. If ASTM C136 test results conducted by the Contractor's Rock Manufacturer on a quality control sample as defined in Article 1.03 - B indicates a difference of 10% or greater passing the no. 8 sieve size from the test results of the approved top rock

submittal sample, ASTM D2434 testing shall be conducted on the material to confirm that the material meets the minimum permeability requirement.

E. The Owner's Testing Agent shall periodically inspect and/or obtain samples of rock materials at the source and/or as they are delivered to the site. Any rock material that does not conform to the approved submittal samples will be rejected immediately or tested by the Owner's Testing Agent to verify compliance with the specifications. Such tests shall imply no warranty of the Contractor's work or compliance with the specifications.

1. Costs for initial rock material testing by the Owner's Testing Agent are the responsibility of the Owner. Costs for any rock material testing by the Owner's Testing Agent on rock materials that are a replacement for rock materials that were rejected by the Owner's Testing Agent due to nonconformance with the specifications, Contractor's submittals or quality control test results, will be borne by the Contractor and may be invoiced to the Contractor by the Owner or deducted from the next Progress Payment.

F. The Owner's Testing Agent shall conduct the following tests during construction:

1. Laboratory and field testing (ASTM D4253 and D2167, D2922, or D3017) to determine density of compacted rock materials.

2. Field percolation testing at four to six locations on the completed top rock surface to confirm a minimum percolation rate of 40 in/hr.

1.05 SITE CONDITIONS

A. The Contractor shall satisfy himself as to the nature and quantity of materials to be moved and other work to be performed, and shall notify the Owner of any differences between site conditions shown on the drawings and actual conditions prior to commencement of work.

PART 2 - PRODUCTS

2.01 HEADER (LEDGER, NAILER)

A. The header will be used by the turf system installer as a means of attaching the turf carpet along the edges of the turf system at the locations shown on the drawings.

B. The header shall be 2”x 4” TREX brand wood-polymer lumber, or approved equal.

C. The header shall be attached to concrete curbing using ½” x 6” SS expansion bolt spaced according to the drawings.

2.02 DRAINAGE PIPE

A. Corrugated High Density Polyethylene (CHDPE) may be substituted for Polyvinyl Chloride (PVC) Pipe where PVC pipe is noted on the drawings.

B. Polyvinyl Chloride (PVC) Pipe: PVC pipe and fittings shall meet the extra strength minimum of SDR-35 of the requirements of ASTM Specification D3034. Joints shall be rubber ring for Storm Drainage Pipe. Manufactured by J-M Manufacturing, Stockton, CA, (1-800-621-4404), or accepted equal.

1. PVC Smooth Wall Perforated Drain Pipe: Size as noted on the drawings, and manufactured to meet CALTRANS Standard Specification Section 68 and AASHTO M278, or accepted equal. Color, White.

2. Storm Drain Pipe: SDR-35. Size as noted on the drawings and manufactured to meet Caltrans standard specifications. Color, White.

C. Corrugated High Density Polyethylene (CHDPE) Storm Drain Pipe: CHDPE solid wall pipe and fittings shall be N-12 drainage pipe with P4-12 1B WT pipe joint assembly as manufactured by Advanced Drainage Systems, 800-821-6710. Inc., or accepted equal. Local sales representative: Jim Winslow, 510-913-2211.

D. Corrugated High Density Polyethylene (CHDPE) Perforated Drain Pipe: Perforated CHDPE pipe and fittings shall be N-I 2 Series 65 WT Corrugated HDPE Pipe and fittings as manufactured by Advanced Drainage Systems, 800-821-6710. Inc., or accepted equal. Local sales representative: Jim Winslow, 510-913-2211.

E. Flat Panel Drainage Composite (FPDC) Perforated HDPE flat panel pipe and fittings shall be AdvanEdge Series 12-inch HDPE Flat Panel Pipe and fittings as manufactured by Advanced Drainage Systems, 800-821-6710. Inc., or accepted equal. Local sales representative: Jim Winslow, 510-913-2211.

2.03 DRAIN INLETS & BURIED JUNCTION BOXES

A. By Christy, Model No. as shown on the drawings. Christy, 800-486-7070; Hanson Concrete Products, Pleasanton, CA, 925-426-4933 or accepted equal.

2.04 NONWOVEN GEOTEXTILE

A. Nonwoven geotextile (Filter Fabric) placed in the subsurface drainage trenches shall conform to the following specifications.

Mechanical Properties	Test Method	Unit	Minimum Ave. Roll Value
Grab tensile strength	ASTM D4632	lbs	120(MD), 120(CD)
Grab tensile elongation	ASTM D4632	%	50(MD), 50(CD)
Trapezoid tear strength	ASTM D4533	lbs	45(MD), 45(CD)
Mullen burst strength	ASTM D3786	psi	225
Puncture strength	ASTM D4833	lbs	65
Apparent opening size	ASTM D4751	mm	0.20
Permittivity	ASTM D4491	sec^{-1}	1.5
Flow rate	ASTM D4491	$gal/min/ft^2$	130

2.05 WOVEN GEOTEXTILE

A. Woven geotextile (Separation Fabric) placed on the subgrade shall conform to the following specifications.

Mechanical Properties	Test Method	Unit	Minimum Ave. Roll Value
Tensile Strength (ultimate)	ASTM D4595	lbs/in	2000(MD), 1500(CD)
Grab tensile strength	ASTM D4632	lbs	250(MD), 250(CD)
Grab tensile elongation	ASTM D4632	%	20(MD), 20(CD)
Trapezoid tear strength	ASTM D4533	lbs	100(MD), 50(CD)
Mullen burst strength	ASTM D3786	psi	450
Puncture strength	ASTM D4833	lbs	120
Apparent opening size	ASTM D4751	mm	0.30
Permittivity	ASTM D4491	sec^{-1}	0.40
Flow rate	ASTM D4491	$gal/min/ft^2$	30

2.06 CRUSHED STONE

A. Drainage Trench Rock shall be crushed stone conforming to the requirements for Bottom Rock in Section 2.05.B. or CalTrans Class 1B permeable material.

B. Bottom Rock shall be crushed angular stone conforming to the following requirements:

1. Gradation Requirements (ASTM C136):
   a. Maximum particle size: 1-1/2"
   b. Maximum percent passing #200 sieve: 3%
   c. Gradation Criteria:

$$D_{60}/D_{10} > 2.5 \; ; \; 0.6 < \frac{D_{30}^2}{D_{10}\,D_{60}} < 3 \; ; \; \frac{D_{15} \text{ of bottom rock}}{D_{85} \text{ of top rock}} \leq 5 \; ; \; S(x) - S(\tfrac{1}{2}\,x) < 60\%$$

["D_{60}" is the particle size diameter of which 60 percent of the test sample's particle diameters are smaller. This and other specified diameters shall be interpolation from a semi-log plot of the gradation test results.]

["S(x) - S(½ x)" is the difference in percent passing between any sieve and the sieve representing half of its nominal opening size. The difference between these percentages shall not exceed 60 percent.]

2. Drainage Requirements (ASTM D2434):
   a. Permeability > 750 in/hr (5.3×10^{-1} cm/sec) [Test with rock saturated and compacted between 92% and 100% of maximum per ASTM D4253]

3. Durability Requirements (ASTM C131):
   a. LA Abrasion (500 revs) < 40

C. Top Rock shall be crushed angular stone conforming to the following requirements:

1. Gradation Requirements (ASTM C136):
   a. Maximum particle size: 3/8"
   b. Maximum percent passing #200 sieve: 3%
   c. Gradation Criteria:

$$D_{60}/D_{10} > 5 \; ; \; 0.8 < \frac{D^2_{30}}{D_{10}\, D_{60}} < 3 \; ; \; \frac{D_{85} \text{ of top rock}}{D_{15} \text{ of bottom rock}} \geq 0.2 \; ; \; S(x) - S(\tfrac{1}{2}\, x) < 40\%$$

2. Drainage Requirements:
   a. Laboratory Permeability > 75 in/hr (5.3 X 10^{-2} cm/sec) (ASTM D2434) [Test with rock saturated and compacted to between 92% and 95% of maximum per ASTM D4253]
   b. Field percolation rate of at least 30 in/hr.

3. Durability Requirements (ASTM C131):
   a. LA Abrasion (500 revs) < 40

D. Gradation Ranges: Bottom and top rock within the following ranges will generally meet the requirements listed above. This information is not a warranty, it is only intended to help guide the Contractor's Rock Manufacturer in the production of the materials.

Gradation Sieve Size	Bottom Rock Percent Passing	Top Rock Percent Passing
2”	100	-
1-1/2”	90 – 100	-
1”	75 – 100	-
3/4”	65 – 95	-
1/2”	55 – 85	100
3/8”	40 – 75	85 – 100
No. 4	20 – 55	60 – 85
No. 8	10 – 30	35 – 65
No. 16	5 – 20	10 – 45
No. 30	0 – 7	0 – 30
No. 50/60	0 – 5	0 – 15
No. 100	0 – 3	0 – 8
No. 200	0 – 2	0 – 3

PART 3 – EXECUTION

3.01 GENERAL

A. Excavating and grading shall be performed in conformance with the alignment, grade and cross-sections indicated on the drawings.

3.02 SPILLAGE, DUST AND EROSION CONTROL

A. The Contractor shall prevent spillage when hauling on or adjacent to any public street or highway. In the event that spillage occurs, the Contractor shall remove all spillage and sweep, wash or otherwise clean such streets in accordance with City, County and/or State requirements.

B. The Contractor shall take all precautions needed to prevent a dust nuisance to adjacent public and private properties and to prevent erosion and transportation of soil to downstream properties due to work under this contract. Any damage so caused by the Contractor's work shall be corrected or repaired by the Contractor.

3.03 SUBGRADE GRADING

A. The subgrade beneath the permeable base shall be prepared in accordance with the geotechnical report(s) and Earthwork specifications.

3.04 COMPACTED FILL

A. Any fill material placed to create the planned subgrade shall be placed in accordance with the geotechnical report(s) and Earthwork specifications.

3.05 SUBGRADE SLOPES AND GRADE TOLERANCES

A. Final subgrade grades shall conform to the lines and grades shown on the drawings.

B. The subgrade shall be excavated to create a positive slope towards the subsurface drain pipes. Unless otherwise specified on the drawings, the minimum slope of the subgrade shall be 1.0%.

C. The final subgrade grade shall be rolled with a smooth drum roller to remove all localized depressions deeper than ½ inch caused by construction and compaction equipment tires or rollers.

D. The measured grades shall not deviate more than 0.08 feet from the planned grades and not vary more than 0.04 feet in 10 feet in any direction. Laser grading is recommended.

E. All subgrade grades shown on the drawings shall be completed by the Contractor and inspected by the Owner and Engineer prior to commencing with the subsequent work items.

F. A conformance survey, performed by a licensed surveyor, is recommended.

3.06 SUBSURFACE DRAINAGE SYSTEM

A. A system of shallow trenches shall be excavated to the lines, grades and dimensions shown on the drawings.

B. The excavated trenches shall be free of loose soil and debris.

C. A layer of filter fabric shall be placed in the shallow trench and backfilled with at least 2 inches of bottom rock or CalTrans Class 1B permeable material. A perforated drain pipe shall then be placed in the trench in accordance with the drawings. The pipe shall be laid with the perforations down and at a minimum slope of 0.5% unless otherwise specified on the drawings. Lengths of pipe shall be joined by fittings fabricated by the pipe manufacturer. The perforated drain pipe shall be covered with at least 2 inches of bottom rock or CalTrans Class 1B permeable material.

D. All trench rock backfill shall be placed in layers eight inches or less in loose thickness and densified to achieve at least 92% of the maximum density (ASTM D4253).

E. Solid pipe clean out risers with end caps shall be installed at locations designated on the drawings. The maximum allowable bend angle for the subdrain clean out is 45 degrees.

F. The perforated sub-drain pipes shall connect to a non-perforated discharge pipe. The discharge pipe shall connect into the storm water drainage system as shown on the drawings.

G. The flat panel drains shall be connected to the perforated sub-drain pipe using connections and fittings by the pipe manufacturer.

H. Flat panels shall be secured to the ground surface to prevent displacement during rock placement operations. Secure using 60d nail with 1-3/4 inch o.d. steel washer at 2 feet on center.

3.07 PERIMETER HEADER

D. The Contractor shall provide and install the header in accordance with the layout and details shown on the drawings. The header will be used by the turf system installer as a means of attaching the turf carpet along the edge of the playfield.

3.08 GEOTEXTILE

A. Geotextile shall not be installed until a perimeter header has been installed.

B. Geotextile shall not be installed until subdrainage trenches have been excavated.

C. Geotextile rolls shall be handled in such a way that they are not damaged.

D. Geotextile shall be placed on exposed subgrade surfaces in accordance with the drawings. The geotextile shall be rolled out parallel to the long direction of the playfield.

E. Geotextile shall be securely anchored and then rolled in such a manner as to continually keep the geotextile sheet in tension.

F. Geotextile seams shall be anchored using 60d nails through 1-1/2” round washers placed at 36 to 48 inches on center during placement. Additional anchoring shall be installed as required to prevent bunching of the geotextile.

G. Adjacent widths of geotextile shall be “shingled” and have a 6-inch overlap at all edges.

H. Holes or tears in the geotextile shall be repaired with a fabric patch spot-seamed with a minimum 24 inch overlap in all directions.

3.09 BOTTOM ROCK

A. The specified bottom rock shall be carefully placed and compacted over the subgrade to the grades and elevations shown on the drawings. If the thickness of the planned bottom rock exceeds 6 inches, the rock shall be placed in horizontal layers not exceeding 8 inches and each layer compacted to 92% of the maximum density with a vibratory smooth drum roller.

B. Should any segregation of the material occur, during any stage of the stockpiling, spreading or grading, the Contractor shall immediately remove and dispose of segregated material and correct or change handling procedures to prevent any further separation.

C. Finished surface shall be proof rolled to 92% of the maximum density with a vibratory smooth drum roller to provide a non-yielding, smooth, flat surface.

D. Final bottom rock grades shall conform to the lines and grades shown on the drawings. The measured grades shall not deviate more than 0.08 feet from the planned grades and not vary more than 0.04 feet in 10 feet in any direction. Laser grading is recommended.

E. The surface of the bottom rock shall be sloped as shown on the drawings.

F. Bottom rock grades shall be completed by the Contractor and inspected by the Owner and Engineer prior to commencing with the subsequent work items.

G. A conformance survey, performed by a licensed surveyor, is recommended.

3.10 TOP ROCK

A. The specified top rock shall be carefully placed using a self-propelled paving machine in order to minimize segregation. Alternative placement methods may be proposed by the Contractor. The Owner may approve these methods provided the Contractor can, to the satisfaction of the Owner, present a history of successful use on past projects and by constructing a representative test area using these methods that shows these methods do not result in significant segregation.

B. A small trial area (15 feet square, minimum) of top rock shall be installed prior to installing the completed surface. The Contractor's Synthetic Turf Installer shall observe the placement and compaction of top rock in the trial area and determine whether the surface is suitable to install the synthetic turf. The Contractor shall modify installation procedures and/or material used until the Contractor's Synthetic Turf Installer is satisfied.

C. Should any segregation of the material occur, during any stage of the work, the Contractor shall immediately remove and dispose of segregated material and correct or change handling procedures to prevent any further segregation.

D. The finished surface shall be compacted to 92% of the maximum density with a vibratory smooth drum roller to provide a non-yielding, smooth, flat surface.

E. Final top rock grades shall conform to the lines and grades shown on the drawings. The measured grades shall not deviate more than 0.04 feet from the planned grades and not vary more than 0.02 feet in 10 feet in any direction. Laser grading is recommended.

F. The surface of the top rock shall be sloped as shown on the drawings.

G. All top rock grades shown on the drawings shall be completed by the Contractor and inspected by the Owner and Engineer prior to commencing with the subsequent work items.

H. A conformance survey, performed by a licensed surveyor, is recommended.

I. Field percolation testing shall be conducted by the Owner's Testing Agent in accordance with Section 1.04.F.2. The Contractor shall correct the top rock layer, at no cost to the Owner, if the minimum percolation requirement is not achieved.

3.11 FINISHING OF SURFACE PLANARITY

A. Finish surface planarity shall be adjusted by the Contractor using the string line method. A mason's line held taught between two workman separated by a distance of approximately 40 feet, shall be placed directly on the finished rock surface, parallel to the long axis of the field. A third workman shall check for separations between the mason's line and the finished surface that are equal to or greater than the tolerances specified in 3.10-E. The entire finished surface shall be checked with the mason's line in increments no greater than 3 linear feet. Areas of separation shall be identified with marking paint and the depth of separation indicated.

B. Areas identified with marking paint shall be filled with top rock to the depth indicated and raked by hand. Filled areas shall be compacted to 92% of the maximum density to provide a non-yielding, smooth, flat surface.

C. The entire finished surface shall be rechecked using the method described in 3.11-A and 3.11-B along the short axis of the field.

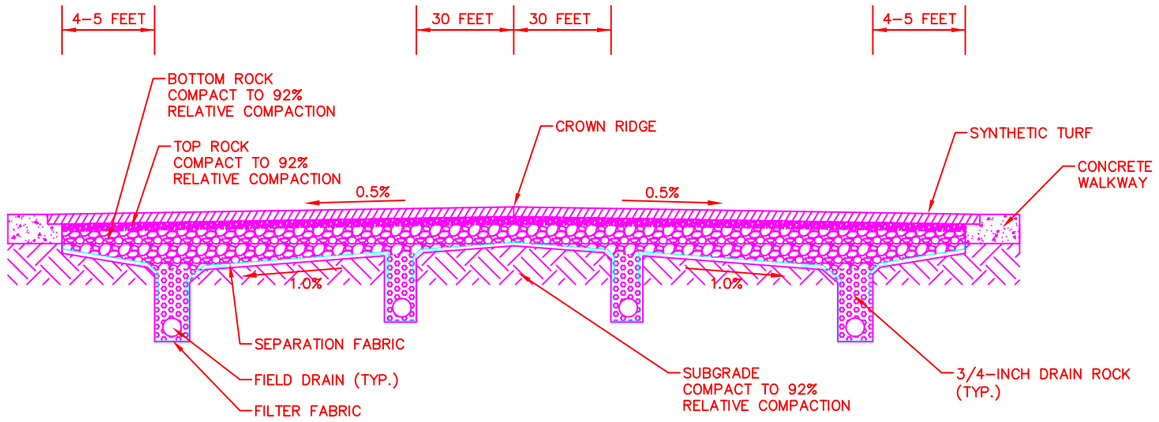
D. Roller marks, tire tracks, footprints or other impressions on the finished surface shall be raked out where they are equal to or greater than the tolerances specified in 3.10-E.

E. Following long and short axis checking and corrections, the Contractor shall notify the Owner that the finished surface is ready for inspection.

F. The Contractor shall perform a final string line check along the long axis of the field in the presence of the Owner and Contractor's Synthetic Turf Installer. Finished surface planarity shall be approved by the Owner prior to installation of synthetic turf system.

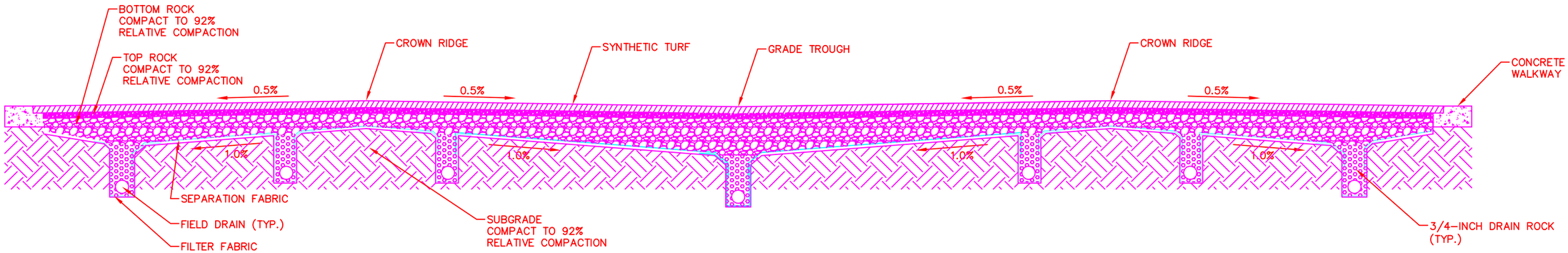
G. Damage to the finished surface planarity occurring after approval shall be corrected by the Contractor using the method described in 3.11-A through F.

END OF SECTION



TYPICAL CROSS–SECTION: SINGLE SOCCER FIELD

NOT TO SCALE



TYPICAL CROSS–SECTION: DOUBLE SOCCER FIELD

NOT TO SCALE

Miller Pacific
ENGINEERING GROUP

FILE: 1206.04 TurfSections.dwg

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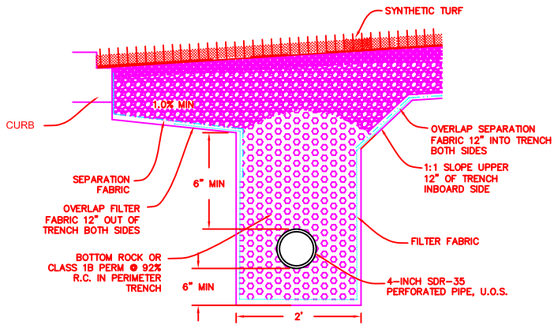
TYPICAL SYNTHETIC TURF SOCCER FIELD SECTIONS

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed NRS
Drawn NRS
Checked

B-1
FIGURE



PERIMETER TRENCH DETAIL
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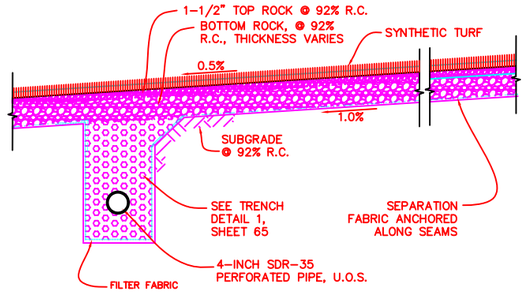

TYPICAL FIELD SECTION
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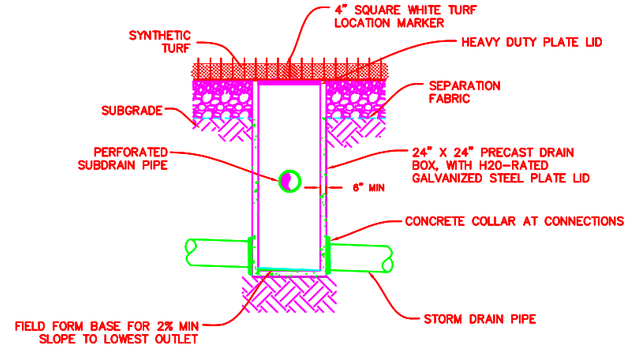

BURIED JUNCTION BOX DETAIL
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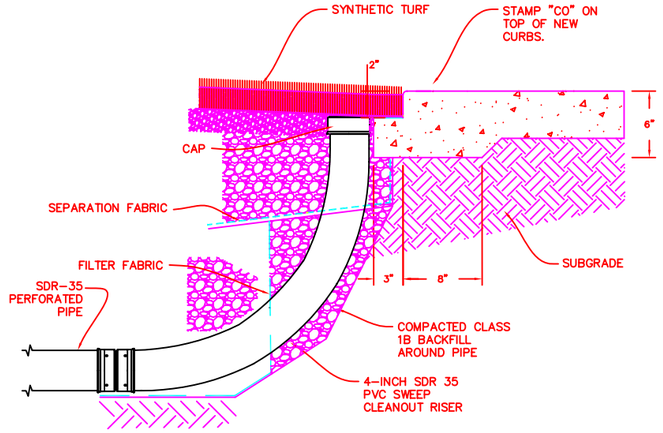

FIELD DRAIN CLEANOUT DETAIL
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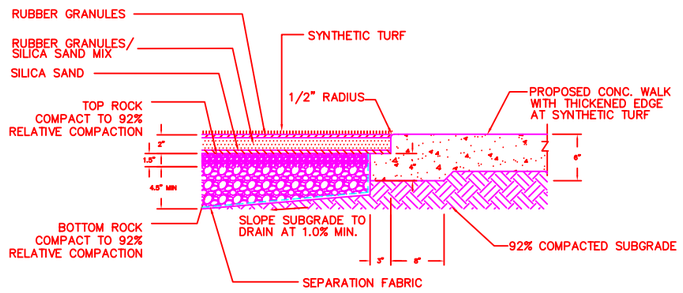

SYNTHETIC TURF TO WALKWAY DETAIL
NOT TO SCALE

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TYPICAL SYNTHETIC TURF DETAILS

East Washington Park
Petaluma, California

Project No. 1206.04 Date: 9/22/08

Designed NRS
Drawn NRS
Checked

B-2
FIGURE