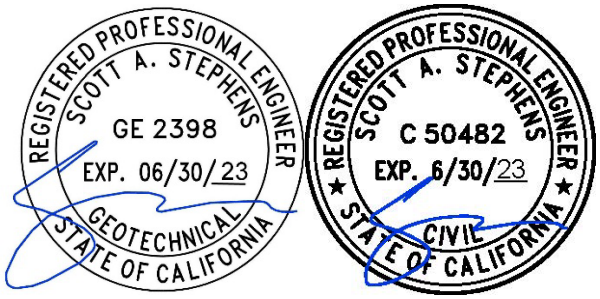
CONTRACT DOCUMENTS

STRAWBERRY RECREATION CENTER
PICKELBALL COURTS
MILL VALLEY, CALIFORNIA

January 3, 2023

Project Number 1872.012

Prepared for:
Strawberry Recreation District
Attn: Ms. Nancy Shapiro
118 E Strawberry Drive
Mill Valley, California 94941



Scott A. Stephens
Geotechnical Engineer # 2398
(Expires 6/30/23)

STRAWBERRY RECREATION CENTER
PICKLEBALL COURTS
MILL VALLEY, CALIFORNIA

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DRAWINGS

STRAWBERRY RECREATION CENTER
PICKLEBALL COURTS
MILL VALLEY, CALIFORNIA

BIDDERS PROPOSAL AND AGREEMENT

The undersigned Bidder, a duly licensed contractor, hereby proposes to the Owner to perform the work described by the General Requirements, Specifications, and Drawings as indicated on the Bid Schedule.

BID SCHEDULE (Prevailing Wage Rates Apply)

Item	Description	Quantity	Units	Price	Total
1.0	Mobilization/Demobilization, Insurance & Misc. Items	1	LS	$_____	$_____
2.0	Grubbing, Clearing, Excavation, and Offhaul	240	CY	$_____	$_____
3.0	Fencing Site/Maintaining Park Access	1	LS	$_____	$_____
4.0	New Soil Nail/ Shotcrete Wall				
4.1	10-foot long 15-kip Soil Nails	21	EA	$_____	$_____
4.2	6-foot long 5-kip Soil Nails	7	EA	$_____	$_____
4.3	Fencing on Wall	77	LF	$_____	$_____
4.4	12-inch Thick Reinforced Shotcrete Wall	630	SF	$_____	$_____
4.5	Drainage Ditch	77	LF	$_____	$_____
5.0	Storm Drain Line (Remove and Replace)	133	LF	$_____	$_____
6.0	Install Pickleball Courts				
6.1a	Reinforced Concrete Court Option	4200	SF	$_____	$_____
6.1b	Asphalt Concrete Court Option	4200	SF	$_____	$_____
6.1c	Post-Tensioned Concrete Court Option	4200	SF	$_____	$_____
6.2	New Fencing with 18-inch Grade Beam with Piers and Gate	115	LF	$_____	$_____
6.3	New Lighting and Electrical Line	1	LS	$_____	$_____

6.4	New Adjustable Height Basketball Hoops	2	EA	$_____	$_____
6.5	Concrete Entry Area	45	SF	$_____	$_____

Owner reserves the right to vary contract quantities. Bid to remain valid for 60 days after submittal.

Bidder: _____ License No. _____

Address: _____ Telephone: _____

_____

Authorized Signature: _____ Date _____

Printed Name: _____

ACCEPTANCE, AGREEMENT and NOTICE TO PROCEED

Owner's Authorized Agent: _____ Date: _____

Printed Name: _____

The contract period commences on the date shown above.
Contractor is directed to submit the Performance Bond and Certificates of Insurance prior to starting actual work.

STRAWBERRY RECREATION CENTER
PICKLEBALL COURTS
MILL VALLEY, CALIFORNIA

DIVISION 1 - GENERAL REQUIREMENTS
PART 1 – GENERAL CONDITIONS

1.01 Scope

The work shall consist of constructing the entire work as described in the General Requirements and on the Drawings, and any other ancillary work required to provide a complete project.

1.02 Engineer

The Engineer for the work described in these documents is Miller Pacific Engineering Group, 504 Redwood Boulevard, Suite 220, Novato, California 94947, (415) 382-3444, who shall be hired and paid by the Owner. The Engineer will be present intermittently to observe the Contractor's operation, to perform tests, measurements and to adjust the work as necessary to meet field conditions. Such observations, tests, measurements, and work adjustments shall not alter the requirements of the plans or specifications nor imply any superintendence or control of the Contractor's operation, nor warranty the Contractor's work.

1.03 Protection of Property

The Contractor shall take all necessary precautions to protect existing structures and other property, and to avoid damage thereto, and shall at his own expense, repair any damage thereto caused by his operations.

1.04 Access

All work shall be carried out from the Owners' lands and those lands over which the Owner has obtained easements. The Contractor shall arrange for any additional access required at no cost to the Owner. At the completion of work, the Contractor shall restore all access routes and other disturbed portions of the work area to their original condition.

1.05 Utilities

The Contractor shall take precautions to prevent damage to any utilities in and near the work area. The Contractor shall contact all affected utility owners and request them to locate and mark the location of their respective utilities on the ground. Any damage to utilities caused by the Contractor's work shall be corrected or repaired by the Contractor at no cost to the Owner. In the event the Contractor fails to take such precautions or make such repairs promptly, the Owner may take steps deemed necessary and deduct the cost of repairs and associated expenses from moneys due to the Contractor.

1.06 Regulatory Requirements

The Contractor shall comply with all governmental regulatory requirements applicable to the work including local, State and Federal agencies.

1.07 Site and Subsurface Conditions

The drawings show approximate topography and other features compiled from a variety of sources. The bidder shall inspect the site and satisfy him/herself as to the reasonableness of the topography and shall notify the Engineer in writing of any apparent discrepancies prior to submitting a bid.

Any subsurface data at the site has been obtained solely to assist in making design conclusions. The Contractor may view any and all such information available, however, there is no warranty for such information and the Contractor shall not be due any additional compensation for changed or unforeseen conditions.

1.08 Layout

The Contractor shall be responsible for the field layout of work. The layout shall be reviewed by the Engineer prior to commencement of work. Such review shall not waive the Contractor's obligation to perform the work in accordance with the plans and specifications.

1.09 Commencement and Completion of Work

The Contractor shall begin the work within ten (10) working days after receiving the Contract signed by the Owner and a Notice to Proceed. The Contractor shall diligently and continuously prosecute all work to completion.

When the work has been substantially completed to the satisfaction of the Engineer and Owner, and upon the Contractor’s request, the Engineer will issue a Notice of Completion. Issuance of such notice does not relieve the Contractor of completing minor work required to provide a complete project.

1.10 Pre-Construction Meeting

An on-site pre-construction meeting shall be held by the Engineer with the Owner and the Contractor to review the Contractor’s proposed construction schedule, work sequence and methods and to clarify the intent of the contract.

1.11 Work Schedule

Unless otherwise approved by the Owner and the Engineer, or required for safety or protection of the work, or for an emergency, the Contractor shall work only those hours and days permitted by local authorities.

1.12 Measurement

Measurement for work performed shall be made in the unit measurements and at the unit prices defined on the bid proposal. Measurement shall be horizontal distances except where slope measure is indicated on the bid schedule. Quantities shall be limited to the amounts defined on the plans, unless otherwise directed by the Engineer and approved in writing by the Engineer and Owner's representative. All extra work performed without written authorization shall be deemed as being done for the convenience of the Contractor and shall not be paid.

1.13 Payment

The Contractor may submit monthly pay requests for work completed. Such pay requests will be reviewed and adjusted, if warranted, by the Engineer and forwarded to the Owner for payment of the amount less 10 percent retention. Payment of the retention will be made 45 days after the date of the Notice of Completion, receipt and approval of Contractor's final billing and lien releases from all subcontractors and suppliers.

1.14 Bonds and Insurance

Prior to commencing work, the Contractor shall provide evidence of the following bonds and insurance.

(a) Comprehensive Bodily Injury Liability of not less than $1,000,000 single limit.
(b) Property Damage Liability of not less than $1,000,000 single limit.
(c) Workers' Compensation Certificate - Statutory Requirement.
(d) Performance Bond – 100%

The Contractor shall require each subcontractor to provide certificates of insurance listed under (a), (b), and (c) above. All liability insurance shall be primary insurance and shall include those persons and entities listed in Part 2 - Special Conditions, their officers, employees, and agents as "Additional Insured." The general liability insurance must include broad form property damage, products and completed operations and contractual liability.

Bonds and Certificates of Insurance shall be in a form and with companies acceptable to the Owner. Policies shall provide for 30 days written notice of cancellation. Certificates of Insurance shall be delivered to the Owner, with copies to the Engineer prior to commencement of work

1.15 Allocation of Risk

The Contractor shall be liable for, and agrees to indemnify, hold harmless, and defend all those parties herein designated to be "Additional Insured" from any loss or expense, including reasonable attorney's fees, costs of suit, and the reasonable value of the time or services incurred by reason of any claim arising under this Contract or from the work described herein, not resulting from the sole and active negligence or sole and willful misconduct of the designated additional insured parties.

1.16 Project Safety and Construction Supervision

The Contractor is solely responsible for safety at and near the project site and for methods of work, selection and operation of equipment, selection, supervision, direction and performance of Contractor's employees, and sequencing of all other related construction activities. Neither the Engineer nor the Owner is responsible in any way for the direction of the Contractor's work or job safety.

1.17 Reference Standards

The following standards and the latest revisions thereto are incorporated in the project specifications by reference.

ABAG – Association of Bay Area Governments (ABAG) - "ABAG Standards" means Manual of Standards for Erosion and Sediment Control Measures, Association of Bay Area Governments.

ASTM – American Society for Testing and Materials (ASTM).

BMP – California Storm Water Best Management Practice Handbook, March 1993.

Caltrans – California Standard Specifications - Standard Specifications of the State of California, Business and Transportation Agency, Department of Transportation, latest revision thereof.

County Standards – Standard Specifications, Cities and County of Marin, Department of Public Works, May 1972 and Uniform Construction Standards, latest revisions thereof.

OSHA – Department of Labor, "Occupational Health and Safety Standards," 29 FR Part 1926.

CBC – California Building Code, latest revision thereof.

1.18 Quality Control

The Engineer will be present at the site intermittently on the Owner's behalf to observe the Contractor's operation, and the work performed, and to perform various tests and measurements to evaluate material quality and work in progress and completed. The Contractor shall cooperate with the Engineer in performing these observations, tests, and measurements.

At the completion of the project, the Engineer will submit a report to the Owner, summarizing their observations, tests and measurements of the work performed and their opinion as to the satisfactory completion of such. Costs of any re-testing and re-inspection required as the result of inadequate, insufficient, or incomplete work by the Contractor may be deducted by the Owner from the contract amount. The Engineer is not responsible for surveys, locations, elevations, or quantities except for those deemed necessary by the Engineer to verify contract quantities.

1.19 Warranty and Maintenance of the Work

The Contractor shall warrant the quality and sufficiency of the work performed and shall be responsible for, and make good all defects in the work, at the Contractor's sole cost and to the satisfaction of the Engineer, for the period of 90 days after the Owner has issued the Notice of Completion of the work.

1.20 Dispute Resolution

All claims, disputes, or controversies arising out of or in relation to this agreement or the work to be performed hereunder shall be first referred, in writing, to the Engineer for decision. The Engineer shall respond with his decision in writing within 30 days. Thereafter the parties will endeavor to resolve the dispute in an amicable manner by mediation prior to institution of any other legal proceedings. Mediation will be through the Judicial Arbitration and Mediation Service of San Francisco with each party paying an equal share of the cost therefore.

PART 2 - SPECIAL CONDITIONS

2.01 Project Description

The project includes construction of a new soil nail and shotcrete retaining wall to construct two new pickle ball courts.

2.02 Selection of Contractor

The Owner reserves the right to competitively negotiate each of the Contracts and to select a contractor based on contractor qualifications, availability, references, past performance, unit prices, total bid price, or other basis. Owner may reject any or all bids. The Owner will not be responsible for any costs incurred by any bidder in preparing and making its bid.

2.03 Easements and Permits

The Contractor shall obtain and pay for all easements or permits for the work from the City of Mill Valley.

2.04 Prevailing Wage

Prevailing wage rates apply per the Department of Industrial Relations.

2.05 Time of Completion

Contractor shall complete the work under this Contract within 45-calendar days after notice to proceed.

2.06 Liquidated Damages

Liquidated damages shall be deducted from the payment due under the contract in the amount of $100 for each calendar day after the contract period that the work is incomplete, plus the Engineer's actual charges for inspections after the contract completion date.

2.07 Owner

For purposes of these documents, the “Owner” is the Agent for the various actual owners, who is authorized to make binding decisions regarding contractual matters relative to this project and disburse funds for payment of work under this contract. The Owner is:

Strawberry Recreation Center
Attn: Nancy Shapiro
118 E. Strawberry Drive
Mill Valley, California

2.08 Additional Insured

The following individuals and firms, together with their officers, employees, and agents shall be included as Additional Insured for all policies required. (See Division 1 General Requirements, paragraph 1.14.)

Miller Pacific Engineering Group
504 Redwood Boulevard, Suite 220
Novato, California 94947

Strawberry Recreation Center
118 E. Strawberry Drive
Mill Valley, California 94941

SECTION 2100
SITE PREPARATION

PART 1 – GENERAL

1.01 SCOPE OF WORK

Work Included - The work under this section consists of demolition of designated improvements, clearing of vegetation, stripping of unsuitable material, disposal of debris, moisture conditioning and surface recompaction.

1.02 QUALITY ASSURANCE

A. Notification - No site work shall be performed without notification of the Engineer at least two (2) full working days prior to commencement of work.

B. Site Information - The Contractor shall satisfy himself as to the nature and quantity of materials to be moved and other work to be performed, and any differences between site conditions shown on the drawings and actual conditions immediately prior to commencement of work.

PART 2 – PRODUCTS

Not applicable.

PART 3 – EXECUTION

3.01 General - Site preparation shall be performed prior to any earthwork specified in the grading plans. Site preparation shall be accomplished to the extent indicated on the drawings or as established by the Engineer.

3.02 Demolition - The work under this section consists of removing and disposing of designated improvements within areas specified on the grading plans. The Contractor shall remove existing structures, either by relocating them off-site or by demolition and disposal.

3.03 CLEARING AND STRIPPING

A. Clearing - All areas to be graded shall be cleared of unsuitable material, such as stumps, logs, timber, brush, trees, and other organic material concrete, metal, asphalt, concrete, rock, and other similar debris on the ground surface or exposed during grading or utility construction.

B. Removal of Trees - Areas to be graded shall be cleared of all trees flagged for removal. Where trees or stumps are removed, the resulting depressions shall be cleaned of roots and loose materials and backfilled with compacted fill as required.

C. Stripping - The surfaces of all areas to be excavated or to receive fill shall be stripped to remove unsuitable material such as, grass, roots, or other vegetation. When approved by

the Engineer in advance, such unsuitable material may be stockpiled for later use as landscaping fill.

3.04 OVER-EXCAVATION

Where areas to receive fill are underlain by weak, saturated, organic, or otherwise unsuitable material, and where unsuitable materials are exposed in the bottom of planned excavations as determined by the Engineer, such unsuitable materials shall be excavated to the depth and extent determined by the Engineer. The excavation shall be backfilled and compacted as required elsewhere.

3.05 DISPOSAL OF DEBRIS

The work performed under this section consists of disposing of all unsuitable material cleared, removed, and stripped under Section 3.02, 3.03 and 3.04. Such material shall become the property of the Contractor and shall be removed from the site.

3.06 MOISTURE CONDITIONING AND SURFACE RECOMPACTION

A. Moisture Conditioning - After clearing, stripping and over-excavation of all areas that are to receive fill material, and before placement of any fill, the exposed soils shall be scarified to a depth of 6 inches, watered or dried as needed, and mixed to achieve a uniform moisture content near the optimum moisture content.

B. Surface Recompaction - After moisture conditioning the soils, the soils shall be compacted with appropriate equipment. The upper 6 inches of the exposed surface material shall be compacted to at least 90 percent relative compaction (ASTM D 1557).

3.07 KEYWAYS AND BENCHES

A. Description - In all fill areas where prepared surfaces are steeper than 5 horizontal to 1 vertical, the surface shall be further prepared to receive the fill and fill slopes by excavating keyways and benches as follows:

B. Keyways - Keyways shall consist of a horizontal trench at least 10 feet wide located directly beneath the toe of planned fill slopes. Keyways shall be excavated to the depth shown on the plans and shall be at least 2 feet deep at the downslope edge. Keyways shall have substantially level bottoms extending entirely into firm undisturbed soil or rock. A subdrain with appropriate cleanouts and outlets shall be installed in each keyway unless specifically waived by the Engineer.

C. Benches - Benches shall consist of level steps at least 1 foot deep excavated into the sloping surface to expose firm, undisturbed soil or rock.

3.08 APPROVAL

After clearing, stripping, over-excavation, recompaction and preparation of all other areas

and before placing and compacting of any fill, the Contractor shall obtain the Engineer's approval of the site preparation work performed in each area.

END OF SECTION

SECTION 2210
SITE GRADING

PART 1.0 – GENERAL

1.01 SCOPE OF WORK

A. Work under this section consists of clearing and removal of debris, grading, excavation, disposal of excess or unsuitable material, filling and compacting, all in accordance with the lines, grades, and cross-sections shown on the contract drawings.

1.02 QUALITY ASSURANCE

A. Review - No site earthwork shall be performed without prior notification of the Engineer. The Engineer shall be notified at least 48 hours prior to commencement of any earthwork.

B. Site Information - The Contractor shall satisfy himself as to the quality and nature of the materials which are required 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.

C. Test Method - Relative compaction will be determined in general accordance with ASTM Test Methods D1557 and D2167, D2922, or D3017.

PART 2.0 – PRODUCTS

2.01 FILL MATERIAL

A. General - Non-organic material, soil and rock materials obtained from on-site excavations may be used as fill as specified herein.

B. Select Fill - Select fill material shall be soil and rock, which is free of perishable material, rubble and building debris, and shall conform to the following requirements.

Size	Percent Finer
6 inch	100
4 inch	90 - 100
No. 200	10 - 90

Plasticity Index: 25 percent maximum

Select fill shall be used in all fills intended to support structures, roads, and utilities.

C. Random Fill - Random fill shall be soil and rock material from on-site excavation which does not meet the requirements for "select fill".

Random fill may be used in non-structural locations. Random fill material may be used only in specific locations approved in advance by the Engineer.

D. Imported Fill - If it is necessary to import fill material, such material shall meet the requirements for select fill.

PART 3.0 – EXECUTION

3.01 GENERAL

Excavating and grading shall be performed in conformance with the alignment, grade and cross-sections indicated on the drawings or as established by the Engineer.

3.02 SPILLAGE, DUST AND EROSION CONTROL

A. Spillage - 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. Dust and Erosion Control - 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 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 SITE PREPARATION

The Contractor shall strip all debris and organic matter from areas to be graded and shall haul this material off-site for legal disposal.

3.04 EXCAVATION

Unclassified excavation shall consist of excavation of all materials of whatever character encountered in the work. All excavation work shall conform to OSHA standards.

3.05 COMPACTED FILL

A. Placement and Conditioning – All fill material shall be placed in horizontal layers eight inches or less in loose thickness, conditioned by watering or drying and mixing as needed, to a moisture content near the optimum moisture content. Where so designated, the moisture content before compaction shall be within the specified range.

B. Compaction - Fill material shall be compacted with a sheepsfoot roller or other approved equipment to achieve at least 90 percent relative compaction, unless otherwise specified.

C. Re-compaction - Field density tests will be performed by the Engineer to determine the degree of compaction obtained. Where compaction is less than that required, additional compactive effort and the Contractor, as necessary, shall make adjustment of the moisture content until the required compaction is obtained.

The Contractor shall be responsible for placing and compacting approved fill material in accordance with the specifications. Should the Contractor fail to meet the density requirements, he shall reduce his rate of haul, furnish additional spreading and/or compaction equipment, remove and replace the fill material, or make any other adjustments necessary to achieve a satisfactorily compacted fill.

D. Seasonal Limits - No fill shall be compacted during periods of rain nor on ground which is saturated or has standing water. Loose soil, which has been stockpiled and wetted by rain or any other means, shall not be used until the moisture content is within limits required by the Engineer.

3.06 SLOPES AND FINAL GRADING

A. Slopes - The slope of the ground surfaces, both during and after grading, shall be no steeper than 2 horizontal to 1 vertical, unless otherwise designated on the plans.

B. Finish Grading - Final grades shall conform to the lines and grades shown on the plans. After completion, excess fill material shall be removed from slopes and the slopes trimmed to expose a dense surface and a uniform finished surface in compacted fill.

All non-slope fill surfaces shall be graded smooth, low spots filled in, and the surface sloped for drainage and rolled with rubber-tired equipment to seal it against excessive infiltration of water. Stockpile areas and haul roads shall be restored to the original ground contours and condition using compacted fill. Excess earth and all other unsuitable material shall be removed from the site.

3.07 CLEAN-UP

A. The site is to be left in a neat, safe, and protected condition acceptable to the Owners and Engineer.

END OF SECTION

SECTION 2270
SLOPE PROTECTION AND EROSION CONTROL

PART 1.0 – GENERAL

1.01 SCOPE OF WORK

This work includes all erosion control required and necessary during the course of construction and the maintenance of erosion control throughout the first winter following completion of construction. Refer to the project-specific Storm Water Pollution Prevention and Erosion Control Plan for further requirements.

1.02 QUALITY ASSURANCE

A. Notification - No site work shall be performed without notification of the Engineer at least two full working days prior to commencement of work.

B. Site Information - The Contractor shall satisfy himself as to the nature and quantity of materials to be moved and other work to be performed, and any differences between site conditions shown on the drawings and actual conditions immediately prior to commencement of work.

PART 2.0 – PRODUCTS

2.01 Culvert Pipe - Pipe for use as a temporary culvert shall be sufficient size and strength for the intended, i.e., temporary roadway crossing, non-structural drainage diversion, or other such use meeting the intent of California RWQCB Best Management Practices, Erosion and Sediment Control (BMP ESC 22). Pipe that is to be part of the permanent construction shall conform to the Plans.

2.02 Filter Cloth - Filter cloth to be used as part of temporary erosion control shall be commercially available product manufactured for such applications.

2.03 Silt Fence - Fence material shall be wood posts, steel posts, filter fabric and backing fabric manufactured for temporary applications and meeting the requirement of BMP ESC 50.

2.04 Straw Wattles - Straw wattles shall be commercially available baled straw, with bale ties sufficiently strong to hold the bales intact for the temporary erosion control. Straw wattles shall consist of North American Green Sedimax – SWB9 or approved equal.

2.05 Hydroseed - Hydroseed shall consist of a mixture of seed, fertilizer, and stabilizing emulsion, or any combination therefore, with fiber and water. The seed mix shall be as shown on the plans or other, proposed by a reputable local licensed landscape contractor familiar with the soil and climate conditions. The proposed seed mix shall be submitted to the Engineer for approval at least two working days prior to expected use. Hydroseeded areas shall have uniform coverage and color.

2.06 Erosion Control Mat - Erosion control mats or blankets are biodegradable or synthetic mats that are used for temporary or permanent stabilization of disturbed soils. Erosion control mats to be used are North American Green S150 or approved equal.

2.07 Jute Netting - Shall be cloth of a uniform plain weave of undyed and unbleached single-jute yarn, 48 inches in width (plus or minus 1 inch) and weighing an average of 0.9 pounds per square yard of cloth (plus or minus 5 percent). The yarn shall be of a loosely twisted construction and shall not vary in thickness by more than one half its normal diameter.

PART 3.0 – EXECUTION

3.01 Drainage - During construction, all fill surfaces shall be sloped to provide positive surface drainage to prevent ponding of water. In the event of oncoming rainy weather, the Contractor shall roll the surface with smooth rollers or rubber-tired equipment to seal the surface against excessive infiltration of water. Temporary drains and ditches shall be provided by the Contractor as necessary.

3.02 Erosion Control during Construction - The Contractor shall take all measures necessary to provide and maintain erosion control devices in order to protect slope areas and adjacent properties from storm damage and flood hazard originating from the site. Temporary erosion control devices such as straw bale barriers and silt fences shall be maintained throughout the construction period. The Contractor shall maintain slopes in their as-graded condition until all slopes are in satisfactory compliance with the job specifications.

3.03 Temporary Access - The Contractor shall construct temporary access roads only in the locations shown on the Plans and approved in advance by the Engineer and Owner. Temporary culverts shall be installed where necessary to maintain drainage, such as along existing gutters and natural drainage way crossings to conform to the intent of BMP ESC 22. All fills placed for temporary roads shall be compacted to at least 85% relative density, or greater, sufficient to minimize sloughing and erosion.

3.04 Silt Fences - Silt fences shall be constructed to encircle each immediate work area, around trees and other features designated to be protected and in other locations required to provide effective erosion protection. Silt fences shall be built as specified under BMP ESC 50.

3.05 Straw Wattles - Straw Wattles shall be constructed in the locations shown on the plans and at other locations required for effective control of erosion. Straw wattles shall be constructed as specified under BMP ESC 51.

3.06 Hydroseeding - Upon completion of all earthwork, the excavated and graded surfaces, including haul roads and other areas disturbed during construction, shall be hydroseeded in accordance with Caltrans Standard Specification, Section 20-3.

The surface shall be roughened as necessary and hydroseeded with components compatible with the soil and climate conditions.

3.07 Erosion Control Mat – Following placement of hydroseed, all constructed, re-graded or disturbed slopes shall be covered with erosion control mats installed per the manufacturer's recommendations. Adjacent lengths of erosion control mats shall overlap four inches along all edges and shall be secured to the slope by wooden pegs, wire pins, or other approved devices to prevent movement of the netting after it has been placed.

3.08 Permanent Surface Drainage - The Contractor shall furnish and install permanent surface drainage including earth lined ditches above the retaining walls as shown on the Plans. Surface water collected in the V-ditch shall be collected in drop inlets and discharged into the existing storm drainage system.

3.9 First Winter Maintenance - After completion of all other work, the Contractor shall maintain all surface and subsurface drainage facilities and erosion control measures for six months or through the following April 15, whichever is longer. Such maintenance shall include, but not be limited to, repair of erosion gullies, reseeding of eroded areas, backfilling, clean out of ditches, re-excavation of drainage swales and sediment basins, and other work necessary to fully control surface and subsurface water.

END OF SECTION

SECTION 2286
SOIL NAILS

PART 1.0 - GENERAL

1.01 SCOPE OF WORK

Description - The work under this section includes the material, equipment, and labor necessary to install and test soil nails, in the locations and to the depths shown on the plans.

1.02 DEFINITIONS

Soil Nail - Anchors comprised of a deformed steel bar grouted into a near horizontal drilled hole, together with appropriate corrosion protection and anchorage hardware for the purpose of reinforcing a slope by transferring tensile loads into the soil and/or rock formation.

Design Load (DL) - The final maximum effective capacity of the soil nail after allowance for time dependant losses or gains.

Proof Load (PL) - The temporary pre-stressing load at which the soil nail is tested.

Kips ("k") - A unit of load equal to 1,000 pounds.

1.03 QUALITY ASSURANCE

A. Notification - No site work shall be performed without notification of the Engineer at least 2 full working days prior to commencement of work.

B. Site Information - The Contractor shall satisfy himself as to the nature and quantity of materials likely to be encountered at the site and other work to be performed, and any differences between site conditions shown on the drawings and the actual conditions immediately prior to commencement of work.

C. Inspection and Testing - The Contractor shall provide the Engineer with access to the work and all reasonable facilities for inspecting and checking the work.

D. Conformance of Materials - All materials used in the construction of the soil nail wall shall conform to the most recent version and relevant standards of the American Society for Testing and Materials (ASTM), American Concrete Institute (ACI), International Association of Foundation Drilling (ADSC), Caltrans Standard Specifications (Caltrans), or other standards specified by the Engineer.

PART 2.0 – PRODUCTS

2.01 Soil Nails - Shall be steel thread bars as designated on the plans and manufactured expressly for use as soil nails or tiebacks by:

Dywidag -Systems International, Long Beach, California;
Con-Tech Systems, Delta, B. C., Canada;
Other supplier approved in advance by the Engineer.

2.02 Thread Bar - Shall conform to ASTM Designation A-615 and the following:

Bar Size	#6	#7	#8	#9	#10	#11
Yield Load Grade 75 ksi	33.0k	45.0k	59.3k	75.0k	95.3k	117.0k

2.03 Hardware - Stressing anchors, couplers, anchor plates, wedge washers, anchor nuts, hex nuts, and all other hardware shall conform to the manufacturer's recommendations and applicable ASTM standards.

2.04 Corrosion Protection - Corrosion protection shall be single or double corrosion protection as recommended by the manufacturer and as shown on the plans.

Unless otherwise required, single corrosion protection shall consist of coating the thread bar with an epoxy coating in conformance with ASTM A-934. The epoxy coating shall have a minimum thickness of 7 mils.

Unless otherwise required, double corrosion protection shall consist of grouting the entire length of the soil nail within a corrugated Polyvinyl Chloride (PVC) sheath.

2.05 Corrosion Inhibitor - Shall be an organic compound with corrosion inhibition, moisture displacing and self-healing properties as recommended by the manufacturer. It shall be physically stable and non-reactive with concrete, steel and sheathing material.

2.06 Accessories - Plastic sheathing, centralizers, spacers, and other accessories of steel or plastic which are necessary for the installation shall be as recommended by the manufacturer. Wood, paper or other organic material shall not be used.

2.07 Cement Grout - Shall be made of non-shrinking portland cement conforming to ASTM C-150. Chemical additives that can control bleed and accelerate or retard set, may be used. Water/cement ratio shall be in the range of 0.4 to 0.5. The grout workability must be suitable for uniform placement. Minimum compressive 30-day strength (f'c) shall be 4000 psi, unless otherwise shown on the plans.

PART 3.0 – EXECUTION

3.01 Pre-Construction Meeting - A pre-construction meeting shall be held at the site. The Contractor shall present his proposed construction method and schedule. The meeting will include the Contractor, the Engineer, and Owner's representative.

3.02 Equipment - The drilling equipment may be percussion, rotary or other type capable of drilling a hole free of protrusions through soil and rock to the dimensions shown on the drawings.

Grout mixing equipment shall be capable of continuous mechanical mixing that will produce a uniform and thoroughly mixed grout. Grout pumping equipment shall be capable of grouting at a pressure of at least 150 psi.

3.03 Alignment - All excavations and holes shall be carefully located and aligned by the Contractor. The drilled hole location shall not deviate more than 2 inches in any direction from the center location shown on the plans. The vertical angle shall be within 3 degrees of the vertical and horizontal orientation shown on the plans.

3.04 Dimensions - The diameter of the auger bit, or the inside diameter of the casing, shall be at least 4 inches and equal to or larger than the diameter shown on the plans. The soil nail lengths shown on the plans are for bidding purposes. Adjustments in location, direction and length may be required by the Engineer.

3.05 Excavation - The excavation (drilling) shall be performed under the intermittent observation of the Engineer to confirm that subsurface conditions are as expected. The Contractor shall keep records of the excavation depth, drilling rates and the transition depth from soil to rock for each drilled excavation.

If excessive sloughing or collapse of the drilled excavation is occurring, then the holes shall be cased to prevent caving. The casing shall be withdrawn as grout is placed.

3.06 Steel Placement - Install the steel thread bars and centralizers promptly after drilling. Centralizers shall be placed every 5 feet along the soil nail to maintain the steel in the middle of the hole.

3.07 Grout Placement - Immediately after the installation of the steel, grout shall be pumped through a grout pipe or tube extending to the bottom of the drilled excavation. The grouting operation shall be a continuous with the grout pipe kept well below the top of the grout at all times. An accurate record of the amount of grout placed in each excavation shall be maintained by the Contractor.

3.08 Verification and Proof Testing - Soil nails shall be load tested to verify that they will resist the design load. Perform a minimum of two verification tests in each different soil or rock and for each different drilling or grouting method to be used. Verification tests nails will be sacrificial. Perform proof testing on a minimum of 5% of the production nails in each row or a minimum of 1 per row, as shown on the plans or as designated by the Engineer.

The Contractor shall provide the test set up, hydraulic jack and pump, gages, other equipment, and labor to perform and record the proof testing under the technical direction of the Engineer. Testing will be carried out no sooner than 7 days after grouting unless the grout mix included an accelerator.

Load tests shall be made by incrementally loading the soil nail. The loads shall be applied with a hydraulic jack equipped with a pressure gage that has been calibrated within the prior 6 months as evidenced by a written certificate. The hydraulic pump shall be capable of applying each load increment within 60 seconds and maintaining the load increment within 5 percent of the intended load during the test period.

The soil nail displacement shall be measured with a dial gauge or other target capable of accurately measuring to 0.001 inches.

The verification load test sequence shall be as follows. Except for the reading of the residual movement at AL, no movement readings need to be taken during unloading of the anchor.

Verification Load Testing Schedule (Ratio of Design Load – DL)

AL (.05 DL), 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.25 DL, 1.50 DL (CTL), 1.75 DL, 2.00 DL

The alignment load (AL) should be applied and held until no displacement occurs. Dial gauges should be set to "zero" after application of the alignment load. The load at each increment thereafter shall be held for a minimum of 10 minutes or until displacement ceases. The final displacement shall be recorded at each load interval. The creep test load (CTL = 1.50 DL) shall be held for a minimum of 60 minutes, displacement measurements shall be taken at 1, 2, 3, 4, 5, 6, 10, 20, 30, 45 and 60 minutes. The total movement within the period of 6 to 60 minutes shall not exceed 0.080 inches (2mm).

Proof Load Testing Schedule (Ratio of Design Load – DL)

AL (.05 DL), 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.25 DL, 1.33 DL (CTL)

The alignment load (AL) should be applied and held until no displacement occurs. Dial gauges should be set to "zero" after application of the alignment load. The load at each increment thereafter shall be held for a minimum of 1 minute or until displacement ceases. The final displacement shall be recorded at each load interval. The creep test load (CTL = 1.50 DL) shall be held for 10 minutes, displacement measurements shall be taken at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total movement between 1 minute and 10 minutes exceeds 0.04 in. (1mm), the test load shall be held for an additional 50 minutes with further displacement measurements made at 15, 20, 25, 30, 45, and 60 minutes. The total movement within the period of 6 to 60 minutes shall not exceed 0.080 in. (2mm).

3.09 Test Nail Acceptance or Rejection – A test nail shall be considered acceptable when it does not pull-out and meets the testing and allowable displacement criteria described above. If a test nail does not meet the accepted criteria, the Contractor shall determine the cause of failure.

For a test nail that does not meet acceptance criteria, the Engineer shall review the results of each verification test. Installation methods which do not satisfy the testing requirements shall be rejected. The Contractor shall propose alternative methods and install replacement verification nails at no additional costs.

The Engineer may require replacement of some or all of the production nails between a failed proof test and adjacent passing proof test nail. Engineering may require installation and testing of additional proof nails to verify adjacent production nails have sufficient load carrying capacity. Production nails may be assigned a reduce capacity and addition production nails may be require to achieve the specified design loads. Installation and testing of additional proof test nails or addition production nails due to proof test nail failures shall be at no additional cost to Owner.

3.10 Protective Coating for Steel - All exposed steel that is not encased in concrete shall be protected with two coats of Black Coal Tar Epoxy; (a) Koppers Bitumastic No. 300-M, (b) Americoat 78 HB, or (c) equivalent product approved by the Engineer, applied in conformance with the manufacturer's recommendations. Any portions of the protective coating that are scratched, nicked, or otherwise disturbed during construction shall be touched-up with additional coats of the epoxy coating.

END OF SECTION

SECTION 3360
SHOTCRETE AND WALL DRAINAGE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Description - Shotcrete placement and wall drainage work shall consist of furnishing all materials and labor required for placing and securing geocomposite drainage material, connection pipes, footing drains, weep holes, drainage gutter, reinforcing steel, nail head bearing plates, nuts and shotcrete for the soil nail walls shown on the plans.

B. Site Information - The Contractor shall satisfy himself as to the nature and quantity of materials to be moved and other work to be performed, and any differences between site conditions shown on the drawings and actual conditions immediately prior to commencement of work.

1.02 DEFINITION

Shotcrete: Mortar or concrete pneumatically projected at high velocity onto a surface; also known as air-blown mortar; also pneumatically applied mortar or concrete, sprayed mortar, and gunned concrete. Shotcrete shall comply with requirements of ACI 506.2, “Specifications for Materials, Proportioning and Application of Shotcrete.”

1.03 SUBMITTALS

A. Certified shotcrete mix design including, but not limited to:
1. Brand and type of portland cement.
2. Source, gradation, and quality of all aggregates used.
3. Proportions of mix by weight and water-cement ratio.
4. Proposed admixtures, manufacturer, dosage, technical literature (where allowed).
5. Compressive strength test results for the proposed shotcrete mix design, manufacturer records completed within 6 months of the start of shotcreting may be submitted for initial verification of the required compressive strengths at the start of production work.

B. Shop Drawings: Reinforcing Steel.

C. Two 300 mm x 300 mm x 25 mm (12 inch by 12 inch by 1 inch) sample panels showing required finish. Submit panels within 30 days after receipt of notice to proceed.

D. Written documentation of project references, including project name, owner’s name, and phone numbers from at least 3 comparable projects in the last 2 years.

E. Written documentation of the nozzleman's qualifications including proof of ACI certification (if applicable).

F. Written documentation of the shotcrete supervisors experience, including direct shotcrete application experience on comparable projects.

G. Written documentation of the certification of the testing laboratory. Include documentation that the strength testing laboratory complies with ASTM C 1077 and has the experience to perform the tests specified in this Section. The testing laboratory shall be AASHTO accredited for ASTM C 1077 or demonstrate the ability to perform the requisite tests.

H. Proposed methods of shotcrete placement and of controlling shotcrete thickness and maintaining facing alignment and location.

I. Description of the proposed equipment for mixing and applying shotcrete. Include the manufacturer instructions, recommendations, literature, performance, and test data.

J. Manufactures' data and specifications for geo-composite strip drainage panels, connectors, outlet pipe and all material used for the wall drainage system as shown on the plans or as specified by Engineer.

1.04 QUALITY CONTROL

A. Contractor Qualifications.

1. The work defined in this section is specialty construction requiring a specialty contractor who is highly knowledgeable and experienced in the fabrication and installation of shotcrete. The Contractor performing the work in this Section shall submit proof of three (3) projects within the last five (5) years on which the Contractor has successfully installed shotcrete of similar applications as required for this project. A brief description of each project with the owner's name and phone number shall be included.

2. Workers, including foreman, nozzleman, and delivery equipment operators, shall be fully qualified to perform the work. All nozzlemen on this project shall have at least one year of experience in the past three years in similar shotcrete application work and shall demonstrate ability to satisfactorily place the material.

3. Initial qualification of the nozzlemen shall be based either on ACI certification or satisfactory completion of preconstruction test panels. The requirement for nozzlemen to shoot preconstruction test panels will be waived for nozzlemen who can submit documented proof that they have been certified in accordance with the ACI 506.3R, and that their certification is current. The Certification shall have been done by an ACI recognized shotcrete testing laboratory, or recognized shotcreting consultant, and shall have covered the type of shotcrete used for the project. Nozzlemen who are not required to shoot preconstruction test panels on the basis of ACI Certification shall still be required to shoot production test panels periodically during the course of the Work at the frequency specified herein.

4. The Contractor shall notify the Engineer not less than 5 days prior to the shooting of preproduction test panels by non-certified nozzlemen. Preproduction test panels shall be prepared using the same shotcrete mix and equipment as those to be used in the production work.

5. The Contractor shall notify the Engineer of any problem that may influence the quality of the shotcrete.

B. Tolerances:

1. Cover of reinforcement: ACI 506.2, Paragraph 3.6.2 unless otherwise shown on the plans.

2. Alignment and thickness of shotcrete shall be controlled by installing ground wires. Alignment and thickness control shall conform to ACI 506R Section 5.6.

1.05 PRECONSTRUCTION TESTING

A. Conform to the requirements of ACI 506R, Paragraph 6.4.

B. Each nozzleman without previous ACI certification shall make 2 test panels for each mix design, 600 mm (24 inches) square and 90 mm (3 1/2 inches) minimum thickness. Take 5 cores or cubes from each 75 mm (3 inch) panel for compressive strength testing in accordance with ACI 506.2.

C. Qualification of the nozzlemen shall also be based on a visual inspection of the shotcrete density and void structure and on achieving the specified 3-day and 28-day compressive strength requirements determined for test specimens extracted from the preconstruction test panels. Preconstruction and production test panels, core extraction and compressive strength shall be conducted in accordance with ACI 506.2 and AASHTO T24/ASTM C42, unless otherwise specified herein.

D. Nozzlemen who are qualified on the basis of preproduction testing may begin production shooting on the basis of acceptable preconstruction test panels and on test specimens passing the 3-day strength requirements. Continued qualification will be subject to test specimens passing the 28-day strength tests and maintaining satisfactory shooting performance during production test panels.

E. Using the proposed mix design make at least two job-site sample panels approximately 2400 mm (8 feet) high and 1800 mm (6 feet) wide with thicknesses shown. The job-site panels shall contain reinforcing typical of the work to be installed and other details to simulate actual job conditions. Finish sample panels as required for work to be installed. Sample panels must be approved by the Resident Engineer before any work can begin.

1.06 CONSTRUCTION TESTING

Make one test panel 450 mm (18 inches) square and 75 mm (3 inches) thick for each day's work or portion thereof. Provide test panels to a testing laboratory approved by Resident Engineer and reimbursed by the contractor. Five compressive strength specimens will be obtained from each panel and tested for compressive strength in accordance with ASTM C42. Two (2) samples are to be tested at 7 days and 28 days after application. The fifth sample should be retained for 56 days should additional testing be required. Strength test results are to be reported to the Resident Engineer 24 hours after completion of test.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C150, Type I, II, III or V.

B. Reinforcement Steel:
1. Reinforcement bars: ASTM A615, Grade 60; deformed.
2. Low-Alloy-Steel Reinforcing Bars: ASTM A706.

3. Galvanized Reinforcing Bars: ASTM A767, Class II zinc coated, hot-dip galvanized after fabrication and bending, as follows:
4. Bearing Plates: ASTM A529, Grade 50
5. Epoxy-Coated Reinforcing Bars: ASTM A775 and ASTM A934
6. Plain Steel Wire: ASTM A82.
7. Deformed-Steel Wire: ASTM A496.
8. Epoxy-Coated-Steel Wire: ASTM A884.

C. Aggregate: ASTM C33, and UACE EM 1110-2 (Gradation Table 3-1), as defined in Table 1.

TABLE 1 -- GRADATION LIMIT FOR AGGREGATES

Sieve Size, U.S. standard square mesh	Percent by Weight Passing Individual Sieves		
	Gradation No. 1	Gradation No. 2	Gradation No. 3
20 mm 3/4 inch	---	---	100
13 mm 1/2 inch	---	100	80-95
10 mm 3/8 inch	100	90-100	70-90
No. 4	95-100	70-85	50-70
No. 8	80-100	50-70	35-55
No. 16	50-85	35-55	20-40
No. 30	25-60	20-35	10-30
No. 50	10-30	8-20	5-17
No. 100	2-10	2-10	2-10

D. Chemical Admixtures: ASTM C494.

E. Air-entraining Admixture: ASTM C260.

F. Water: Fresh, Clean, and Potable

2.01 MIXES

A. Shotcrete: The shotcrete used shall consist of a mixture of Portland cement, sand, aggregate, and water so proportioned and mixed to be pumped. Shotcrete shall have a minimum compressive strength of 2000 pounds per square inch at 3-days and 4000 psi at 28-days or as shown on the plans, whichever is greater. No shotcrete work shall be performed prior to verification by the Engineer of the required compressive strength.

B. Mix Design: Testing Laboratory, retained by Contractor, shall design a mix to produce concrete as specified and perform tests as required. Certified test reports (duplicate) shall be submitted. Reports shall include proportions of design mix.

C. Maintain water-cement ratio between 0.35 to 0.50 by weight.

D. Concrete-mix design adjustments may be considered if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant. Resubmit and

obtain approval from the Resident Engineer of proposed changes to concrete-mix design.

E. Improper Mix: Immediately notify the Concrete Testing Laboratory and the Resident Engineer if at any time during construction the accepted mix design proves to be unsatisfactory for any reason. The Contractor's Concrete Mix Designer shall modify the design, subject to the review of the Resident Engineer, until a satisfactory mix is obtained.

PART 3 – EXECUTION

3.01 WALL DRAINAGE NETWORK

A. Install and secure all elements of the wall drainage network as shown on the plans or as required by the Engineer to suit field conditions. The drainage network shall consist of installing geocomposite drain strips, connectors, and weep holes. All elements of the drainage network shall be installed prior to shotcreting.

B. Install composite drain strips centered between the column of nails as shown on the plans. The drain strips shall be at least 450 mm wide and placed with the geotextile side against the ground. The wall excavation should be notched into the ground at the panel locations so that the drainage panels do not protrude into the wall as dimensioned on the plans. Secure the strips to the excavation face and prevent shotcrete from contaminating the ground side of the geotextile. Drain strips shall be continuous. Splices, if approved by the Engineer, shall be made with a minimum 300 mm overlap such that the flow of water is not impeded. Repair any damage to the geocomposite drain strips prior to shotcrete placement.

C. Install connector panels and lower footing drainage panels as shown on the plans. Weep holes should be provided through the shotcrete facing to drain water from behind the wall. Use schedule 40 pvc pipe to form the weep hole through the wall. Prevent shotcrete intrusion into the discharge end of the pipe.

3.02 SHOTCRETE PROPORTIONING, DELIVERING AND MIXING

A. Proportioning: Mix shall be designed by Contractor-retained testing laboratory; see "PRECONSTRUCTION TESTING" hereinbefore.

B. Mixing Processes:

1. Mixing, General: Strength of mix is specified on the drawings. At Contractor's option, use either the dry or wet mix process. Discharge entire batch before recharging. Clean mixer at least once every 8-hour shift or portion thereof. Reject material mixed and standing for 45 minutes; remixing or tempering not permitted.

2. Wet Mix Process: Conform to ACI 506R, Paragraph 1.5.2.

3.03 EQUIPMENT, WET MIX PROCESS

A. Batching and Mixing Equipment: ACI 506R, Paragraph 3.5. Batch by weighing; use rotating mixing equipment and mix in accordance with ACI 304R, and ASTM C94 for ready-mixed concrete.

B. Delivery Equipment: Use pneumatic feed or positive displacement type of design and size capable of delivering premixed materials accurately, uniformly, and continuously through the hose, all in accordance with ACI 506R, Paragraphs 3.3 and 3.7.

C. Air Supply: ACI 506R, Paragraph 3.4.2.

D. Water Supply: Conform to ACI 506R, Paragraph 3.8.1 with adequate capacity to maintain water pressure approximately 65 N (15 pounds) higher than highest air pressure required, both air and water pressure uniformly steady, non-pulsating.

3.04 ALIGNMENT CONTROL

A. General: To establish thickness and surface planes or shotcrete build-up provide ground wires, taut, secure, true to line and plane, conforming to ACI 506R, Paragraph 5.6.

B. The Contractor shall ensure that the thickness of shotcrete satisfies the minimum requirements shown on the Contract Drawings. Shotcrete shall completely encase all reinforcement and other obstructions shown on the plans. Shotcrete shall be applied by the wet-mix process only.

C. The Contractor shall ensure that the front face of the shotcrete remains less than 25 mm (1 inch) outside of its required limits shown on the Contract Drawings.

D. The Contractor shall ensure that the excavated face be flat and free from irregularity prior to shotcrete placement. Additional shotcrete used to fill gaps, voids and irregularities on the excavation face is the responsibility of the Contractor.

E. The cost of additional material used to fill void space between the actual shotcrete face and the proposed limits of the shotcrete face is the responsibility of the Contractor.

F. Reinforcing Positioning: Check that reinforcing is positioned and sized in accordance with the Contract Documents and ACI 506R, Paragraph 5.4.

3.06 SHOOTING

A. General: ACI 506R, Paragraph 8.5.7. Shoot and fill corners first, with continuous uniform material flow from nozzle held approximately 600 to 1500 mm (2 to 5 feet) from the work, at angle normal to the surface.

1. Shoot around reinforcing with nozzle close to encase reinforcement as illustrated in ACI 506R, Figure 8.4, left column.

2. If flow is not uniform and slugs, sand spots or wet sloughs result, turn nozzle away until faulty work is cut out and repaired.

3. Do no shotcrete work if temperature is below 4 degrees Celsius (40 degrees Fahrenheit) without providing continuous heat and adequate protection from freezing.

4. Shotcrete shall be placed in two, successive lifts. Furthermore, each lift shall be 4 inches thick except that for the second lift, the thickness shall be increased to 8

inches where necessary to cover the protruding soil nails. Each lift shall fully encase the applicable welded wire fabric reinforcing layer and reinforcing bars as shown on the plans. The second layer shall also receive an architectural surface treatment and stain.

B. Preparation of Surfaces to Receive Shotcrete: ACI 506R, Paragraph 5.2, as applicable to the work, as approved.

C. Rebound: ACI 506R, Paragraph 8.5.11. Do not work rebound into construction nor salvage rebound for subsequent batching.

D. Suspend application if:
1. High wind prevents nozzlemen from proper application of material.
2. Weather approaches freezing and shotcrete cannot be protected.
3. Rain, other than a very light sprinkle, occurs which would wash cement out of freshly placed material.
4. Ground water or surface water flow is persistent enough to wash cement out of freshly placed material.

E. Time Between Coats:
1. In sloping, vertical or overhanging work, allow interval of time sufficient for initial, but not final, set to develop.
2. At development of initial set, lightly broom surface to remove any laitance to provide better bond with succeeding applications.

F. Construction Joints:
1. ACI 506R, Paragraph 5.7.2, tapering over a width of 300 mm (1 foot) to a 25 mm (1 inch) edge from board laid flat.
2. Before proceeding with additional shotcrete work, thoroughly clean joint and adjacent shotcrete, then wet and scour surfaces with air jet.

G. Warm Weather Application: Prevent dryout resulting in cracking and separation by keeping surfaces continuously moist and/or covered with continuously moistened burlap for 7 days after shotcreting.

H. Surface Finish: Bring final surfaces of shotcrete to an even plane, well formed corners either square or to radius shown, working up to ground wires using somewhat lower placing velocity than normal.
1. Remove ground wires to 20 mm (3/4 inch) back from surface and fill holes with shotcrete to adjacent surface elevations.
2. Wood float surfaces to provide a smooth true finish.

3.07 CURING - ACI 506.2, Paragraph 3.8.

3.08 HOT WEATHER SHOTCRETING - ACI 506R, Paragraph 8.9.

3.09 COLD WEATHER SHOTCRETING - ACI 506R, Paragraph 8.10.

3.10 PROTECTION AND CLEANUP

A. Protection: Protect adjacent walls, windows, doors, other building surfaces, grounds and/or shrubs and property of others from damage by shotcreting, rebound and dust.

1. Construct a sealed dust partition to confine rebound and dust to immediate work area. Dust partition shall be integral with exhaust system. A negative air pressure shall be maintained within partitioned area during shotcrete applications to prevent dust leakage beyond area.

2. Immediately clean all shotcrete materials and remove all rebound from site.

B. Clean-up: Continuously remove rebound material to ensure that base, intermediate, and finish surfaces are clean and ready for bonding layers.

4.01 ARCHITECTURAL SURFACE TREATMENT AND COLORING

A. All shotcrete surfaces shall receive architectural surface treatment that conform to the details shown on the plans, the provisions in Section 53, “Shotcrete,” and Section 51, “Shotcrete Structures,” of the Standard Specifications and these special provisions.

B. If applicable, the exterior surface of the subject soil nail wall shall be “sculpted” and color stained such that the final product is similar to that of natural, fractured local bedrock.

C. For sculpted shotcrete, the final surface shall be prepared for staining by pressure washing to remove all loose material, laitance, efflorescence, sheen and other foreign materials. No sandblasting will be allowed.

D. For stained shotcrete, application of the stain base shall be by air or airless sprayer, highlight coloration shall be by staining or other suitable antiquating method. The stain material shall be applied in accordance with the printed instructions of the stain material manufacturer. A copy of such printed material shall be furnished to the Engineer prior to application of the material. The stain material shall produce a spectrum of brown earth tone colors. Color hardeners shall be used to achieve a wider variety of earth tones. Colors shall be such that alteration of the color and further color development after initial application can be accomplished.

5.01 DEFECTIVE WORK

General work will be evaluated by the Engineer or designated agent in accordance with ACI 506.4. If the evaluation reveals unbonded work or cores fail to meet specified strengths, or finishes are unsatisfactory, repair such defective work, as approved, without additional cost to the Owner.

END OF SECTION