



**CITY OF EAST PALO ALTO, CALIFORNIA  
DEPARTMENT OF PUBLIC WORKS – ENGINEERING DIVISION**

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## **ADDENDUM 5 ATTACHMENTS**

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**ADDISON AVENUE SAFE ROUTE TO SCHOOL AND GREEN STREET  
IMPROVEMENTS PROJECT – 22  
CIP-ST-26**

# **ADDENDUM 5 ATTACHMENT A**

## **Technical Specifications Section 110A**

## Section 110A Lime Stabilized Soil

### 1.01 Description

This work consists of mixing in-place soil with dry quicklime and water; which includes spreading, mixing, and compacting the mixture to the lines, grades and dimensions shown on the plans and as specified in these specifications or special provisions.

Equipment may not operate within 18 inches of each side of the existing water main(s) less than 30 inches in below top of pavement unless authorized in writing by the Engineer.

### 1.02 Materials

**In-place material** - shall not contain rocks or solids other than soil clods larger than 4.0 inches in any dimension. Removing and disposing of said rocks or solids larger than 4.0 inches will be paid for as extra work. Notify the Engineer if you encounter rocks or solids greater than 1/3 of the layer thickness.

**Quicklime** – Quicklime shall meet ASTM C 977, and Caltrans Std. Specs; Section 24. Sampling shall conform to ASTM C 50. The Quicklime shall be protected from moisture until used, and be sufficiently dry to flow freely when handled. Quicklime shall be furnished in bulk.

When dry sieved in a mechanical sieve shaker for 10 minutes +/- 30 seconds a 250-gram test sample of Quicklime shall conform to the following grading requirements:

Sieve Size	Percentage Passing
1/8	98 - 100

**Water** shall be clean and potable and shall be added as needed during mixing and re-mixing operations, during compacting, and during the curing period.

**1.03 Application Rate** The lime application rate is based on the laboratory mix design. The percentage of lime is determined according to the maximum dry weight of the untreated material determined in the laboratory by ASTM D1557. The contractor, prior to commencing the field work shall perform a mix design to confirm the final spread rate of lime.

The mix design will provide evidence that the required Unconfined Compressive Strength (UCS) is attainable per ASTM D 5102. For bidding purposes, the

Contractor shall use a lime application rate of five percent (5%) at 120-pcf-soil weight. The application rate will be expressed as 6 lbs per sq. ft. of lime.

#### **1.04 Proportioning / Spreading**

The Quicklime shall be spread in one operation to the required width, grade and cross section. Quicklime shall be evenly spread at the designated rate and shall not vary more than 5 percent on any area. Only a calibrated spreader able to provide a uniform distribution of the Quicklime throughout the treatment area shall spread the Quicklime. The Quicklime shall be added in a dry state and every precaution shall be taken to prevent dusting.

Tailgate spreading of the Quicklime will not be permitted. Tailgating is defined as having manual control of the spread rate, instead of automatic. The spreader truck shall demonstrate the ability to maintain a consistent spread rate over variable travel speeds. The contractor will demonstrate the consistency of the spread rate by conducting multiple pan tests.

No traffic other than the mixing equipment or other related construction equipment will be allowed to pass over the spread Quicklime until after completion of mixing.

#### **1.05 Initial Mixing**

Mixing equipment shall be equipped with a visible depth indicator showing mixing depth, an odometer to indicate travel speed and a controllable water additive system for regulating water added to the mixture. The initial mix shall be done while introducing water through a controllable pump on the mixing machine.

Mixing equipment shall be the type that can mix to the full depth of the desired thickness and leave a relatively smooth bottom of the treated section. Mixing and re-mixing, regardless of equipment used, will continue until the material is uniformly mixed, free of streaks or pockets of unhydrated Quicklime. Moisture content shall be a minimum of 4 percent over the treated soils design optimum after the initial mixing.

Treated material shall not be mixed or spread while the atmospheric temperature is below 35 F or below 1.67 C.

**The initial and final mixings shall not be performed on the same day.**

#### **1.06 Mellowing and Re-Mixing**

After initial mixing and hydration, the treated material shall mellow for a minimum of 16 hours prior to re-mixing. Once the mellowing period has been completed, the treated soil shall be re-mixed and re-hydrated to the full depth of treatment.

All material other than rock or aggregate complies with the following requirements:

Sieve size	Percent Passing
1"	98 Min.

No color reaction of the treated material, exclusive of one inch or larger clods, is tested with the standard phenolphthalein alcohol indicator, will be considered evidence of inadequate mixing.

### **1.07 Compacting**

The Quicklime treated soils shall be compacted to a minimum relative compaction determined by ASTM 1557.

The maximum compacted thickness of a single layer may be any thickness the contractor can demonstrate to the Engineer that his equipment and method of operation will provide the required compacted density throughout the layer.

Initial compaction shall be performed by means of sheepfoot compactor. Final rolling shall be by means of steel-tired or pneumatic-tired rollers. Areas inaccessible to rollers shall be compacted to the required compaction by other means satisfactory to the Engineer. Final and finish compaction shall be completed within 36 hours of final mixing.

### **1.08 Curing**

The surface of each compacted layer of treated material shall be kept moist until covered by a subsequent layer. If treated section is to be exposed for more than 3-days, then a curing seal shall be considered. The cure seal shall consist of SS or CSS grade asphaltic emulsion and can be applied as an option to continued water curing after the initial 3-days.

Curing seal shall be applied at a rate of between 0.10 and 0.20 gallons per square yard of surface. Curing seal shall not be placed when the atmospheric temperature is below 5°C.

### **1.09 Full Depth Reclamation**

Contractor shall continue with Full Depth Reclamation – Cement as described elsewhere in these Specifications.

# **ADDENDUM 5 ATTACHMENT B**

## **Technical Specifications Section 110B**

## Section 110B Full Depth Reclamation - Cement

### 1.0 DESCRIPTION

This specification shall govern the process known as Full-Depth Recycling (FDR). FDR consists of reconstructing the existing distressed pavement sections by in-place recycling of the pavement materials and stabilizing to enhance the structural properties of the recycled materials. This work shall consist of pulverizing the existing roadway materials and uniformly mixing with Portland cement and water. Mixture shall then be compacted, finished, and cured in such a manner that the in-place cement treated mixture forms a dense, uniform mass conforming to the lines, grades, and cross sections shown on the Drawings.

Equipment may not operate within 18 inches of each side of the existing water main(s) less than 30 inches in below top of pavement unless authorized in writing by the Engineer.

### 2.00 GENERAL

#### 2.01 Materials.

**Recycled Materials** – Material to be treated with Portland cement shall consist of pulverized asphaltic concrete and underlying base materials.

Existing materials shall be pulverized so that 100 percent will pass a 2-inch (50-mm) sieve and a minimum of 85 percent will pass a 1-inch (25-mm) sieve.

**Portland cement** – All cement to be used and furnished shall conform to ASTM C150. The cement shall be protected from moisture until used and be sufficiently dry to flow freely when handled. Cement shall be furnished in bulk and not exposed until applied to the prepared grade.

**Water** – Water shall be free from oils, acids, organic matter or other substances deleterious to the cement treatment of materials. The water shall not contain more than 1000 parts per million of chlorides nor more than 1000 parts per million of sulfates as SO<sub>4</sub>. Water shall be clean and potable and shall be added as needed during mixing, compacting, and finishing operations and during the curing period, as required.

**2.02 Cement Application Rate.** The cement application rate is based on the laboratory mix design. The percentage of cement is determined according to the maximum dry weight of the untreated material determined in the laboratory by ASTM D1557. The contractor, prior to commencing the field work shall perform a mix design to confirm the final spread rate of cement. The mix design must produce an FDR material with an unconfined compressive strength from 300-600 psi determined at 7-days of cure per ASTM D 1633, Method A. For bidding

purposes, the Contractor shall use a cement application rate of five percent (5%) at 120 pcf-soil weight. The corresponding cement application rate shall be 6 lbs. per square foot.

**2.03 Contractors Qualification.** The contractor performing FDR cement stabilization shall document a minimum of five years experience performing similar cement stabilization work. The contractor shall submit a list of equipment to be utilized in performance of the cement stabilization work. The contractor shall submit a detailed description of work procedures for approval by the Engineer prior to beginning FDR cement stabilization work.

The contractor performing FDR cement stabilization shall have a representative on site with a minimum of 5 years' experience in cement stabilization. Their function should include coordinating with other contractors and site representatives. All personnel should be properly trained in the FDR treatment process, including quality control and safety procedures.

**2.04 Protection of Existing Utilities.** Where existing underground utilities or utility services lie within the FDR section, the contractor shall verify, by potholing or other means acceptable to and approved by the Engineer, that there is sufficient cover over the utilities to provide clearance for the FDR mixing process without damage to the existing utility facilities. This verification shall be carried out where each utility crosses the boundary of the FDR section, and at a minimum of one location in between. This paragraph shall not relieve the Contractor of conforming with all utility protection requirements.

The Contractor shall be responsible for the protection of existing pipelines, manholes, catch basins, valve boxes, monument boxes and other utility structures that are to remain within the FDR work area. Any such utility facilities that are damaged from roadway excavation work performed by the Contractor shall be either repaired or replaced to the satisfaction of the Engineer at no additional cost, in accordance with Section 15-1.02, "Preservation of Property." of the State Standard Specifications.

**2.05 Equipment.** The FDR section shall be constructed utilizing a combination of machines that will produce results that meet all the requirements herein. The Engineer shall approve the use such machines prior to use.

**Cement Spreader:** The cement spreader shall be equipped with such instrumentation and control equipment to control spread rates over variable travel speeds. The operator shall demonstrate that the instrumentation and control equipment is calibrated and capable of controlling the spread rates within specifications.

**Mixer:** The mixing equipment shall be capable of mixing the full-specified depth of cement treatment, leaving a relatively smooth plane at the bottom of the FDR section. Mixing equipment shall be equipped with a visible depth indicator showing the mixing depth, and odometer or footmeter to



indicate travel speed, and a controllable water additive system for regulating water added to the mixture.

**Compactors:** When compacting cement treated sections greater than eight (8) inches, a sheepsfoot type compactor capable of compacting the entire section to the project specification shall be used.

### **3.00 CONSTRUCTION**

**3.01 Preparation of Existing Roadway.** The existing asphaltic concrete (AC) surfacing and the underlying base material shall be pulverized to the full depth of the FDR section.

The pulverized materials shall be graded to conform to the lines and grade shown on the plans prior to application of the cement. Grading operations will require some movement of material along the grade and/or off-haul of material to conform to the lines and elevations shown on the Drawings and to allow for the new asphalt concrete section.

No more of the existing roadway sections shall be pulverized or removed in any working day than can be treated and finished graded the following day. Pulverized material shall be temporarily compacted at the end of each day with a smooth drum roller, to allow for traffic. Temporary AC tapers shall be placed at conforms if the grade difference exceeds 2 inches.

Contractor shall stabilize soil with lime as described elsewhere in these specifications.

**3.02 Portland Cement Application.** The Portland cement shall be applied in one consecutive operation to the required width, grade and cross section. The total application rate shall not vary more than 10 percent on any area. Only a calibrated spreader able to provide a uniform distribution of the cement throughout the treatment area shall spread cement. The cement shall be added in a dry state and every precaution shall be taken to prevent dusting. The spreader shall be equipped with an air vacuum return system to capture fugitive dust.

Contractor is required to remove any cement powder that drifts or blows onto any areas or objects outside the FDR work zone (lip of gutter to lip of gutter).

A pan test, consisting of placing a three (3) square foot pan on the grade in front of the spreader truck, shall determine compliance of application rate. After cement has been spread, the pan and cement dropped in the pan shall be weighed to determine the rate of spread in pounds per square foot. Certified weight tags (not truck tags) will be used to verify the amount of cement delivered to project.

No traffic other than the mixing equipment or other related construction equipment would be allowed to pass over the exposed cement until after completion of mixing.

Cement shall not be spread or mixed/hydrated while the atmospheric temperature is below 35° F (1.67° C.) At the Engineers discretion, processing will be allowed if temperature is rising.

**3.03 Mixing and Hydrating.** The depth of FDR treatment shall be indicated on the project plans. In areas where the mixer can not access, such as around manholes or curbs, Contractor shall process the same day by pulling the material away from obstacles immediately after cement application. Material and cement shall be relayed to an area accessible to mixing equipment.

The mixer shall be capable of automatically adjusting itself to maintain a constant depth. On the initial mix, the water truck must have a solid connection to the mixer. The water shall be injected directly into the mixing chamber and shall produce a homogenous blend free from streaks or pockets of dry cement. Leakage of water from equipment will not be permitted. Care shall be exercised to avoid the addition of any excessive water.

When mixed material, exclusive of one inch or larger clods, is sprayed with a phenolphthalein alcohol indicator solution, areas showing no color reaction will be considered evidence of inadequate mixing.

Contractor is required to complete mixing and initial compaction of the total FDR-cement section within 2 hours of initial hydration of cement.

**3.04 Compaction.** Maintain moisture above the optimum moisture content, but within allowable range as determined by the moisture/density relationship of the laboratory compaction curve. The FDR-cement section shall be compacted to **95-percent** of the maximum density as determined by ASTM 1557.

The maximum compacted thickness of a single layer may be any thickness the contractor can demonstrate to the engineer that his equipment and method of operation will provide the required compacted density throughout the treated layer.

**3.04.1 Initial compaction** – Contractor shall achieve the project minimum compaction requirement during the initial compaction operation. Lift thickness of 12 inches and greater shall be compacted by a sheepfoot compactor (Rex 3-70 compactor or approved equal) with an open ring design to prevent bridging of the lower half of the FDR section. Areas inaccessible to compaction equipment shall be compacted to the required compaction by other means satisfactory to the Engineer.

**3.04.2 Surface compaction** - Surface compaction is defined as the upper 3 inches of the FDR section. Surface compaction shall be by means of a steel-drum or pneumatic-tired roller. Areas inaccessible to rollers shall be

compacted to the required compaction requirement by other means satisfactory to the Engineer.

**3.05 Final Grading.** Surface compaction and finish grading shall proceed in such a manner as to produce, in not more than 2 hours from initial compaction, a smooth, closely knit surface conforming to the crown, grade and lines indicated and will be free of ridges or loose material.

Maintain proper moisture content on the treated surfaces within the allowable range during all grading procedures.

All excess material above the grade tolerance specified by the drawings should be removed from the grade prior to final surface compaction of the FDR section. This excess material can be used in areas inaccessible to treatment equipment, provided the cement base material is used within the allotted time constraints.

The trimmed and completed surface shall be rolled with steel or pneumatic tired rollers. Minor indentations may remain in the surface of the finished material as long as no loose material remains in the indentations.

**3.06 Traffic Loading.** Once the FDR section is finished, Contractor may be allowed to place subsequent structural layers over the FDR section provided that the following criteria's are met:

- A. The section is stable and non-yielding under a minimum 15 ton proof-roll.
- B. The section has no evidence of cracking from shrinkage or load stress
- C. The section criteria's have all been met, including the FDR section thickness, percentage of cement placed, and quantity or volume of FDR treatment confirmed.

**3.07 Repairs.** If the FDR-cement section is damaged, removing and replacing the entire depth of affected layers in the damaged area shall be the only solution to repair it. Feathering will not be permitted for surface repairs.

**3.08 Micro-cracking. (At the discretion of the Engineer)** After 24 to 48 hours, the engineer may require that the finished FDR section be vibrated with between 1 and 3 passes of a 10-12 ton steel-wheel vibratory roller, traveling at a speed of approximately 2 mph and vibrating at maximum amplitude (or as directed by Engineer). The section shall have 100% coverage so as to induce minute cracks in the treated FDR section.

**3.09 Curing.** After placement and compaction of the FDR-cement section is completed, it shall be protected against drying and traffic for 3-days. The Engineer, based on factors such as degree of traffic, temperature, and stability may reduce the 3-day cure period.

Curing shall be moist (water fogging), bituminous seal, or other method approved by the Engineer. If moist curing is used, exposed surfaces of the FDR section shall be kept continuously moist with a fog spray for 3 days. If a bituminous

curing is used, it shall consist of liquid asphalt or emulsified asphalt meeting the requirements of Section 37 of the State Standard Specifications.

The bituminous curing seal shall be applied in sufficient quantity to provide a continuous membrane over the soil at a rate of between 0.10 and 0.20 gallon per square yard of surface with the exact rate determined by the Engineer. It shall be applied as soon as possible after the completion of final rolling. The surface shall be kept moist until the seal is applied. At the time the bituminous material is applied, the soil surface shall be dense, shall be free of all loose and extraneous material, and shall contain sufficient moisture to prevent excessive penetration of the bituminous material.

# **ADDENDUM 5 ATTACHMENT C**

## **Revised Bid Schedule**

**BID SCHEDULE**

## Notes:

1. The Contract will be awarded on the basis of Total Base Bid amount only.
2. The Addition of Additive Alternate Bid items does not change the basis by which the project will be awarded.
3. The bidder must complete the Alternate Bid in full for the bid to be considered.

**BASE BID**

Item Number	Item Description	Qty	Unit	Unit Cost	Total Cost
1	Mobilization	LS	1		
2	Progress Schedule (Critical Path Method)	LS	1		
3	Traffic Control	LS	1		
4	Stormwater Pollution Prevention	LS	1		
5	Construction Staking and Surveying	LS	1		
6	Utility Potholing - Design	EA	40		
7	General Utility Potholing	LS	1		
8	Reconstruct Fence - 2161 Addison Avenue	LF	20		
9	Reconstruct Fence and Gates – 2165 Addison Avenue	LF	51		
10	Reconstruct Fence and Gates – 2169 Addison Avenue	LF	50		
11	Reconstruct Fence and Gates – 2175 Addison Avenue	LF	50		
12	Reconstruct Fence and Gates - 2187 Addison Avenue	LF	50		
13	Reconstruct Fence - 2191 Addison Avenue	LF	30		
14	Reconstruct Fence - 2293 Addison Avenue)	LF	20		
15	Reconstruct Fence and Gate - 1240 Bay Road	LF	70		
16	Remove and Trim Trees	LS	1		
17	Remove Concrete	LS	1		
18	Cut-off Curb (Type 1)	LF	316		
19	Cut-off Curb (Type 2)	LF	378		
20	Concrete Curb Ramp	EA	10		
21	Concrete Curb and Gutter	LF	160		

22	Concrete Sidewalk	SF	2330		
23	Urban Curb, Gutter, and Sidewalk (Type D-3)	LF	320		
24	Driveway (Type D-1)	LF	214		
25	Driveway (Type D-2)	LF	40		
26	Vertical Curb (Type A1-6)	LF	32		
27	3-Ft Valley Gutter (Type D-5)	LF	530		
28	6-Ft Valley Gutter (Type D-5)	LF	33		
29	Miscellaneous Concrete	LS	1		
30	Full-Depth Reclamation – Cement	SY	2253		
31	Cement (Full-Depth Reclamation – Cement)	TON	76		
32	Hot Mix Asphalt (Type A)	TON	560		
33	Base for AC Pavement - Parking	SF	3650		
34	Base Failure Repair (Digout)	SF	6086		
35	Remove AC Speed Hump	EA	2		
36	Remove AC Pavement	LS	1		
37	AC Speed Hump	EA	2		
38	Crack Sealing	LS	1		
39	Slurry Seal	SY	3747		
40	Bioretention Areas	LS	1		
41	Planting	LS	1		
42	Irrigation	LS	1		
43	Landscaping Maintenance	LS	1		
44	Storm Drain Manhole	EA	5		
45	12" RCP	LF	1600		
46	Inlet Type GO	EA	1		
47	Overflow Inlet at Bioretention Area	EA	7		
48	Modify Existing Curb Inlet at Bioretention Area No. 8	EA	1		
49	Adjust Sanitary Sewer Manhole Frame and Cover to Grade	EA	1		

50	Reconstruct Sanitary Sewer Utility Lateral	EA	27		
51	Water Service Lateral	EA	16		
52	Abandon Water Service Lateral	EA	16		
53	Adjust Water Valve Box with Cover to Grade	EA	10		
54	Adjust Water Meter Box with Cover to Grade	EA	12		
55	Adjust Telephone Box with Cover to Grade	EA	2		
56	Project Funding Sign	EA	2		
57	Remove Roadside Sign	EA	29		
58	Salvage Pedestrian Barricade w/ Sign	EA	2		
59	Remove Striping, Pavement Markers, and Pavement Markings	LS	1		
60	Thermoplastic Pavement Markings	SF	552		
61	Crosswalk and Limit Line Stripe	SF	1804		
62	Detail 22 Striping	LF	200		
63	Detail 23 Striping	LF	224		
64	Educational Sign	EA	2		
65	Pedestrian Barricade w/ Sign	EA	2		
66	Roadside Sign (Salvaged Sign)	EA	29		
67	Replacement Sign	EA	20		
68	Two-way Reflective Blue Pavement Markers	EA	7		
69	Lime Stabilized Soil	SY	2253		
70	Lime (Lime Stabilized Soil)	TON	76		
TOTAL BASE BID					

Total Base Bid in Words:

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