TOWN OF FAIRFAX
SUPPLEMENTAL STAFF REPORT
June 1, 2022

TO: Mayor and Town Council

FROM: Hamid Shamsapour, Interim Director of Public Works

SUBJECT: Adopt a Resolution Declaring the Existence of a Local Emergency at or near 195 Pine Drive, Fairfax, and Authorizing the Emergency Procurement of Materials and Labor Without Competitive Bidding, Superseding Emergency Resolution 22-21

RECOMMENDATION

Staff respectfully recommends that the Town Council adopt a Resolution Declaring the Existence of a Local Emergency at or near 195 Pine Drive, Fairfax, and Authorizing the Emergency Procurement of Materials and Labor Without Competitive Bidding, Superseding Emergency Resolution 22-21.

BACKGROUND

This supplement has been prepared because the Contractor (Maggiora & Ghilotti) has submitted a cost proposal for completing the work on the T&M basis not to exceed $481,000. This amount exceeds the Project (Town) Engineer's initial Construction cost estimate of $260,000.

With action during a special meeting of March 30, 2022, the Town Council of the Town of Fairfax adopted Emergency Resolution No. 22-21 finding, unanimously, that:

1. The recitals in said Emergency Resolution were true and correct; and
2. Finding and determining based on substantial evidence in the staff report and oral testimony the existence of a local emergency at or in the vicinity of 195 Pine Drive, Fairfax. These emergency findings were deemed to be entered into the minutes of the meeting at which this Emergency Resolution was passed.

On that basis, as documented in said Emergency Resolution No. 22-21, the Town Manager was ordered and authorized to:

3. Provide for the emergency repair of those public facilities in an expeditious manner, necessary to stabilize the roadway condition and reopen the roadway to the public, located at or near 195 Pine Drive, Fairfax; and
4. To take any directly related and immediate action required by those emergency conditions, and to procure the necessary equipment, services, and supplies for those purposes, without giving notice for bids to let contracts pursuant to Public Contract Code Sections 22035 and 22050.

The Town Manager was authorized to let said contract(s) in an amount not to exceed $260,000 for construction and $70,000 for design/construction management costs without further approval by the Town Council and said funding was deemed budgeted and appropriated for the improvements.

The Town Council unanimously adopted Resolution Nos. 22-25 and 22-29 confirming the continued existence of the emergency at its April 6, and May 4, 2022 meetings, respectively.

DISCUSSION

The Town Council previously adopted a substantially similar Resolution that declared:
The Town Manager is hereby ordered and authorized to provide for the emergency repair or replacement of those public facilities necessary to stabilize the roadway condition and reopen the roadway located at or near 195 Pine Drive, Fairfax to take any directly related and immediate action required by those emergency conditions, and to procure the necessary equipment, services, and supplies for those purposes, without giving notice for bids to let contracts pursuant to Public Contract Code Sections 22035 and 22050. Said contract(s) may exceed the Town Manager's purchasing authority but shall not exceed $260,000 for construction and $70,000 for design/construction management costs without further approval by the Town Council. To the extent said funding is required to be spent from the Town's general fund, such amounts are hereby deemed budgeted and appropriated for such improvements.

Town staff has determined, based upon the advice and analysis of its design professional, that the action recited in the preceding recital cannot be procured within the not to exceed amounts set forth therein and cannot reasonably be obtained for less than $481,000 as proposed by Maggiora & Ghilotti, Inc. which is less than the design professional of the Town's estimate of $495,500.

FISCAL IMPACT

To the extent funding is required to be spent from the Town's general fund, such amounts are hereby deemed budgeted and appropriated for such improvements.

ATTACHMENTS

A. Superseding Resolution with the following exhibts attached:
   Exhibit "A" Contract
   Exhibit "B" Engineer's Estimate
   Exhibit "C" Contractor's Proposal

B. Design Summary (Plans and Specifications)

EMERGENCY RESOLUTION 22-__

A RESOLUTION OF THE TOWN COUNCIL OF THE TOWN OF FAIRFAX DECLARING THE EXISTENCE OF A LOCAL EMERGENCY AT OR NEAR 195 PINE DRIVE, FAIRFAX, AND AUTHORIZING THE EMERGENCY PROCUREMENT OF MATERIALS AND LABOR WITHOUT COMPETITIVE BIDDING, SUPERSEDING EMERGENCY RESOLUTION 22-21

WHEREAS, Sections 22035 and 22050 of the Public Contracts Code authorize the Town of Fairfax to proceed with awarding a public works contract to perform emergency work upon adoption by the Town Council by a four-fifths vote of a resolution declaring that the public interest and necessity demand the immediate expenditure of public funds to safeguard life, health, or property; and

WHEREAS, Public Contract Code Section 22050 also provides that the Town Council may, by resolution, delegate the authority to order any action required by the emergency and to procure the necessary equipment, services, and supplies for those purposes, without giving notice for bids to let the contracts to the Town Manager, her designee, or any other officer; and

WHEREAS, the Town may exercise its emergency powers under Section 22050 by making a finding, based on substantial evidence set forth in the minutes of its meeting, that the emergency will not permit a delay resulting from a competitive solicitation for bids and that the Town's action is necessary to respond to the emergency; and

WHEREAS, the Town was forced to close a portion of the roadway at or near 195 Pine Drive on March 29, 2022, due to the collapse of a residential structure at that location, and limit travel to residential traffic only in order to protect persons and property; and

WHEREAS, the Town finds that in order to stabilize the roadway at the above listed site, to prevent and mitigate loss or impairment of life, health, property, and reopen the road to the public and emergency services, it must act in an expeditious manner; and

WHEREAS, the roadway condition at the above listed location on Pine Drive poses a clear and imminent danger, requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, and essential public services; and

WHEREAS, time does not permit the preparation of specifications and the solicitation of competitive bids before commencement of the emergency stabilization and road re-opening; and

WHEREAS, this Town Council previously adopted a substantially similar Resolution that declared in pertinent part as follows:

> ***SECTION 2.*** *The Town Manager is hereby ordered and authorized to provide for the emergency repair or replacement of those public facilities necessary to stabilize the roadway condition and reopen the roadway located at or near*

195 Pine Drive, Fairfax to take any directly related and immediate action required by those emergency conditions, and to procure the necessary equipment, services, and supplies for those purposes, without giving notice for bids to let contracts pursuant to Public Contract Code Sections 22035 and 22050. Said contract(s) may exceed the Town Manager's purchasing authority, but shall not exceed $260,000 for construction and $70,000 for design/construction management costs without further approval by the Town Council. To the extent said funding is required to be spent from the Town's general fund, such amounts are hereby deemed budgeted and appropriated for such improvements.

And,

WHEREAS, Town staff has determined, based upon the advice and analysis of its design professional, that the action recited in the preceding recital cannot be procured within the not to exceed amounts set forth therein and cannot reasonably be obtained for less than $481,000 as proposed by Maggiora & Ghilotti, Inc. which is less than the design professional of the Town's estimate of $495,500; and

NOW, THEREFORE, BE IT RESOLVED that the Town Council of the Town of Fairfax hereby declares and orders as follows:

SECTION 1. The Town Council hereby finds, by a four-fifths majority, that the recitals in this Emergency Resolution are true and correct. The Town Council finds and determines based on substantial evidence in the staff report and oral testimony the existence of a local emergency at or in the vicinity of 195 Pine Drive, Fairfax. These emergency findings shall be deemed to be entered into the minutes of the meeting at which this Emergency Resolution is passed.

SECTION 2. The Town Manager is hereby ordered and authorized to provide for the emergency repair or replacement of those public facilities necessary to stabilize the roadway condition and reopen the roadway located at or near 195 Pine Drive, Fairfax, to take any directly related and immediate action required by those emergency conditions, and to procure the necessary equipment, services, and supplies for those purposes, without giving notice for bids to let contracts pursuant to Public Contract Code Sections 22035 and 22050 (the "Action Ordered"). Said contract(s) may exceed the Town Manager's purchasing authority, but shall not exceed **$481,000** for construction and $70,000 for design/construction management costs without further approval by the Town Council. **Said contract(s) include by way of illustration and not by limitation the contract with Maggiora & Ghilotti, Inc. set forth in Exhibit A, which Town Manager is empowered to enter into subject to minor revisions, if any, approved by the Town Attorney**. To the extent said funding is required to be spent from the Town's general fund, such amounts are hereby deemed budgeted and appropriated for such improvements. **The Town Council hereby finds that (1) the design professional of the Town's estimate of $495,500 for the Action**

Ordered set forth in Exhibit B is reasonable, (2) that such estimate is hereby adopted by the Town Council as its own estimate of the reasonable cost of the Action Ordered, (3) that the Action Ordered cannot reasonably be obtained at lesser expense than set forth in the proposal of Maggiora & Ghilotti, Inc. attached hereto as Exhibit C, and (4) that any speculative public benefit that might be obtained through competitive bidding resulting in bids that undercut the design professional of the Town's estimate by even more than the proposal of Maggiora & Ghilotti, Inc. would be substantially outweighed by the adverse effect on the public that would be associated with the delays caused by advertised bidding and the resulting further extended impairment of life, health, and property caused by an even further delayed reopening the road to the public and emergency services.

SECTION 3. The Town Council shall review the emergency action at its next regularly scheduled meeting and at every regularly scheduled meeting thereafter until the work ordered hereby is terminated. Such review shall be for the purpose of determining, by a four-fifths vote, that there is a need to continue the work. Said review may be conducted as a consent calendar item.

SECTION 4. This Resolution shall be effective immediately upon adoption by four affirmative votes of the Town Council of the Town of Fairfax.

SECTION 5. This Resolution replaces and supersedes Emergency Resolution 22-21.

The foregoing resolution was duly passed and adopted at a special meeting of the Town Council of the Town of Fairfax held in said Town on the 1st day of June 2022 by the following vote:

AYES:
NOES:
ABSENT:

_____
Stephanie Hellman, Mayor

Attest: _____
Michele Gardner, Town Clerk

Exhibit A
Maggiora & Ghilotti, Inc. Contract

TOWN OF FAIRFAX

CONSTRUCTION CONTRACT

195 PINE DRIVE RETAINING WALL PROJECT

1. PARTIES AND DATE.

This Contract is made and entered into this 2nd day of June, 2022 by and between the Town of Fairfax, a public agency of the State of California ("Town") and Maggiora & Ghilotti, Inc., a California corporation with its principal place of business at 555 Du Bois Street, San Rafael, CA 94901 ("Contractor"). Town and Contractor are sometimes individually referred to as "Party" and collectively as "Parties" in this Contract.

2. RECITALS.

2.1 Town. Town is a public agency organized under the laws of the State of California, with power to contract for services necessary to achieve its purpose.

2.2 Contractor. Contractor desires to perform and assume responsibility for the provision of certain construction services required by the Town on the terms and conditions set forth in this Contract. Contractor represents that it is duly licensed and experienced in providing retaining wall, soil nails, micro pile, and ancillary improvements related construction services to public clients, that it and its employees or subcontractors have all necessary licenses and permits to perform the services in the State of California, and that it is familiar with the plans of Town. The following license classifications are required for this Project: "A" License.

2.3 Project. Town desires to engage Contractor to render such services for the 195 Pine Drive Retaining Wall Project ("Project") as set forth in this Contract.

2.4 Project Documents & Certifications. Contractor has obtained, and delivers concurrently herewith, a performance bond, a payment bond, and all insurance documentation, as required by the Contract.

3. TERMS

3.1 Incorporation of Documents. This Contract includes and hereby incorporates in full by reference the following documents, including all exhibits, drawings, specifications and documents therein, and attachments and addenda thereto:

- Services (Exhibit "A")
- Plans and Specifications (Exhibit "B")
- Special Conditions (Exhibit "C")
- Contractor's Certificate Regarding Workers' Compensation (Exhibit "D")
- Public Works Contractor Registration Certification (Exhibit "E")
- Payment and Performance Bonds (Exhibit "F")
- Addenda
- Change Orders executed by the Town

3.2 Contractor's Basic Obligation; Scope of Work. Contractor promises and agrees, at its own cost and expense, to furnish to the Town all labor, materials, tools, equipment, services,

and incidental and customary work necessary to fully and adequately complete the Project, including all structures and facilities necessary for the Project or described in the Contract (hereinafter sometimes referred to as the "Work"), for a Total Contract Price as specified pursuant to this Contract. All Work shall be subject to, and performed in accordance with the above referenced documents, as well as the exhibits attached hereto and incorporated herein by reference. The plans and specifications for the Work are further described in Exhibit "B" attached hereto and incorporated herein by this reference. Special Conditions, if any, relating to the Work are described in Exhibit "C" attached hereto and incorporated herein by this reference.

3.2.1 Change in Scope of Work. Any change in the scope of the Work, method of performance, nature of materials or price thereof, or any other matter materially affecting the performance or nature of the Work shall not be paid for or accepted unless such change, addition or deletion is approved in writing by a valid change order executed by the Town. Should Contractor request a change order due to unforeseen circumstances affecting the performance of the Work, such request shall be made within five (5) business days of the date such circumstances are discovered or shall waive its right to request a change order due to such circumstances. If the Parties cannot agree on any change in price required by such change in the Work, the Town may direct the Contractor to proceed with the performance of the change on a time and materials basis.

3.2.2 Substitutions/"Or Equal". Pursuant to Public Contract Code Section 3400(b), the Town may make a finding that designates certain products, things, or services by specific brand or trade name. Unless specifically designated in this Contract, whenever any material, process, or article is indicated or specified by grade, patent, or proprietary name or by name of manufacturer, such Specifications shall be deemed to be used for the purpose of facilitating the description of the material, process or article desired and shall be deemed to be followed by the words "or equal."

Contractor may, unless otherwise stated, offer for substitution any material, process or article which shall be substantially equal or better in every respect to that so indicated or specified in this Contract. However, the Town may have adopted certain uniform standards for certain materials, processes and articles. Contractor shall submit requests, together with substantiating data, for substitution of any "or equal" material, process or article no later than thirty-five (35) days after award of the Contract. To facilitate the construction schedule and sequencing, some requests may need to be submitted before thirty-five (35) days after award of Contract. Provisions regarding submission of "or equal" requests shall not in any way authorize an extension of time for performance of this Contract. If a proposed "or equal" substitution request is rejected, Contractor shall be responsible for providing the specified material, process or article. The burden of proof as to the equality of any material, process or article shall rest with Contractor.

The Town has the complete and sole discretion to determine if a material, process or article is an "or equal" material, process or article that may be substituted. Data required to substantiate requests for substitutions of an "or equal" material, process or article data shall include a signed affidavit from Contractor stating that, and describing how, the substituted "or equal" material, process or article is equivalent to that specified in every way except as listed on the affidavit. Substantiating data shall include any and all illustrations, specifications, and other relevant data including catalog information which describes the requested substituted "or equal" material, process or article, and substantiates that it is an "or equal" to the material, process or article. The substantiating data must also include information regarding the durability and lifecycle cost of the requested substituted "or equal" material, process or article. Failure to submit all the

required substantiating data, including the signed affidavit, to the Town in a timely fashion will result in the rejection of the proposed substitution.

Contractor shall bear all of the Town's costs associated with the review of substitution requests. Contractor shall be responsible for all costs related to a substituted "or equal" material, process or article. Contractor is directed to the Special Conditions (if any) to review any findings made pursuant to Public Contract Code section 3400.

3.3 Period of Performance.

3.3.1 Contract Time. Contractor shall perform and complete all Work under this Contract within eighty four (84) days, beginning the effective date of the Notice to Proceed ("Contract Time"). Contractor shall perform its Work in strict accordance with any completion schedule, construction schedule or project milestones developed by the Town. Such schedules or milestones may be included as part of Exhibits "A" or "B" attached hereto, or may be provided separately in writing to Contractor. Contractor agrees that if such Work is not completed within the aforementioned Contract Time and/or pursuant to any such completion schedule, construction schedule or project milestones developed pursuant to provisions of the Contract, it is understood, acknowledged and agreed that the Town will suffer damage.

3.3.2 Force Majeure. Neither Town nor Contractor shall be considered in default of this Contract for delays in performance caused by circumstances beyond the reasonable control of the non-performing party. For purposes of this Contract, such circumstances include but are not limited to, abnormal weather conditions; floods; earthquakes; fire; pandemics or epidemics; war; riots and other civil disturbances; strikes, lockouts, work slowdowns, and other labor disturbances; sabotage or judicial restraint. Should such circumstances occur, the non-performing party shall, within a reasonable time of being prevented from performing, give written notice to the other party describing the circumstances preventing continued performance and the efforts being made to resume performance of this Contract. Contractor's exclusive remedy in the event of delay covered under this section shall be a non-compensable extension of the Contract Time.

3.3.3 Liquidated Damages. Pursuant to Government Code Section 53069.85, Contractor shall pay to the Town as fixed and liquidated damages the sum of **Two Thousand Dollars ($2,000)** per day for each and every calendar day of delay beyond the Contract Time or beyond any completion schedule, construction schedule or Project milestones established pursuant to the Contract.

3.4 Standard of Performance; Performance of Employees. Contractor shall perform all Work under this Contract in a skillful and workmanlike manner, and consistent with the standards generally recognized as being employed by professionals in the same discipline in the State of California. Contractor represents and maintains that it is skilled in the professional calling necessary to perform the Work. Contractor warrants that all employees and subcontractors shall have sufficient skill and experience to perform the Work assigned to them. Finally, Contractor represents that it, its employees and subcontractors have all licenses, permits, qualifications and approvals of whatever nature that are legally required to perform the Work, including any required business license, and that such licenses and approvals shall be maintained throughout the term of this Contract. As provided for in the indemnification provisions of this Contract, Contractor shall perform, at its own cost and expense and without reimbursement from the Town, any work necessary to correct errors or omissions which are caused by Contractor's failure to comply with the standard of care provided for herein. Any employee who is determined by the Town to be

uncooperative, incompetent, a threat to the safety of persons or the Work, or any employee who fails or refuses to perform the Work in a manner acceptable to the Town, shall be promptly removed from the Project by Contractor and shall not be re-employed on the Work.

3.5 Control and Payment of Subordinates; Contractual Relationship. Town retains Contractor on an independent contractor basis and Contractor is not an employee of Town. Any additional personnel performing the work governed by this Contract on behalf of Contractor shall at all times be under Contractor's exclusive direction and control. Contractor shall pay all wages, salaries, and other amounts due such personnel in connection with their performance under this Contract and as required by law. Contractor shall be responsible for all reports and obligations respecting such additional personnel, including, but not limited to: social security taxes, income tax withholding, unemployment insurance, and workers' compensation insurance.

3.6 Town's Basic Obligation. Town agrees to engage and does hereby engage Contractor as an independent contractor to furnish all materials and to perform all Work according to the terms and conditions herein contained for the sum set forth above. Except as otherwise provided in the Contract, the Town shall pay to Contractor, as full consideration for the satisfactory performance by Contractor of the services and obligations required by this Contract, the below-referenced compensation in accordance with compensation provisions set forth in the Contract.

3.7 Compensation and Payment.

3.7.1 Amount of Compensation. As consideration for performance of the Work required herein, Town agrees to pay Contractor the Total Contract Price of Four Hundred Eighty-One Thousand Dollars ($481,000) ("Total Contract Price") provided that such amount shall be subject to adjustment pursuant to the applicable terms of this Contract or written change orders approved and signed in advance by the Town.

3.7.2 Payment of Compensation. If the Work is scheduled for completion in thirty (30) or less calendar days, Town will arrange for payment of the Total Contract Price upon completion and approval by Town of the Work. If the Work is scheduled for completion in more than thirty (30) calendar days, Town will pay Contractor on a monthly basis as provided for herein. On or before the fifth (5th) day of each month, Contractor shall submit to the Town an itemized application for payment in the format supplied by the Town indicating the amount of Work completed since commencement of the Work or since the last progress payment. These applications shall be supported by evidence which is required by this Contract and such other documentation as the Town may require. The Contractor shall certify that the Work for which payment is requested has been done and that the materials listed are stored where indicated. Contractor may be required to furnish a detailed schedule of values upon request of the Town and in such detail and form as the Town shall request, showing the quantities, unit prices, overhead, profit, and all other expenses involved in order to provide a basis for determining the amount of progress payments.

3.7.3 Prompt Payment. Town shall review and pay all progress payment requests in accordance with the provisions set forth in Section 20104.50 of the California Public Contract Code. However, no progress payments will be made for Work not completed in accordance with this Contract. Contractor shall comply with all applicable laws, rules and regulations relating to the proper payment of its employees, subcontractors, suppliers or others.

3.7.4 Contract Retentions. From each approved progress estimate, five percent (5%) will be deducted and retained by the Town, and the remainder will be paid to Contractor. All

Contract retention shall be released and paid to Contractor and subcontractors pursuant to California Public Contract Code Section 7107.

3.7.5 Other Retentions. In addition to Contract retentions, the Town may deduct from each progress payment an amount necessary to protect Town from loss because of: (1) liquidated damages which have accrued as of the date of the application for payment; (2) any sums expended by the Town in performing any of Contractor's obligations under the Contract which Contractor has failed to perform or has performed inadequately; (3) defective Work not remedied; (4) stop notices as allowed by state law; (5) reasonable doubt that the Work can be completed for the unpaid balance of the Total Contract Price or within the scheduled completion date; (6) unsatisfactory prosecution of the Work by Contractor; (7) unauthorized deviations from the Contract; (8) failure of Contractor to maintain or submit on a timely basis proper and sufficient documentation as required by the Contract or by Town during the prosecution of the Work; (9) erroneous or false estimates by Contractor of the value of the Work performed; (10) any sums representing expenses, losses, or damages as determined by the Town, incurred by the Town for which Contractor is liable under the Contract; and (11) any other sums which the Town is entitled to recover from Contractor under the terms of the Contract or pursuant to state law, including Section 1727 of the California Labor Code. The failure by the Town to deduct any of these sums from a progress payment shall not constitute a waiver of the Town's right to such sums.

3.7.6 Substitutions for Contract Retentions. In accordance with California Public Contract Code Section 22300, the Town will permit the substitution of securities for any monies withheld by the Town to ensure performance under the Contract. At the request and expense of Contractor, securities equivalent to the amount withheld shall be deposited with the Town, or with a state or federally chartered bank in California as the escrow agent, and thereafter the Town shall then pay such monies to Contractor as they come due. Upon satisfactory completion of the Contract, the securities shall be returned to Contractor. For purposes of this Section and Section 22300 of the Public Contract Code, the term "satisfactory completion of the contract" shall mean the time the Town has issued written final acceptance of the Work and filed a Notice of Completion as required by law and provisions of this Contract. Contractor shall be the beneficial owner of any securities substituted for monies withheld and shall receive any interest thereon. The escrow agreement used for the purposes of this Section shall be in the form provided by the Town.

3.7.7 Title to Work. As security for partial, progress, or other payments, title to Work for which such payments are made shall pass to the Town at the time of payment. To the extent that title has not previously been vested in the Town by reason of payments, full title shall pass to the Town at delivery of the Work at the destination and time specified in this Contract. Such transferred title shall in each case be good, free and clear from any and all security interests, liens, or other encumbrances. Contractor promises and agrees that it will not pledge, hypothecate, or otherwise encumber the items in any manner that would result in any lien, security interest, charge, or claim upon or against said items. Such transfer of title shall not imply acceptance by the Town, nor relieve Contractor from the responsibility to strictly comply with the Contract, and shall not relieve Contractor of responsibility for any loss of or damage to items.

3.7.8 Labor and Material Releases. Contractor shall furnish Town with labor and material releases from all subcontractors performing work on, or furnishing materials for, the Work governed by this Contract prior to final payment by Town.

3.7.9 Prevailing Wages. Contractor is aware of the requirements of California Labor Code Section 1720 et seq., and 1770 et seq., as well as California Code of Regulations, Title 8, Section 16000 et seq., ("Prevailing Wage Laws"), which require the payment of prevailing

wage rates and the performance of other requirements on "public works" and "maintenance" projects. Since the Services are being performed as part of an applicable "public works" or "maintenance" project, as defined by the Prevailing Wage Laws, and since the total compensation is $1,000 or more, Contractor agrees to fully comply with such Prevailing Wage Laws. Town shall provide Contractor with a copy of the prevailing rates of per diem wages in effect at the commencement of this Contract upon request. Contractor shall make copies of the prevailing rates of per diem wages for each craft, classification or type of worker needed to execute the Services available to interested parties upon request, and shall post copies at Contractor's principal place of business and at the project site. Contractor shall defend, indemnify and hold the Town, its officials, officers, employees and agents free and harmless from any claim or liability arising out of any failure or alleged failure to comply with the Prevailing Wage Laws. Contractor and any subcontractor shall forfeit a penalty of up to $200 per calendar day or portion thereof for each worker paid less than the prevailing wage rates.

3.7.10 Apprenticeable Crafts. When Contractor employs workmen in an apprenticeable craft or trade, Contractor shall comply with the provisions of Section 1777.5 of the California Labor Code with respect to the employment of properly registered apprentices upon public works. The primary responsibility for compliance with said section for all apprenticeable occupations shall be with Contractor. The Contractor or any subcontractor that is determined by the Labor Commissioner to have knowingly violated Section 1777.5 shall forfeit as a civil penalty an amount not exceeding $100 for each full calendar day of noncompliance, or such greater amount as provided by law.

3.7.11 Hours of Work. Contractor is advised that eight (8) hours labor constitutes a legal day's work. Pursuant to Section 1813 of the California Labor Code, Contractor shall forfeit a penalty of $25.00 per worker for each day that each worker is permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week, except when payment for overtime is made at not less than one and one-half (1-1/2) times the basic rate for that worker.

3.7.12 Payroll Records. Contractor and each subcontractor shall keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by him or her in connection with the public work. The payroll records shall be certified and shall be available for inspection at all reasonable hours at the principal office of Contractor in the manner provided in Labor Code section 1776. In the event of noncompliance with the requirements of this section, Contractor shall have 10 days in which to comply subsequent to receipt of written notice specifying in what respects such Contractor must comply with this section. Should noncompliance still be evident after such 10-day period, Contractor shall, as a penalty to Town, forfeit not more than $100.00 for each calendar day or portion thereof, for each worker, until strict compliance is effectuated. The amount of the forfeiture is to be determined by the Labor Commissioner. A contractor who is found to have violated the provisions of law regarding wages on Public Works with the intent to defraud shall be ineligible to bid on Public Works contracts for a period of one to three years as determined by the Labor Commissioner. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, such penalties shall be withheld from progress payments then due. The responsibility for compliance with this section is on Contractor. The requirement to submit certified payroll records directly to the Labor Commissioner under Labor Code section 1771.4 shall not apply to work performed on a public works project that is exempt pursuant to the small project exemption specified in Labor Code Section 1771.4.

3.7.13 Contractor and Subcontractor Registration. Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. No bid will be accepted nor any contract entered into without proof of the contractor's and subcontractors' current registration with the Department of Industrial Relations to perform public work. Contractor is directed to review, fill out and execute the Public Works Contractor Registration Certification attached hereto as Exhibit "E" prior to contract execution. Notwithstanding the foregoing, the contractor registration requirements mandated by Labor Code Sections 1725.5 and 1771.1 shall not apply to work performed on a public works project that is exempt pursuant to the small project exemption specified in Labor Code Sections 1725.5 and 1771.1.

3.7.14 Labor Compliance; Stop Orders. This Project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. It shall be the Contractor's sole responsibility to evaluate and pay the cost of complying with all labor compliance requirements under this Contract and applicable law. Any stop orders issued by the Department of Industrial Relations against Contractor or any subcontractor that affect Contractor's performance of Work, including any delay, shall be Contractor's sole responsibility. Any delay arising out of or resulting from such stop orders shall be considered Contractor caused delay subject to any applicable liquidated damages and shall not be compensable by the Town. Contractor shall defend, indemnify and hold the Town, its officials, officers, employees and agents free and harmless from any claim or liability arising out of stop orders issued by the Department of Industrial Relations against Contractor or any subcontractor.

3.8 Performance of Work; Jobsite Obligations.

3.8.1 Water Quality Management and Compliance.

3.8.1.1 Water Quality Management and Compliance. Contractor shall keep itself and all subcontractors, staff, and employees fully informed of and in compliance with all local, state and federal laws, rules and regulations that may impact, or be implicated by the performance of the Work including, without limitation, all applicable provisions of the Federal Water Pollution Control Act (33 U.S.C. §§ 1300); the California Porter-Cologne Water Quality Control Act (Cal Water Code §§ 13000-14950); local ordinances regulating discharges of storm water; and any and all regulations, policies, or permits issued pursuant to any such authority regulating the discharge of pollutants, as that term is used in the Porter-Cologne Water Quality Control Act, to any ground or surface water in the State.

3.8.1.2 Compliance with the Statewide Construction General Permit. Contractor shall comply with all conditions of the most recent iteration of the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity, issued by the California State Water Resources Control Board ("Permit"). It shall be Contractor's sole responsibility to file a Notice of Intent and procure coverage under the Permit for all construction activity which results in the disturbance of more than one acre of total land area or which is part of a larger common area of development or sale. Prior to initiating work, Contractor shall be solely responsible for preparing and implementing a Storm Water Pollution Prevention Plan (SWPPP) as required by the Permit. Contractor shall be responsible for procuring, implementing and complying with the provisions of the Permit and the SWPPP, including the standard provisions, and monitoring and reporting requirements as required by the Permit. The Permit requires the SWPPP to be a "living document" that changes as necessary to meet the conditions and requirements of the job site as it progresses through

difference phases of construction and is subject to different weather conditions. It shall be Contractor's sole responsibility to update the SWPPP as necessary to address conditions at the project site.

3.8.1.3 Other Water Quality Rules Regulations and Policies. Contractor shall comply with the lawful requirements of any applicable municipality, drainage Town, or local agency regarding discharges of storm water to separate storm drain systems or other watercourses under their jurisdiction, including applicable requirements in municipal storm water management programs.

3.8.1.4 Cost of Compliance. Storm, surface, nuisance, or other waters may be encountered at various times during construction of The Work. Therefore, the Contractor, by submitting a Bid, hereby acknowledges that it has investigated the risk arising from such waters, has prepared its Bid accordingly, and assumes any and all risks and liabilities arising therefrom.

3.8.1.5 Liability for Non-Compliance. Failure to comply with the Permit is a violation of federal and state law. Pursuant to the indemnification provisions of this Contract, Contractor hereby agrees to defend, indemnify and hold harmless the Town and its officials, officers, employees, volunteers and agents for any alleged violations. In addition, Town may seek damages from Contractor for any delay in completing the Work in accordance with the Contract, if such delay is caused by or related to Contractor's failure to comply with the Permit.

3.8.1.6 Reservation of Right to Defend. Town reserves the right to defend any enforcement action brought against the Town for Contractor's failure to comply with the Permit or any other relevant water quality law, regulation, or policy. Pursuant to the indemnification provisions of this Contract, Contractor hereby agrees to be bound by, and to reimburse the Town for the costs (including the Town's attorney's fees) associated with, any settlement reached between the Town and the relevant enforcement entity.

3.8.1.7 Training. In addition to the standard of performance requirements set forth in paragraph 3.4, Contractor warrants that all employees and subcontractors shall have sufficient skill and experience to perform the Work assigned to them without impacting water quality in violation of the laws, regulations and policies described in paragraph 3.8.1. Contractor further warrants that it, its employees and subcontractors will receive adequate training, as determined by Town, regarding the requirements of the laws, regulations and policies described in paragraph 3.8.1 as they may relate to the Work provided under this Contract. Upon request, Town will provide the Contractor with a list of training programs that meet the requirements of this paragraph.

3.8.2 Safety. Contractor shall execute and maintain its work so as to avoid injury or damage to any person or property. Contractor shall comply with the requirements of the specifications relating to safety measures applicable in particular operations or kinds of work. In carrying out its Work, Contractor shall at all times be in compliance with all applicable local, state and federal laws, rules and regulations, and shall exercise all necessary precautions for the safety of employees appropriate to the nature of the Work and the conditions under which the Work is to be performed. Safety precautions as applicable shall include, but shall not be limited to, adequate life protection and lifesaving equipment; adequate illumination for underground and night operations; instructions in accident prevention for all employees, such as machinery guards, safe walkways, scaffolds, ladders, bridges, gang planks, confined space procedures, trenching and shoring, fall protection and other safety devices, equipment and wearing apparel as are

necessary or lawfully required to prevent accidents or injuries; and adequate facilities for the proper inspection and maintenance of all safety measures. Furthermore, Contractor shall prominently display the names and telephone numbers of at least two medical doctors practicing in the vicinity of the Project, as well as the telephone number of the local ambulance service, adjacent to all telephones at the Project site.

3.8.3 Laws and Regulations. Contractor shall keep itself fully informed of and in compliance with all local, state and federal laws, rules and regulations in any manner affecting the performance of the Contract or the Work, including all Cal/OSHA requirements, and shall give all notices required by law. Contractor shall be liable for all violations of such laws and regulations in connection with Work. If Contractor observes that the drawings or specifications are at variance with any law, rule or regulation, it shall promptly notify the Town in writing. Any necessary changes shall be made by written change order. If Contractor performs any work knowing it to be contrary to such laws, rules and regulations and without giving written notice to the Town, Contractor shall be solely responsible for all costs arising therefrom. Town is a public entity of the State of California subject to certain provisions of the Health & Safety Code, Government Code, Public Contract Code, and Labor Code of the State. It is stipulated and agreed that all provisions of the law applicable to the public contracts of a municipality are a part of this Contract to the same extent as though set forth herein and will be complied with. Contractor shall defend, indemnify and hold Town, its officials, officers, employees and agents free and harmless, pursuant to the indemnification provisions of this Contract, from any claim or liability arising out of any failure or alleged failure to comply with such laws, rules or regulations.

3.8.4 Permits and Licenses. Contractor shall be responsible for securing Town permits and licenses necessary to perform the Work described herein, including, but not limited to, any required business license. While Contractor will not be charged a fee for any Town permits, Contractor shall pay the Town's business license fee, if any. Any ineligible contractor or subcontractor pursuant to Labor Code Sections 1777.1 and 1777.7 may not perform work on this Project.

3.8.5 Trenching Work. If the Total Contract Price exceeds $25,000 and if the Work governed by this Contract entails excavation of any trench or trenches five (5) feet or more in depth, Contractor shall comply with all applicable provisions of the California Labor Code, including Section 6705. To this end, Contractor shall submit for Town's review and approval a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation of such trench or trenches. If such plan varies from the shoring system standards, the plan shall be prepared by a registered civil or structural engineer.

3.8.6 Hazardous Materials and Differing Conditions. As required by California Public Contract Code Section 7104, if this Contract involves digging trenches or other excavations that extend deeper than four (4) feet below the surface, Contractor shall promptly, and prior to disturbance of any conditions, notify Town of: (1) any material discovered in excavation that Contractor believes to be a hazardous waste that is required to be removed to a Class I, Class II or Class III disposal site; (2) subsurface or latent physical conditions at the site differing from those indicated by Town; and (3) unknown physical conditions of an unusual nature at the site, significantly different from those ordinarily encountered in such contract work. Upon notification, Town shall promptly investigate the conditions to determine whether a change order is appropriate. In the event of a dispute, Contractor shall not be excused from any scheduled completion date and shall proceed with all Work to be performed under the Contract, but shall retain all rights provided by the Contract or by law for making protests and resolving the dispute.

3.8.7 Underground Utility Facilities. To the extent required by Section 4215 of the California Government Code, Town shall compensate Contractor for the costs of: (1) locating and repairing damage to underground utility facilities not caused by the failure of Contractor to exercise reasonable care; (2) removing or relocating underground utility facilities not indicated in the construction drawings; and (3) equipment necessarily idled during such work. Contractor shall not be assessed liquidated damages for delay caused by failure of Town to provide for removal or relocation of such utility facilities.

3.8.8 Air Quality. Contractor must fully comply with all applicable laws, rules and regulations in furnishing or using equipment and/or providing services, including, but not limited to, emissions limits and permitting requirements imposed by the California Air Resources Board (CARB). Although CARB limits and requirements are more broad, Contractor shall specifically be aware of their application to "portable equipment", which definition is considered by CARB to include any item of equipment with a fuel-powered engine. Contractor shall indemnify Town against any fines or penalties imposed by CARB, or any other governmental or regulatory agency for violations of applicable laws, rules and/or regulations by Contractor, its subcontractors, or others for whom Contractor is responsible under its indemnity obligations provided for in this Contract.

3.8.9 State Recycling Mandates. Contractor shall comply with State Recycling Mandates. Any recyclable materials/debris collected by the contractor that can be feasibly diverted via reuse or recycling must be hauled by the appropriate handler for reuse or recycling.

3.9 Completion of Work. When Contractor determines that it has completed the Work required herein, Contractor shall so notify Town in writing and shall furnish all labor and material releases required by this Contract. Town shall thereupon inspect the Work. If the Work is not acceptable to the Town, the Town shall indicate to Contractor in writing the specific portions or items of Work which are unsatisfactory or incomplete. Once Contractor determines that it has completed the incomplete or unsatisfactory Work, Contractor may request a reinspection by the Town. Once the Work is acceptable to Town, Town shall pay to Contractor the Total Contract Price remaining to be paid, less any amount which Town may be authorized or directed by law to retain. Payment of retention proceeds due to Contractor shall be made in accordance with Section 7107 of the California Public Contract Code.

3.10 Claims; Government Code Claim Compliance.

3.10.1 Intent. Effective January 1, 1991, Section 20104 et seq., of the California Public Contract Code prescribes a process utilizing informal conferences, non-binding judicial supervised mediation, and judicial arbitration to resolve disputes on construction claims of $375,000 or less. Effective January 1, 2017, Section 9204 of the Public Contract Code prescribes a process for negotiation and mediation to resolve disputes on construction claims. The intent of this Section is to implement Sections 20104 et seq. and Section 9204 of the California Public Contract Code. This Section shall be construed to be consistent with said statutes.

3.10.2 Claims. For purposes of this Section, “Claim” means a separate demand by the Contractor, after a change order duly requested in accordance with the terms of this Contract has been denied by the Town, for (A) a time extension, (B) payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract, or (C) an amount the payment of which is disputed by the Town. A “Claim” does not include any demand for payment for which the Contractor has failed to provide notice, request a change order, or otherwise failed to follow any procedures contained in the Contract Documents. Claims

governed by this Section may not be filed unless and until the Contractor completes all procedures for giving notice of delay or change and for the requesting of a time extension or change order, including but not necessarily limited to the change order procedures contained herein, and Contractor's request for a change has been denied in whole or in part. Claims governed by this Section must be filed no later than fourteen (14) days after a request for change has been denied in whole or in part or after any other event giving rise to the Claim. The Claim shall be submitted in writing to the Town and shall include on its first page the following in 16 point capital font: "THIS IS A CLAIM." Furthermore, the claim shall include the documents necessary to substantiate the claim. Nothing in this Section is intended to extend the time limit or supersede notice requirements otherwise provided by contract for the filing of claims, including all requirements pertaining to compensation or payment for extra Work, disputed Work, and/or changed conditions. Failure to follow such contractual requirements shall bar any claims or subsequent lawsuits for compensation or payment thereon.

3.10.3 Supporting Documentation. The Contractor shall submit all claims in the following format:

3.10.3.1 Summary of claim merit and price, reference Contract Document provisions pursuant to which the claim is made

3.10.3.2 List of documents relating to claim:

(A) Specifications

(B) Drawings

(C) Clarifications (Requests for Information)

(D) Schedules

(E) Other

3.10.3.3 Chronology of events and correspondence

3.10.3.4 Analysis of claim merit

3.10.3.5 Analysis of claim cost

3.10.3.6 Time impact analysis in CPM format

3.10.3.7 If Contractor's claim is based in whole or in part on an allegation of errors or omissions in the Drawings or Specifications for the Project, Contractor shall provide a summary of the percentage of the claim subject to design errors or omissions and shall obtain a certificate of merit in support of the claim of design errors and omissions.

3.10.3.8 Cover letter and certification of validity of the claim, including any claims from subcontractors of any tier, in accordance with Government Code section 12650 *et seq*.

3.10.4 Town's Response. Upon receipt of a claim pursuant to this Section, Town shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the Contractor a written statement identifying what portion of the claim is disputed and

what portion is undisputed. Any payment due on an undisputed portion of the claim will be processed and made within 60 days after the public entity issues its written statement.

3.10.4.1 If Town needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, Town shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the Contractor a written statement identifying the disputed portion and the undisputed portion.

3.10.4.2 Within 30 days of receipt of a claim, Town may request in writing additional documentation supporting the claim or relating to defenses or claims Town may have against the Contractor. If additional information is thereafter required, it shall be requested and provided pursuant to this subdivision, upon mutual agreement of Town and the Contractor.

3.10.4.3 Town's written response to the claim, as further documented, shall be submitted to the Contractor within 30 days (if the claim is less than $50,000, within 15 days) after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor in producing the additional information or requested documentation, whichever is greater.

3.10.5 Meet and Confer. If the Contractor disputes Town's written response, or Town fails to respond within the time prescribed, the Contractor may so notify Town, in writing, either within 15 days of receipt of Town's response or within 15 days of Town's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand, Town shall schedule a meet and confer conference within 30 days for settlement of the dispute.

3.10.6 Mediation. Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, Town shall provide the Contractor a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after Town issues its written statement. Any disputed portion of the claim, as identified by the Contractor in writing, shall be submitted to nonbinding mediation, with Town and the Contractor sharing the associated costs equally. Town and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing, unless the parties agree to select a mediator at a later time.

3.10.6.1 If the Parties cannot agree upon a mediator, each Party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each Party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator.

3.10.6.2 For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the Parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

3.10.6.3 Unless otherwise agreed to by Town and the Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

3.10.6.4 The mediation shall be held no earlier than the date the Contractor completes the Work or the date that the Contractor last performs Work, whichever is earlier. All unresolved claims shall be considered jointly in a single mediation, unless a new unrelated claim arises after mediation is completed.

3.10.7 Procedures After Mediation. If following the mediation, the claim or any portion remains in dispute, the Contractor must file a claim pursuant to Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions, the running of the period of time within which a claim must be filed shall be tolled from the time the Contractor submits his or her written claim pursuant to subdivision (a) until the time the claim is denied, including any period of time utilized by the meet and confer conference or mediation.

3.10.8 Civil Actions. The following procedures are established for all civil actions filed to resolve claims subject to this Section:

3.10.8.1 Within 60 days, but no earlier than 30 days, following the filing or responsive pleadings, the court shall submit the matter to non-binding mediation unless waived by mutual stipulation of both parties or unless mediation was held prior to commencement of the action in accordance with Public Contract Code section 9204 and the terms of these procedures.. The mediation process shall provide for the selection within 15 days by both parties of a disinterested third person as mediator, shall be commenced within 30 days of the submittal, and shall be concluded within 15 days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court.

3.10.8.2 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1114.11 of that code. The Civil Discovery Act of 1986 (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of Part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

3.10.8.3 In addition to Chapter 2.5 (commencing with Section 1141.10) of Title 3 of Part 3 of the Code of Civil Procedure, (A) arbitrators shall, when possible, be experienced in construction law, and (B) any party appealing an arbitration award who does not obtain a more favorable judgment shall, in addition to payment of costs and fees under that chapter, also pay the attorney's fees on appeal of the other party.

3.10.9 Government Code Claims. In addition to any and all contract requirements pertaining to notices of and requests for compensation or payment for extra work, disputed work, claims and/or changed conditions, Contractor must comply with the claim procedures set forth in Government Code sections 900 et seq. prior to filing any lawsuit against the Town. Such Government Code claims and any subsequent lawsuit based upon the Government Code claims shall be limited to those matters that remain unresolved after all procedures pertaining to extra work, disputed work, claims, and/or changed conditions have been followed by Contractor. If no such Government Code claim is submitted, or if any prerequisite contractual requirements are not otherwise satisfied as specified herein, Contractor shall be barred from bringing and maintaining

a valid lawsuit against the Town. A Government Code claim must be filed no earlier than the date the work is completed or the date the Contractor last performs work on the Project, whichever occurs first. A Government Code claim shall be inclusive of all unresolved claims unless a new unrelated claim arises after the Government Code claim is submitted.

3.10.10 Non-Waiver. Town's failure to respond to a claim from the Contractor within the time periods described in this Section or to otherwise meet the time requirements of this Section shall result in the claim being deemed rejected in its entirety. Town's failure to respond shall not waive Town's rights to any subsequent procedures for the resolution of disputed claims.

3.11 Loss and Damage. Except as may otherwise be limited by law, Contractor shall be responsible for all loss and damage which may arise out of the nature of the Work agreed to herein, or from the action of the elements, or from any unforeseen difficulties which may arise or be encountered in the prosecution of the Work until the same is fully completed and accepted by Town. In the event of damage proximately caused by an Act of God, as defined by Section 7105 of the Public Contract Code, the Town may terminate this Contract pursuant to Section 3.17.3; provided, however, that the Town needs to provide Contractor with only one (1) day advanced written notice.

3.12 Indemnification.

3.12.1 Scope of Indemnity**.** To the fullest extent permitted by law, Contractor shall defend, indemnify and hold the Town, its officials, employees, agents and authorized volunteers free and harmless from any and all claims, demands, causes of action, suits, actions, proceedings, costs, expenses, liability, judgments, awards, decrees, settlements, loss, damage or injury of any kind, in law or equity, to property or persons, including wrongful death, (collectively, "Claims") in any manner arising out of, pertaining to, or incident to any alleged acts, errors or omissions, or willful misconduct of Contractor, its officials, officers, employees, subcontractors, consultants or agents in connection with the performance of the Contractor's services, the Project or this Contract, including without limitation the payment of all consequential damages, expert witness fees and attorneys' fees and other related costs and expenses. Notwithstanding the foregoing, to the extent required by Civil Code section 2782, Contractor's indemnity obligation shall not apply to liability for damages for death or bodily injury to persons, injury to property, or any other loss, damage or expense arising from the sole or active negligence or willful misconduct of the Town or the Town's agents, servants, or independent contractors who are directly responsible to the Town, or for defects in design furnished by those persons.

3.12.2 Additional Indemnity Obligations**.** Contractor shall defend, with counsel of Town's choosing and at Contractor's own cost, expense and risk, any and all Claims covered by this section that may be brought or instituted against Town or its officials, employees, agents and authorized volunteers. In addition, Contractor shall pay and satisfy any judgment, award or decree that may be rendered against Town or its officials, employees, agents and authorized volunteers as part of any such claim, suit, action or other proceeding. Contractor shall also reimburse Town for the cost of any settlement paid by Town or its officials, employees, agents and authorized volunteers as part of any such claim, suit, action or other proceeding. Such reimbursement shall include payment for Town's attorney's fees and costs, including expert witness fees. Contractor shall reimburse Town and its officials, employees, agents and authorized volunteers, for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided. Contractor's obligation to

indemnify shall not be restricted to insurance proceeds, if any, received by the Town, its officials, employees, agents and authorized volunteers.

3.13 Insurance.

3.13.1 Time for Compliance. Contractor shall not commence Work under this Contract until it has provided evidence satisfactory to the Town that it has secured all insurance required under this section. In addition, Contractor shall not allow any subcontractor to commence work on any subcontract until it has provided evidence satisfactory to the Town that the subcontractor has secured all insurance required under this section. Failure to provide and maintain all required insurance shall be grounds for the Town to terminate this Contract for cause.

3.13.2 Minimum Requirements. Contractor shall, at its expense, procure and maintain for the duration of the Contract insurance against claims for injuries to persons or damages to property which may arise from or in connection with the performance of the Work hereunder by Contractor, its agents, representatives, employees or subcontractors. Contractor shall also require all of its subcontractors to procure and maintain the same insurance for the duration of the Contract. Such insurance shall meet at least the following minimum levels of coverage:

3.13.2.1 Minimum Scope of Insurance. Coverage shall be at least as broad as the latest version of the following: (1) *General Liability:* Insurance Services Office Commercial General Liability coverage (occurrence form CG 00 01) OR Insurance Services Office Owners and Contractors Protective Liability Coverage Form (CG 00 09 11 88) (coverage for operations of designated contractor); (2) *Automobile Liability:* Insurance Services Office Business Auto Coverage form number CA 00 01, code 1 (any auto); and (3) *Workers' Compensation and Employer's Liability:* Workers' Compensation insurance as required by the State of California and Employer's Liability Insurance. Policies shall not contain exclusions contrary to this Contract.

3.13.2.2 Minimum Limits of Insurance. Contractor shall maintain limits no less than: (1) *General Liability:* $2,000,000 per occurrence and $4,000,000 aggregate for bodily injury, personal injury and property damage; (2) *Automobile Liability:* $2,000,000 per accident for bodily injury and property damage; and (3) *Workers' Compensation and Employer's Liability:* Workers' compensation limits as required by the Labor Code of the State of California. Employer's Liability limits of $1,000,000 each accident, policy limit bodily injury or disease, and each employee bodily injury or disease. Defense costs shall be available in addition to the limits. Notwithstanding the minimum limits specified herein, any available coverage shall be provided to the parties required to be named as additional insureds pursuant to this Contract.

3.13.3 Insurance Endorsements. The insurance policies shall contain the following provisions, or Contractor shall provide endorsements (amendments) on forms supplied or approved by the Town to add the following provisions to the insurance policies:

3.13.3.1 General Liability. (1) Such policy shall give the Town, its officials, employees, agents and authorized volunteers additional insured status using ISO endorsements CG20 10 10 01 plus CG20 37 10 01, or endorsements providing the exact same coverage, with respect to the Work or operations performed by or on behalf of Contractor, including materials, parts or equipment furnished in connection with such work; (2) all policies shall waive or shall permit Contractor to waive all rights of subrogation which may be obtained by the Contractor or any insurer by virtue of payment of any loss or any coverage provided to any person named as an additional insured pursuant to this Contract, and Contractor agrees to waive

all such rights of subrogation; and (3) the insurance coverage shall be primary insurance as respects the Town, its officials, employees, agents and authorized volunteers, or if excess, shall stand in an unbroken chain of coverage excess of Contractor's scheduled underlying coverage. Any insurance or self-insurance maintained by the Town, its officials, employees, agents and authorized volunteers shall be excess of Contractor's insurance and shall not be called upon to contribute with it.

3.13.3.2 Automobile Liability. (1) Such policy shall give the Town, its officials, employees, agents and authorized volunteers additional insured status with respect to the ownership, operation, maintenance, use, loading or unloading of any auto owned, leased, hired or borrowed by Contractor or for which Contractor is responsible; (2) all policies shall waive or shall permit Contractor to waive all rights of subrogation which may be obtained by the Contractor or any insurer by virtue of payment of any loss or any coverage provided to any person named as an additional insured pursuant to this Contract, and Contractor agrees to waive all such rights of subrogation; and (3) the insurance coverage shall be primary insurance as respects the Town, its officials, employees, agents and authorized volunteers, or if excess, shall stand in an unbroken chain of coverage excess of Contractor's scheduled underlying coverage. Any insurance or self-insurance maintained by the Town, its officials, employees, agents and authorized volunteers shall be excess of Contractor's insurance and shall not be called upon to contribute with it in any way.

3.13.3.3 Workers' Compensation and Employer's Liability Coverage. The insurer shall agree to waive all rights of subrogation against the Town, its officials, employees, agents and authorized volunteers for losses paid under the terms of the insurance policy which arise from work performed by Contractor.

3.13.3.4 All Coverages. Each insurance policy required by this Contract shall be endorsed to state that: (1) coverage shall not be suspended, voided, reduced or canceled except after thirty (30) days prior written notice by certified mail, return receipt requested, has been given to the Town; and (2) any failure to comply with reporting or other provisions of the policies, including breaches of warranties, shall not affect coverage provided to the Town, its officials, employees, agents and authorized volunteers.

3.13.4 Separation of Insureds; No Special Limitations. All insurance required by this Section shall contain standard separation of insureds provisions. In addition, such insurance shall not contain any special limitations on the scope of protection afforded to the Town, its officials, employees, agents and authorized volunteers.

3.13.5 Deductibles and Self-Insurance Retentions. Any deductibles or self-insured retentions must be declared to and approved by the Town. Contractor shall guarantee that, at the option of the Town, either: (1) the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects the Town, its officials, employees, agents and authorized volunteers; or (2) the Contractor shall procure a bond or other financial guarantee acceptable to the Town guaranteeing payment of losses and related investigation costs, claims and administrative and defense expenses.

3.13.6 Acceptability of Insurers. Insurance is to be placed with insurers with a current A.M. Best's rating no less than A-:VII, licensed to do business in California, and satisfactory to the Town. Exception may be made for the State Compensation Insurance Fund when not specifically rated.

3.13.7 Verification of Coverage. Contractor shall furnish Town with original certificates of insurance and endorsements effecting coverage required by this Contract on forms satisfactory to the Town. The certificates and endorsements for each insurance policy shall be signed by a person authorized by that insurer to bind coverage on its behalf, and shall be on forms supplied or approved by the Town. All certificates and endorsements must be received and approved by the Town before work commences. The Town reserves the right to require complete, certified copies of all required insurance policies, at any time.

3.13.8 Subcontractors. All subcontractors shall meet the requirements of this Section before commencing Work. Contractor shall furnish separate certificates and endorsements for each subcontractor. Subcontractor policies of General Liability insurance shall name the Town, its officials, employees, agents and authorized volunteers as additional insureds using form ISO 20 38 04 13 or endorsements providing the exact same coverage. All coverages for subcontractors shall be subject to all of the requirements stated herein except as otherwise agreed to by the Town in writing.

3.13.9 Reporting of Claims. Contractor shall report to the Town, in addition to Contractor's insurer, any and all insurance claims submitted by Contractor in connection with the Work under this Contract.

3.14 Bond Requirements.

3.14.1 Payment Bond. If required by law or otherwise specifically requested by Town in Exhibit "C" attached hereto and incorporated herein by reference, Contractor shall execute and provide to Town concurrently with this Contract a Payment Bond in an amount required by the Town and in a form provided or approved by the Town. If such bond is required, no payment will be made to Contractor until the bond has been received and approved by the Town.

3.14.2 Performance Bond. If specifically requested by Town in Exhibit "C" attached hereto and incorporated herein by reference, Contractor shall execute and provide to Town concurrently with this Contract a Performance Bond in an amount required by the Town and in a form provided or approved by the Town. If such bond is required, no payment will be made to Contractor until the bond has been received and approved by the Town.

3.14.3 Bond Provisions. Should, in Town's sole opinion, any bond become insufficient or any surety be found to be unsatisfactory, Contractor shall renew or replace the effected bond within (ten) 10 days of receiving notice from Town. In the event the surety or Contractor intends to reduce or cancel any required bond, at least thirty (30) days prior written notice shall be given to the Town, and Contractor shall post acceptable replacement bonds at least ten (10) days prior to expiration of the original bonds. No further payments shall be deemed due or will be made under this Contract until any replacement bonds required by this Section are accepted by the Town. To the extent, if any, that the Total Contract Price is increased in accordance with the Contract, Contractor shall, upon request of the Town, cause the amount of the bond to be increased accordingly and shall promptly deliver satisfactory evidence of such increase to the Town. If Contractor fails to furnish any required bond, the Town may terminate the Contract for cause.

3.14.4 Surety Qualifications. Only bonds executed by an admitted surety insurer, as defined in California Code of Civil Procedure Section 995.120, shall be accepted. If a California-admitted surety insurer issuing bonds does not meet these requirements, the insurer

will be considered qualified if it is in conformance with Section 995.660 of the California Code of Civil Procedure, and proof of such is provided to the Town.

3.15 Warranty. Contractor warrants all Work under the Contract (which for purposes of this Section shall be deemed to include unauthorized work which has not been removed and any non-conforming materials incorporated into the Work) to be of good quality and free from any defective or faulty material and workmanship. Contractor agrees that for a period of one year (or the period of time specified elsewhere in the Contract or in any guarantee or warranty provided by any manufacturer or supplier of equipment or materials incorporated into the Work, whichever is later) after the date of final acceptance, Contractor shall within ten (10) days after being notified in writing by the Town of any defect in the Work or non-conformance of the Work to the Contract, commence and prosecute with due diligence all Work necessary to fulfill the terms of the warranty at its sole cost and expense. Contractor shall act sooner as requested by the Town in response to an emergency. In addition, Contractor shall, at its sole cost and expense, repair and replace any portions of the Work (or work of other contractors) damaged by its defective Work or which becomes damaged in the course of repairing or replacing defective Work. For any Work so corrected, Contractor's obligation hereunder to correct defective Work shall be reinstated for an additional one year period, commencing with the date of acceptance of such corrected Work. Contractor shall perform such tests as the Town may require to verify that any corrective actions, including, without limitation, redesign, repairs, and replacements comply with the requirements of the Contract. All costs associated with such corrective actions and testing, including the removal, replacement, and reinstitution of equipment and materials necessary to gain access, shall be the sole responsibility of Contractor. All warranties and guarantees of subcontractors, suppliers and manufacturers with respect to any portion of the Work, whether express or implied, are deemed to be obtained by Contractor for the benefit of the Town, regardless of whether or not such warranties and guarantees have been transferred or assigned to the Town by separate agreement and Contractor agrees to enforce such warranties and guarantees, if necessary, on behalf of the Town. In the event that Contractor fails to perform its obligations under this Section, or under any other warranty or guaranty under this Contract, to the reasonable satisfaction of the Town, the Town shall have the right to correct and replace any defective or non-conforming Work and any work damaged by such work or the replacement or correction thereof at Contractor's sole expense. Contractor shall be obligated to fully reimburse the Town for any expenses incurred hereunder upon demand.

3.16 Employee/Labor Certifications.

3.16.1 Contractor's Labor Certification. By its signature hereunder, Contractor certifies that he is aware of the provisions of Section 3700 of the California Labor Code which require every employer to be insured against liability for Worker's Compensation or to undertake self-insurance in accordance with the provisions of that Code, and agrees to comply with such provisions before commencing the performance of the Work. A certification form for this purpose, which is attached to this Contract as Exhibit "D" and incorporated herein by reference, shall be executed simultaneously with this Contract.

3.16.2 Equal Opportunity Employment. Contractor represents that it is an equal opportunity employer and that it shall not discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, sex, age or other interests protected by the State or Federal Constitutions. Such non-discrimination shall include, but not be limited to, all activities related to initial employment, upgrading, demotion, transfer, recruitment or recruitment advertising, layoff or termination.

3.16.3 Verification of Employment Eligibility. By executing this Contract, Contractor verifies that it fully complies with all requirements and restrictions of state and federal law respecting the employment of undocumented aliens, including, but not limited to, the Immigration Reform and Control Act of 1986, as may be amended from time to time, and shall require all subcontractors and sub-subcontractors to comply with the same.

3.17 General Provisions.

3.17.1 Town's Representative. The Town hereby designates **Hamid Shamsapour**, or his or her designee, to act as its representative for the performance of this Contract ("Town's Representative"). Town's Representative shall have the power to act on behalf of the Town for all purposes under this Contract. Contractor shall not accept direction or orders from any person other than the Town's Representative or his or her designee.

3.17.2 Contractor's Representative. Before starting the Work, Contractor shall submit in writing the name, qualifications and experience of its proposed representative who shall be subject to the review and approval of the Town ("'Contractor's Representative"). Following approval by the Town, Contractor's Representative shall have full authority to represent and act on behalf of Contractor for all purposes under this Contract. Contractor's Representative shall supervise and direct the Work, using his best skill and attention, and shall be responsible for all construction means, methods, techniques, sequences and procedures and for the satisfactory coordination of all portions of the Work under this Contract. Contractor's Representative shall devote full time to the Project and either he or his designee, who shall be acceptable to the Town, shall be present at the Work site at all times that any Work is in progress and at any time that any employee or subcontractor of Contractor is present at the Work site. Arrangements for responsible supervision, acceptable to the Town, shall be made for emergency Work which may be required. Should Contractor desire to change its Contractor's Representative, Contractor shall provide the information specified above and obtain the Town's written approval.

3.17.3 Termination. This Contract may be terminated by Town at any time, either with our without cause, by giving Contractor three (3) days advance written notice. In the event of termination by Town for any reason other than the fault of Contractor, Town shall pay Contractor for all Work performed up to that time as provided herein. In the event of breach of the Contract by Contractor, Town may terminate the Contract immediately without notice, may reduce payment to Contractor in the amount necessary to offset Town's resulting damages, and may pursue any other available recourse against Contractor. Contractor may not terminate this Contract except for cause. In the event this Contract is terminated in whole or in part as provided, Town may procure, upon such terms and in such manner as it may determine appropriate, services similar to those terminated. Further, if this Contract is terminated as provided, Town may require Contractor to provide all finished or unfinished documents, data, diagrams, drawings, materials or other matter prepared or built by Contractor in connection with its performance of this Contract. Town shall not be liable for any costs other than the charges or portions thereof which are specified herein. Contractor shall not be entitled to payment for unperformed Work including, without limitation, any overhead and profit on the portion of the Work that is terminated and shall not be entitled to damages or compensation of any kind or nature for termination of Work.

3.17.4 Contract Interpretation. Should any question arise regarding the meaning or import of any of the provisions of this Contract or written or oral instructions from Town, the matter shall be referred to Town's Representative, whose decision shall be binding upon Contractor.

3.17.5 Anti-Trust Claims. This provision shall be operative if this Contract is applicable to California Public Contract Code Section 7103.5. In entering into this Contract to supply goods, services or materials, Contractor hereby offers and agrees to assign to the Town all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2, commencing with Section 16700, of Part 2 of Division 7 of the Business and Professions Code) arising from purchases of goods, services, or materials pursuant to the Contract. This assignment shall be made and become effective at the time the Town tender final payment to Contractor, without further acknowledgment by the Parties.

3.17.6 Notices. All notices hereunder and communications regarding interpretation of the terms of the Contract or changes thereto shall be provided by the mailing thereof by registered or certified mail, return receipt requested, postage prepaid and addressed as follows:

CONTRACTOR:

Maggiora & Ghilotti, Inc.
555 Du Bois Street
San Rafael, CA 94901
Attn: Don Muns, General Superintendent

TOWN:

Town of Fairfax
142 Bolinas Road
Fairfax, CA
94930
Attn: Hamid Shamsapour, Interim Director of Public Works

Any notice so given shall be considered received by the other Party three (3) days after deposit in the U.S. Mail as stated above and addressed to the Party at the above address. Actual notice shall be deemed adequate notice on the date actual notice occurred, regardless of the method of service.

3.17.7 Time of Essence. Time is of the essence in the performance of this Contract.

3.17.8 Assignment Forbidden. Contractor shall not, either voluntarily or by action of law, assign or transfer this Contract or any obligation, right, title or interest assumed by Contractor herein without the prior written consent of Town. If Contractor attempts an assignment or transfer of this Contract or any obligation, right, title or interest herein, Town may, at its option, terminate and revoke the Contract and shall thereupon be relieved from any and all obligations to Contractor or its assignee or transferee.

3.17.9 No Third Party Beneficiaries. There are no intended third party beneficiaries of any right or obligation assumed by the Parties.

3.17.10 Laws and Venue. This Contract shall be interpreted in accordance with the laws of the State of California. If any action is brought to interpret or enforce any term of this Contract, the action shall be brought in a state or federal court situated in the County of San Mateo, State of California.

3.17.11 Counterparts. This Contract may be executed in counterparts, each of which shall constitute an original.

3.17.12 Successors. The Parties do for themselves, their heirs, executors, administrators, successors, and assigns agree to the full performance of all of the provisions contained in this Contract.

3.17.13 [Reserved]

3.17.14 Solicitation. Contractor maintains and warrants that it has not employed nor retained any company or person, other than a bona fide employee working solely for Contractor, to solicit or secure this Contract. Further, Contractor warrants that it has not paid nor has it agreed to pay any company or person, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, brokerage fee, gift or other consideration contingent upon or resulting from the award or making of this Contract. For breach or violation of this warranty, Town shall have the right to terminate this Contract without liability.

3.17.15 Conflict of Interest. Contractor maintains and warrants that it has not employed nor retained any company or person, other than a bona fide employee working solely for Contractor, to solicit or secure this Agreement. Further, Contractor warrants that it has not paid nor has it agreed to pay any company or person, other than a bona fide employee working solely for Contractor, any fee, commission, percentage, brokerage fee, gift or other consideration contingent upon or resulting from the award or making of this Contract. For breach or violation of this warranty, Town shall have the right to rescind this Contract without liability. For the term of this Contract, no official, officer or employee of Town, during the term of his or her service with Town, shall have any direct interest in this Contract, or obtain any present or anticipated material benefit arising therefrom. In addition, Contractor agrees to file, or to cause its employees or subcontractors to file, a Statement of Economic Interest with the Town's Filing Officer as required under state law in the performance of the Work.

3.17.16 Certification of License.

3.17.16.1 Contractor certifies that as of the date of execution of this Contract, Contractor has a current contractor's license of the classification indicated below under Contractor's signature.

3.17.16.2 Contractors are required by law to be licensed and regulated by the Contractors' State License Board which has jurisdiction to investigate complaints against contractors if a complaint regarding a patent act or omission is filed within four (4) years of the date of the alleged violation. A complaint regarding a latent act or omission pertaining to structural defects must be filed within ten (10) years of the date of the alleged violation. Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, P.O. Box 26000, Sacramento, California 95826.

3.17.17 Authority to Enter Contract. Each Party warrants that the individuals who have signed this Contract have the legal power, right and authority to make this Contract and bind each respective Party.

3.17.18 Entire Contract; Modification. This Contract contains the entire agreement of the Parties with respect to the subject matter hereof, and supersedes all prior negotiations, understandings or agreements. This Contract may only be modified by a writing signed by both Parties.

3.17.19 Non-Waiver. None of the provisions of this Contract shall be considered waived by either party, unless such waiver is specifically specified in writing.

3.17.20 Town's Right to Employ Other Contractors. Town reserves right to employ other contractors in connection with this Project or other projects.

[SIGNATURES ON NEXT PAGE]

SIGNATURE PAGE FOR CONSTRUCTION CONTRACT
BETWEEN THE TOWN OF FAIRFAX
AND
MAGGIORA & GHILOTTI, INC

IN WITNESS WHEREOF, the Parties have entered into this Contract as of the 2nd day of June, 2022.

TOWN OF FAIRFAX
Approved By:

_____
Heather Abrams
Town Manager

_____
Date

Attested By:

_____
Town Clerk

Approved As To Form:

_____
Town Attorney

(CONTRACTOR'S SIGNATURE MUST BE NOTARIZED AND CORPORATE SEAL AFFIXED, IF APPLICABLE)

MAGGIORA & GHILOTTI, INC.

_____
Signature

_____
Name

_____
Title

_____
Date

EXHIBIT "A"

SERVICES

The Project is described in the following document, which is incorporated herein by reference as if fully set forth herein:

> *Memorandum of Mike Jewett and Scott Stephens, Miller Pacific Engineering Group dated May 16, 2022 regarding the subject Design Summary for Soil Nail & Shotcrete Retaining Wall regarding the project 195 Pine Drive Retaining Wall, and all appendices thereto.*

EXHIBIT "B"

PLANS AND SPECIFICATIONS

The plans and specifications for the Project are set forth in the following document, which is incorporated herein by reference as if fully set forth herein:

Memorandum of Mike Jewett and Scott Stephens, Miller Pacific Engineering Group dated May 16, 2022 regarding the subject Design Summary for Soil Nail & Shotcrete Retaining Wall regarding the project 195 Pine Drive Retaining Wall, and all appendices thereto.

EXHIBIT "C"

SPECIAL CONDITIONS

ARTICLE 1. BONDS

Within ten (10) calendar days from the date the Contractor is notified of award of the Contract, the Contractor shall deliver to the Town four identical counterparts of the Performance Bond and Payment Bond on the forms supplied by the Town and included as Exhibit "F" to the Contract. Failure to do so may, in the sole discretion of Town, result in the forfeiture of Contractor's bid security. The surety supplying the bond must be an admitted surety insurer, as defined in Code of Civil Procedure Section 995.120, authorized to do business as such in the State of California and satisfactory to the Town. The Performance Bond and the Payment Bond shall be for one hundred percent (100%) of the Total Contract Price.

EXHIBIT "D"

CERTIFICATION
LABOR CODE - SECTION 1861

I, the undersigned Contractor, am aware of the provisions of Section 3700, et seq., of the California Labor Code which require every employer to be insured against liability for Worker's Compensation or to undertake self-insurance in accordance with the provisions of the Code, and I, the undersigned Contractor, agree to and will comply with such provisions before commencing the performance of the Work on this Contract.

Maggiora & Ghilotti, Inc.

By: _____
Signature

_____
Name (Print)

_____
Title (Print)

EXHIBIT "E"

PUBLIC WORKS CONTRACTOR REGISTRATION CERTIFICATION

Pursuant to Labor Code sections 1725.5 and 1771.1, all contractors and subcontractors that wish to bid on, be listed in a bid proposal, or enter into a contract to perform public work must be registered with the Department of Industrial Relations. See http://www.dir.ca.gov/Public-Works/PublicWorks.html for additional information.

No bid will be accepted nor any contract entered into without proof of the contractor's and subcontractors' current registration with the Department of Industrial Relations to perform public work.

Contractor hereby certifies that it is aware of the registration requirements set forth in Labor Code sections 1725.5 and 1771.1 and is currently registered as a contractor with the Department of Industrial Relations.[1]

Name of Contractor:_____

DIR Registration Number:_____

DIR Registration Expiration:_____

Small Project Exemption: _____ Yes or _____ No

Unless Contractor is exempt pursuant to the small project exemption, Contractor further acknowledges:

- Contractor shall maintain a current DIR registration for the duration of the project.
- Contractor shall include the requirements of Labor Code sections 1725.5 and 1771.1 in its contract with subcontractors and ensure that all subcontractors are registered at the time of bid opening and maintain registration status for the duration of the project.
- Failure to submit this form or comply with any of the above requirements may result in a finding that the bid is non-responsive.

Name of Contractor_____

Signature_____

Name and Title_____

Dated_____

[1] If the Project is exempt from the contractor registration requirements pursuant to the small project exemption under Labor Code Sections 1725.5 and 1771.1, please mark "Yes" in response to "Small Project Exemption."

EXHIBIT "F"

PAYMENT AND PERFORMANCE BONDS

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS:

THAT WHEREAS, the Town of Fairfax (hereinafter referred to as "Town") has awarded to _____, (hereinafter referred to as the "Contractor") _____ an agreement for _____ (hereinafter referred to as the "Project").

WHEREAS, the work to be performed by the Contractor is more particularly set forth in the Contract Documents for the Project dated _____, (hereinafter referred to as "Contract Documents"), the terms and conditions of which are expressly incorporated herein by reference; and

WHEREAS, the Contractor is required by said Contract Documents to perform the terms thereof and to furnish a bond for the faithful performance of said Contract Documents.

NOW, THEREFORE, we, _____, the undersigned Contractor and _____ as Surety, a corporation organized and duly authorized to transact business under the laws of the State of California, are held and firmly bound unto the Town in the sum of _____ DOLLARS, ($_____), said sum being not less than one hundred percent (100%) of the total amount of the Contract, for which amount well and truly to be made, we bind ourselves, our heirs, executors and administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the Contractor, his or its heirs, executors, administrators, successors or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions and agreements in the Contract Documents and any alteration thereof made as therein provided, on its part, to be kept and performed at the time and in the manner therein specified, and in all respects according to their intent and meaning; and shall faithfully fulfill all obligations including the one-year guarantee of all materials and workmanship; and shall indemnify and save harmless the Town, its officers and agents, as stipulated in said Contract Documents, then this obligation shall become null and void; otherwise it shall be and remain in full force and effect.

As a condition precedent to the satisfactory completion of the Contract Documents, unless otherwise provided for in the Contract Documents, the above obligation shall hold good for a period of one (1) year after the acceptance of the work by Town, during which time if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the Town from loss or damage resulting from or caused by defective materials or faulty workmanship, Surety shall undertake and faithfully fulfill all such obligations. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the Town's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

Whenever Contractor shall be, and is declared by the Town to be, in default under the Contract Documents, the Surety shall remedy the default pursuant to the Contract Documents, or shall promptly, at the Town's option:

(1) Take over and complete the Project in accordance with all terms and conditions in the Contract Documents; or

(2) Obtain a bid or bids for completing the Project in accordance with all terms and conditions in the Contract Documents and upon determination by Surety of the lowest responsive and responsible bidder, arrange for a Contract between such bidder, the Surety and the Town, and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the Town under the Contract and any modification thereto, less any amount previously paid by the Town to the Contractor and any other set offs pursuant to the Contract Documents.

(3) Permit the Town to complete the Project in any manner consistent with local, California and federal law and make available as work progresses sufficient funds to pay the cost of completion of the Project, less the balance of the contract price, including other costs and damages for which Surety may be liable. The term "balance of the contract price" as used in this paragraph shall mean the total amount payable to Contractor by the Town under the Contract and any modification thereto, less any amount previously paid by the Town to the Contractor and any other set offs pursuant to the Contract Documents.

Surety expressly agrees that the Town may reject any contractor or subcontractor which may be proposed by Surety in fulfillment of its obligations in the event of default by the Contractor.

Surety shall not utilize Contractor in completing the Project nor shall Surety accept a bid from Contractor for completion of the Project if the Town, when declaring the Contractor in default, notifies Surety of the Town's objection to Contractor's further participation in the completion of the Project.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project to be performed thereunder shall in any way affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract Documents or to the Project, including but not limited to the provisions of sections 2819 and 2845 of the California Civil Code.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20__).

(Corporate Seal)

_____
Contractor/ Principal

By _____

Title _____

_____

(Corporate Seal) Surety

By _____
Attorney-in-Fact

Signatures of those signing for the Contractor and Surety must be notarized and evidence of corporate authority attached.

(Attach Attorney-in-Fact Certificate) Title _____

The rate of premium on this bond is _____ per thousand. The total amount of premium charges, $_____.
(The above must be filled in by corporate attorney.)

THIS IS A REQUIRED FORM

Any claims under this bond may be addressed to:

(Name and Address of Surety) _____
_____
_____

(Name and Address of Agent or Representative for service of process in California, if different from above) _____
_____

(Telephone number of Surety and Agent or Representative for service of process in California) _____

NOTE: A copy of the Power-of-Attorney authorizing the person signing on behalf of the Surety to do so must be attached hereto.

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capaTown(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____

Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPATOWN CLAIMED BY SIGNER

☐ Individual
☐ Corporate Officer

_____
Title(s)

☐ Partner(s) ☐ Limited ☐ General
☐ Attorney-In-Fact
☐ Trustee(s)
☐ Guardian/Conservator
☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____

_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS That

WHEREAS, the Town of Fairfax (hereinafter designated as the "Town"), by action taken or a resolution passed_____, 20____has awarded to _____ hereinafter designated as the "Principal," a contract for the work described as follows:

_____ (the "Project"); and

WHEREAS, the work to be performed by the Principal is more particularly set forth in the Contract Documents for the Project dated _____ ("Contract Documents"), the terms and conditions of which are expressly incorporated by reference; and

WHEREAS, said Principal is required to furnish a bond in connection with said contract; providing that if said Principal or any of its Subcontractors shall fail to pay for any materials, provisions, provender, equipment, or other supplies used in, upon, for or about the performance of the work contracted to be done, or for any work or labor done thereon of any kind, or for amounts due under the Unemployment Insurance Code or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of said Principal and its Subcontractors with respect to such work or labor the Surety on this bond will pay for the same to the extent hereinafter set forth.

NOW THEREFORE, we, the Principal and _____ as Surety, are held and firmly bound unto the Town in the penal sum of _____ _____ Dollars ($_____) lawful money of the United States of America, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, his or its subcontractors, heirs, executors, administrators, successors or assigns, shall fail to pay any of the persons named in Section 9100 of the Civil Code, fail to pay for any materials, provisions or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or amounts due under the Unemployment Insurance Code with respect to work or labor performed under the contract, or for any amounts required to be deducted, withheld, and paid over to the Employment Development Department or Franchise Tax Board from the wages of employees of the contractor and his subcontractors pursuant to Section 18663 of the Revenue and Taxation Code, with respect to such work and labor the Surety or Sureties will pay for the same, in an amount not exceeding the sum herein above specified.

This bond shall inure to the benefit of any of the persons named in Section 9100 of the Civil Code so as to give a right of action to such persons or their assigns in any suit brought upon this bond.

It is further stipulated and agreed that the Surety on this bond shall not be exonerated or released from the obligation of this bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described, or pertaining or relating to the furnishing of labor, materials, or equipment therefore, nor by any change or modification of any terms of payment or extension of the time for any payment pertaining or relating to any scheme or work of improvement herein above described, nor by any rescission or attempted rescission of the contract, agreement or bond, nor by any conditions precedent or

subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond, nor by any fraud practiced by any person other than the claimant seeking to recover on the bond and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given, and under no circumstances shall Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the owner or Town and original contractor or on the part of any obligee named in such bond, but the sole conditions of recovery shall be that claimant is a person described in Section 9100 of the Civil Code, and has not been paid the full amount of his claim and that Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned and the provisions of sections 2819 and 2845 of the California Civil Code.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this _____ day of _____, 20__.

(Corporate Seal)

_____
Contractor/ Principal

By _____

Title _____

_____
Surety

(Corporate Seal)

By _____
Attorney-in-Fact

Title _____

Signatures of those signing for the Contractor and Surety must be notarized and evidence of corporate authority attached. A Power-of-Attorney authorizing the person signing on behalf of the Surety to do so must be attached hereto.

NOTE: A copy of the Power-of-Attorney authorizing the person signing on behalf of the Surety to do so must be attached hereto.

Notary Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA
COUNTY OF _____

On _____, 20___, before me, _____, Notary Public, personally

appeared _____, who proved to me on the basis of satisfactory

evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capaTown(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

_____
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

CAPATOWN CLAIMED BY SIGNER

☐ Individual
☐ Corporate Officer

_____
Title(s)

☐ Partner(s) ☐ Limited ☐ General
☐ Attorney-In-Fact
☐ Trustee(s)
☐ Guardian/Conservator
☐ Other:

Signer is representing:
Name Of Person(s) Or Entity(ies)

_____
_____

DESCRIPTION OF ATTACHED DOCUMENT

_____
Title or Type of Document

_____
Number of Pages

_____
Date of Document

_____
Signer(s) Other Than Named Above

Exhibit B
Engineer's Estimate

Engineers Estimate

To:	Hamid Shamsapour & Mark Lockaby, Town of Fairfax	Project:	195 Pine Drive Retaining Wall
From:	Mike Jewett and Scott Stephens, Miller Pacific	cc:	
Date:	May 25, 2022	Job No.:	201.209
Subject:	Soil Nail & Shotcrete Retaining Wall Emergency Repair		

This memo provides our current engineer's estimate for the planned retaining structure to support the damaged outer portion of Pine Drive destabilized from a landslide at 195 Pine Drive in Fairfax. A concept estimate was previously provided prior to subsurface exploration and design of the repair plan.

Considering site access and availability of construction materials, a soil nail and shotcrete wall repair appears best suited for the site conditions. The new wall will be constructed within the Town's right-of-way to restore support to the road. The retaining wall will be located along the outboard side of the roadway, will be approximately 72-feet-long, and will have retained heights of up to about twenty feet. Micropiles will be installed behind the initial shotcrete facing to provide vertical support for the initial facing during excavation and construction of the lower wall segments. The size (extent and height) of the planned wall is more than the concept estimate and is needed to provide support for the roadway beyond the lateral edges of the landslide where the potential for future instability of the steep slope below is high.

It should be noted that the actual constructed extent and depth of the wall may vary based on the subsurface conditions encountered. We believe the current extents and depths are conservative. We would recommend the project be contracted on a time and materials basis or quantity/unit price basis so that changes in the scope of the project can be made with corresponding adjustments in the project costs.

Our engineer's estimate for the current project is provide below and appears to generally correspond with our understanding of the Contractor's cost estimate.

Description	Approx. Quantity	Units	Rate	Price
Mobilization/Demobilization, Daily Cleanup, Insurance, Building Permits, and other misc. items	1	LS	30000	$30,000
Vertical Micro-pile Supports	11	each	7500	$82,500
Soil Nails	42	each	3500	$147,000
Sacraficial Nail with Load Test	1	LS	7500	$7,500
Load Test Production Nails	4	each	3000	$12,000
Shotcrete with Drainage Panels and Reinforcement	1300	SF	100	$130,000
Grading and Benching	350	CY	100	$35,000
Guard Rail	70	LF	300	$21,000
Pestrian Rail	70	LF	200	$14,000
Roadway Repaving (AB + AC)	550	SF	30	$16,500
		Subtotal:		**$495,500**
Engineering, Inspection and Testing		%	15	$74,325
		Total:		**$569,825**

If there are any questions or if we can be of further assistance, please call.

Very truly yours,
MILLER PACIFIC ENGINEERING GROUP
Consulting Town Engineer

Scott Stephens
Civil Engineer No. 50482
Geotechnical Engineer No. 2398
(Expires 6/30/23)

Exhibit C
Proposal of Maggiora & Ghilotti

Maggiora & Ghilotti, Inc. 555 Du Bois Street, San Rafael, CA 94901 ph: (415) 459-8640 fax: (415) 459-2065
CA Lic #226767 A DIR: 1000007991

R.O.M. 1

May 16, 2022

RFP 195 Pine Drive Fairfax Ca.

Email mlockaby@townoffairfax.org;hshamsapour@townoffairfax.org

Attn: Hamid Shamsapour, Mark Lockaby **Office: (415) 458-2370**

Project: **Retaining wall with soil nails, micro pile**
Location: **195 Pine Drive Fairfax Ca.**
Plans: **Miller Pacific 90% drawings dated 3/22/2022**

Proposal

ITEM	DESCRIPTION	QUANTITY	UOM	UNIT PRICE	TOTAL
1	Mobilization, site preparation and benching	1	LS	49403	$ 49,403
2	Micro piles	11	EA	8969	$ 98,659
3	Soil Nails	42	EA	3769	$ 158,298
4	Shotcrete	1,300	SF	93.5	$ 121,550
5	Midwest guard rail	80	LF	250	$ 20,000
6	Cable rail	80	LF	225	$ 18,000
7	Pave back roadway	30	Ton	503	$ 15,090
Total	Estimated not to exceed				$ 481,000

Conditions

M&G not responsible for dwelling or possessions on site

M&G is planning on limited access from below

Schedule: Mutually agreed 4 weeks +- and dependent on material supply 3-4 weeks once R.O.M. is approved

Exclusions

Standard Exclusions

Engineering; Design; Soils Engineering; Field Testing; Inspections; Permits and fees; Utility Fees; Bonds; Handling and/or Removals of Hazardous Material, Survey

Specific Exclusions

Unidentified utilities
Buried hard rock or concrete
Support of utilities
Landscape

Thank you for the opportunity to bid. Quote is good for **30** days

The above proposal is hereby accepted:

By:		By:	*Don Muns*
Name/Title:		Name/Title:	Don Muns General Superintendent
Date:		Date:	May 16, 2022
Company:		Company:	Maggiora & Ghilotti, Inc
License #	NA		CA Lic #226767-A DIR: 1000007991

Design Summary

To:	Hamid Shamsapour & Mark Lockaby, Town of Fairfax	Project:	195 Pine Drive Retaining Wall
From:	Mike Jewett and Scott Stephens, Miller Pacific	cc:	
Date:	May 16, 2022	Job No.:	201.209
Subject:	Design Summary for Soil Nail & Shotcrete Retaining Wall		

Revision Log

Revision No.	Date	Revision Description
0	May 16, 2022	Permit Submittal

1.0 Introduction

This technical memorandum provides Miller Pacific Engineering Group's engineering design calculations for the new retaining wall planned near 195 Pine Drive in Fairfax. A previously constructed retaining wall within the property at 195 Pine Drive and below the public roadway failed resulting in a loss of support for the roadway. Therefore, the new soil nail and shotcrete retaining wall will be constructed within the Town's right-of-way to restore support to the road. The retaining wall will be located along the outboard side of the roadway, will be approximately 72-feet-long and will have retained heights of up to about twenty feet. Micropiles will be installed immediately behind the initial shotcrete facing to provide vertical support for the initial facing throughout excavation and wall construction. The new retaining wall is shown on the Design Drawings in Appendix A.

2.0 Geotechnical Reference Data

Miller Pacific explored subsurface conditions at the site on March 30, 2021 with one test boring. The boring was drilled along the outboard side of Pine Drive near the proposed wall alignment, as approximately shown on Sheet 2 in Appendix A. The boring was drilled using small, track-mounted drilling equipment to about 21 feet below ground surface. Subsurface conditions generally consist of about 11 feet of soft to medium stiff clayey soils over shale bedrock. Within the upper few feet, the shale bedrock generally exhibits low hardness, friable strength and is highly to completely weathered. The shale generally grades harder and stronger with depth. Several outcrops of harder, resistant Franciscan bedrock are also apparent on the cut slope along the inboard side of the roadway.

ATTACHMENT B

Table 1 – Soil Nail Retaining Wall Design Criteria

Soil	Unit Weight	Friction Angle	Cohesion	Ultimate Bond Strength
Roadway Fill	120 pcf	28 deg	200 psf	500 psf
Shale Bedrock	130 pcf	36 deg	500 psf	3,000 psf

3.0 Retaining Wall Design Calculations

Our calculations for the soil nail and shotcrete retaining walls were performed in general accordance with the guidelines outlined in the FHWA Soil Nail Wall Reference Manual (FHWA, 2015). We analyzed internal stability of the soil nail walls using the computer software SNAIL developed by Caltrans (Caltrans, 2015). Our analysis included evaluating wall heights of 10, 15 and 20 feet using the geotechnical criteria outlined in Table 1. We included a vertical surcharge of 200 pounds per square foot across the width of the roadway to account for loads due to vehicle and other surcharge sources. We also applied a peak ground acceleration (PGA) of 0.35 g in our analysis for seismic conditions. This PGA was estimated using the median weighted average of the 2014 NGA West-2 deterministic analyses assuming Site Class B (estimated VS30 = 760 meters per second), a characteristic magnitude of 8.0 for the San Andreas Fault, and an estimated site-to-source distance of 9.5 kilometers. The output from our analyses is included in Appendix B.

4.0 Soil Nail Corrosion Considerations

Corrosion testing was not performed on the soil and bedrock samples obtained from our soil boring. As discussed in the FHWA manual, “Class A” corrosion protection consisting of encapsulation of the bar in high-density polyethylene sheathing is typically required for permanent soil nail walls in which the corrosion classification is not evaluated. From discussions with potential wall Contractors, we understand that it will likely take several additional weeks to obtain soil nails that are fully encapsulated due to limited availability. While our calculations show that No. 6, Grade 75 bars are capable of resisting the structural loads for the new wall, we’ve specified the use of No. 8 bars to allow for 0.25 inches of “sacrificial” steel to account for potential corrosion losses. This additional steel was calculated using a 75-year design life and the Caltrans guidelines for the rate of sacrificial steel loss in “fill or disturbed natural soils” specified in their most recent corrosion guidelines (Caltrans, 2021).

5.0 Supplemental Services

During construction, we should intermittently observe construction of the new retaining wall to confirm that the wall is constructed in general conformance with our design. This should include intermittent observation and/or testing of the following work items: drilling, installation and grouting of soil nails; placement of steel reinforcement for the shotcrete facing; installation of the retaining wall drainage system; strength testing of grout and shotcrete; and soil nail load testing and backfilling.

6.0 References

Caltrans, “SNAIL” Soil Nail Wall Design Software, 2015.

Caltrans, “Corrosion Guidelines, Version 3.2”, May 2021.

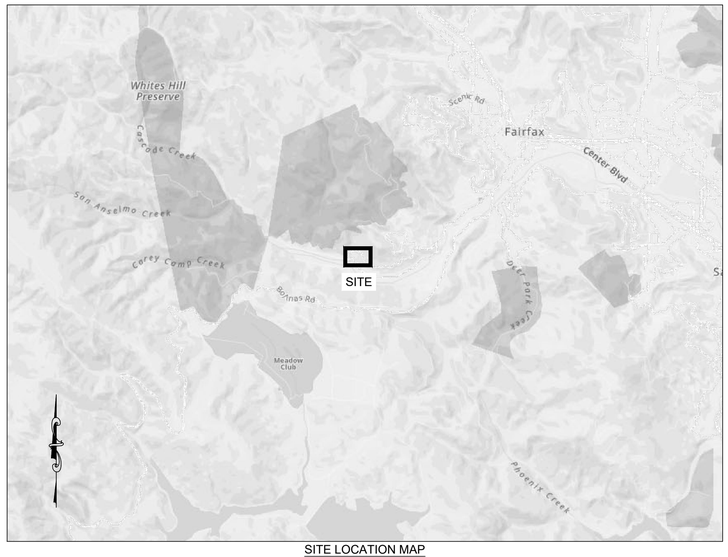
Federal Highway Administration, Soil Nail Walls Reference Manual (FHWA GEC 007), Publication No. FHWA-NHI-14-007, February 2015.

Pacific Earthquake Engineering Research (PEER) Center, “Weighted Average of 2014 NGA West-2 GMPEs”, Spreadsheet, last updated April 14, 2015.

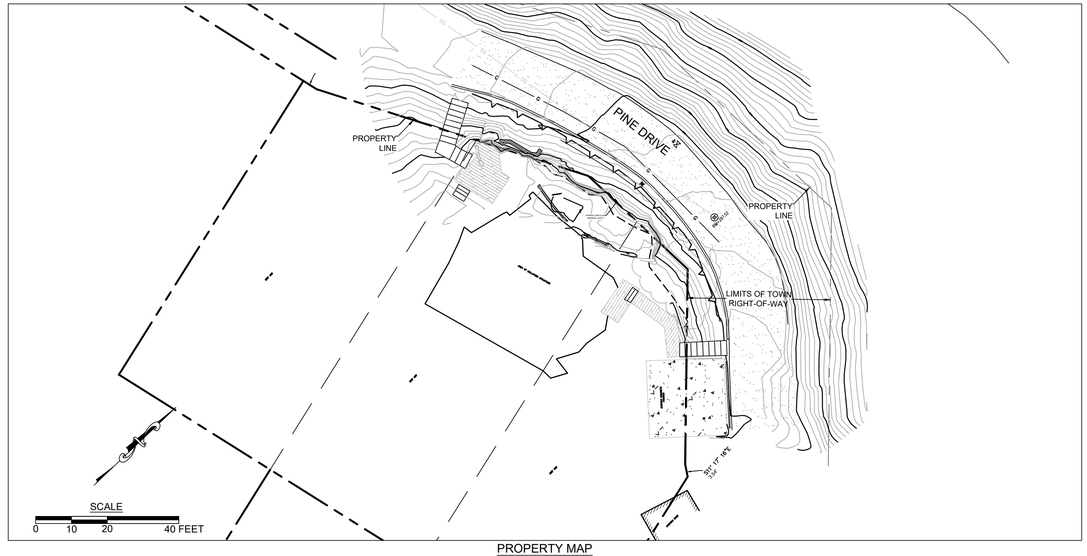
APPENDIX A

DESIGN DRAWINGS & TECHNICAL SPECIFICATIONS

TOWN OF FAIRFAX
195 PINE DRIVE RETAINING WALL
FAIRFAX, CALIFORNIA



SITE LOCATION MAP
(NO SCALE)



PROPERTY MAP
(SCALE: 1" = 10'-0")

ABBREVIATIONS & SYMBOLS

APPROX	APPROXIMATELY
BW	BOTTOM OF WALL ELEVATION
CONC	CONCRETE
(E)	EXISTING
FT	FEET
IN	INCH
LF	LINEAR FEET
(N)	NEW
STD	CALTRANS STANDARD DETAIL
TW	TOP OF WALL ELEVATION
	APPROX BORING LOCATION BY MILLER PACIFIC

INDEX OF SHEETS	
SHEET NO.	SHEET TITLE
1	TITLE SHEET & NOTES
2	RETAINING WALL PLAN
3	WALL PROFILE & SECTION
4	DETAILS
5	BORING LOGS
6	EROSION & SEDIMENT CONTROL

GENERAL

1. ALL CONDITIONS AND DIMENSIONS SHOWN ON THE PLANS SHALL BE VERIFIED BY THE CONTRACTOR. ANY DISCREPANCIES THAT REQUIRE CLARIFICATION OR REVISIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER BEFORE STARTING WORK.
2. THE CONTRACTOR SHALL POSSES A CLASS "A" LICENSE.
3. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, PROCEDURES, TECHNIQUES, SAFETY, AND SEQUENCE.
4. CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT PRIOR TO START OF ANY CONSTRUCTION. CONTRACTOR SHALL NOTIFY ALL PUBLIC OR PRIVATE UTILITY COMPANIES A MINIMUM OF 48 HOURS PRIOR TO COMMENCEMENT OF WORK ADJACENT TO EXISTING UTILITY LINES.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR THE VERIFICATION OF ALL EXISTING UTILITIES IN THE FIELD. ANY UTILITIES DAMAGED BY THE CONTRACTOR SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
6. A TOWN OF FAIRFAX ENCROACHMENT PERMIT IS REQUIRED FOR ALL WORK, INCLUDING STAGING OF MATERIALS AND EQUIPMENT IN THE PUBLIC RIGHT-OF-WAY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AN ENCROACHMENT PERMIT IN ACCORDANCE WITH THE PERMIT REQUIREMENTS.
7. THE CONTRACTOR SHALL COORDINATE WITH THE TOWN AND ENGINEER TO ESTABLISH THE RETAINING WALL LAYOUT PRIOR TO BEGINNING WALL CONSTRUCTION.
8. THE CONTRACTOR SHALL HAUL AWAY ALL UNUSED/EXCESS EXCAVATED MATERIAL OFF SITE FOR LEGAL DISPOSAL.
9. NO CONSTRUCTION MATERIALS, EQUIPMENT, DEBRIS OR WASTE SHALL BE PLACED OR STORED WHERE IT MAY BE SUBJECT TO WIND OR RAIN EROSION AND DISPERSION.
10. WORKMANSHIP TO BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS ALONG WITH 2018 CALTRANS STANDARD SPECIFICATIONS, MARIN COUNTY STANDARDS AND GENERALLY ACCEPTED CONSTRUCTION PRACTICES.

SURVEY NOTES

1. TOPOGRAPHIC INFORMATION SHOWN HERE IS BASED UPON A FIELD SURVEY PERFORMED BY OBERKAMPER & ASSOCIATES CIVIL ENGINEERS, INC. ON APRIL 7, 2022.
2. THE BOUNDARY LINES SHOWN HEREON ARE BASED ON THE RECORDED MAP FILED IN THE COUTY OF MARIN IN BOOK 5 PAGE 14.
3. BENCHMARK NOTE: ELEVATIONS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) VIA NATIONAL GEODETIC SURVEY'S (NGS) 'GEOID 12B' GEOID MODEL BEING APPLIED TO COMPUTED ELLIPSOID HEIGHTS AS TIED TO THE PUBLISHED ELLIPSOID HEIGHT AT AVAILABLE CORS STATIONS ON THE CALIFORNIA REAL TIME NETWORK.
4. ALL TREES SHOWN HEREON REFLECT THEIR HORIZONTAL GROUND LOCATIONS. DIAMETERS WERE MEASURED AT BREAST HEIGHT.

REINFORCING STEEL

1. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GR 60.
2. WELDED WIRE FABRIC (WWF) SHALL CONFORM TO ASTM A185.
3. PROVIDE 3 IN MINIMUM COVER FOR CONCRETE CAST AGAINS EARTH AND 2 IN MINIMUM COVER FOR CONCRETE EXPOSED TO EARTH OR WEATHER.

SHOTCRETE

3. REFER TO TECHNICAL SPECIFICATION SECTION 3360 FOR SHOTCRETE REQUIREMENTS.
4. WORK SHALL CONFORM TO ACI 506.2 LATEST EDITION EXCEPT AS MODIFIED BY SECTION 3360.
5. CEMENT SHALL CONFORM TO ASTM C 150, TYPE II.
6. SHOTCRETE SHALL HAVE A MINMUM COMPRESSIVE STRENGTH OF 4,000 PSI AT 28 DAYS.
7. SHOTCRETE FINISH SHALL BE AS SPECIFIED BY THE TOWN ENGINEER.

SOIL NAILS & MICROPILES

1. REFER TO TECHNICAL SPECIFICATION 2286 FOR SOIL NAIL & MICROPILE REQUIREMENTS.
2. SOIL NAILS & MICROPILES SHALL BE DYWIDAG STEEL THREAD BARS (OR APPROVED EQUIVALENT) AS DESIGNATED ON THE PLANS AND MANUFACTURED EXPRESSLY FOR USE AS SOIL NAILS OR TIEBACKS.
3. GRADE 75 THREADBAR SHALL CONFORM TO ASTM A615
   GRADE 150 THREADBAR SHALL CONFORM TO ASTM 722
4. BEARING PLATES AND HARDWARE SHALL CONFORM TO THE MANUFACTURER'S RECOMMENDATIONS AND APPLICABLE ASTM STANDARDS.
5. CEMENT GROUT SHALL BE MADE OF PORTLAND CEMENT CONFORMING TO ASTM C 150 WITH f'c = 4,000 PSI AND WATER CEMENT RATIO BETWEEN 0.4 AND 0.5.
6. LOAD TESTING SCHEDULE:
   (DL = DESIGN LOAD, CTL = CREEP TEST LOAD)

7.1 PERFORM A MINIMUM OF (2) VERIFICATION TESTS AT THE LOCATIONS SHOWN ON SHEET 3 AND PROOF TESTING ON A MINIMUM OF 5% OF THE PRODUCTION NAILS WITH AT LEAST (1) PROOF TEST PER ROW.

7.2 VERIFICATION LOAD TEST
AL (0.05 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

HOLD LOAD AT EACH INCREMENT FOR A MINIMUM OF 10 MINUTES OR UNTIL DISPLACEMENT CEASES. THE FINAL DISPLACEMENT SHALL BE RECORDED AT EACH LOAD INTERVAL. THE CTL SHALL BE HELD FOR A MINIMUM OF 60 MINUTES WITH DISPLACEMENT MEASUREMENTS 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 0.08 IN.

7.3 PROOF LOAD TEST:
AL (0.05 DL), 0.25 DL, 0.50 DL, 0.75 DL, 1.00 DL, 1.33 DL (CTL)

HOLD CTL FOR 10 MINUTES WITH DISPLACEMENT MEASUREMENTS AT 1, 2, 3, 4, 5, 6, AND 10 MINUTES. IF THE TOTAL MOVEMENT BETWEEN 1 AND 10 MINUTES EXCEEDS 0.04 IN, THE TEST LOAD SHALL BE HELD FOR AN ADDITIONAL 50 MINUTES WITH FURTHER DISPLACEMENT READINGS MADE AT 15, 20, 25, 30, 45, AND 60 MINUTES. THE TOTAL MOVEMENT WITHIN THE PERIOD OF 6 TO 60 MINUTES SHALL NOT EXCEED 0.08 IN.

7.4 THE SOIL NAIL DISPLACEMENT SHALL BE MEASURED WITH A DIAL GAUGE CAPABLE OF ACCURATELY MEASURING DISPLACEMENT TO THE NEAREST 0.001 IN.

ASPHALT PAVEMENT

1. PAVEMENT CONSTRUCTION SHALL CONFORM TO SECTION 39 OF THE CALTRANS STANDARD SPECIFICATIONS.
2. HMA SURFACE COURSE SHALL BE USED FOR THE TOP 0.15 FT OF THE PAVEMENT SECTION. THE SURFACE COURSE SHALL BE CONSTRUCTED USING TYPE A, 1/2-INCH GRADED AGGREGATE WHILE LOWER HMA COURSE SHALL BE CONSTRUCTED USING TYPE A, 3/4-INCH GRADED AGGREGATE

EROSION & SEDIMENT CONTROL

1. EROSION AND SEDIMENT CONTROL MEASURES SHALL COMPLY WITH ALL REQUIREMENTS OUTLINED IN THE MARIN COUNTY STORMWATER POLLUTION PREVENTION PROGRAM (MCSTOPPP) MINIMUM CONTROL MEASURES FOR SMALL CONSTRUCTION PROJECTS AS OUTLINED IN THE MCSTOPPP CONSTRUCTION EROSION AND SEDIMENT CONTROL PLAN APPLICANT PACKAGE.
2. ANY AREAS IN WHICH GROUND SURFACE AND VEGETATIVE COVER HAS BEEN DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE COVERED WITH A PRE-APPROVED SEED MIX AND BIODEGRADABLE EROSION CONTROL MATS UPON COMPLETION OF CONSTRUCTION.
3. EROSION CONTROL MATS SHALL CONSIST OF NORTH AMERICAN GREEN SC150 OR APPROVED EQUAL

WALL DRAINAGE

1. DRAINAGE PANELS TO CONSIST OF J-DRAIN SWD-12 OR APPROVED EQUAL.
2. PIPE USED FOR WEEP HOLES AND DRAINAGE COLLECTION SHALL CONFORM TO ASTM D3034, SDR 35 OR APPROVED EQUAL. INSTALL ALL PIPING, FITTINGS, CLEANOUTS AND OTHER ELEMENTS IN ACCORDANCE WITH REQUIREMENTS OUTLINED IN THE MOST RECENT VERSION OF THE CALIFORNIA PLUMBING CODE.

SPECIAL INSPECTIONS

1. BUILDING CODE (CBC) CHAPTER 17, SHALL BE PERFORMED BY MILLER PACIFIC OR A QUALIFIED TESTING AND INSPECTION AGENCY, INCLUDING THE FOLLOWING.

1.1 SHOTCRETE: INTERMITTENT OBSERVATION DURING PLACEMENT. A 12 IN X 12 IN X 6 IN PANEL SHALL BE PREPARED BY THE CONTRACTOR DURING EACH DAY OF SHOTCRETE PLACEMENT OR FOR EVERY 50 CY OF SHOTCRETE (WHICHEVER RESULTS IN MORE PANELS). CORES SHALL BE COLLECTED FROM THE PANELS AND TESTED FOR COMPRESSIVE STRENGTH IN ACCORDANCE WITH ASTM C1604/C1604M. A MINIMUM OF 1 CORE SHALL BE TESTED AT 7 DAYS AND A MINIMUM OF 2 CORES SHALL BE TESTED AT 28 DAYS.

1.2 CONCRETE: INTERMITTENT OBSERVATION DURING PLACEMENT. CONCRETE SHALL BE SAMPLED AND CYLINDERS SHALL BE CAST FOR STRENGTH TESTING IN CONFORMANCE WITH ASTM C39. A MINIMUM OF 1 CYLINDER SHALL BE TESTED AT 7 DAYS AND A MINIMUM OF 3 CYLINDERS SHALL BE TESTED AT 28 DAYS.

1.3 SOIL NAILS & MICROPILES: INTERMITTENT OBSERVATION OF DRILLING. FINISHED SOIL NAIL EXCAVATIONS SHALL BE OBSERVED PRIOR TO INSTALLING THREADBAR. THREAD BAR SHALL BE OBSERVED PRIOR TO PLACEMENT IN DRILLED HOLE. LOAD TESTING SHALL BE PERFORMED AS SPECIFIED HEREIN.

1.4 GROUT: INTERMITTENT OBSERVATION DURING PLACEMENT. FOR EACH DAY OF GROUTING, GROUT SHALL BE SAMPLED FROM THE TREMIE PIPE (OR OTHER DISCHARGE POINT) AND CYLINDERS SHALL BE CAST FOR STRENGTH TESTING IN CONFORMANCE WITH ASTM C39. A MINIMUM OF 1 CYLINDER SHALL BE TESTED AT 3 DAYS AND A MINIMUM OF 2 CYLINDERS SHALL BE TESTED AT 28 DAYS.

1.5 REINFORCING STEEL: REBAR AND WELDED WIRE MESH SHALL BE OBSERVED PRIOR TO PLACEMENT OF SHOTCRETE.

1.6 WALL DRAINAGE: WALL DRAINAGE PANELS AND RELATED COMPONENTS SHALL BE OBSERVED PRIOR TO PLACEMENT OF SHOTCRETE AND PRIOR TO BACKFILLING CONCRETE WALLS.

PERMIT SUBMITTAL			
Description	Mark	Date	By
		5/16/2022	RCA

Revisions

504 Redwood Blvd.
Suite 220
Novato, CA 94947
T 415 / 382-3444
F 415 / 382-3450
www.millerpac.com

MILLER PACIFIC ENGINEERING GROUP

FILE: 201.209 Permit Drawings, Rev 0_recover.dwg

TITLE SHEET & NOTES

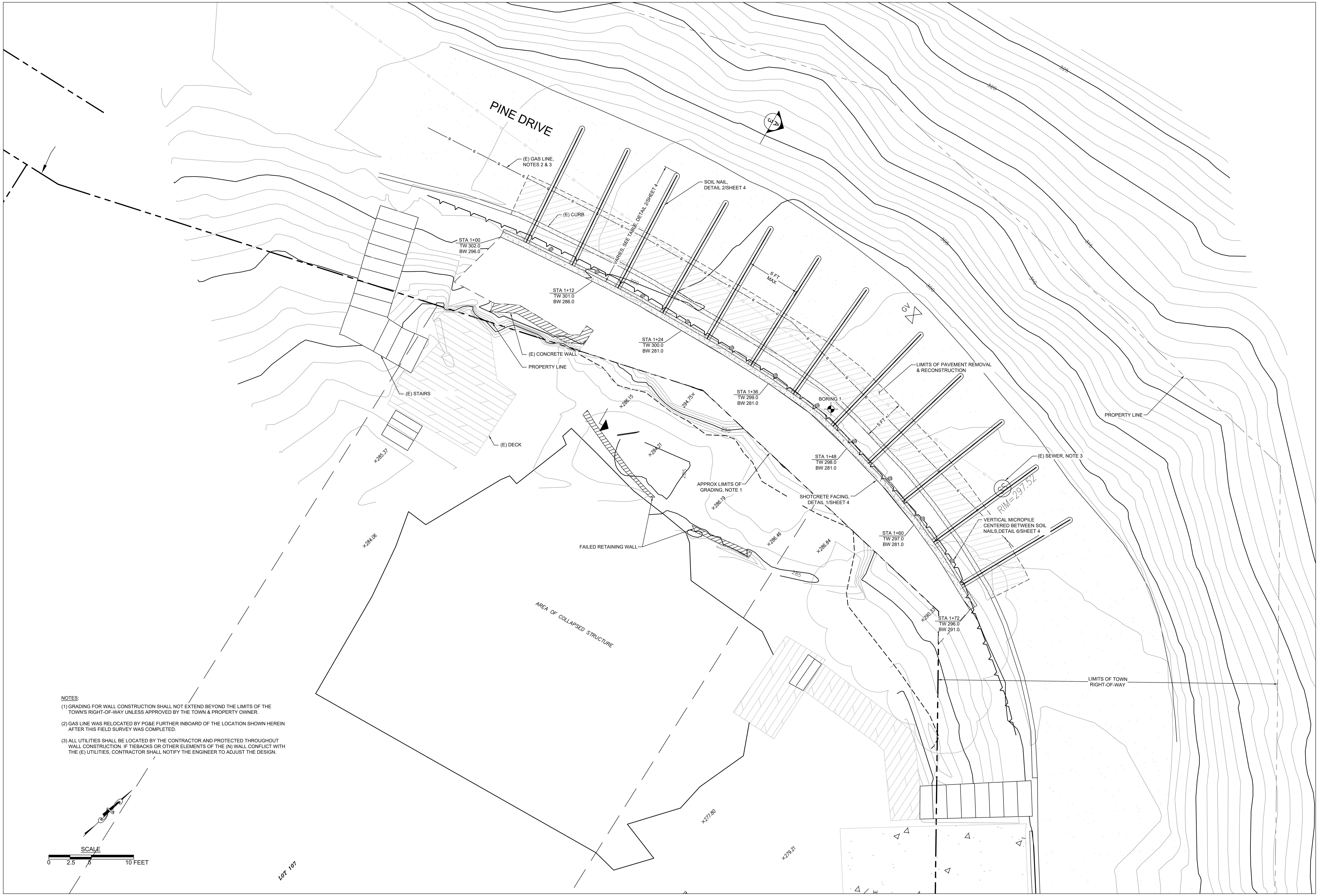
Designed RCA
Drawn RCA
Checked SAS

Town of Fairfax
195 Pine Drive Retaiing Wall
Fairfax, California

Project No. 201.195

REGISTERED PROFESSIONAL ENGINEER
RUSSELL C. ANDERSON
No. 3037
Exp. 6/30/23
GEOTECHNICAL
STATE OF CALIFORNIA

SHEET
1



NOTES:

(1) GRADING FOR WALL CONSTRUCTION SHALL NOT EXTEND BEYOND THE LIMITS OF THE TOWN'S RIGHT-OF-WAY UNLESS APPROVED BY THE TOWN & PROPERTY OWNER.

(2) GAS LINE WAS RELOCATED BY PG&E FURTHER INBOARD OF THE LOCATION SHOWN HEREIN AFTER THIS FIELD SURVEY WAS COMPLETED.

(3) ALL UTILITIES SHALL BE LOCATED BY THE CONTRACTOR AND PROTECTED THROUGHOUT WALL CONSTRUCTION. IF TIEBACKS OR OTHER ELEMENTS OF THE (N) WALL CONFLICT WITH THE (E) UTILITIES, CONTRACTOR SHALL NOTIFY THE ENGINEER TO ADJUST THE DESIGN.

LEGEND:

APPROXIMATE LOCATION OF BORING BY MILLER PACIFIC (SEE SHEET 5 FOR BORING LOG)

1 - RETAINING WALL PLAN
(SCALE: 1" = 5'-0")

Mark	Date	By	Description
	5/16/2022	RCA	PERMIT SUBMITTAL

Revisions

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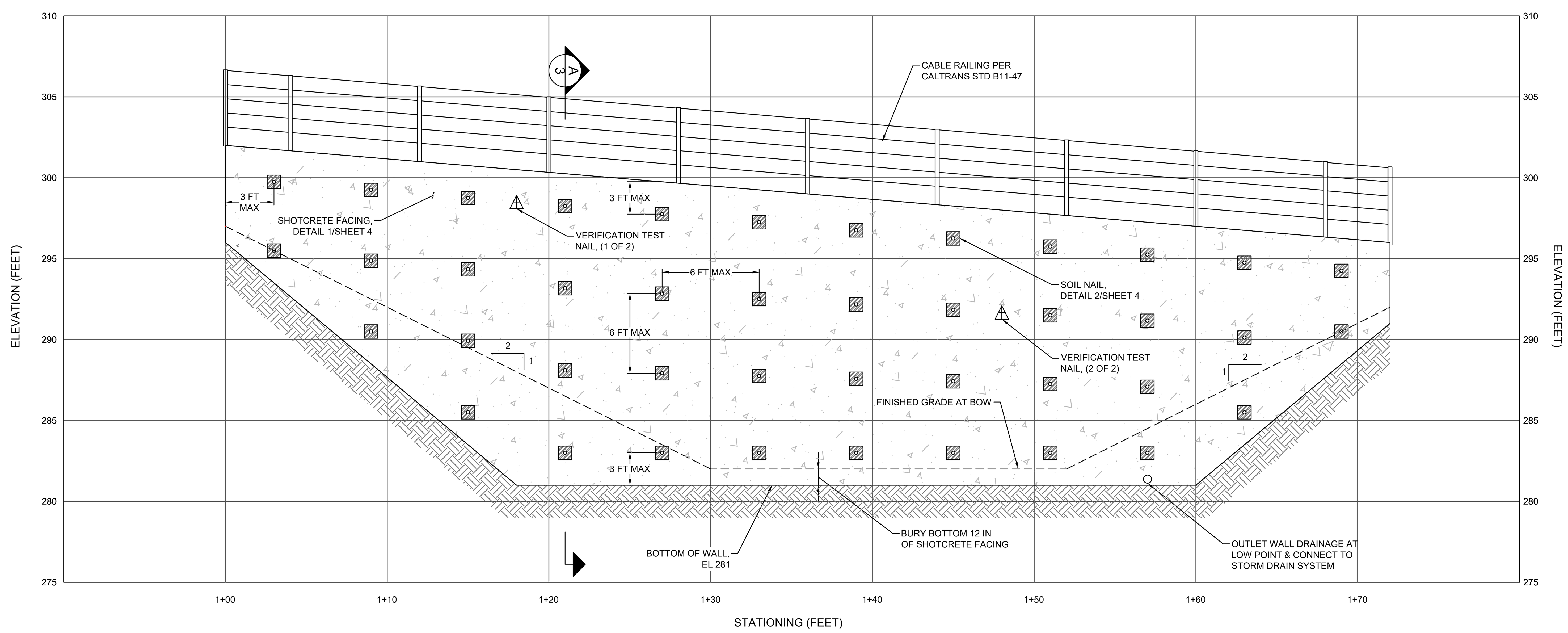
Designed RCA
Drawn RCA
Checked SAS

RETAINING WALL PLAN

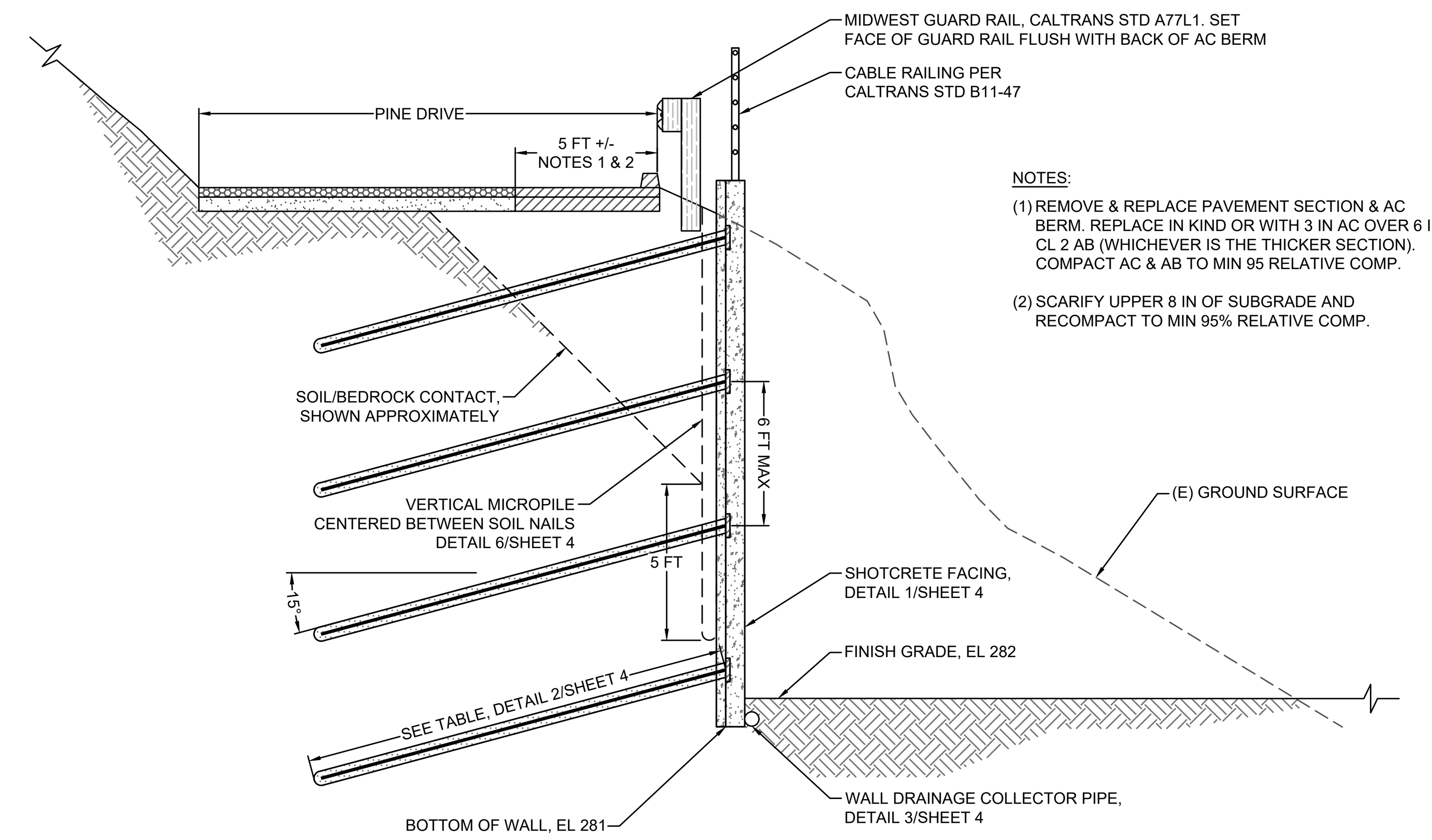
Town of Fairfax
195 Pine Drive Retaiing Wall
Fairfax, California
Project No. 201.195

REGISTERED PROFESSIONAL ENGINEER RUSSELL C. ARMSTRONG No. 303 Exp. 6/30/23 GEOTECHNICAL STATE OF CALIFORNIA

SHEET
2



1 WALL PROFILE
(SCALE: 1" = 5'-0")



NOTES:

(1) REMOVE & REPLACE PAVEMENT SECTION & AC BERM. REPLACE IN KIND OR WITH 3 IN AC OVER 6 IN CL 2 AB (WHICHEVER IS THE THICKER SECTION). COMPACT AC & AB TO MIN 95 RELATIVE COMP.

(2) SCARIFY UPPER 8 IN OF SUBGRADE AND RECOMPACT TO MIN 95% RELATIVE COMP.

A SOIL NAIL WALL SECTION
(SCALE: 1" = 5'-0")

Mark	Date	By	Description
	5/16/2022	RCA	PERMIT SUBMITTAL

Revisions

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MPEG MILLER PACIFIC ENGINEERING GROUP

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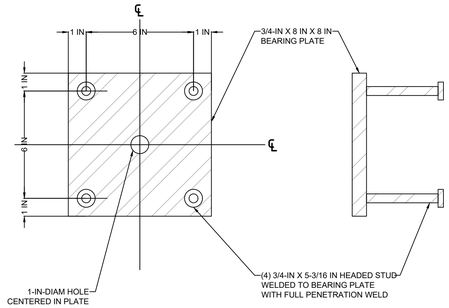
WALL PROFILE & SECTIONS

Town of Fairfax
195 Pine Drive Retaining Wall
Fairfax, California
Project No. 201.195

Designed RCA
Drawn RCA
Checked SAS

REGISTERED PROFESSIONAL ENGINEER RUSSELL C. ARNOLD No. 303 Exp. 6/30/23 GEOTECHNICAL STATE OF CALIFORNIA

SHEET
3



5 — BEARING PLATE
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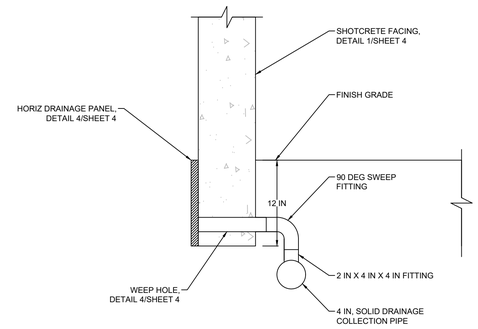
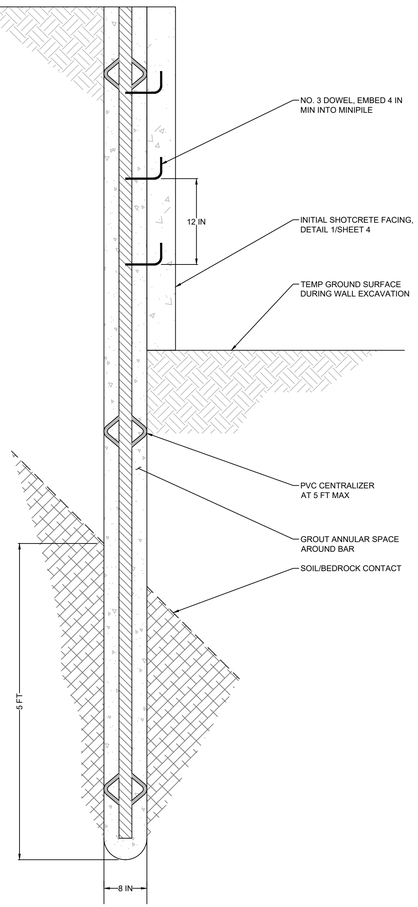


3 — DRAINAGE COLLECTION PIPE
(NO SCALE)



6 — MICROPILE
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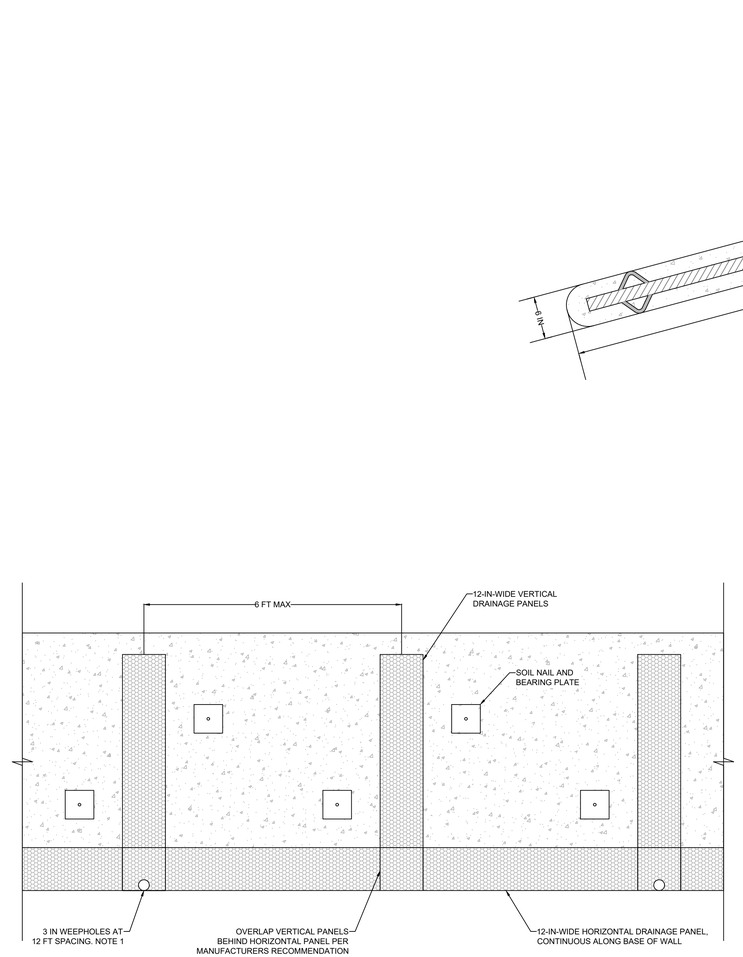
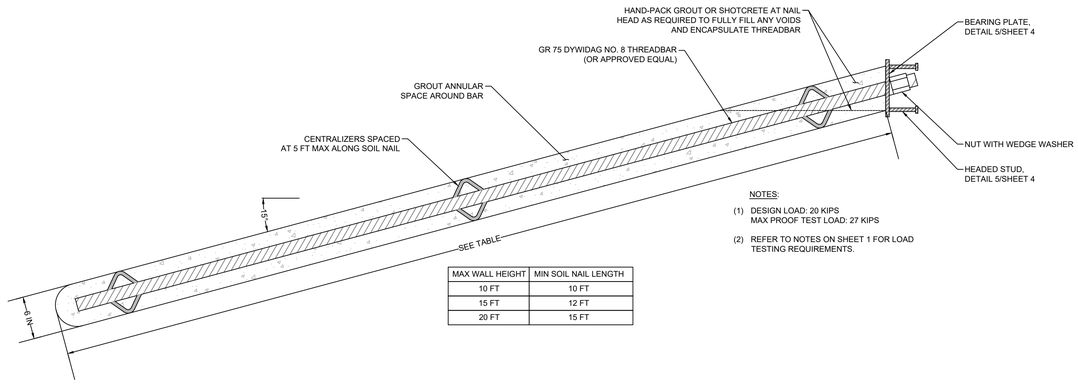


NOTES:
(1) WEEPHOLES SHALL CONNECT TO DRAINAGE COLLECTION PIPE, DETAIL 2/SHEET 4

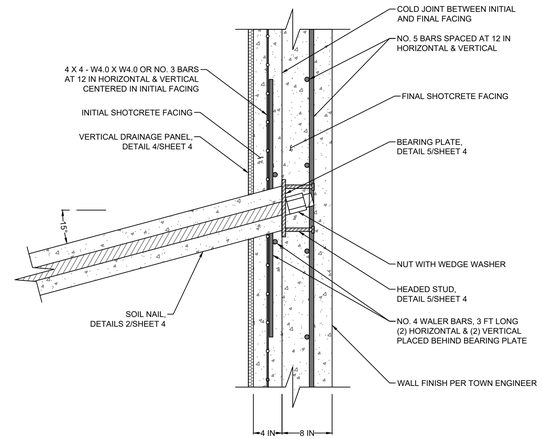
4 — RETAINING WALL DRAINAGE
(NO SCALE)



NOTES:
(1) DESIGN LOAD: 20 KIPS
MAX PROOF TEST LOAD: 27 KIPS
(2) REFER TO NOTES ON SHEET 1 FOR LOAD TESTING REQUIREMENTS.

MAX WALL HEIGHT	MIN SOIL NAIL LENGTH
10 FT	10 FT
15 FT	12 FT
20 FT	15 FT

2 — SOIL NAIL
(NO SCALE)



1 — SHOTCRETE FACING
(NO SCALE)

	Mark	Date	By
PERMIT SUBMITTAL		5/16/2022	RCA
	Description	Revisions	

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FILE: 201.209 Permit Drawings, Rev 0_recover.dwg

DETAILS

Town of Fairfax
195 Pine Drive Retaining Wall
Fairfax, California
Project No. 201.195

Designed	Drawn	Checked
RCA	RCA	SAS

REGISTERED PROFESSIONAL ENGINEER — RUSSELL C. ARNOLD — No. 2033 — Exp. 6/30/23 — GEOTECHNICAL — STATE OF CALIFORNIA

SHEET
4

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

PI	PLASTICITY INDEX
LL	LIQUID LIMIT
SA	SIEVE ANALYSIS
HYD	HYDROMETER ANALYSIS
P200	PERCENT PASSING NO. 200 SIEVE
P4	PERCENT PASSING NO. 4 SIEVE

STRENGTH TESTS

UC	LABORATORY UNCONFINED COMPRESSION
TXCU	CONSOLIDATED UNDRAINED TRIAXIAL
TXUU	UNCONSOLIDATED UNDRAINED TRIAXIAL
	UC, CU, UU = 1/2 Deviator Stress
DS (2.0)	DRAINED DIRECT SHEAR (NORMAL PRESSURE, ksf)

SAMPLER TYPE

- MODIFIED CALIFORNIA
- HAND SAMPLER
- STANDARD PENETRATION TEST
- ROCK CORE
- THIN-WALLED / FIXED PISTON
- 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

Town of Fairfax
Pine Drive Retaining Wall
Fairfax, California

Project No. 201.209 Date: 5/18/2022

Drawn EIC Checked

A-1 FIGURE

FILENAME: 201.209 Permit Drawings, Rev 0_recover.dwg

FRACTURING AND BEDDING

Fracture Classification	Spacing	Bedding Classification
Crushed	less than 3/4 inch	Laminated
Intensely fractured	3/4 to 2-1/2 inches	Very thinly bedded
Closely fractured	2-1/2 to 8 inches	Thinly bedded
Moderately fractured	8 to 24 inches	Medium bedded
Widely fractured	2 to 6 feet	Thickly bedded
Very widely fractured	greater than 6 feet	Very thickly bedded

HARDNESS

Low	Carved or gouged with a knife
Moderate	Easily scratched with a knife, friable
Hard	Difficult to scratch, knife scratch leaves dust trace
Very hard	Rock scratches metal

STRENGTH

Friable	Crumbles by rubbing with fingers
Weak	Crumbles under light hammer blows
Moderate	Indentations <1/8 inch with moderate blow with pick end of rock hammer
Strong	Withstands few heavy hammer blows, yields large fragments
Very strong	Withstands many heavy hammer blows, yields dust, small fragments

WEATHERING

Complete	Minerals decomposed to soil, but fabric and structure preserved
High	Rock decomposition, thorough discoloration, all fractures are extensively coated with clay, oxides or carbonates
Moderate	Fracture surfaces coated with weathering minerals, moderate or localized discoloration
Slight	A few stained fractures, slight discoloration, no mineral decomposition, no affect on cementation
Fresh	Rock unaffected by weathering, no change with depth, rings under hammer impact

NOTE: Test boring and test pit logs are an interpretation of conditions encountered at the location and time of exploration. Subsurface rock, soil and water conditions may differ in other locations and with the passage of time.

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ROCK CLASSIFICATION CHART

Town of Fairfax
Pine Drive Retaining Wall
Fairfax, California

Project No. 201.209 Date: 5/18/2022

Drawn EIC Checked

A-2 FIGURE

FILENAME: 201.209 Permit Drawings, Rev 0_recover.dwg

BORING 1

EQUIPMENT: Bobcat-mounted Hydraulic Drill Rig with 6-inch Solid Flight Auger
DATE: 3/30/2022
ELEVATION: 305 feet*
*REFERENCE: Google Earth, 2022

DEPTH meters	DEPTH feet	SAMPLE	SYMBOL (4)		BLOWS / FOOT (1)	DRY UNIT WEIGHT pcf (2)	MOISTURE CONTENT (%)	SHEAR STRENGTH psf (3)	OTHER TEST DATA	DRILL RATE (MIN/FT)
0	0			8" Asphalt Concrete over 3" Void over 2" AC						
				Gravel/Aggregate Baserock						
				Sandy CLAY with Gravel (CL) green-gray to yellow-brown, moist to wet, soft to medium stiff, medium to high plasticity	5	102	13.7	UC 200		
1	5				5	100	17.0	UC 350	P200 63.7%	
2	10				8	101	15.7	UC 475		
3				SHALE dark gray, low hardness, friable, highly to completely weathered, pervasively sheared, includes clasts of harder/stronger rock	75/10"	123	9.1	UC 1125		6.0
4	15									
5				grades hard, strong	50/5"		6.6			18.0
6	20			grades very hard, very strong, no recovery						
				Bottom of boring at 21 feet No groundwater observed during drilling	50/<1"					45.0

▽ Water level encountered during drilling
▼ Water level measured after drilling

NOTES: (1) UNCORRECTED FIELD BLOW COUNTS
(2) METRIC EQUIVALENT DRY UNIT WEIGHT kN/m³ = 0.1571 x DRY UNIT WEIGHT (pcf)
(3) METRIC EQUIVALENT STRENGTH (kPa) = 0.0479 x STRENGTH (psf)
(4) GRAPHIC SYMBOLS ARE ILLUSTRATIVE ONLY

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BORING LOG

Town of Fairfax
Pine Drive Retaining Wall
Fairfax, California

Project No. 201.209 Date: 5/18/2022

Drawn EIC Checked

A-3 FIGURE

FILENAME: 201.209 Permit Drawings, Rev 0_recover.dwg

PERMIT SUBMITTAL

Mark	Date	Description
	5/16/2022	RCA

Revisions

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FILE: 201.209 Permit Drawings, Rev 0_recover.dwg

Designed RCA Drawn RCA Checked SAS

BORING LOGS

Town of Fairfax
195 Pine Drive Retaining Wall
Fairfax, California

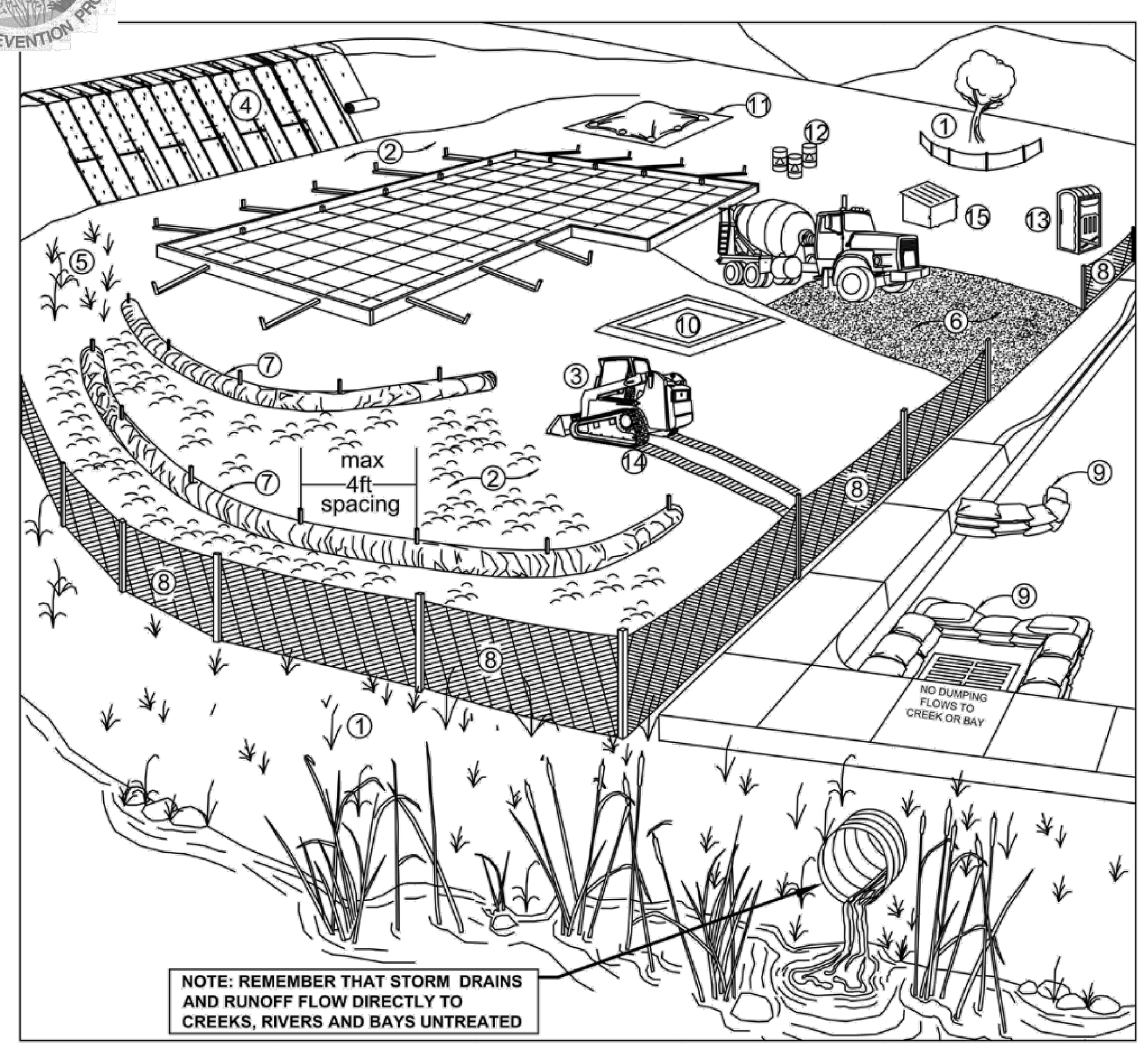
Project No. 201.195

REGISTERED PROFESSIONAL ENGINEER RUSSELL C. ANDERSON GEOTECHNICAL STATE OF CALIFORNIA
No. 3037 Exp. 6/30/23

SHEET 5

Marin County Stormwater Pollution Prevention Program

Minimum Control Measures
For Small Construction Projects



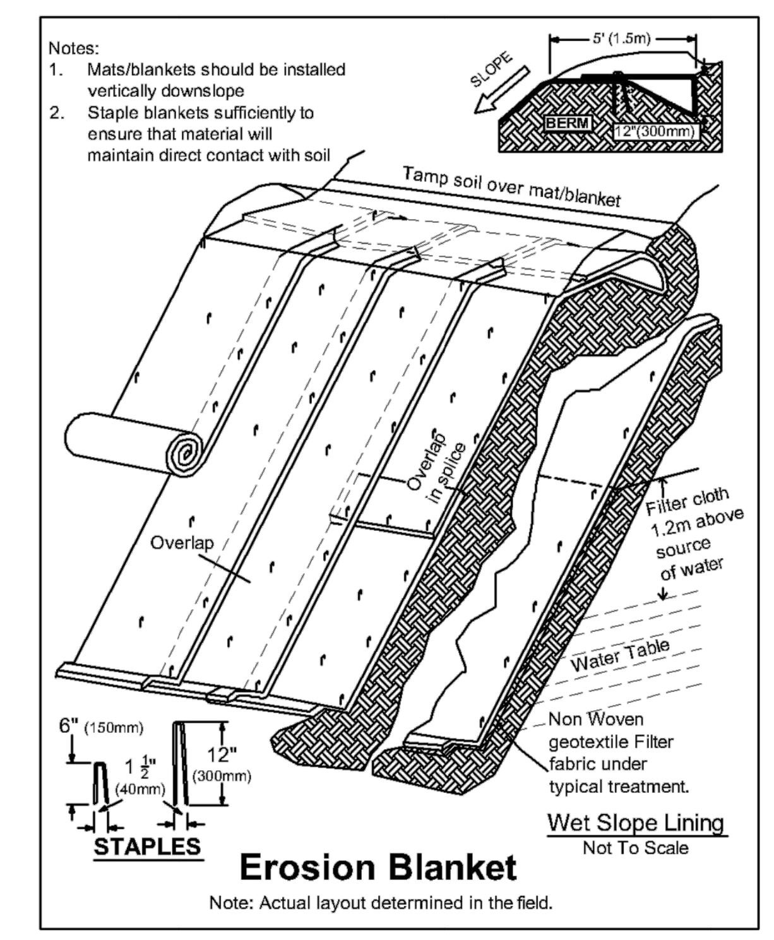
Erosion Controls	Sediment Controls	Good Housekeeping
NS Scheduling	6. Tracking Controls	10. Concrete Washout
1. Preserve Vegetation & Creek Set Backs	7. Fiber Rolls	11. Stockpile Management
2. Soil Cover	8. Silt Fence	12. Hazardous Material Management
3. Soil Preparation/ Roughening	9. Drain Inlet Protection	13. Sanitary Waste Management
4. Erosion Control Blankets	NS Trench Dewatering	14. Equipment and Vehicle Maintenance
5. Revegetation		15. Litter and Waste Management

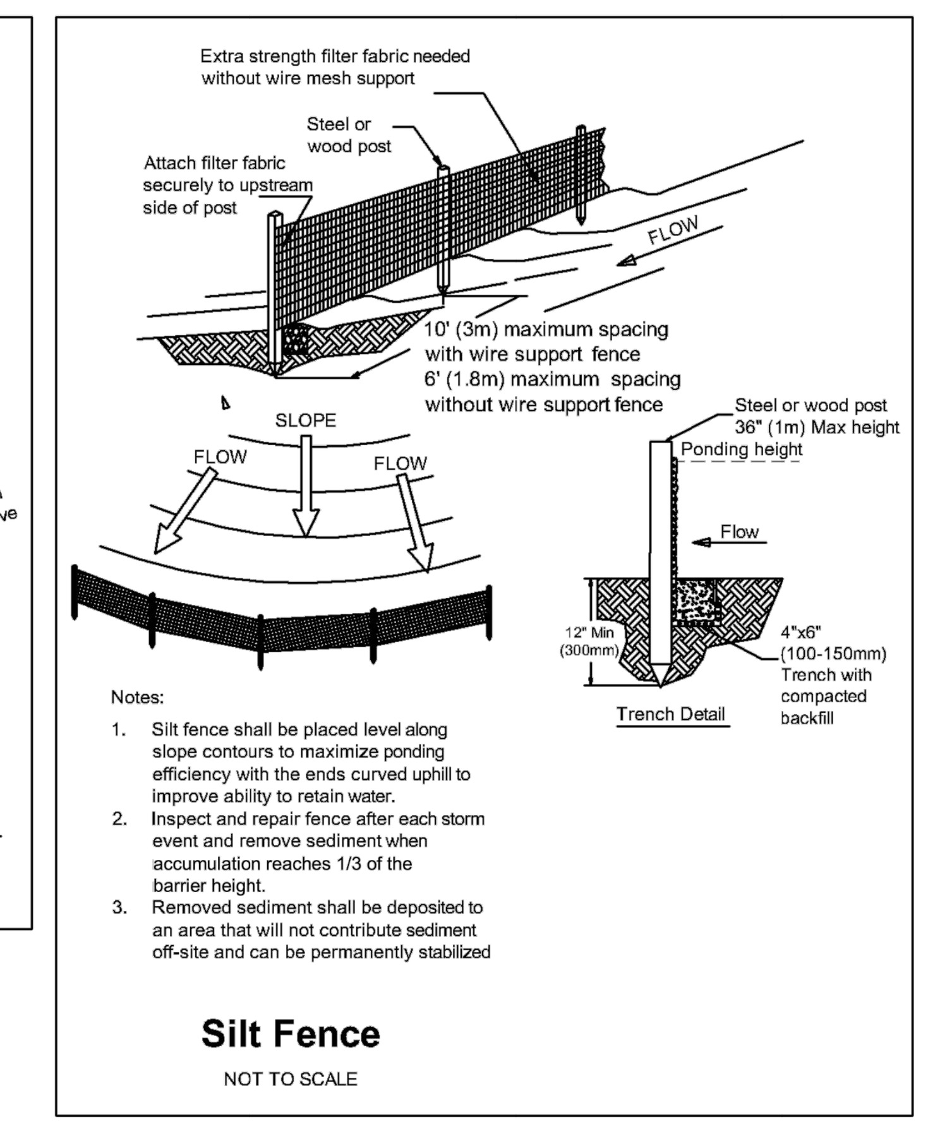
NS=not shown on graphic

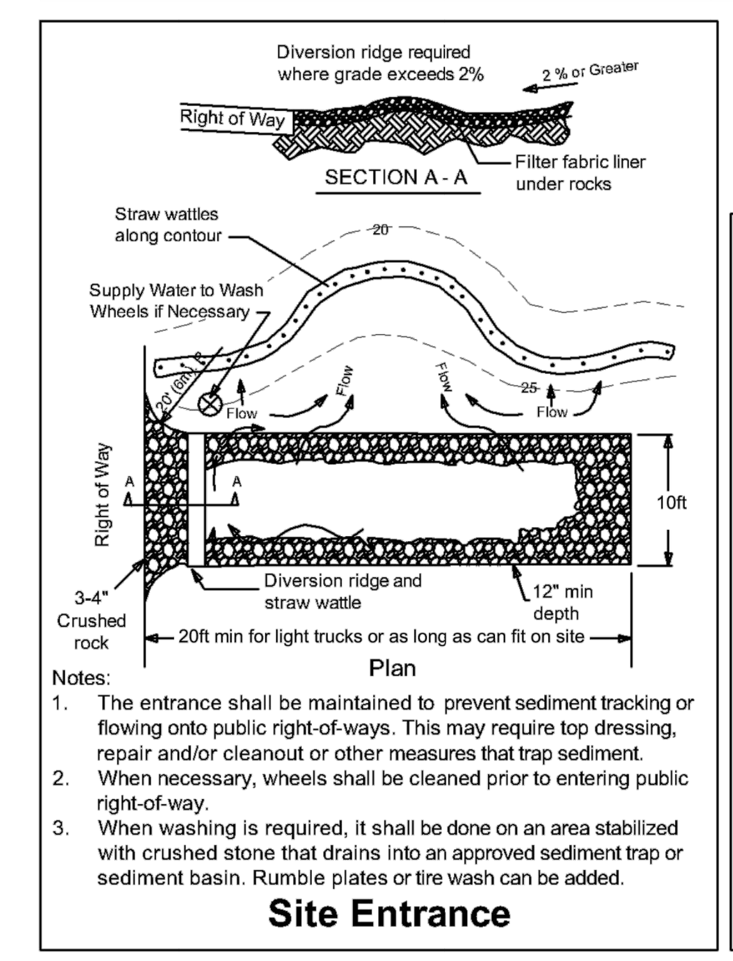
Note: Select an **effective combination of control measures from each category**, Erosion Control, Sediment Control, and Good Housekeeping. Control measures shall be **continually implemented and maintained throughout the project** until activities are complete, disturbed areas are stabilized with permanent erosion controls, and the local agency has signed off on permits that may have been required for the project. **Inspect and maintain the control measures** before and after rain events, and as required by the local agency or state permit.
More detailed information on the BMPs can be found in the related California Stormwater Quality Association (CASQA) and California Department of Transportation (Caltrans) BMP Factsheets. CASQA factsheets are available by subscription in the *California Best Management Practices Handbook Portal: Construction* at http://www.casqa.org. Caltrans factsheets are available in the *Construction Site BMP Manual March 2003* at http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm.
Visit www.mcstoppp.org for more information on construction site management and Erosion and Sediment Control Plans.

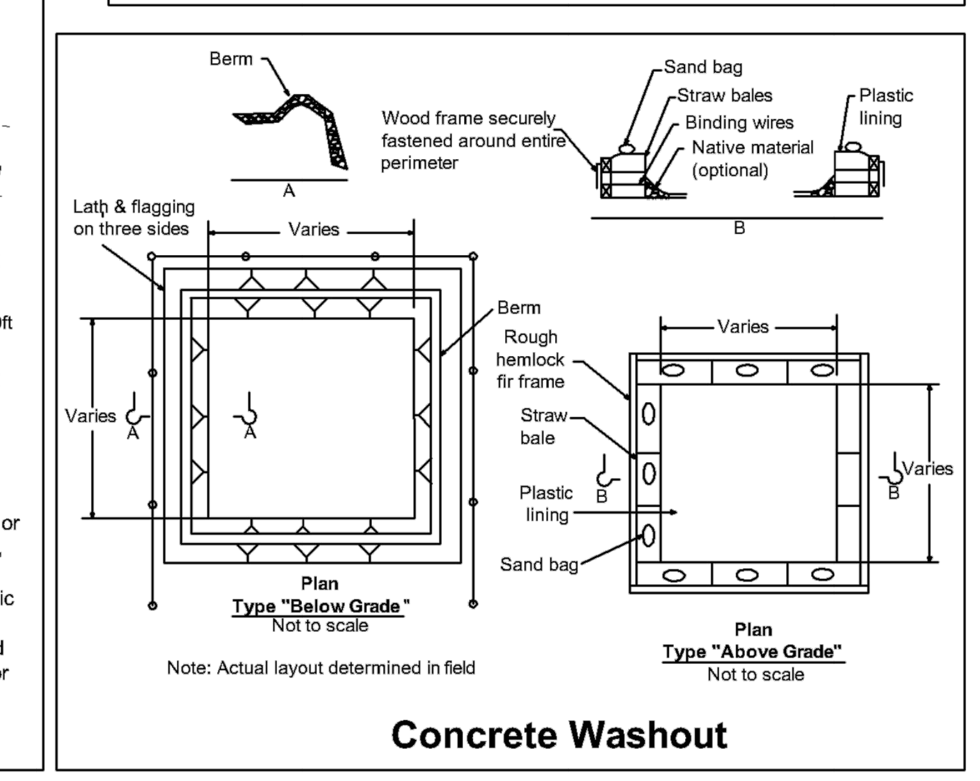
If you require materials in alternative formats, please contact:
415-473-4381 voice/TTY or disabilityaccess@co.marin.ca.us

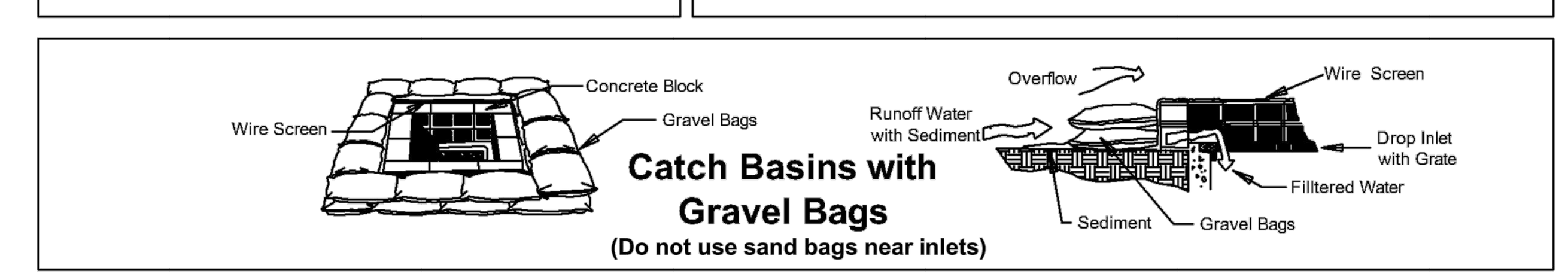
Control Measure		General Description
Erosion Control Best Management Practices		
N/A	Scheduling	Plan the project and develop a schedule showing each phase of construction. Schedule construction activities to reduce erosion potential, such as scheduling ground disturbing activities during the summer and phasing projects to minimize the amount of area disturbed. *For more info see the following factsheets: CASQA: EC-1; or Caltrans: SS-1.*
1	Preserve Existing Vegetation and Creek Setbacks	Preserve existing vegetation to the extent possible, especially along creek buffers. Show creek buffers on maps and identify areas to be preserved in the field with temporary fencing. Check with the local Planning and Public Works Departments for specific creek set back requirements. *For more info see the following factsheets: CASQA: EC-2; or Caltrans: SS-2.*
2	Soil Cover	Cover exposed soil with straw mulch and tackifier (or equivalent). *For more info see the following factsheets: CASQA: EC-3, EC-5, EC-6, EC-7, EC-8, EC-14, EC-16; or Caltrans: SS-2, SS-4, SS-5, SS-6, SS-7, SS-8.*
3	Soil Preparation/ Roughening	Soil preparation is essential to vegetation establishment and BMP installation. It includes soil testing and amendments to promote vegetation growth as well as roughening surface soils by mechanical methods (decompacting, scarifying, stair stepping, etc.). *For more info see the following factsheets: CASQA: EC-15.*
4	Erosion Control Blankets	Install erosion control blankets (or equivalent) on disturbed sites with 3:1 slopes or steeper. Use wildlife-friendly blankets made of biodegradable natural materials. Avoid using blankets made with plastic netting or fixed aperture netting. See: http://www.coastal.ca.gov/nps/Wildlife-Friendly_Products.pdf. *For more info see the following factsheets: CASQA: EC-7; or Caltrans: SS-7.*
5	Revegetation	Re-vegetate areas of disturbed soil or vegetation as soon as practical. *For more info see the following factsheets: CASQA: EC-4; or Caltrans: SS-4.*
Sediment Control Best Management Practices		
6	Tracking Controls	Stabilize site entrance to prevent tracking soil offsite. Inspect streets daily and sweep street as needed. Require vehicles and workers to use stabilized entrance. Place crushed rock 12-inches deep over a geotextile, using angular rock between 4 and 6-in. Make the entrance as long as can be accommodated on the site, ideally long enough for 2 revolutions of the maximum tire size (16-20 feet long for most light trucks). Make the entrance wide enough to accommodate the largest vehicle that will access the site, ideally 10 feet wide with sufficient radii for turning in and out of the site. Rumble pads or rumble racks can be used in lieu of or in conjunction with rock entrances. Wheel washes may be needed where space is limited or where the site entrance and sweeping is not effective. *For more info see the following factsheets: CASQA: TC-1; TC-3; or Caltrans: TC-1; TC-3.*
7	Fiber Rolls	Use fiber rolls as a perimeter control measure, along contours of slopes, and around soil stockpiles. On slopes space rolls 10 to 20 feet apart (using closer spacing on steeper slopes). Install parallel to contour. If more than one roll is used in a row overlap roll do not abut. J-hook end of roll upslope. Install rolls per either Type 1 (stake rolls into shallow trenches) or Type 2 (stake in front and behind roll and lash with rope). Use wildlife-friendly fiber rolls made of biodegradable natural materials. Avoid using fiber rolls made with plastic netting or fixed aperture netting. See: http://www.coastal.ca.gov/nps/Wildlife-Friendly_Products.pdf. Manufactured linear sediment control or compost socks can be used in lieu of fiber rolls. *For more info see the following factsheets: CASQA: SE-5 (Type 1); SE-12, SE-13; or Caltrans: SC-5 (Type 1 and Type 2).*
8	Silt Fence	Use silt fence as a perimeter control measure, and around soil stockpiles. Install silt fence along contours. Key silt fence into the soil and stake. Do not use silt fence for concentrated water flows. Install fence at least 3 feet back from the slope to allow for sediment storage. Wire backed fence can be used for extra strength. Avoid installing silt fence on slopes because they are hard to maintain. Manufactured linear sediment control can be used in lieu of silt fences. *For more info see the following factsheets: CASQA: SE-1; SE-12; or Caltrans: SC-1.*
9	Drain Inlet Protection	Use gravel bags, (or similar product) around drain inlets located both onsite and in gutter as a last line of defense. Bags should be made of a woven fabric resistant to photo-degradation filled with 0.5-1-in washed crushed rock. Do not use sand bags or silt fence fabric for drain inlet protection. *For more info see the following factsheets: CASQA: SE-10; or. Caltrans: SC-10.*
N/A	Trench Dewatering	Follow MCSTOPPP BMPs for trench dewatering. http://www.marincounty.org/depts/pw/divisions/mcstoppp/development/~/media/Files/Departments/PW/mcstoppp/development/TrenchingSWReqMCSTOPPPFinal6_09.pdf. *For more info see the following factsheets: CASQA: NS-2; or Caltrans: NS-2.*
Good Housekeeping Best Management Practices		
10	Concrete Washout	Construct a lined concrete washout site away from storm drains, waterbodies, or other drainages. Ideally, place adjacent to stabilized entrance. Clean as needed and remove at end of project. *For more info see the following factsheets: CASQA: WM-8; or .Caltrans: WM-8.*
11	Stockpile Management	Cover all stockpiles and landscape material and berm properly with fiber rolls or sand bags. Keep behind the site perimeter control and away from waterbodies. *For more info see the following factsheets: CASQA: WM-3 or Caltrans: WM-3.*
12	Hazardous Material Management	Hazardous materials must be kept in closed containers that are covered and within secondary containment; do not place containers directly on soil. *For more info see the following factsheets: CASQA: WM-6; or Caltrans: WM-6.*
13	Sanitary Waste Management	Place portable toilets near stabilized site entrance, behind the curb and away from gutters, storm drain inlets, and waterbodies. Tie or stake portable toilets to prevent tipping and equip units with overflow pan/tray (most vendors provide these). *For more info see the following factsheets: CASQA: WM-9; or Caltrans: WM-9.*
14	Equipment and Vehicle Maintenance	Prevent equipment fluid leaks onto ground by placing drip pans or plastic tarps under equipment. Immediately clean up any spills or drips. *For more info see the following factsheets: CASQA: NS-8, NS-9, and NS-10; or Caltrans: NS-8, NS-9, and NS-10.*
15	Litter and Waste Management	Designate waste collection areas on site. Use watertight dumpsters and trash cans; inspect for leaks. Cover at the end of each work day and when it is raining or windy. Arrange for regular waste collection. Pick up site litter daily. *For more info see the following factsheets: CASQA: WM-5; or Caltrans: WM-5.*











Revisions			
Description	Mark	Date	By
PERMIT SUBMITTAL		5/16/2022	RCA

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FILE: 201.209 Permit Drawings, Rev 0_recover.dwg

EROSION & SEDIMENT CONTROL

Town of Fairfax
195 Pine Drive Retaining Wall
Fairfax, California
Project No. 201.195

Designed RCA
Drawn RCA
Checked SAS

SHEET
6

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.

Verification Load (PL) - The temporary pre-stressing load at which verification soil nails are tested.

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

1.03 SUBMITTALS

A. General – Submittals shall conform to Section 46-1.01C of the latest edition of Caltrans Standard Specifications.

1.04 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;
Other supplier approved in advance by the Engineer.

2.02 Thread Bar - Shall conform to the following:

A. Grade 75 shall conform to ASTM A615

B. Grade 150 shall conform to ASTM A722

2.03 Bearing Plates and Hardware - Bearing plates, headed studs, washers, nuts, and all other hardware shall conform to the manufacturer's recommendations and applicable ASTM standards.

2.04 Corrosion Protection - Corrosion protection shall be "bare steel" bars of the minimum size specified on the drawings.

2.05 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.

2.06 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 28-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 minimum vertical and horizontal spacing 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 anticipated. 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 bars promptly after drilling. Centralizers shall be placed every 5 feet along the soil nail.

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, as shown on the plans or as designated by the Engineer. 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 when 80% percent of the grout design strength is achieved.

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, 1.33 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 = 1.33 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 additional production nails may be required to achieve the specified design loads.

Installation and testing of additional proof test nails or additional production nails due to proof test nail failures shall be at no additional cost to Owner.

END OF SECTION

SECTION 3360
SHOTCRETE FACING

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Description – This Section specifies the requirements for furnishing, batching, mixing, transporting, placing, finishing, and testing shotcrete for soil nail walls.

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.

C. Work shall conform to all requirements of ACI 506.2-13 except as modified herein.

1.02 DEFINITIONS

Shotcrete - concrete or mortar conveyed through a hose and pneumatically projected at high velocity onto a surface to achieve compaction.

1.03 REFERENCE STANDARDS

A. ASTM International

A615/A615M-12—Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

C33/C33M-13—Standard Specification for Concrete Aggregates

C94/C94M-13a—Standard Specification for Ready-Mixed Concrete

C127-12—Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

C128-12—Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate

C150/C150M-12—Standard Specification for Portland Cement

C309-11—Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

C685/C685M-11—Standard Specification for Concrete made by Volumetric Batching and Continuous Mixing

C1064/C1064M-12—Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

C1077-13b—Standard Practice for Laboratories Agency Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

C1116/C1116M-10a—Standard Specification for Fiber-Reinforced Concrete

C1140/C1140M-11—Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels

C1141/C1141M-08—Standard Specification for Admixtures for Shotcrete

C1315-11—Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete

C1385/C1385M-10—Standard Practice for Sampling Materials for Shotcrete

C1436-08—Standard Specification for Materials for Shotcrete

C1480/C1480M-12—Standard Specification for Packaged, Pre-Blended, Dry, Combined Materials for Use in Wet or Dry Shotcrete Application

C1602/C1602M-12—Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

B. American Concrete Institute

ACI 506.2-13 – Shotcrete Specification

ACI 506R-5 – Guide to Shotcrete

1.04 SUBMITTALS

A. Submit shotcrete mixture proportions. Submittals shall show constituent proportions by mass in the case of batching by weight or proportions by volume in the case of volumetric batching. For prepackaged materials meeting ASTM C1480/C1480M, submit suppliers' technical data showing compliance with requirements.

B. Submit compressive strength test results.

C. Submit water-cementitious materials ratio (*w*/*cm*) for wet-mixture shotcrete only.

D. Submit admixture types, brand names, producers, manufacturer's technical data sheets describing technical properties and performance in shotcrete and showing compatibility with the project cementitious materials.

E. Submit cementitious materials types, test reports showing manufacturing location, and compliance with applicable ASTM standards.

F. Submit aggregate source, producers' names, gradations, specific gravities, compliance with ASTM C33/C33M, and evidence that this data is not more than 1 year old.

G. Submit aggregate absorption in accordance with ASTM C127 for coarse aggregate and ASTM C128 for fine aggregate.

H. Submit qualifications and experience of the proposed workers including the supervisor, nozzlemen, and crew. Submit evidence of ACI certification of nozzlemen proposed for the Work.

I. Submit proof of experience for the Contractor and the shotcrete crew foreman to include at least five projects of similar size and complexity. Proof shall include a description of previous project's size; density of reinforcing materials; volume of shotcrete placed; and the name, address, and current phone number of person(s) representing the Owner or Architect/Engineer.

J. For nonpotable water, submit the source and reports confirming compliance with ASTM C1602/C1602M.

K. Submit mill certificate showing conformance for reinforcing steel or welded wire reinforcement.

L. Submit curing materials and curing procedures for shotcrete.

M. Submit name of proposed Contractor's testing agency and documentation of the agency's certification to ASTM C1077.

N. Manufactures' data and specifications for geocomposite drainage panels, connectors, outlet pipe and all material used for the wall drainage system as shown on the plans or as specified by Engineer.

1.05 QUALITY CONTROL

A. Contractor Qualifications.

1. 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.

2. Initial qualification of the nozzlemen shall be based on ACI certification and satisfactory completion of preconstruction testing. The nozzlemen shall be certified as an ACI Shotcrete Nozzleman by the American Concrete Institute as outlined in ACI Publication CP-60 and the certification shall be current.

1.06 PRECONSTRUCTION TESTING

A. Testing of materials required as part of the preconstruction program shall be conducted by the Contractor's testing agency. Agency selection shall be acceptable to the Engineer.

B. Notify the Engineer of the time and place of preconstruction testing and provide Engineer with copies of testing reports.

C. Construct preconstruction test panels for examination by Engineer prior to project shotcrete placement. Preparation and testing shall comply with ASTM C1140/C1140M. Mixture proportions shall meet the requirements of 2.03.

D. Construct test panels for each proposed shotcrete mixture, each anticipated shooting orientation, and each proposed nozzleman.

E. Test specimens cored from the panels for compliance with the specified compressive strength in accordance with ASTM C1604/C1604M

F. Prepare additional panels with the specified reinforcement. Core panels in accordance with ASTM C1140/C1140M. Cores containing reinforcement shall be provided to the Engineer for visual examination to determine acceptance. Cores for examination shall have a minimum diameter of 3.75 in. and be the full thickness of the panel.

G. If the initial prequalification test panel is rejected, a second panel may be shot and tested. If this panel is acceptable, Work may proceed. If the second panel is not acceptable, the Contractor shall change procedures, mixture proportions, nozzlemen, or shotcrete equipment as necessary before repeating the preconstruction testing. Do not proceed with Work until preconstruction test results are satisfactory to Engineer.

1.07 TESTING DURING CONSTRUCTION

A. Construct a test panel for each mixture, each nozzleman, and each work day or for every 50 yd^3 placed, whichever results in the most panels. The face dimensions of a test panel shall be a minimum of 16 x 16 in. with a minimum depth of 5 in. Shoot test panels in a vertical orientation only unless otherwise specified.

B. Condition test panels in accordance with ASTM C1140/C1140M until transported to the testing agency's laboratory.

C. Obtain test specimens from test panels using procedures outlined in ASTM C1140/C1140M or C1604/C1604M. Cores shall be a nominal 3 in. diameter.

D. Test shotcrete specimens for compliance in accordance with ASTM C1604/C1604M for compressive strength. Test one sample at 3, 7 and 28 days after application. If the 28 day break exceeds the design strength, then two additional samples should be test at 28 days for evaluation of average 28 day strength. If the 28 day break does not exceed the design strength, then three additional samples should be tested at 56 days. Strength test results are to be reported to the Engineer within 24 hours after completion of test.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials to prevent contamination, segregation, corrosion, or damage. Store and protect liquid admixtures as required to prevent evaporation and freezing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Portland Cement: ASTM C150, Type II.

B. Aggregate: Unless otherwise specified, aggregates shall comply with ASTM C33/C33M for normal weight aggregates. The combined aggregate gradation shall comply with grading No. 2 of ASTM C1436, unless otherwise specified.

C. Water shall be potable.

D. Admixtures shall comply with ASTM C1141/C1141M or, for hydration control admixtures, with ASTM C494/C494M.

E. Reinforcement:
1. Reinforcing bars shall be ASTM A615, Grade 60, deformed
2. Welded wire reinforcement shall be ASTM 1064, minimum yield strength of 60 ksi

F. Curing Materials: Curing compounds shall comply with ASTM C309 or C1315. Do not use curing materials that cause stains for shotcrete having an architectural finish.

G. Geocomposite Drainage Panels: Contech C-Drain™ C-110 Series or approved equal. Use weepholes, fittings, and other components that are recommended by the manufacturer

2.02 SHOTCRETE PROPERTIES

A. The 28 day compressive strength shall be 4,000 psi minimum. The Compressive strength shall be assessed in accordance with ACI 301.

2.03 PROPORTIONING

A. Proportion shotcrete mixture by mass complying with ASTM C94/C94M, or by volume complying with ASTM C685/C685M, to satisfy the specified properties.

2.04 BATCHING, MIXING, AND DELIVERING

A. Batch, mix, and deliver wet-mixture shotcrete in accordance with ASTM C94/C94M, C685/C685M, or C1116/C1116M as applicable. For dry-mixture, batching, mixing and delivering shall be in accordance with ASTM C685 /C685M or C1116/C1116M.

B. Predampening or other methods suitable for prewetting the dry materials shall be used with packaged preblended material for dry-mixture shotcrete.

PART 3 – EXECUTION

3.01 PREPARATION OF SURFACE TO RECEIVE SHOTCRETE

A. Earth: Surfaces shall be prepared to line and grade. Dampen surfaces immediately prior to shooting. No standing water shall be visible.

B. Concrete, masonry, and shotcrete: Remove all deteriorated, loose, unsound material or contaminants that will inhibit bonding. Receiving surface shall be dampened and allowed to dry to a saturated surface-dry (SSD) condition just prior to shotcrete application. Chip surfaces to receive shotcrete to remove offsets causing abrupt changes in thickness.

C. Rock: Remove loose material, mud, or other foreign material that will inhibit bonding. Clean surface prior to shotcrete placement. Dampen surfaces immediately prior to shooting. No standing water shall be visible.

D. Reinforcement
   1. Surface Condition: The surface of the reinforcement shall be free of overspray or other deleterious materials that inhibit development of bond with the shotcrete.
   2. Secure reinforcement to prevent movement. The use of mechanical splices is permitted when approved.
   3. Forms: Use material of adequate thickness for formwork to resist movement during shooting. Reinforce, secure, and brace forms to minimize the effects of vibration during shooting. Construct forms to allow escape of placement air, overspray, and rebound. Use form-release coating material on removable forms unless the formed surface is to subsequently receive an additional coating.

3.02 JOINTS

A. Construction Joints: Taper construction joints at approximately 45 degrees from receiving surface. Form joints by cutting plastic shotcrete. Joints at slab intersections shall be made at 90 degrees. Roughen shotcrete in the joint face while it is still plastic.

3.03 ALIGNMENT CONTROL

A. To establish thickness and plane of required surface, install taut ground wires or other means to guide the nozzleman. Install alignment control means at corners or offsets not established by forms.

3.04 APPLICATION

A. Placement Techniques
   1. Use the same shotcrete mixture and equipment that was used during nozzleman qualification and mixture design acceptance for the production shotcrete.
   2. Use temporary coverings to protect adjacent surfaces from the deposit of overspray or impact from the nozzle stream.
   3. Install sufficient lighting and ventilation to provide the shotcrete crew with a clear view of the shooting area. Suspend Work and adopt corrective measures if visibility is unsuitable for the application of quality shotcrete.
   4. Provide a working surface that permits nozzlemen unobstructed access to the receiving surface. Place shotcrete first in corners, recesses, and other areas where rebound or overspray cannot easily escape.
   5. The supply of shotcrete material and air pressure at the nozzle shall be uniform, providing a steady, continuous flow of shotcrete with no detrimental surging or pulsing. Maintain the velocity and consistency of shotcrete exiting the nozzle at a uniform rate appropriate for the given job conditions so that satisfactory material consolidation and minimum rebound is achieved.
   6. Place shotcrete perpendicular to the receiving surface with the nozzle held at such a distance to produce maximum consolidation of the shotcrete and full encapsulation of the reinforcement.
   7. Shoot dry-mixture shotcrete material within 45 min after batching or, in the case of prepackaged material, within 45 min after predampening. Shoot wet-mixture shotcrete material within the time limits in ASTM C94/94M.

8. Apply shotcrete using a circular or elliptical motion of the nozzle while building the required thickness.
9. Use sufficient material velocity, material consistency, and distance from the end of the nozzle to the receiving surface to produce maximum consolidation of the shotcrete and full encapsulation of the reinforcing steel.
10. In corners, direct the nozzle to bisect the corner angle. Apply shotcrete so sagging or sloughing does not occur. Where there is potential for accumulated rebound or overspray material to be incorporated into the Work at congested areas of steel reinforcement, embedded obstructions, corners, and recesses, use a compressed air blow pipe to remove loose material from the Work.
11. Discontinue placement of shotcrete or shield the nozzle stream if wind causes separation of ingredients in the nozzle stream.
12. Do not reuse rebound or overspray in the Work.
13. Remove laitance from shotcrete surfaces that are to receive additional shotcrete layers.
14. Surface preparation prior to the shooting of shotcrete shall comply with 3.01.D.3.
15. Do not apply shotcrete to surfaces with standing or flowing water.
16. Remove hardened overspray and rebound from adjacent surfaces, including exposed reinforcement.

B. Intermediate Surfaces
1. When applying more than one layer of shotcrete, use a cutting rod, brush with a stiff bristle, or other suitable equipment to remove all loose material, overspray, laitance, or other material that may compromise the bond of the subsequent layer of shotcrete. Conduct removal immediately after shotcrete reaches initial set.
2. Allow shotcrete to stiffen sufficiently before applying subsequent layers. If shotcrete has hardened, clean the surface of all loose material, laitance, overspray, or other material that may compromise the bond of subsequent layers. Bring the surface to a saturated surface-dry condition at the time of application of the next layer of shotcrete.

C. Encasement of Reinforcement
1. Place shotcrete to encase reinforcement and other embedments, and provide at least two inches of cover.
2. Adjust air volume, material feed volume, and distance of the nozzle from the Work as necessary to encase reinforcement.
3. Keep the front face of the reinforcement clean during shooting operations so that shotcrete builds up from behind to encase the reinforcement without the formation of shadows or voids.
4. Shotcrete crew shall continuously remove accumulations of rebound and overspray using a compressed air blowpipe, or other suitable device, in advance of deposition of new shotcrete.

D. Hot Weather Shotcreting: Unless otherwise specified, do not place shotcrete when shotcrete temperature is above 95°F, unless prequalification testing in 1.5.1 shows that the required quality of materials can be achieved at higher temperatures. The temperature of reinforcement and receiving surfaces shall be below 90ºF prior to shotcrete placement.

E. Cold Weather Shotcreting: Unless otherwise specified, shooting may proceed when ambient temperature is 40°F and rising. Stop shooting when ambient temperature is

40°F and falling, unless measures are taken to protect the shotcrete. Shotcrete material temperature, when shot, shall not be less than 50ºF. Do not place shotcrete against frozen surfaces.

F. Shotcrete Temperature
1. Unless otherwise specified, when the average of the highest and lowest ambient temperature during the period from midnight to midnight is expected to drop below 40°F for more than 3 consecutive days, deliver shotcrete to meet the following temperatures in place immediately after placement:
    a. Between 55°F and 75°F for sections less than 12 in. in the least dimension;
    b. Between 50°F and 70°F for sections to 36 in. in the least dimension.
2. The minimum requirements of 3.04.F.1 may be terminated when ambient temperatures greater than 50°F occur during more than half of any 24-hour duration.

3.05 FINISH

A. Finish as indicated on the Drawings.

B. Gun Finish: Leave finished shotcrete surface as gun finish unless otherwise specified. Proceed to rod, rubber float, wood float, or troweled finish.

B. Troweled or Rod Finish: Do not initiate cutting or finishing until the shotcrete is sufficiently set to avoid sloughing or sagging.

C. Texture and Color: Match natural bedrock. Contractor to present texture and color options for approval by Owner.

3.06 CURING

A. When the daily mean temperature is above 40°F, curing shall be continuous for a minimum of 7 consecutive days or for the time necessary to attain 70 percent of the specified compressive or flexural strength, whichever period is less.

B. If shotcrete is placed with daily mean temperatures 40°F or lower, cold weather protection shall be provided until the shotcrete achieves 70 percent of the specified strength.

C. Unless otherwise specified, complete moist curing by one of the following methods:
1. Ponding or continuous sprinkling for a minimum of 7 days;
2. Covering with an absorptive mat or sand that is kept continuously wet;
3. Covering with impervious sheet material;
4. Use of curing compounds; apply twice the rate for formed surfaces as recommended by manufacturer if the surface is a gun finish.

D. Do not use natural curing in lieu of that specified in this section unless the relative humidity of the air in contact with the shotcrete remains at or above 85 percent and such curing is authorized by Engineer.

3.07 TOLERANCES

A. Dimensional tolerances of finished shotcrete shall comply with the following:
1. Horizontal deviation from planned alignment and finished surface: +/- 1 inch;

2. Deviation from cross-sectional dimensions: -1/4 inch to +1 inch;

3.08 ACCEPTANCE OF WORK

A. Remove and replace shotcrete that exhibits laminations, voids, or sand pockets.

B. Shotcrete Work that meets specifications shall be accepted.

C. Shotcrete Work that has previously failed to meet one or more requirements, but has been repaired to bring it into compliance shall be accepted.

D. Shotcrete Work that fails to meet one or more requirements and that cannot be brought into compliance shall be either accepted or rejected by Engineer. Modifications to the mixture proportions or the shotcreting procedures shall be implemented to assure that remaining Work complies with the requirements.

E. The basis for acceptance or rejection of shotcrete properties shall be the specified compressive strength.

END OF SECTION

APPENDIX B - SNAIL OUTPUT

STRUCTURAL DESIGN CALCULATIONS

SOIL NAIL & SHOTCRETE RETAINING WALL
195 PINE DRIVE
FAIRFAX, CALIFORNIA 94930

Prepared for:

Town of Fairfax Public Works
142 Bolinas Road
Fairfax, California 94930

Project No. 201.209

May 16, 2022

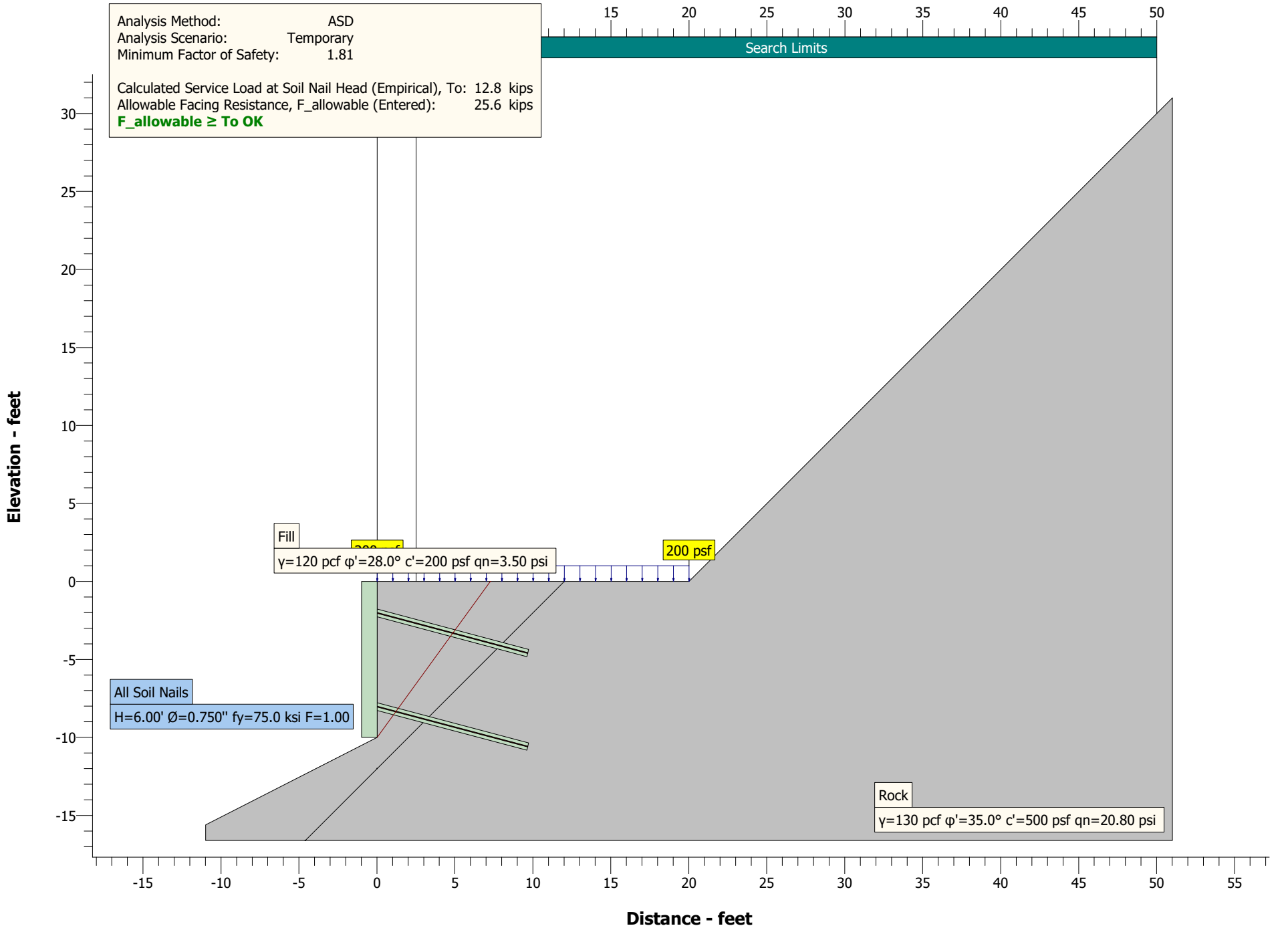
Prepared by:
MILLER PACIFIC ENGINEERING GROUP

Rusty Arend
Geotechnical Engineer No. 3031
(Expires 6/30/23)

REVIEWED BY

Scott Stephens
Geotechnical Engineer No. 2398
(Expires 6/30/23)

SNAIL OUTPUT – 10-FT-TALL WALL


Analysis Method: ASD
Analysis Scenario: Temporary
Minimum Factor of Safety: 1.81
Calculated Service Load at Soil Nail Head (Empirical), To: 12.8 kips
Allowable Facing Resistance, F_allowable (Entered): 25.6 kips
F_allowable ≥ To OK
Search Limits
Fill
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
200 psf
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

Snail

Version: 2.2.2

File Information

File Name: 10 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:51:43

Project Information

Description: 10 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

Geometry

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 10.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	-27	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	2
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	10.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	2.00 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Temporary

Factor of Safety:

Minimum: 1.81
Found at Search Point: 2
Found at Grid Point: 55
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 12.8 kips
Allowable Facing Resistance, F_allowable (Entered): 25.6 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

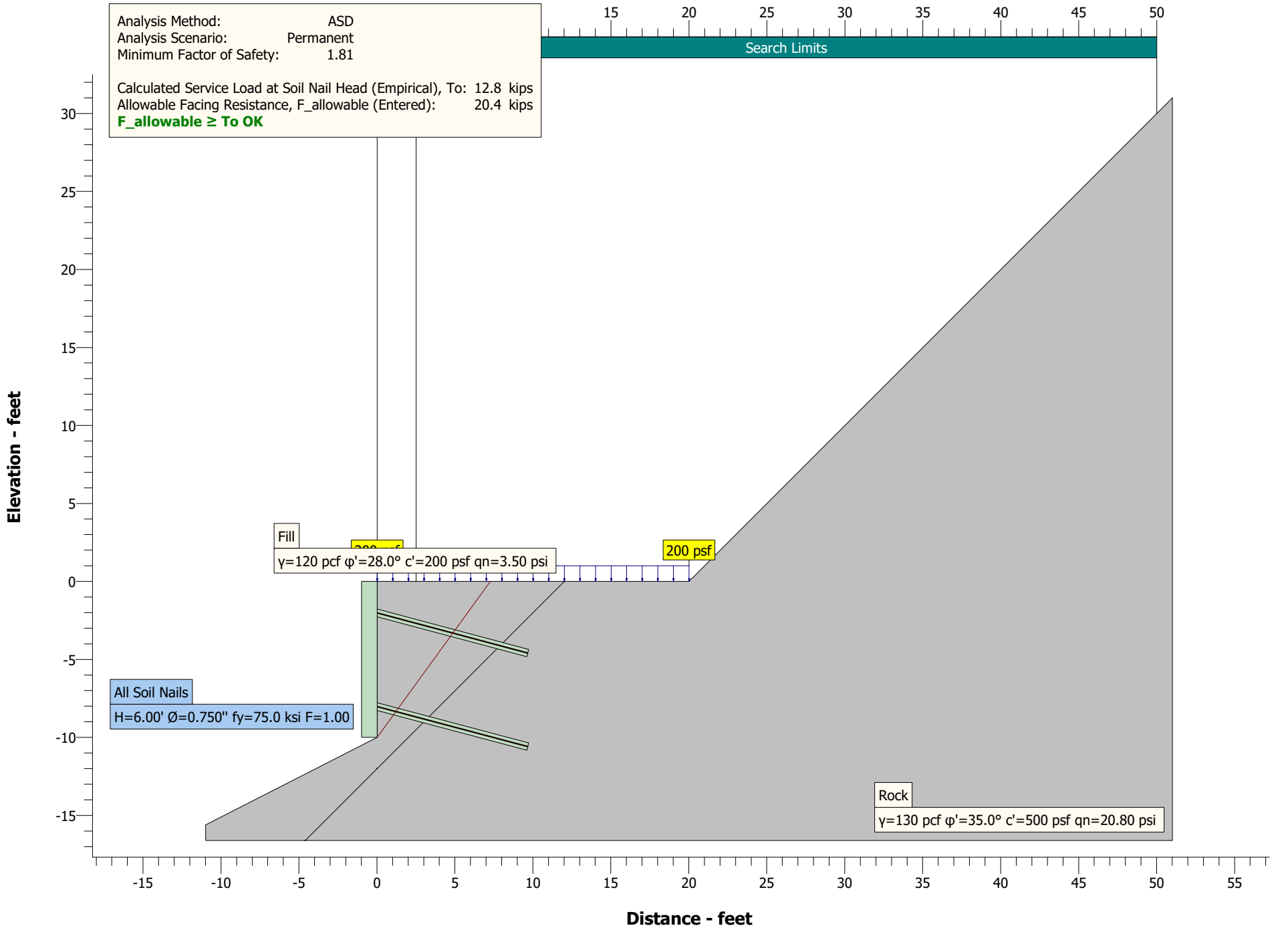
Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 12.8 kips (Clouterre)

			Failure Planes				Reinforcement		
			Lower		Upper				
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.18	2.50	74.06	7.28	80.54	3.04	1	15.2	Pullout
							2	38.3	Pullout
** 2	1.81	7.25	54.06	12.35	0.00	0.00	1	12.6	Pullout
							2	37.7	Pullout
3	2.07	12.00	39.81	15.62	0.00	0.00	1	10.3	Pullout
							2	37.1	Pullout
4	3.30	16.75	30.84	19.51	0.00	0.00	1	2.3	Pullout
							2	36.6	Pullout
5	3.85	21.50	28.14	24.38	0.00	0.00	1	0.0	Pullout
							2	36.5	Pullout
6	4.24	26.25	27.95	20.80	39.54	10.21	1	0.0	Pullout
							2	36.5	Pullout
7	4.13	31.00	34.11	37.44	0.00	0.00	1	6.6	Pullout
							2	36.8	Pullout
8	3.66	35.75	35.76	44.06	0.00	0.00	1	8.6	Pullout
							2	36.9	Pullout
9	3.36	40.50	36.98	50.70	0.00	0.00	1	9.8	Pullout
							2	37.0	Pullout
10	3.15	45.25	37.92	57.36	0.00	0.00	1	10.0	Pullout
							2	37.0	Pullout
11	3.00	50.00	38.66	64.03	0.00	0.00	1	10.1	Pullout
							2	37.0	Pullout

END OF REPORT


Analysis Method: ASD
Analysis Scenario: Permanent
Minimum Factor of Safety: 1.81
Calculated Service Load at Soil Nail Head (Empirical), To: 12.8 kips
Allowable Facing Resistance, F_allowable (Entered): 20.4 kips
F_allowable ≥ To OK
Search Limits
Fill
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
200 psf
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

Snail

Version: 2.2.2

File Information

File Name: 10 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:51:20

Project Information

Description: 10 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

Geometry

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 10.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	-27	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	2
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	10.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	2.00 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Permanent

Factor of Safety:

Minimum: 1.81
Found at Search Point: 2
Found at Grid Point: 55
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 12.8 kips
Allowable Facing Resistance, F_allowable (Entered): 20.4 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

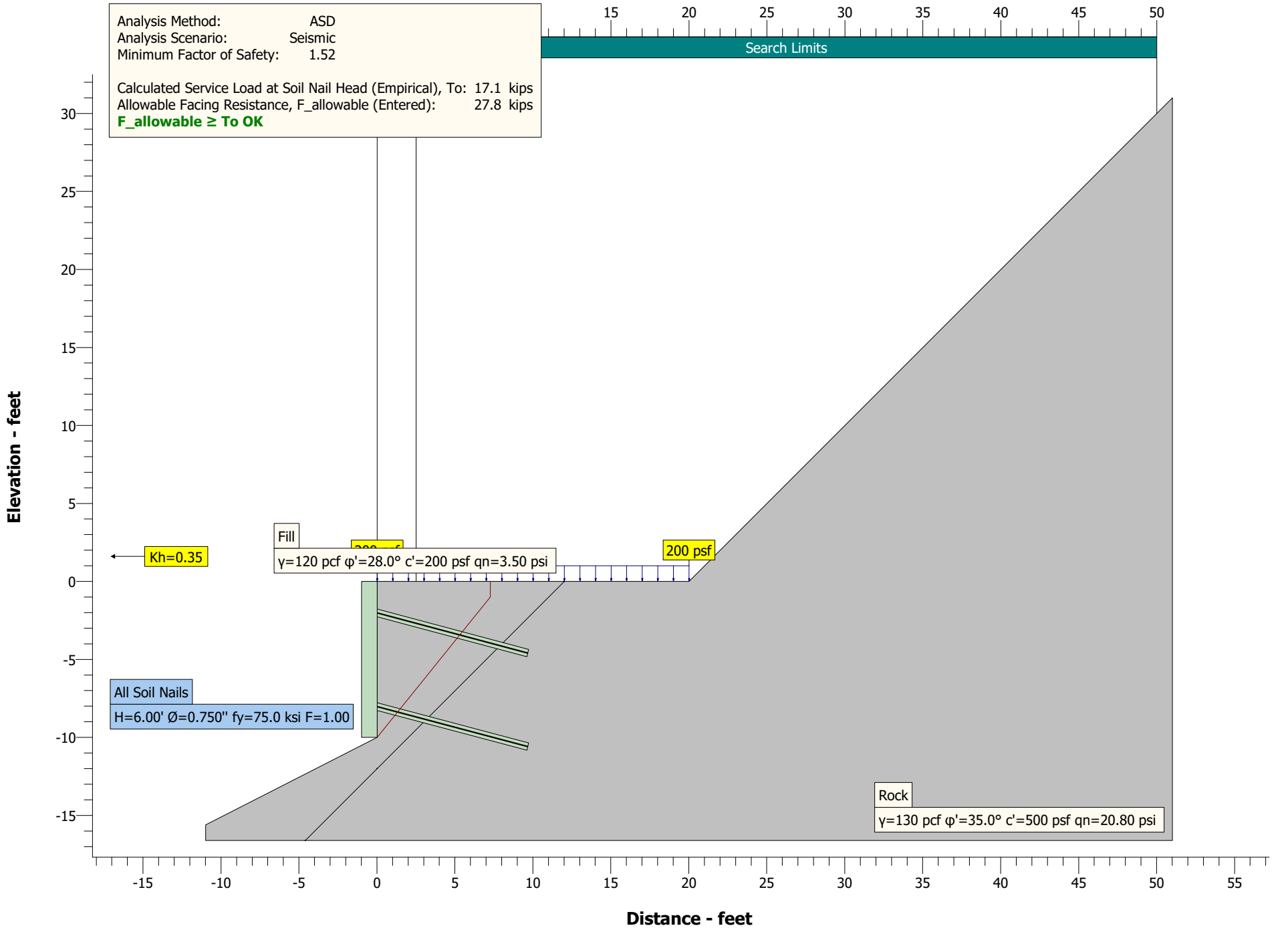
Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 12.8 kips (Clouterre)

			Failure Planes				Reinforcement		
			Lower		Upper				
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.18	2.50	74.06	7.28	80.54	3.04	1	15.2	Pullout
							2	38.3	Pullout
** 2	1.81	7.25	54.06	12.35	0.00	0.00	1	12.6	Pullout
							2	37.7	Pullout
3	2.07	12.00	39.81	15.62	0.00	0.00	1	10.3	Pullout
							2	37.1	Pullout
4	3.30	16.75	30.84	19.51	0.00	0.00	1	2.3	Pullout
							2	36.6	Pullout
5	3.85	21.50	28.14	24.38	0.00	0.00	1	0.0	Pullout
							2	36.5	Pullout
6	4.24	26.25	27.95	20.80	39.54	10.21	1	0.0	Pullout
							2	36.5	Pullout
7	4.13	31.00	34.11	37.44	0.00	0.00	1	6.6	Pullout
							2	36.8	Pullout
8	3.66	35.75	35.76	44.06	0.00	0.00	1	8.6	Pullout
							2	36.9	Pullout
9	3.36	40.50	36.98	50.70	0.00	0.00	1	9.8	Pullout
							2	37.0	Pullout
10	3.15	45.25	37.92	57.36	0.00	0.00	1	10.0	Pullout
							2	37.0	Pullout
11	3.00	50.00	38.66	64.03	0.00	0.00	1	10.1	Pullout
							2	37.0	Pullout

END OF REPORT


Analysis Method: ASD
Analysis Scenario: Seismic
Minimum Factor of Safety: 1.52
Calculated Service Load at Soil Nail Head (Empirical), To: 17.1 kips
Allowable Facing Resistance, F_allowable (Entered): 27.8 kips
F_allowable ≥ To OK
Search Limits
Kh=0.35
Fill
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
200 psf
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

Snail

Version: 2.2.2

File Information

File Name: 10 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:50:56

Project Information

Description: 10 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

Geometry

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 10.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	-27	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	2
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	10.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	2.00 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Seismic

Factor of Safety:

Minimum: 1.52
Found at Search Point: 2
Found at Grid Point: 54
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 17.1 kips
Allowable Facing Resistance, F_allowable (Entered): 27.8 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

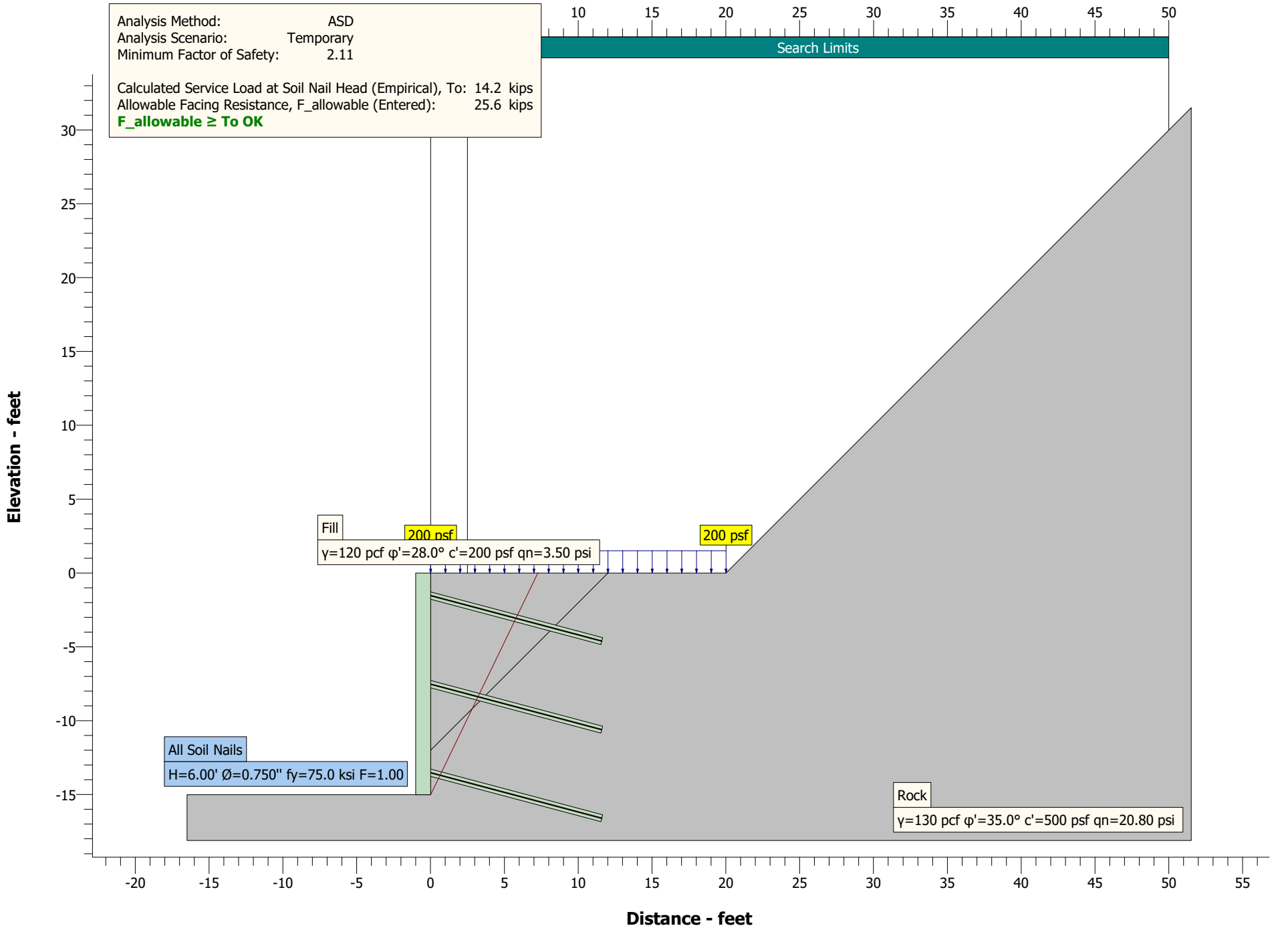
** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 17.1 kips (Clouterre)

			Failure Planes				Reinforcement		
			Lower		Upper				
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.15	2.50	72.18	7.35	85.24	3.01	1	20.0	Pullout
							2	51.0	Pullout
** 2	1.52	7.25	51.15	11.56	90.00	1.00	1	16.2	Pullout
							2	50.1	Pullout
3	1.52	12.00	39.81	15.62	0.00	0.00	1	13.8	Pullout
							2	49.5	Pullout
4	2.05	16.75	28.25	19.01	90.00	1.00	1	0.0	Pullout
							2	48.6	Pullout
5	2.31	21.50	25.71	23.86	-90.00	1.15	1	0.0	Pullout
							2	48.4	Pullout
6	2.32	26.25	20.38	28.00	90.00	6.50	1	0.0	Pullout
							2	47.8	Pullout
7	2.17	31.00	18.71	32.73	90.00	10.50	1	0.0	Pullout
							2	46.8	Pullout
8	1.99	35.75	19.81	38.00	-90.00	12.87	1	0.0	Pullout
							2	47.6	Pullout
9	1.81	40.50	20.63	43.28	-90.00	15.25	1	0.0	Pullout
							2	47.9	Pullout
10	1.67	45.25	21.28	48.56	90.00	17.62	1	0.0	Pullout
							2	47.9	Pullout
11	1.55	50.00	21.80	53.85	90.00	20.00	1	0.0	Pullout
							2	48.0	Pullout

END OF REPORT

SNAIL OUTPUT – 15-FT-TALL WALL


Analysis Method: ASD
Analysis Scenario: Temporary
Minimum Factor of Safety: 2.11
Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 25.6 kips
F_allowable ≥ To OK
Search Limits
Fill
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
200 psf
200 psf
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

==========

Snail

Version: 2.2.2

==========

File Information

==========

File Name: 15 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:47:46

==========

Project Information

==========

Description: 15 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

==========

Geometry

==========

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 15.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	3
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	12.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	1.50 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Temporary

Factor of Safety:

Minimum: 2.11
Found at Search Point: 2
Found at Grid Point: 55
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 25.6 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

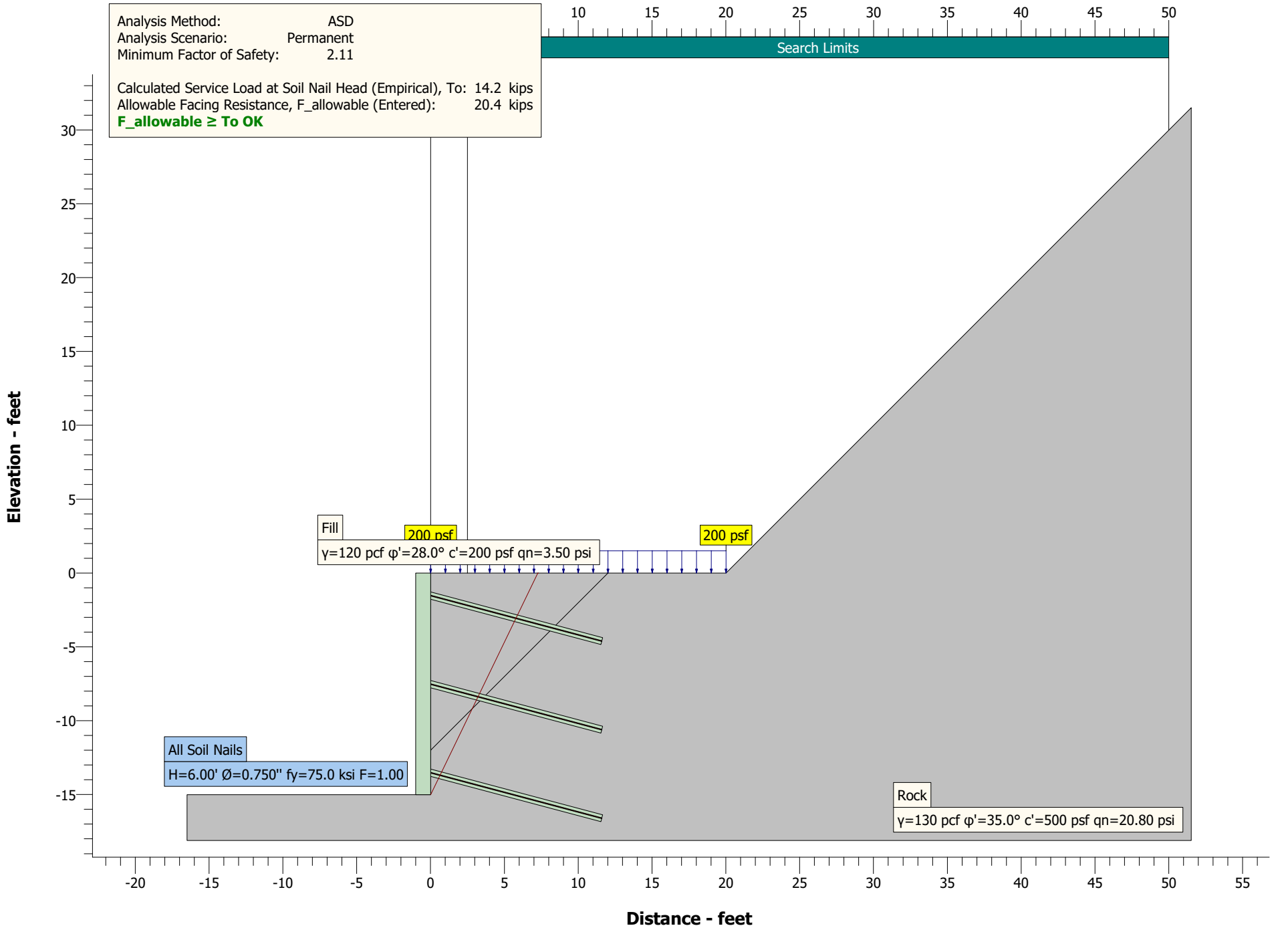
** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 14.2 kips (Clouterre)

Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Failure Planes: Lower Angle degrees	Lower Length feet	Upper Angle degrees	Upper Length feet	Reinforcement: Level	Stress ksi	Controlling Resistance Failure Mode
1	2.58	2.50	79.38	12.21	85.24	3.01	1	23.8	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
** 2	2.11	7.25	64.20	16.66	0.00	0.00	1	20.6	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
3	2.49	12.00	45.00	16.97	-90.00	3.00	1	5.2	Pullout
							2	31.3	Pullout
							3	41.7	Bar Yield
4	2.46	16.75	41.85	22.48	0.00	0.00	1	0.0	Pullout
							2	28.4	Pullout
							3	41.7	Bar Yield
5	2.69	21.50	37.50	27.10	0.00	0.00	1	0.0	Pullout
							2	24.0	Pullout
							3	41.7	Bar Yield
6	2.87	26.25	32.93	31.27	-90.00	4.25	1	0.0	Pullout
							2	18.7	Pullout
							3	41.7	Bar Yield
7	2.87	31.00	30.42	35.95	90.00	7.80	1	0.0	Pullout
							2	15.5	Pullout
							3	41.7	Bar Yield
8	2.78	35.75	31.05	41.73	90.00	9.22	1	0.0	Pullout
							2	16.4	Pullout
							3	41.7	Bar Yield
9	2.68	40.50	31.53	47.52	90.00	10.65	1	0.0	Pullout
							2	17.0	Pullout
							3	41.7	Bar Yield
10	2.57	45.25	31.91	53.30	90.00	12.07	1	0.0	Pullout
							2	17.5	Pullout
							3	41.7	Bar Yield

11	2.46	50.00	28.37	56.82	-90.00	18.00	1	0.0	Pullout
							2	12.7	Pullout
							3	41.7	Bar Yield

END OF REPORT


Analysis Method: ASD
Analysis Scenario: Permanent
Minimum Factor of Safety: 2.11
Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 20.4 kips
F_allowable ≥ To OK
Search Limits
Fill
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
200 psf
200 psf
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

Snail

Version: 2.2.2

File Information

File Name: 15 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:47:20

Project Information

Description: 15 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

Geometry

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 15.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	3
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	12.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	1.50 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Permanent

Factor of Safety:

Minimum: 2.11
Found at Search Point: 2
Found at Grid Point: 55
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 20.4 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

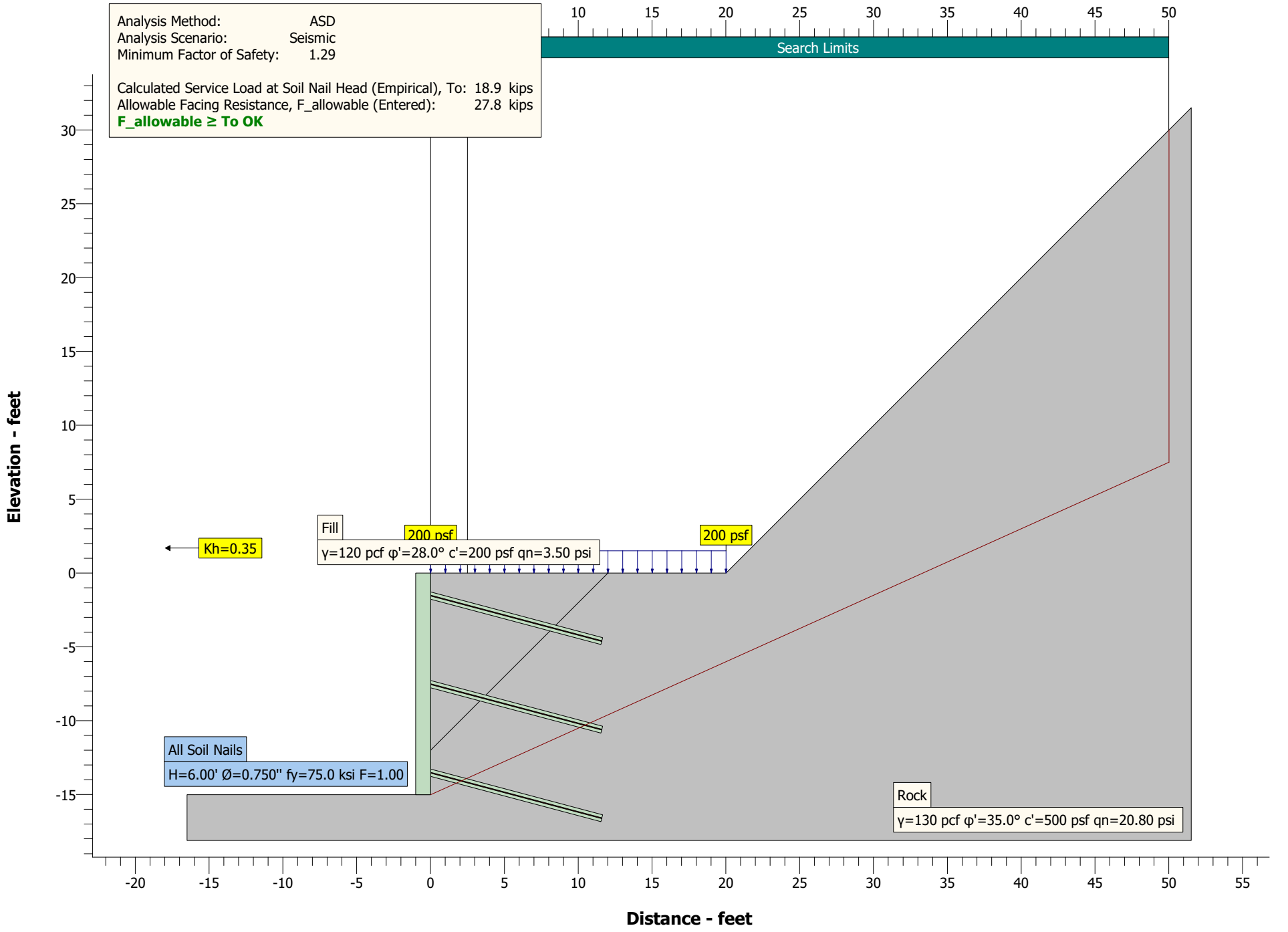
** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 14.2 kips (Clouterre)

Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Failure Planes: Lower Angle degrees	Lower Length feet	Upper Angle degrees	Upper Length feet	Reinforcement: Level	Stress ksi	Controlling Resistance Failure Mode
1	2.58	2.50	79.38	12.21	85.24	3.01	1	23.8	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
** 2	2.11	7.25	64.20	16.66	0.00	0.00	1	20.6	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
3	2.49	12.00	45.00	16.97	-90.00	3.00	1	5.2	Pullout
							2	31.3	Pullout
							3	41.7	Bar Yield
4	2.46	16.75	41.85	22.48	0.00	0.00	1	0.0	Pullout
							2	28.4	Pullout
							3	41.7	Bar Yield
5	2.69	21.50	37.50	27.10	0.00	0.00	1	0.0	Pullout
							2	24.0	Pullout
							3	41.7	Bar Yield
6	2.87	26.25	32.93	31.27	-90.00	4.25	1	0.0	Pullout
							2	18.7	Pullout
							3	41.7	Bar Yield
7	2.87	31.00	30.42	35.95	90.00	7.80	1	0.0	Pullout
							2	15.5	Pullout
							3	41.7	Bar Yield
8	2.78	35.75	31.05	41.73	90.00	9.22	1	0.0	Pullout
							2	16.4	Pullout
							3	41.7	Bar Yield
9	2.68	40.50	31.53	47.52	90.00	10.65	1	0.0	Pullout
							2	17.0	Pullout
							3	41.7	Bar Yield
10	2.57	45.25	31.91	53.30	90.00	12.07	1	0.0	Pullout
							2	17.5	Pullout
							3	41.7	Bar Yield

11	2.46	50.00	28.37	56.82	-90.00	18.00	1	0.0	Pullout
							2	12.7	Pullout
							3	41.7	Bar Yield

END OF REPORT


Analysis Method: ASD
Analysis Scenario: Seismic
Minimum Factor of Safety: 1.29
Calculated Service Load at Soil Nail Head (Empirical), To: 18.9 kips
Allowable Facing Resistance, F_allowable (Entered): 27.8 kips
F_allowable ≥ To OK
Search Limits
Kh=0.35
Fill
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
200 psf
200 psf
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

Snail

Version: 2.2.2

File Information

File Name: 15 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:46:49

Project Information

Description: 15 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

Geometry

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 15.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	3
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	12.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	1.50 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Seismic

Factor of Safety:

Minimum: 1.29
Found at Search Point: 11
Found at Grid Point: 44
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 18.9 kips
Allowable Facing Resistance, F_allowable (Entered): 27.8 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

** Indicates Minimum Factor of Safety

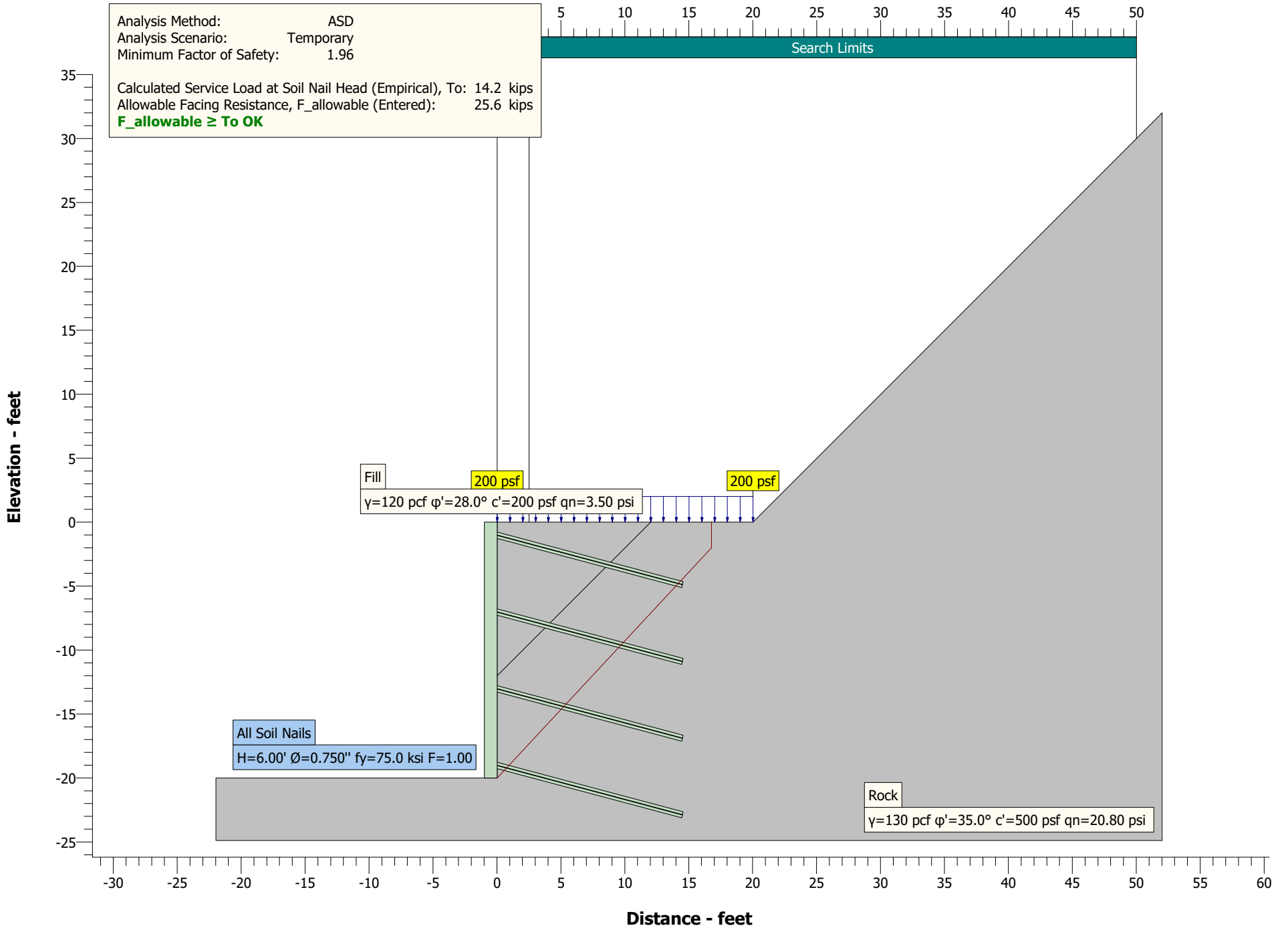
Search Level: At the toe of the wall Facing Design Force = 18.9 kips (Clouterre)

			Failure Planes				Reinforcement		
			Lower		Upper				
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.53	2.50	71.57	6.32	86.82	9.01	1	31.6	Pullout
							2	55.6	Bar Yield
							3	55.6	Bar Yield
2	1.93	7.25	64.20	16.66	0.00	0.00	1	27.4	Pullout
							2	55.6	Bar Yield
							3	55.6	Bar Yield
3	1.69	12.00	41.19	15.95	-90.00	4.50	1	0.0	Pullout
							2	37.0	Pullout
							3	55.6	Bar Yield
4	1.64	16.75	35.62	20.60	90.00	3.00	1	0.0	Pullout
							2	29.2	Pullout
							3	55.6	Bar Yield
5	1.67	21.50	28.25	24.41	90.00	4.95	1	0.0	Pullout
							2	16.7	Pullout
							3	55.6	Bar Yield
6	1.65	26.25	25.91	29.18	-90.00	8.50	1	0.0	Pullout
							2	12.1	Pullout
							3	55.6	Bar Yield
7	1.59	31.00	22.75	33.62	90.00	13.00	1	0.0	Pullout
							2	5.0	Pullout
							3	55.6	Bar Yield
8	1.51	35.75	23.27	38.92	90.00	15.37	1	0.0	Pullout
							2	6.2	Pullout
							3	55.6	Bar Yield
9	1.43	40.50	23.67	44.22	90.00	17.75	1	0.0	Pullout
							2	7.1	Pullout
							3	55.6	Bar Yield
10	1.36	45.25	23.98	49.52	90.00	20.12	1	0.0	Pullout
							2	7.8	Pullout
							3	55.6	Bar Yield

** 11	1.29	50.00	24.23	54.83	-90.00	22.50	1	0.0	Pullout
							2	8.4	Pullout
							3	55.6	Bar Yield

END OF REPORT

SNAIL OUTPUT – 20-FT-TALL WALL


Analysis Method: ASD
Analysis Scenario: Temporary
Minimum Factor of Safety: 1.96
Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 25.6 kips
F_allowable ≥ To OK
Search Limits
Fill
200 psf
200 psf
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

Snail

Version: 2.2.2

File Information

File Name: 20 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:53:32

Project Information

Description: 20 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

Geometry

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 20.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	4
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	15.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	1.00 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Temporary

Factor of Safety:

Minimum: 1.96
Found at Search Point: 4
Found at Grid Point: 54
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 25.6 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

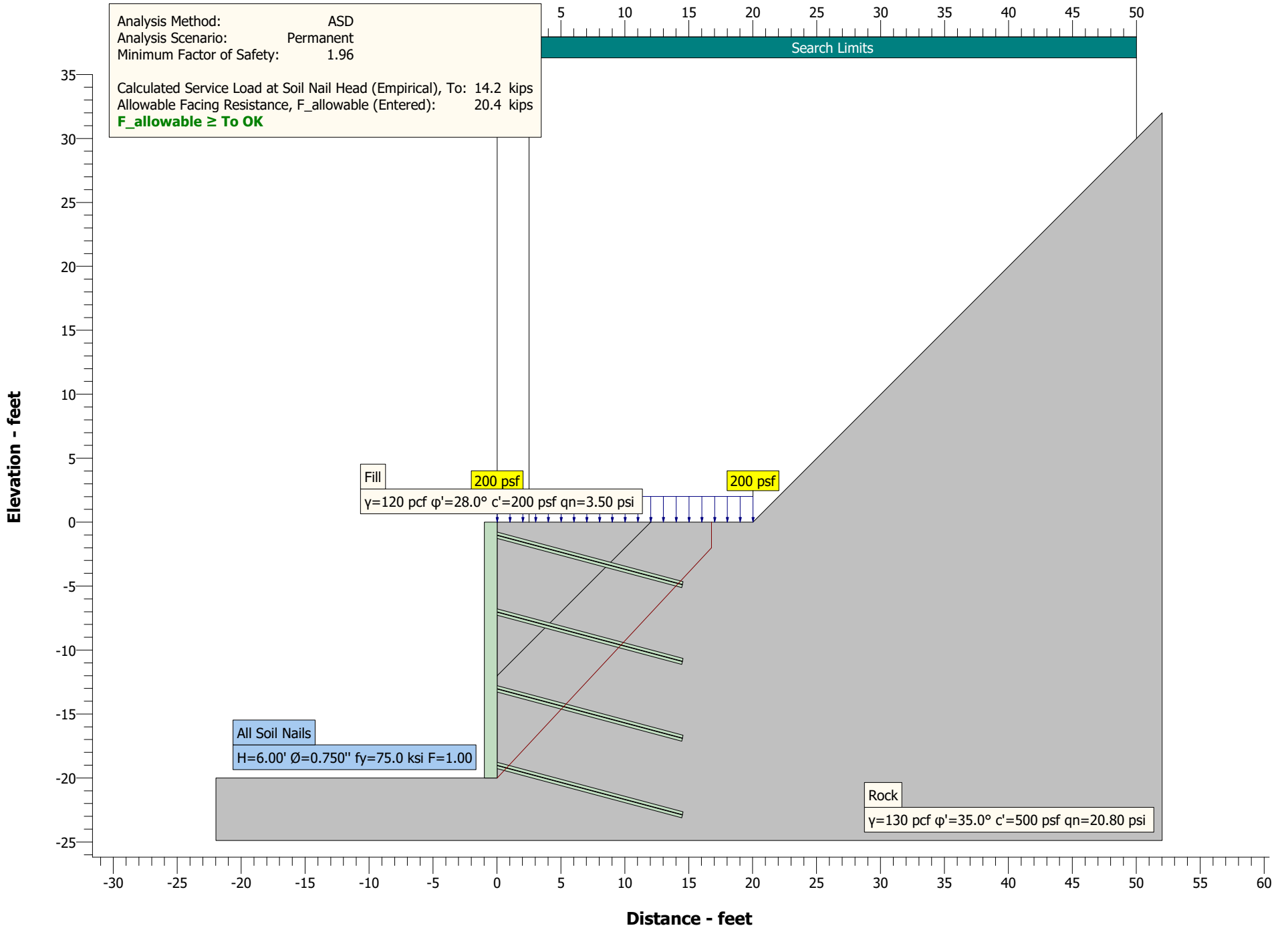
** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 14.2 kips (Clouterre)

Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Failure Planes: Lower Angle degrees	Failure Planes: Lower Length feet	Failure Planes: Upper Angle degrees	Failure Planes: Upper Length feet	Reinforcement Level	Reinforcement Stress ksi	Controlling Resistance Failure Mode
1	2.58	2.50	79.38	12.21	88.21	8.00	1	37.8	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
2	2.10	7.25	67.81	17.28	79.73	4.07	1	33.8	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
3	2.06	12.00	53.13	20.00	90.00	4.00	1	14.5	Pullout
							2	35.1	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
** 4	1.96	16.75	47.06	24.59	90.00	2.00	1	1.9	Pullout
							2	26.5	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
5	2.05	21.50	45.00	30.41	0.00	0.00	1	0.0	Pullout
							2	23.4	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
6	2.17	26.25	38.66	33.62	-90.00	5.25	1	0.0	Pullout
							2	12.8	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
7	2.18	31.00	38.66	39.70	90.00	6.20	1	0.0	Pullout
							2	12.8	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
8	2.15	35.75	34.99	43.64	90.00	10.72	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield

9	2.10	40.50	34.99	49.44	-90.00	12.15	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield
10	2.05	45.25	34.99	55.23	-90.00	13.57	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield
11	1.99	50.00	34.99	61.03	90.00	15.00	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield

END OF REPORT


Analysis Method: ASD
Analysis Scenario: Permanent
Minimum Factor of Safety: 1.96
Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 20.4 kips
F_allowable ≥ To OK
Search Limits
Fill
200 psf
200 psf
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

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Snail

Version: 2.2.2

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File Information

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File Name: 20 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:53:09

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Project Information

==========

Description: 20 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

==========

Geometry

==========

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 20.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	4
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	15.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	1.00 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Permanent

Factor of Safety:

Minimum: 1.96
Found at Search Point: 4
Found at Grid Point: 54
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 14.2 kips
Allowable Facing Resistance, F_allowable (Entered): 20.4 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

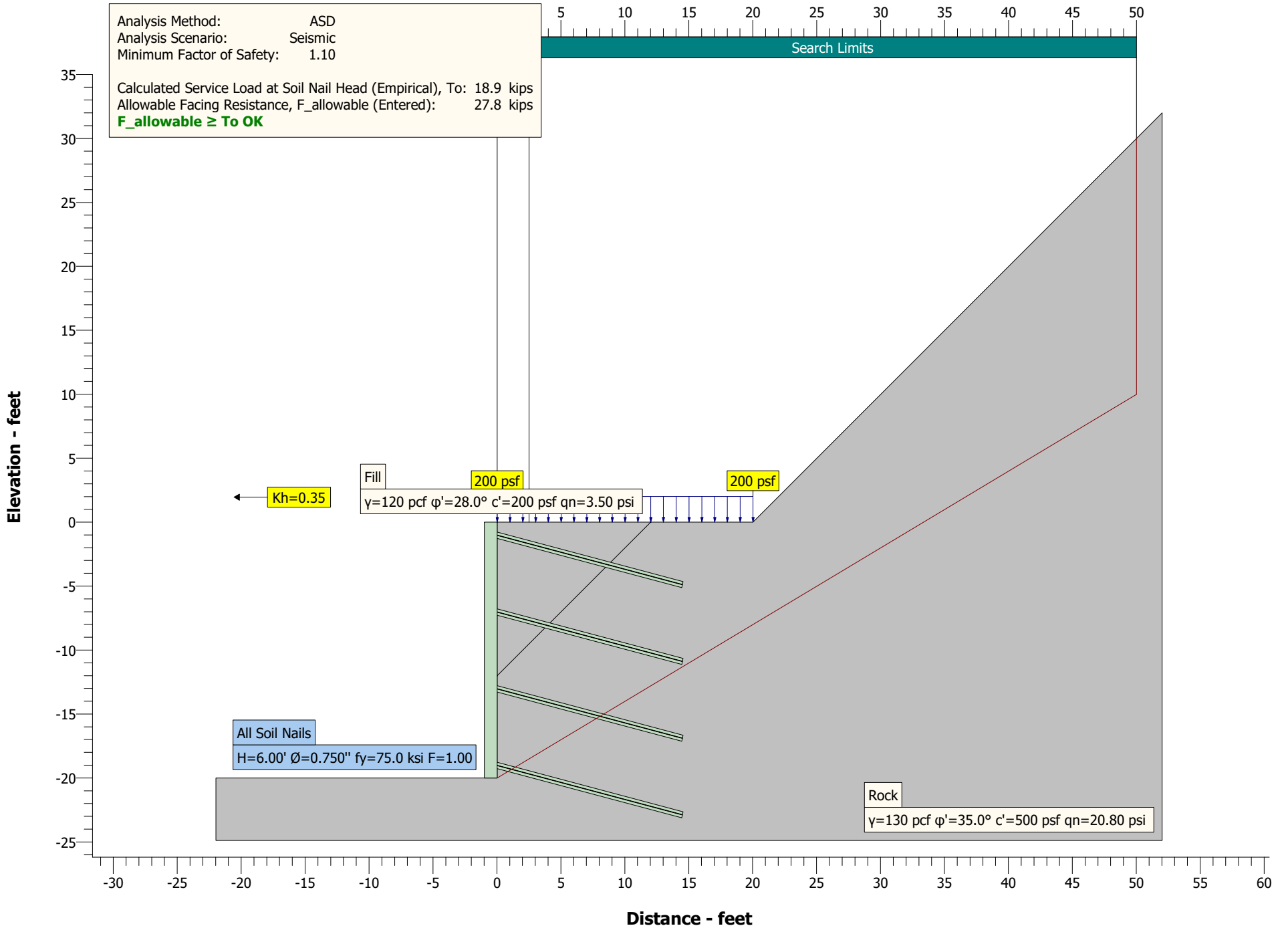
** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 14.2 kips (Clouterre)

Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Failure Planes: Lower Angle degrees	Lower Length feet	Upper Angle degrees	Upper Length feet	Reinforcement Level	Reinforcement Stress ksi	Controlling Resistance Failure Mode
1	2.58	2.50	79.38	12.21	88.21	8.00	1	37.8	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
2	2.10	7.25	67.81	17.28	79.73	4.07	1	33.8	Pullout
							2	41.7	Bar Yield
							3	41.7	Bar Yield
							4	41.7	Bar Yield
3	2.06	12.00	53.13	20.00	90.00	4.00	1	14.5	Pullout
							2	35.1	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
** 4	1.96	16.75	47.06	24.59	90.00	2.00	1	1.9	Pullout
							2	26.5	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
5	2.05	21.50	45.00	30.41	0.00	0.00	1	0.0	Pullout
							2	23.4	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
6	2.17	26.25	38.66	33.62	-90.00	5.25	1	0.0	Pullout
							2	12.8	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
7	2.18	31.00	38.66	39.70	90.00	6.20	1	0.0	Pullout
							2	12.8	Pullout
							3	41.7	Bar Yield
							4	41.7	Bar Yield
8	2.15	35.75	34.99	43.64	90.00	10.72	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield

9	2.10	40.50	34.99	49.44	-90.00	12.15	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield
10	2.05	45.25	34.99	55.23	-90.00	13.57	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield
11	1.99	50.00	34.99	61.03	90.00	15.00	1	0.0	Pullout
							2	5.8	Pullout
							3	40.0	Pullout
							4	41.7	Bar Yield

END OF REPORT


Analysis Method: ASD
Analysis Scenario: Seismic
Minimum Factor of Safety: 1.10
Calculated Service Load at Soil Nail Head (Empirical), To: 18.9 kips
Allowable Facing Resistance, F_allowable (Entered): 27.8 kips
F_allowable ≥ To OK
Search Limits
Kh=0.35
Fill
200 psf
200 psf
γ=120 pcf φ'=28.0° c'=200 psf qn=3.50 psi
All Soil Nails
H=6.00' Ø=0.750" fy=75.0 ksi F=1.00
Rock
γ=130 pcf φ'=35.0° c'=500 psf qn=20.80 psi
Elevation - feet
Distance - feet

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File Information
==========

File Name: 20 Ft wall Section.snz
Run Date: 05/13/22
Run Time: 16:52:44

==========
Project Information
==========

Description: 20 Ft Wall
Location:
EA:
Project ID: 201.209
Wall No.:
Structure No.:
Station:
Engineer: MPEG
Designer

Comments:

==========
Geometry
==========

Layout:

Reference Point:

At: Top of Wall
Distance From Origin: 0.00 feet
Elevation Above Origin: 0.00 feet

Wall Dimensions:

Wall Height: 20.00 feet
Facing Angle: 90.00 degrees
Facing Batter: 0.000 :12 H:V

Ground Surface:

Number of lines that define the ground surface above the wall: 2

No.	Angle degrees	Distance feet
1	0	20.00
2	45	

Number of lines that define the ground surface in front of the toe: 1

No.	Angle degrees	Distance feet
1	0	

Soil Layers:

Number of Layers: 2

Layers Below the Top Layer:

Coordinates of the Top of the Layer: feet

Layer	Point 1 Distance	Point 1 Elevation	Point 2 Distance	Point 2 Elevation
2	0.00	-12.00	12.00	0.00

Ground Water:

Include Ground Water: No

Soil Nails

Dimensions and Properties:

Maximum Vertical Spacing:	6.00 feet
Number of Soil Nail Rows:	4
Soil Nail Design Parameters:	Uniform Throughout Cross-Section
Soil Nail Length:	15.00 feet
Inclination From Horizontal:	15 degrees
Vertical Distance from Top of Wall to First Row:	1.00 feet
Vertical Spacing:	6.00 feet
Horizontal Spacing H:	6.00 feet
Nail Bar Diameter Ø:	0.750 inches
Nail Bar Yield Strength fy:	75.0 ksi

Facing Resistance:

	Temporary	Permanent	Seismic
ASD Allowable Facing Resistance:	25.6	20.4	27.8 kips

Soil Properties

Layer	Description	Unit Weight γ pcf	Friction Angle φ' degrees	Cohesion c' psf
1	Fill	120	28.0	200
2	Rock	130	35.0	500

Loads

Applied Loads:

Seismic:

Horizontal Seismic Coefficient Kh0.35:

External Load:

Apply external load: No

Surcharges:

Apply surcharges: Yes

No.	Distance from Top of Wall Begin feet	End feet	Load Begin psf	Load End psf
1	0.00	20.00	200	200

Factors of Safety

	Temporary	Permanent	Seismic
Pullout (Distal):	2.00	2.00	1.50
Pullout (Proximal):	2.00	2.00	1.50
Nail Bar Yield:	1.80	1.80	1.35

Search Options

Search Limits:

Begin: 2.50 feet
End: 50.00 feet

Below Toe Searches (BTS):

Perform below Toe Search: No

Advanced Search Options:

Use Advanced Search Options: No

Results

Analysis:

Method: ASD
Scenario: Seismic

Factor of Safety:

Minimum: 1.10
Found at Search Point: 11
Found at Grid Point: 48
Found at Search Level: Toe of the wall

Load at Soil Nail Head:

Calculated Service Load at Soil Nail Head (Empirical), To: 18.9 kips
Allowable Facing Resistance, F_allowable (Entered): 27.8 kips
F_allowable ≥ To OK

Nominal Pullout Resistance:

Layer	Description	Nominal Pullout Resistance klf
1	Fill	0.792
2	Rock	4.705

Results by Search Level:

** Indicates Minimum Factor of Safety

Search Level: At the toe of the wall Facing Design Force = 18.9 kips (Clouterre)

			Failure Planes				Reinforcement		
			Lower		Upper				
Search Point	Minimum Factor of Safety	Distance From Toe of Wall feet	Angle degrees	Length feet	Angle degrees	Length feet	Level	Stress ksi	Controlling Resistance Failure Mode
1	2.47	2.50	79.38	12.21	88.21	8.00	1	50.4	Pullout
							2	55.6	Bar Yield
							3	55.6	Bar Yield
							4	55.6	Bar Yield
2	1.93	7.25	67.81	17.28	79.73	4.07	1	45.1	Pullout
							2	55.6	Bar Yield
							3	55.6	Bar Yield
							4	55.6	Bar Yield
3	1.55	12.00	49.40	18.44	90.00	6.00	1	18.3	Pullout
							2	39.9	Pullout
							3	55.6	Bar Yield
							4	55.6	Bar Yield
4	1.33	16.75	39.89	21.83	90.00	6.00	1	0.0	Pullout
							2	19.9	Pullout
							3	55.6	Bar Yield
							4	55.6	Bar Yield
5	1.32	21.50	34.99	26.24	90.00	6.45	1	0.0	Pullout
							2	7.8	Pullout
							3	53.3	Pullout
							4	55.6	Bar Yield
6	1.31	26.25	30.96	30.61	-90.00	10.50	1	0.0	Pullout
							2	0.0	Pullout
							3	47.2	Pullout
							4	55.6	Bar Yield
7	1.27	31.00	30.96	36.15	90.00	12.40	1	0.0	Pullout
							2	0.0	Pullout
							3	47.2	Pullout
							4	55.6	Bar Yield
8	1.23	35.75	30.96	41.69	90.00	14.30	1	0.0	Pullout
							2	0.0	Pullout
							3	47.2	Pullout
							4	55.6	Bar Yield

9	1.18	40.50	30.96	47.23	-90.00	16.20	1	0.0	Pullout
							2	0.0	Pullout
							3	47.2	Pullout
							4	55.6	Bar Yield
10	1.14	45.25	30.96	52.77	-90.00	18.10	1	0.0	Pullout
							2	0.0	Pullout
							3	47.2	Pullout
							4	55.6	Bar Yield
** 11	1.10	50.00	30.96	58.31	90.00	20.00	1	0.0	Pullout
							2	0.0	Pullout
							3	47.2	Pullout
							4	55.6	Bar Yield

END OF REPORT