CONSTRUCTION CONTRACT

THIS CONSTRUCTION CONTRACT ("Contract") is made and entered into on the date of the last signature set forth below, by and between the City of Littleton, a municipal corporation within the State of Colorado ("City"), and Edge Contracting, Inc., a Colorado corporation ("Contractor"). The Contractor and the City are referred to as a "Party" or collectively the "Parties."

1.1 **Contract Documents and Exhibits**. The term "Contract Documents" consist of this Contract together with the following:

Exhibit A	Scope of Work
Exhibit B	Bid Schedule
Exhibit C	Performance and Payment Bond
Exhibit D	Littleton Engineering Design Standards ("Standards and Specifications") (Incorporated by Reference Only) (Exhibit D Available online)
Exhibit E	Drawings and Specifications
Exhibit F	Special Conditions

All exhibits referred to in this Contract are attached hereto and are, by reference, incorporated herein for all purposes. Any forms provided within the Contract are not intended to be considered final, and the City expressly reserves the right to modify said contract forms, in its sole discretion. In the event any matter, term, provision, or condition that is the subject of this Contract requires clarification or is in dispute, or is the subject of a difference of opinion, the purpose and intent of the Contract shall be first ascertained by reference to the Contract Documents in their entirety. In the event of any dispute or differences between the respective documents that constitute the Contract Documents, then the Contractor shall secure the written instructions from the City before proceeding with the performance of the services affected by such conflicts, omissions or discrepancies.

1.2 **Project.**

1.2.1 The Contractor shall commence and complete the Scope of Work ("Work"), **Exhibit A**, in accordance with the Contract Documents, as defined herein. The Contractor agrees to perform and complete the Work in a proper and workmanlike manner, consistent with the highest standards of professional and construction practices and in full compliance with, and as required by or pursuant to, this Contract, and with the greatest economy, efficiency, and expedition consistent therewith. The Contractor shall, at its own expense, furnish all labor, materials, tools, supplies, machinery, utilities, permits, licenses, and other equipment that may be necessary for the completion of

the Work, as outlined in the Contract Documents. The Contractor shall have no property right in materials after they have been attached, affixed or incorporated in the Work or the soil.

1.2.2 Further, the Contractor acknowledges that all reasonably necessary steps were taken to ascertain the nature and location of the Work, and the general and local conditions which can affect the Work or the cost of the Work. Failure by the Contractor to do so will not relieve it from responsibility for successfully performing Work without additional expense to the City. The City will not be responsible for any understanding or representations concerning conditions unless such understanding or representations are expressly stated in the Contract.

1.2.3 The City shall furnish all lands and rights-of-way required for completion of the Work. In acquiring rights-of-way, the City will proceed as expeditiously as possible, but in the event all rights-of-way or easements are not acquired prior to the beginning of construction, the Contractor shall begin Work on such lands and rights-of-way as have been acquired. No claim for damage will be allowed or shall be made by reason of the City's delay in obtaining lands, easements or rights-of-way. In the event of litigation or other delays in acquiring rights-of-way, the time allowed herein for completion will be extended to compensate for the time actually lost by such delay.

1.3 **Commencement and Completion of the Project**. The Contractor understands and agrees that all Work required under this Contract shall not commence until a Notice to Proceed is issued and shall be fully completed within **120 calendar days of receiving Notice to Proceed**. The Contractor acknowledges and understands that it is an essential term of this Contract that Contractor maintain a rate of progress in the Work that will result in completion of the Work in accordance with the Contract Documents, and to that end, Contractor agrees to proceed with all due diligence to complete the Work in a timely manner in accordance with the Contract Documents.

1.4 **Contract Price**. The City accepts the Contractor's bid as set forth in the Bid Schedule, **Exhibit B**, in the total amount of **$1,643,680.00 (one million six hundred forty-three thousand six hundred eighty dollars and no cents).** The City shall make payment(s) to Contractor in the manner and at such times as set forth in the Standards and Specifications. Should the Contract price exceed one-hundred and fifty-thousand dollars ($150,000.00), the City shall deduct and retain five (5) percent from the total amount of each approved invoice, including Change Orders. The City may also deduct in addition to retainage as stated above, the additional amount(s) of any and all outstanding claims pursuant to Colorado Revised Statute ("C.R.S.") §38-26-107 from each approved invoice.

1.5 **Payments to Constitute Current Expenditures.**

1.5.1 Notwithstanding any other term, provision, or condition herein, all financial obligations of the City are contingent on funds for that purpose being appropriated, budgeted and otherwise made available by the City Council. The City's obligations under the Contract shall not constitute a multiple-fiscal year direct or indirect debt or other financial obligation of the City within the meaning of Article X, Section 20 of the Colorado Constitution.

1.5.2 Further, pursuant to 103.6(2) of Article 91, Title 24, C.R.S., no Change Order, Amendment, or other form of order or directive by the City which requires additional compensable work to be performed, and which work causes the aggregate amount payable under this Contract to exceed the amount appropriated for the original Contract, shall be executed, or shall work be performed by the Contractor, unless the City provides written assurances to the Contractor that lawful appropriations to cover the costs of such additional work have been made or unless such work is covered under a remedy-granting provision of this Contract. For purposes of this paragraph, "remedy-granting provision" shall be defined as set forth in C.R.S. §24-91-103.6(4).

1.6 **Confidentiality.** Notwithstanding any provision in the Contract Documents to the contrary, the City is obligated to comply with the Colorado Open Records Act (C.R.S. §§24-72-101 *et seq.*), which may require the City to disclose all or a portion of communications relating to the Contract, or terms of same, or of any transaction under the Contract, and other related matters. The Contractor shall familiarize itself with the Colorado Open Records Act. In no event shall the City be liable to the Contractor for the disclosure of all or a portion of communications, or relating documents, or electronic imaging, including all documents and exhibits that may be included as part of this Contract.

1.7 **Bonds**.

1.7.1 Contemporaneous with the Contractor's execution of this contract, the Contractor shall provide a Performance Bond and a Labor and Material Payment Bond as security for the faithful performance and payment of all the Contractor's obligations under the Contract Documents. All bonds shall be in the form prescribed by the City, executed by a surety company i) licensed to do business in the State of Colorado; ii) with a general rating of A and a financial size category of Class X or better in Best's Insurance Guide, each in the penal sum of the contract price; and iii) in conformance with C.R.S. §§ 38-26-105 and 106 ("Bonds"). All Bonds signed by an agent or attorney-in-fact shall be accompanied by a certified copy of the signatory's authority to act. The Contractor shall, at all times while providing, performing, or completing the Work including without limitation at all times while correcting any failure to meet warranty pursuant to the Standards and

Specifications, maintain and keep in force the Bonds at the Contractor's expense.

1.7.2 If the Surety for any Bond furnished by the Contractor is placed in a receivership or declared bankrupt, or its rights to do business in Colorado are terminated, or it ceases to meet the requirements specified herein, the Contractor shall within five (5) days thereafter substitute another Bond and Surety, both of which shall be acceptable to the City.

1.8 **Insurance.**

1.8.1 The Contractor shall not commence work, and shall not allow any subcontractor to commence work, until it has obtained all insurance required herein and such insurance has been approved by City. For the duration of the Contract, the Contractor must maintain the insurance coverage required in this section. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Contract shall not act as a waiver of the Contractor's breach of Contract or of any of the City's rights or remedies under this Contract.

1.8.2 The Contractor shall not be relieved of any liability, claims, demands, or other obligations assumed pursuant to the Contract Documents by reason of its failure to procure or maintain insurance, or by reason of its failure to procure or maintain insurance in sufficient amounts, durations, or types.

1.8.3 The Contractor shall procure and maintain at its own cost and shall cause each subcontractor of the Contractor to procure and maintain at its own cost (or shall insure the activity of Contractor's subcontractors in Contractor's own policy with respect to), the minimum insurance coverages listed below. Such coverages shall be procured and maintained with forms and insurers acceptable to the City. All coverages shall be continuously maintained from the date of commencement of the Work. In the case of any claims-made policy, the necessary retroactive dates and extended reporting periods shall be procured to maintain such continuous coverage.

i. Workers' Compensation and Employers' Liability insurance with minimum limits of FIVE HUNDRED THOUSAND DOLLARS ($500,000) each accident, FIVE HUNDRED THOUSAND DOLLARS ($500,000) disease - policy limit, and FIVE HUNDRED THOUSAND DOLLARS ($500,000) disease - each employee. The policy shall cover obligations imposed by the Workers' Compensation Act of Colorado and any other applicable laws for any employee engaged in the performance of Work.

ii. Commercial General Liability insurance with minimum combined single limits of ONE MILLION DOLLARS ($1,000,000) each occurrence and TWO MILLION DOLLARS ($2,000,000) aggregate. The policy shall be applicable to all premises and operations. The policy shall include coverage for bodily injury, broad form property damage (including completed operations), personal injury (including coverage for contractual and employee acts), blanket contractual, independent contractors, products, and both ongoing and completed operations. The policy shall include coverage for explosion, collapse, and underground hazards ("XCU"). The policy shall contain a severability of interests provision.

iii. Comprehensive Automobile Liability insurance with a minimum combined single limit for bodily injury and property damage of ONE MILLION DOLLARS ($1,000,000) with respect to each of Contractor's owned, hired and/or non-owned vehicles assigned to or used in performance of the Work. The policy shall contain a severability of interests provision.

iv. Contractor's Pollution Liability/Environmental Impairment insurance with a minimum limit of ONE MILLION DOLLARS ($1,000,000) per occurrence and ONE MILLION DOLLARS ($1,000,000) aggregate if Work involves pollution risk to the environment or losses causes by pollution conditions including any Work which includes microbial matter, mold, fungi, or bacteria and any Work which will involve the use of hazardous materials that may arise from the operations of the Contractor (and its subcontractors). Said policy shall cover Contractor's completed operations, be on an occurrence basis and include the following:

1. Bodily Injury, sickness, disease, mental anguish or shock sustained by any person, including death.
2. Property Damage including natural resource damages, physical injury to or destruction of tangible property including resulting loss of use, cleanup costs, and the loss of use of tangible property that has not been physically injured or destroyed.
3. Defense, including costs, charges and expenses incurred in the investigation, adjustment or defense of claims for such compensatory damages.
4. Cleanup costs, removal, storage, disposal, and or use of the pollutant; and defense, including costs and expenses incurred in the investigation, defense, or

settlement of claims.
5. Coverage shall apply to sudden and gradual pollution conditions resulting from the escape of release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants (including asbestos).

v. Installation Floater/Inland Marine insurance with minimum limits of not less than the insurable value of the work to be performed at completion. The value shall include the aggregate value of any City-furnished equipment and materials to be erected or installed by the Contractor not otherwise insured. The policy shall protect the Contractor and the City from all insurable risks of physical loss or damage to materials and equipment not otherwise covered, while in warehouses or storage areas, during installation, during testing, and after the Work under this Contract is completed. The policy shall be of the "all risks" type, with coverages designed for the circumstances which may occur in the particular Work to be performed under this Contract. The policy shall provide for losses to be payable to the Contractor and the City as their interests may appear. The policy shall contain a provision that in the event of payment for any loss under the coverage provided, the insurance company shall have no rights of recovery against the Contractor or the City.

vi. Excess or Umbrella Liability insurance with minimum limit of ONE MILLION DOLLARS ($1,000,000) per occurrence. This policy shall become primary (drop down) in the event the primary liability policy limits are impaired or exhausted. The policy shall be written on an occurrence form and shall follow form of the primary.

1.8.4 The City of Littleton shall be included as additional insured for Commercial General Liability and Comprehensive Automobile Liability insurance. The City of Littleton shall be included as additional insured or loss payee for Installation Floater/Inland Marine insurance. All policies of insurance providing additional insured status shall be primary insurance, and any insurance carried by the City, its officers, or its employees, shall be excess and not contributory insurance to that provided by Contractor. The additional insured endorsement for the Commercial General Liability insurance required above shall not contain any exclusion for bodily injury or property damage arising from completed operations. The Contractor shall be solely responsible for any deductible losses under each of the policies required above.

1.8.5 Certificates of insurance shall be completed by the Contractor's insurance company as evidence that policies providing the required coverages, conditions, and minimum limits are in full force and effect, and shall be subject to review and approval by the City. The certificate cannot contain "endeavor to" language in the portion of the certificate addressing cancellation. The City of Littleton shall be included as Certificate Holder. The City reserves the right to request and receive a certified copy of any policy and any endorsement thereto.

1.8.6 The coverages afforded under the policies shall not be cancelled, terminated or materially changed until at least thirty (30) days' prior written notice has been given to the City. Failure on the part of the Contractor to procure or maintain policies providing the required coverages, conditions, and minimum limits shall constitute a material breach of Contract upon which the City may immediately terminate the Contract, or at its discretion may procure or renew any such policy or any extended reporting period thereto and may pay any and all premiums in connection therewith, and all monies so paid by the City shall be repaid by Contractor to the City upon demand, or the City may offset the cost of the premiums against any monies due to Contractor from the City.

1.8.7 The Parties hereto understand and agree that the City is relying on, and does not waive or intend to waive by any provision of this Contract, the monetary limitations or any other rights, immunities, and protections provided by the Colorado Governmental Immunity Act, C.R.S. § 24-10-101 et seq., as from time to time amended, or otherwise available to the City, its officers, or its employees.

1.9 **Patented Devises, Materials and Processes**. If the Contractor is required or desires to use any design, device, material or processes covered by patent or copyright, the Contractor shall provide for such use by suitable legal agreement with the patentee or patent owner. The Contractor shall warrant that the materials, equipment or devices used on or incorporated in the Work shall be delivered free of any rightful claim of any third-party for infringement of any United States patent or copyright. If notified promptly in writing and given authority, information and assistance, the Contractor shall defend, or may settle, at its expense, any suit or proceeding against the City so far as based on a claimed patent or copyright infringement which would result in a breach of this warranty, and the Contractor shall pay all damages and costs awarded therein against the City due to such breach. In case any use of any materials, equipment or devices is in such suit held to constitute an infringement and such use is enjoined, the Contractor shall, at its expense and option, either procure for the City the right to continue using said materials, equipment or devices, or replace same with non-infringing materials, equipment or devices, or modify the same so it becomes non-infringing. The Contractor shall report to the City promptly and in reasonable written detail each notice or claim of patent or copyright infringement based on the performance of

this Contract of which the Contractor has knowledge. In the event of any claim or suit against the City as a result of any alleged patent or copyright infringement arising out of the performance of this Contract or out of the use of any supplies furnished or Work or services performed hereunder, the Contractor shall furnish to the City when requested by the City, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the City except where the Contractor has agreed to indemnify the City. This clause shall be included in all subcontracts.

1.10 **Taxes.** The City of Littleton is not subject to taxation. The Contractor shall not invoice the City for any state, federal or local taxes whatsoever. Upon written notification by the City, the Contractor shall reimburse the City in a timely manner for any taxes erroneously paid by the City.

1.11 **Termination for Convenience of City.** This Contract and the performance of the Work hereunder may be terminated at any time, in whole or in part, for convenience. Any such termination shall be effected by delivery to the Contractor of a written notice ("Notice of Termination") specifying the extent to which performance of Work is terminated, the date upon which termination becomes effective, and any necessary actions to be taken by the Contractor to effectuate termination and close-out the Contract. If the Contract is terminated, the Contractor shall be paid on a prorated basis of Work satisfactorily completed, under the Work. The portion of Work satisfactorily completed but not yet accepted by the City shall be determined by the City.

1.12 **Cooperation with Other Contractors.** In connection with the improvements under this Contract, the right is reserved by the City to award any Work not included in the Contract to another contractor for performance during the progress of this Contract, or to perform such Work with the City's forces, and the Contractor shall cooperate and so conduct its operation as to minimize the interference therewith, as directed by the Project Manager.

1.13 **Termination of Contractor's Responsibility**. This Contract will be considered complete when all Work and final cleanup has been finished, the Work has been accepted by the City, and all claims for payment of labor, materials, or services of any kind used in connection with the Work have been settled for by the Contractor or its Surety. The Contractor will then be released from further obligation except as set forth in the Bond and for its responsibility for injury to persons or property arising from its duties and obligations under the Standards and Specifications. The Bond executed for performance of this Contract shall be in full effect for a period of one (1) year following acceptance of the Work; except with regard to the representation regarding copyright infringement found in Section 1.9 where the Bond shall remain in effect for three (3) years, and except with regard to the representation regarding patent infringement found in Section 1.9, where the Bond shall remain in effect for six (6) years. Neither the final payment nor any provision in the Contract Documents shall relieve the Contractor of the responsibility for

negligence or faulty materials or workmanship. Payment to the Contractor will not relieve the Contractor of any obligation under this Contract.

1.14 **Subcontracting or Assignment of Work.** No contractual relationship will be recognized under the Contract other than the contractual relationship between the City and Contractor. No portion of the Contract shall be subcontracted, assigned or otherwise disposed of except with the written consent of the City, which consent shall not be unreasonably withheld. Requests for permission to subcontract, assign or otherwise dispose of any portion of the Contract shall be in writing to the Project Manager and shall be accompanied by documents demonstrating the organization which will perform the Work is particularly experienced and equipped for such Work. Consent to subcontract, assign or otherwise dispose of any portion of the Contract shall not be construed to relieve the Contractor of any responsibility for the fulfillment of the Contract.

1.15 **Waiver of Breach.** A waiver by any Party to the Contract or the breach of any term or provision of the Contract shall not operate or be construed as a waiver of any subsequent breach by either Party.

1.16 **No Third-Party Beneficiaries.** It is expressly understood and agreed that enforcement of the terms and conditions of this Contract, and all rights of action relating to such enforcement, shall be strictly reserved to the City and the Contractor and nothing contained in this Contract shall give or allow any such claim or right of action to any other third-party on this Contract. It is the express intention of the City and the Contractor that any person other than the City or the Contractor receiving services or benefits under this Contract shall be deemed to be an incidental beneficiary only.

1.17 **Independent Contractor.** The Contractor shall perform the Work as an independent contractor and shall not be deemed by virtue of this Contract to have entered into any partnership, joint venture, employer/employee or other relationship with the City other than as a contracting party and independent contractor.

1.18 **Accessibility Standards.** The Contractor shall comply with the accessibility standards for an individual with a disability adopted by the Colorado Office of Information Technology, in accordance with C.R.S. § 24-85-103 and its implementing regulations. Notwithstanding the foregoing, this requirement shall not be applicable to contracts or agreements for professional services, as defined by C.R.S. § 24-30-1402, or to any portion or part of the contract or agreement that is providing professional services. Further, the contractor shall indemnify, hold harmless, and assume liability on behalf of the city and the city's officers, employees, and agents, for all costs, expenses, claims, damages, liabilities, court awards, attorney fees and related costs, and any other amounts incurred by the city in relation to the contractor's noncompliance with the accessibility standards

for an individual with a disability adopted by the Colorado Office of Information Technology, in accordance with C.R.S. § 24-85-103, and its implementing regulations.

1.19 **Non-Discrimination.** In connection with the performance of the Work, the Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ethnicity, citizenship, immigration status, sex, gender, age, sexual orientation, gender identity or gender expression, marital status, source of income, military status, protective hairstyle, genetic information, pregnancy, or disability, or any other status protected by applicable law. The Contractor will take affirmative action to ensure applicants are employed, and employees are treated during employment, without regard to their race, color, religion, national origin, ethnicity, citizenship, immigration status, sex, gender, age, sexual orientation, gender identity or gender expression, marital status, source of income, military status, protective hairstyle, genetic information, pregnancy, disability, or any other status protected by applicable law. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

1.20 **Indemnification.** The Contractor agrees to investigate, defend, indemnify and hold harmless the City, its officers, employees, insurers, and self-insurance pool, from and against all liability, claims and demands on account of any losses, injuries, and damages, including but not limited to, alleged personal injury claims, and/or death claims, or property damage claims, or errors and omissions, which arise solely out of the Contractor's and/or any of its agents' officers or employees performance of the Contractor's obligations under this Contract. The City is prohibited by Article XI, Section 1, Colorado Constitution, from indemnifying any individual or entity. Therefore, the City does not indemnify the Contractor, successors, or assigns under this Contract. Notwithstanding the foregoing, nothing herein is intended to constitute a covenant, promise, or agreement to indemnify and hold harmless the City from any liability or damages directly caused by or attributable to the City's own negligence, nor is anything herein intended to be nor may be construed as a waiver of the immunities, protections, or limitations on damages provided to the City by the Colorado Governmental Immunity Act, C.R.S. §§24-10-101 et seq., as it may from time to time be amended.

1.21 **Governing Law and Venue.** The Contract shall be governed by the laws of the State of Colorado. Venue for any action arising under the Contract or for the enforcement of the Contract shall be in the appropriate court for Arapahoe County, Colorado.

1.22 **Additional Documents or Action**. The Parties agree to execute any additional documents and to take any additional action that is necessary to carry out this Contract.

1.23 **Binding Effect.** This Contract shall inure to the benefit of, and be binding upon, the Parties, their respective legal representatives, successors, heirs, and assigns; provided, however, that nothing in this paragraph shall be construed to permit the assignment of this Contract except as otherwise expressly authorized herein.

1.24 **Integration, Amendment, and Severability.** This Contract represents the entire agreement between the Parties and there are no oral or collateral agreements or understandings. This Contract may be amended only by an instrument in writing signed by the Parties or as otherwise provided herein. If any other provision of this Contract is held invalid or unenforceable, no other provision shall be affected by such holding, and all of the remaining provisions of this Contract shall continue in full force and effect.

1.25 **Binding Authority.** The Contractor represents and affirms that the signature page hereof accurately states the full legal name of Contractor (whether as a corporation, partnership, limited liability company, sole proprietorship, or other), contains all requisite signature(s) on behalf of Contractor, has been properly acknowledged by attestation, notary acknowledgment, or both, and in all other respects is effective to bind Contractor, in accordance with all applicable statutes, regulations, resolutions, rules, bylaws, agreements, or similar sources of authority or limitation. This Contract may be executed in counterpart(s), each of which shall be deemed to be an original, and all of which, taken together, shall constitute one instrument.

1.26 **Subject to Legislative Approval and Compliance with Law.** The Contractor acknowledges and agrees that if a Change Order is required under the terms of the Contract, the City shall not incur any liability whatsoever for claims of payment, compensation, damages, or adjustment of any kind by the Contractor due to any delays for the required approvals and execution under the City's Purchasing Ordinance. The Contractor further acknowledges and agrees that this Contract's execution may be contingent upon approval by the City Council, in compliance with all applicable provisions of the City Charter and City Code. The City shall not incur any liability whatsoever if this Contract is not approved by City Council.

1.27 **Notices.** All notices required under this Contract shall be in writing and shall be sent by registered or certified mail, return receipt requested, to the addresses of the Parties herein set forth. A Party may change its mailing address by giving written notice of such change of address to other Party.

Notice to City:
City of Littleton
City Manager
2255 West Berry Avenue
Littleton, CO 80120

Notice to Contractor: Edge Contracting, Inc.
1453 Brickyard Road
Golden, CO 80403

1.28 **Force Majeure.** Neither Party shall be responsible for a delay in its respective performance under this Contract, other than a delay in payment for Work already performed, if such delay is caused by extraordinary weather conditions or other natural catastrophes, war, terrorist attacks, sabotage, computer viruses, riots, strikes, lockouts or other industrial disturbances, epidemics, pandemics, acts of governmental agencies or authorities, discovery of hazardous materials or differing and unforeseeable site conditions, or other events beyond the reasonable control of the claiming Party. Contractor shall be entitled to an equitable adjustment to the project schedule in accordance with the Standards and Specifications. When a delay on any aspect of the Work occurs, the Contractor, to the maximum extent possible, shall utilize its resources elsewhere in the Work.

1.29 **Electronic Signatures and Electronic Records.** The Contractor consents to the use of electronic signatures by the City. The Contract, and any other documents requiring a signature hereunder, may be signed electronically by the City in the manner specified by the City. The Parties agree not to deny the legal effect or enforceability of the Contract solely because it is in electronic form or because an electronic record was used in its formation. The Parties agree not to object to the admissibility of the Contract in the form of an electronic record, or a paper copy of an electronic document, or a paper copy of a document bearing an electronic signature, on the ground that it is an electronic record or electronic signature or that it is not in its original form or is not an original.

[signatures to follow]

CITY OF LITTLETON, COLORADO

_____
Kyle Schlachter
MAYOR

ATTEST

_____
Colleen Norton
CITY CLERK

APPROVED AS TO FORM:

_____
Reid Betzing
CITY ATTORNEY

CONTRACTOR

_____ _____
Cole Cattoor Date
VICE PRESIDENT

Exhibit A
Scope of Work

The Contractor shall install new sanitary sewer mains to serve the Shadycroft Acres subdivision.

Work will consist of the following primary components:

1. installation of approximately 3,330 linear feet of 8-inch sewer main;
2. installation of approximately 600 linear feet of 4-inch sewer service line piping;
3. installation of 21, 60-inch diameter precast concrete manholes;
4. installation of 20, 4-inch residential sewer service connections;
5. two connections to existing sewer mains;
6. road surface restorations including hot-mix asphalt pavement; and
7. road shoulder restorations including driveways, landscaping, seeding, and sodding.

The Contractor shall be expected to maintain traffic control devices at all times within the work area, and ensure local traffic has access. A subcontractor approved in advance by the City is permitted to install and maintain traffic control devices regularly. Night and weekend work is not anticipated.

Exhibit B

Item No.	Description	UOM	Price	Quantity	Total Cost
1	Mobilization	Lump-Sum	$120,000.00	1	$120,000.00
2	Traffic Control	Lump-Sum	$22,000.00	1	$22,000.00
3	8-inch Diameter SDR-26 PVC Sewer Main	Linear Foot/Feet	$145.00	3,324	$481,980.00
4	4-inch Diameter SDR-26 PVC Service Line	Linear Foot/Feet	$110.00	585	$64,350.00
5	Connection to Existing Sewer Main	Each	$10,200.00	2	$20,400.00
6	4-inch Sewer Service Line Connection	Each	$1,400.00	20	$28,000.00
7	60-inch Diameter Precast Concrete Manhole	Each	$17,000.00	19	$323,000.00
8	60-inch Diameter Precast Concrete Manhole with Cast-in-Place Concrete Base	Each	$21,100.00	2	$42,200.00
9	Pavement Removal	Square Yard	$20.00	3,500	$70,000.00
10	Hot-Mix Asphalt Replacement	Ton	$140.00	636	$89,040.00
11	Class 6 Gravel Road Base Under Asphalt Pavement	Ton	$70.00	1,045	$73,150.00
12	Class 6 Gravel Drive and Road Shoulder Surface Restoration	Ton	$420.00	7	$2,940.00
13	Concrete Driveway Apron Removal & Replacement	Square Yard	$300.00	50	$15,000.00
14	Pipeline Trench Over Excavation and Trench Stabilization	Cubic Yard	$250.00	20	$5,000.00
15	Imported Backfill	Cubic Yard	$150.00	20	$3,000.00
16	CLSM Flowable Fill Pipe Encasement and Trench Backfill	Cubic Yard	$250.00	20	$5,000.00
17	Sod Turf Grass Surface Restoration	Square Yard	$13.00	14,650	$190,450.00
18	Seeding Turf Grass Surface Restoration	Square Yard	$4.50	1,000	$4,500.00
19	Riprap Rock Surface Restoration	Ton	$250.00	27	$6,750.00
20	Sign Removal and Replacement	Each	$330.00	4	$1,320.00
21	Erosion and Sediment Control Measures	Lump-Sum	$25,600.00	1	$25,600.00
22	F/A MINOR CONTRACT REVISIONS	Lump-Sum	$50,000.00	1	$50,000.00

TOTAL: $1,643,680.00

Exhibit C

Bond Number: 3010369

PERFORMANCE, LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that EDGE CONTRACTING, INC. (Contractor), as Principal (the "Principal") and Harco National Insurance Company, a corporation organized under the laws of the State of Illinois, and authorized to transact business in the State of Colorado, as "Surety", jointly and severally, including their heirs, personal representatives, successors and assigns, are held and firmly bound unto the City of Littleton as Obligee, hereinafter called Owner, for the use and benefit of claimants as herein below defined, in the amount of one million six hundred forty-three thousand six hundred eighty dollars and no cents ($1,643,680.00), for the payment and interest as provided by law for the performance of the Contract between the Principal and the Owner, dated _____, 2026, for the Shadycroft Acres Sanitary Sewer Extension Project #25-51 in accordance with drawings and specifications; which the Contract is made a part hereof, and is hereinafter referred to as the Contract, and incorporated by this reference.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the Principal, at all times, shall promptly and faithfully perform said Contract, and shall promptly make payment to all claimants as hereinafter defined, for all labor and material used or reasonably required for use in the performance of the Contact, any authorized modifications thereof during the original term of the Contract, any extensions thereof that may be granted by the Owner, and during the term of any guarantee or warranty required under the Contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense when the Owner may incur in making good any default, then the Principal and Surety shall have no obligation under this Bond, otherwise it shall remain in full force and effect for a period of one (1) year following execution of the Contract. Upon expiration, this Bond shall be extended by a continuation certificate for an additional one (1) year, and extended thereafter until the warranty period has expired in accordance with the terms of the Contract.

The Surety, for value received, agrees that no extension of time, change in, addition to, or other alteration or modification of the terms of the Contract or work to be performed there under or any other forbearance on the part of either the Owner or the Principal to the other shall in any way release or impact the Surety's liability or obligation on this Bond, and the Surety hereby waives notice of any extension of time, change in, addition to, or other alteration or forbearance.

Whenever the Owner terminates the Contract in accordance with the terms thereof, the Surety shall, within fifteen (15) calendar days after written notice of such termination, notify the Owner in writing of its election to complete the Contract in accordance with its terms and conditions, or notify the Owner that the Surety elects not to complete the Contract. If the Surety fails to provide the written notice within the fifteen (15) calendar day period, then it will have deemed to have not elected to complete the Contract. Should the Surety elect to complete the Contract, then it shall, within fifteen (15) additional calendar days, following written notice of such election, obtain a bid or bids for submission to Owner for completing the Contract in accordance with its terms and conditions. The Surety shall arrange for a contract between bidder and Owner, and make

available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the Contract price; but not exceeding, including other costs, attorneys fees of the Owner and damages for which the Surety shall be liable hereunder, the amount set forth in the first paragraph hereof. In the event of termination, the Surety may not engage the Principal to complete the Contract, without prior written consent of the Owner, which consent may be withheld in the Owner's sole discretion. If the Surety elects to complete the Contract, then it shall be entitled to receive the balance of the Contract price, less i) any amounts paid by the Owner to the Principal; ii) costs incurred by the Owner in correcting the defective work; iii) any additional legal, design professional or other costs incurred by the Owner resulting from Principal's default; and iv) any liquidated damages caused by the delayed performance or nonperformance of the Principal. Any progress payments, less retainage, due but not paid at the date of termination shall be paid to the Surety so long as the Surety has agreed to indemnify the Owner for the amount thereof and no other claims have been made to such funds by subcontractors or suppliers in accordance with the Contract or any applicable law. In the event that the Surety elects not to complete the Contract, the Owner may then have work completed by such means and in such manner, as it may deem advisable. The Surety, in such event, shall at all times make available, as work progresses under the Contract between the Owner and new contractor, sufficient funds to pay the cost of completion of the Contract pursuant to the its terms together with the other amounts set forth above, but in no event shall the Surety be responsible for the payment of any sums to the Owner until the Owner has paid in full its total obligation under the terms of the original Contract, plus Change Orders or amendments less deductions and claims chargeable by law or by the Contract, if any, and less the retainage which will be disbursed as provided by the Contract and any applicable law.

Any proceeding, whether legal or equitable, under this Bond, except for claims for payment of labor and material, or copyright or patent infringement, must be instituted before the expiration of two (2) years from the date on which final payment under the Contract falls due.

Further, the above named Principal and Surety hereby jointly and severally agree with the Owner that the Principal shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such Contract ("claimant"), and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, repairs or machinery, equipment and tools, consumed or used in connection with the construction of such work, whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

The above-named Principal and Surety hereby jointly and severally agree with the Owner that every claimant, who has not been paid in full at any time up to and including the time of final settlement for the work contracted to be done, file with the Owner, a verified statement of the amount due and unpaid in accordance with Section 38-26-107, C.R.S. Provided, further, that no final settlement between the Owner and the Principal shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied. The Owner shall not be liable for the payment of any costs, attorney fees, or other expenses of any such legal remedies a claimant may have against the Principal or Surety.

SIGNED this 30th day of APRIL 2026.

In the presence of:

EDGE Contracting, Inc.

NICOLE D. CATTOOR

(Contractor / Principal)

Harco National Insurance Company

(Surety) **Ashlea McCaughey, Attorney-In-Fact**

(Accompany this Bond with Attorney in-fact's authority from the Surety to execute the Bond, certified to include the date of the Bond.)

APPROVED FOR THE OWNER:

BRENT SODERLIN
DIRECTOR OF PUBLIC WORKS AND UTILITIES

POWER OF ATTORNEY

Bond # 3010369

HARCO NATIONAL INSURANCE COMPANY
INTERNATIONAL FIDELITY INSURANCE COMPANY

Member companies of IAT Insurance Group, Headquartered: 4200 Six Forks Rd, Suite 1400, Raleigh, NC 27609

KNOW ALL MEN BY THESE PRESENTS: That **HARCO NATIONAL INSURANCE COMPANY**, a corporation organized and existing under the laws of the State of Illinois, and **INTERNATIONAL FIDELITY INSURANCE COMPANY**, a corporation organized and existing under the laws of the State of New Jersey, and having their principal offices located respectively in the cities of Rolling Meadows, Illinois and Newark, New Jersey, do hereby constitute and appoint

GRACE RASMUSSEN, ASHLEA MCCAUGHEY, LINDSEY MINUTILLO, ALISSA CAHALAN, CONNOR OBERG, TODD BENGFORD, MARK SWEIGART, DONALD E. APPLEBY, SARAH C. BROWN

Greenwood Village, CO

their true and lawful attorney(s)-in-fact to execute, seal and deliver for and on its behalf as surety, any and all bonds and undertakings, contracts of indemnity and other writings obligatory in the nature thereof, which are or may be allowed, required or permitted by law, statute, rule, regulation, contract or otherwise, and the execution of such instrument(s) in pursuance of these presents, shall be as binding upon the said **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY**, as fully and amply, to all intents and purposes, as if the same had been duly executed and acknowledged by their regularly elected officers at their principal offices.

This Power of Attorney is executed, and may be revoked, pursuant to and by authority of the By-Laws of **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY** and is granted under and by authority of the following resolution adopted by the Board of Directors of **INTERNATIONAL FIDELITY INSURANCE COMPANY** at a meeting duly held on the 13th day of December, 2018 and by the Board of Directors of **HARCO NATIONAL INSURANCE COMPANY** at a meeting held on the 13th day of December, 2018.

"**RESOLVED**, that (1) the Chief Executive Officer, President, Executive Vice President, Senior Vice President, Vice President, or Secretary of the Corporation shall have the power to appoint, and to revoke the appointments of, Attorneys-in-Fact or agents with power and authority as defined or limited in their respective powers of attorney, and to execute on behalf of the Corporation and affix the Corporation's seal thereto, bonds, undertakings, recognizances, contracts of indemnity and other written obligations in the nature thereof or related thereto; and (2) any such Officers of the Corporation may appoint and revoke the appointments of joint-control custodians, agents for acceptance of process, and Attorneys-in-fact with authority to execute waivers and consents on behalf of the Corporation; and (3) the signature of any such Officer of the Corporation and the Corporation's seal may be affixed by facsimile to any power of attorney or certification given for the execution of any bond, undertaking, recognizance, contract of indemnity or other written obligation in the nature thereof or related thereto, such signature and seals when so used whether heretofore or hereafter, being hereby adopted by the Corporation as the original signature of such officer and the original seal of the Corporation, to be valid and binding upon the Corporation with the same force and effect as though manually affixed."

IN WITNESS WHEREOF, **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY** have each executed and attested these presents on this 31st day of December, 2023

INTERNATIONAL FIDELITY INSURANCE COMPANY CORPORATE SEAL 1904 NEW JERSEY

STATE OF NEW JERSEY
County of Essex

STATE OF ILLINOIS
County of Cook

HARCO NATIONAL INSURANCE COMPANY CORPORATE SEAL 1904 ILLINOIS

Michael F. Zurcher
Executive Vice President, Harco National Insurance Company
and International Fidelity Insurance Company

On this 31st day of December, 2023 , before me came the individual who executed the preceding instrument, to me personally known, and, being by me duly sworn, said he is the therein described and authorized officer of **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY**; that the seals affixed to said instrument are the Corporate Seals of said Companies; that the said Corporate Seals and his signature were duly affixed by order of the Boards of Directors of said Companies.

CATHY CRUZ NOTARY PUBLIC STATE OF NEW JERSEY

IN TESTIMONY WHEREOF, I have hereunto set my hand affixed my Official Seal, at the City of Newark, New Jersey the day and year first above written.

Cathy Cruz a Notary Public of New Jersey
My Commission Expires April 16, 2029

CERTIFICATION

I, the undersigned officer of **HARCO NATIONAL INSURANCE COMPANY** and **INTERNATIONAL FIDELITY INSURANCE COMPANY** do hereby certify that I have compared the foregoing copy of the Power of Attorney and affidavit, and the copy of the Sections of the By-Laws of said Companies as set forth in said Power of Attorney, with the originals on file in the home office of said companies, and that the same are correct transcripts thereof, and of the whole of the said originals, and that the said Power of Attorney has not been revoked and is now in full force and effect.

IN TESTIMONY WHEREOF, I have hereunto set my hand on this day,

Irene Martins, Assistant Secretary

HOLMES MURPHY

THINKING AHEAD

April 28, 2026

City of Littleton
2255 West Berry Avenue
Littleton, CO 80120

Bond Number: 3010369
Bond Amount: $1,643,680.00
Principal: EDGE Contracting, Inc.
Obligee: City of Littleton
Project Description: Shadycroft Acres Sanitary Sewer Extension Project #25-51, Littleton, CO

To Whom It May Concern:

Please note that the enclosed bonds and accompanying Power of Attorney forms are currently undated as the contract has not yet been dated.

This letter authorizes you to insert the appropriate dates once the contracts have been executed. It is essential that the dates on the bond and the Power of Attorney are on or after the contract date for the bond to be effective. The bond may be considered invalid if either the bond or the Power of Attorney is dated prior to the contract date.

Upon dating the bonds, kindly inform our office within 24 hours of the relevant date so that we can update our records and those of the surety accordingly.

Sincerely,

Ashlea McCaughey
Email: amccaughey@holmesmurphy.com
Phone: 720-458-5775
Holmes, Murphy and Associates, LLC
5619 DTC Pkwy, Suite 1000
Greenwood Village, CO 80111
HOLMESMURPHY.COM

SHADYCROFT ACRES SANITARY SEWER EXTENSION

BIDDING DOCUMENTS

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

Littleton
Colorado

PREPARED FOR:

City of Littleton

LOCATION:

Littleton, CO

DATE:

DECEMBER 19, 2025

AE2S PROJECT NO:

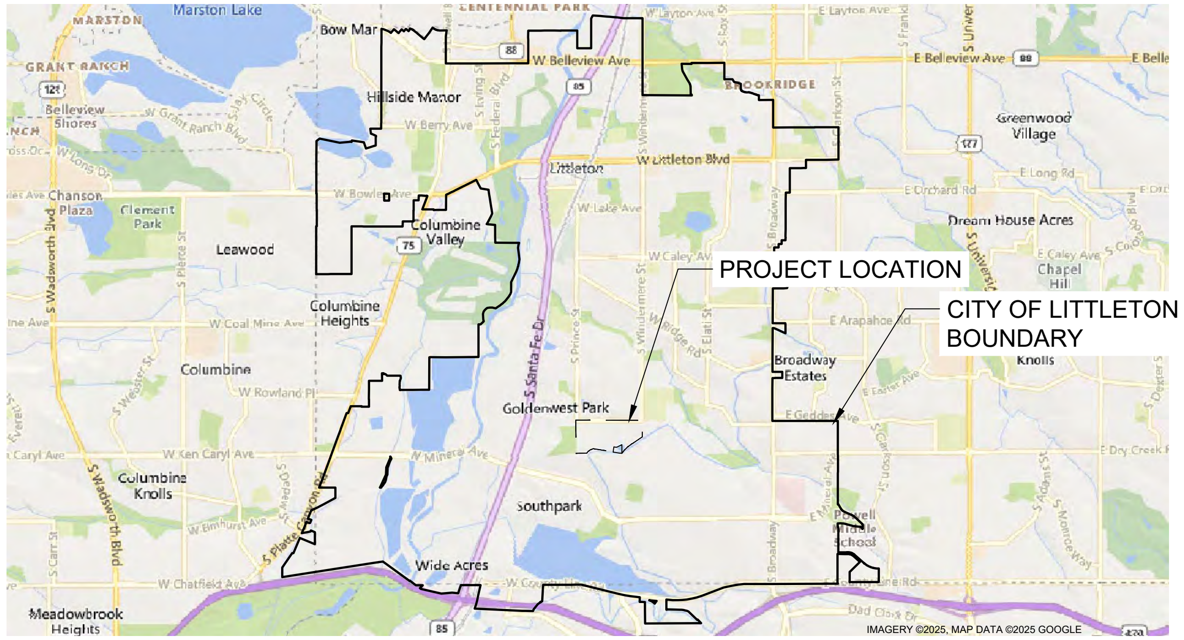
P14647-2025-001

CITY PROJECT NO:

25-51

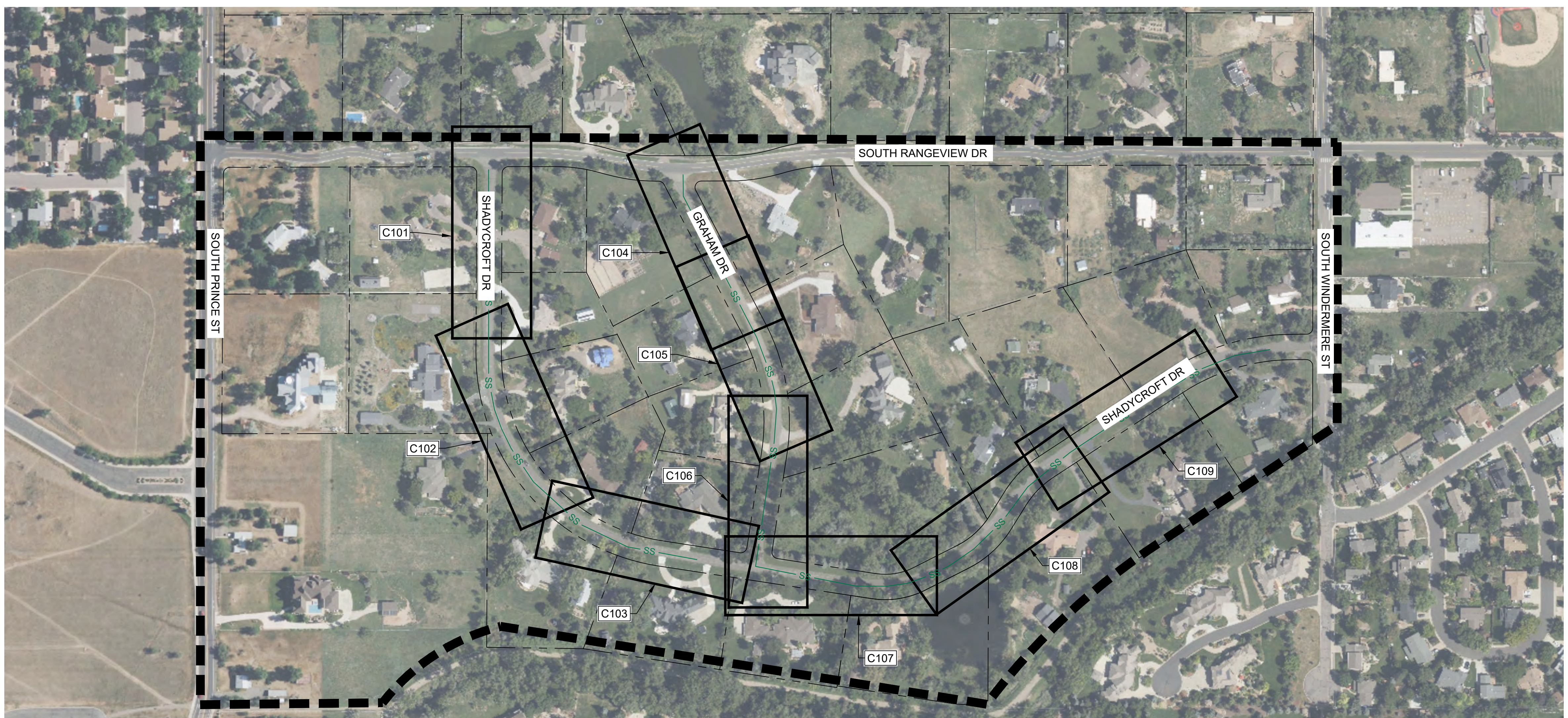
DRAWING INDEX		
SHEET NUMBER	SHEET TITLE	SHEET DESIGNATOR
G001	COVER	GEN
G002	PROJECT LOCATION MAPS & SHEET KEY MAP	GEN
G003	LEGENDS	GEN
G004	PROJECT NOTES, ABBREVIATIONS, DRAWING CONVENTIONS	GEN
G005	GENERAL NOTES	GEN
C101	SANITARY SEWER PLAN & PROFILE	PP
C102	SANITARY SEWER PLAN & PROFILE	PP
C103	SANITARY SEWER PLAN & PROFILE	PP
C104	SANITARY SEWER PLAN & PROFILE	PP
C105	SANITARY SEWER PLAN & PROFILE	PP
C106	SANITARY SEWER PLAN & PROFILE	PP
C107	SANITARY SEWER PLAN & PROFILE	PP
C108	SANITARY SEWER PLAN & PROFILE	PP
C109	SANITARY SEWER PLAN & PROFILE	PP
C501	STANDARD DETAILS	SD
C502	STANDARD DETAILS	SD

File: C:\Users\jlane\DOCACCDocs\AE2S\14647-2025-001 Littleton Shadycroft Acres Sewer Design\Project Files\01-Civil\Plan Sheets\GEN.dwg
Plotted By: Joey Lane Date: Wednesday, December 17, 2025
Advanced Engineering and Environmental Services, LLC www.ae2s.com



1 G002 **CITY OF LITTLETON**
NOT TO SCALE

NORTH



2 G002 **PROJECT AERIAL MAP**
NOT TO SCALE

NORTH

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS

SYM	DATE	APPR

PROJECT TITLE: **SHADYCROFT ACRES SANITARY SEWER EXTENSION**

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE: **PROJECT LOCATION MAPS & SHEET KEY MAP**

CLIENT: **CITY OF LITTLETON**
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51

SHEET DESIGNATOR: GEN
SHEET NO: G002

Plotted By: Joey Lane Date: Wednesday, December 17, 2025

File: C:\Users\jlane\OAC\Docs\#4258\14647-2025-001 Littleton Shadycroft Acres Sewer Design\Project Files\01-Civil\Plan Sheets\LEGEND.dwg
Plotted By: Joey Lane Date: Wednesday, December 17, 2025

WATER

DESCRIPTION	EXISTING	NEW
PIPE		
WATER MAIN	W	
WATER SERVICE		
STRUCTURES		
MANHOLE	W	W
METER MANHOLE	M	M
ARV MANHOLE		
WELL	WW	WW
MONITORING WELL	MW	MW
PRV MANHOLE		
WATER HANDHOLE	W	W
VAULT	W	W
VALVES		
CURBSTOP		
GATE		
BUTTERFLY		
PLUG		
CHECK		
BALL		
HYDRANTS		
FIRE		
ARV		
BLOW OFF		
FITTINGS		
11.25° BEND		
22.50° BEND		
30° BEND		
45° BEND		
60° BEND		
90° BEND		
WYE (R)		
WYE (L)		
CAP		
COUPLING		
CROSS		
PLUG		
REDUCER		
TEE		
SADDLE TAP		

SANITARY

DESCRIPTION	EXISTING	NEW
PIPE		
SANITARY MAIN	SS	
SANITARY SERVICE		
STRUCTURES		
MANHOLE	S	S
CLEAN OUT	CO	CO
METER MANHOLE	M	M
SEPTIC TANK	ST	ST
VAULT	S	S
LIFTSTATION	L	L
VALVES		
GATE		
BUTTERFLY		
PLUG		
FITTINGS		
WYE (R)		
WYE (L)		
PLUG		
CAP		

STORM

DESCRIPTION	EXISTING	NEW
PIPE		
STORM MAIN	SD	
STORM LEAD		
STRUCTURES		
MANHOLE	D	D
AREA INLET		
BEEHIVE INLET		
CURB INLET		
DOUBLE CURB INLET		
OUTFALL		

GAS

DESCRIPTION	EXISTING	NEW
LINES		
NATURAL GAS	G	G
STRUCTURES		
MANHOLE	G	G
METER	G	G
VALVES		
GATE VALVE		

SITE

DESCRIPTION	EXISTING	NEW
VEGETATION		
CONIFEROUS TREE (LARGE)		
CONIFEROUS TREE (SMALL)		
DECIDUOUS TREE (LARGE)		
DECIDUOUS TREE (SMALL)		
SHRUB		
STUMP		
TREE LINE		
SIGNAGE		
STREET SIGN		
MILE POST	MP	MP
SITE		
BUILDING		
CURB		
CONCRETE		
FENCES		
BARBED WIRE		
CHAIN LINK		
WOOD		
VINYL		
WOVEN WIRE	XX	XX
GUARD RAIL		
SILT	SF	SF
SUPER SILT	SSF	SSF
GATE POST	GP	
TOPOLOGY		
CONTOURS	900	900
R.O.W. / PROPERTY LINES		
EASEMENT		

ELECTRICAL

DESCRIPTION	EXISTING	NEW
LINES		
ELECTRIC	E	E
OVERHEAD	OHE	OHE
UNDERGROUND	UGE	UGE
STRUCTURES		
MANHOLE	E	E
HANDHOLE	E	E
UTILITY POLE		
GUY ANCHOR		
LIGHT POST		
PUSH TO WALK POST	P	P
STREET LIGHT		
SIGNAL		
SIGNAL WITH ARM		

COMMUNICATIONS

DESCRIPTION	EXISTING	NEW
LINES		
COMMUNICATIONS	C	
FIBER OPTIC	FO	
TELEPHONE	T	
CABLE TV	CATV	
CLOSED CIRCUIT TV	CCTV	
STRUCTURES		
MANHOLE	C	C
TELEPHONE MANHOLE	T	T
TELEPHONE PEDESTAL	T	T
TELEPHONE FIBER OPTIC PEDESTAL	FO	FO
TELEVISION PEDESTAL	TV	TV
UNKNOWN PEDESTAL	U	U

DEMOLITION

DESCRIPTION	EXISTING	NEW
LINES		
FEATURES TO BE REMOVED		
FEATURES TO BE ABANDONED		
REMOVE CURB & GUTTER		
STRUCTURES		
REMOVE TREE OR SHRUB		
AREA		
ITEMS TO BE REMOVED		

AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION
Advanced Engineering and Environmental Services, LLC www.ae2s.com

GENERAL NOTES

1. THIS LEGEND SHEET IS FOR VISUAL REFERENCE OF THE SYMBOLS AND LINETYPES USED ON THIS PROJECT. SOME OF THE SYMBOLS AND LINETYPES MAY NOT BE USED BY THIS PARTICULAR PROJECT.

SHEET TITLE: **LEGENDS**

CLIENT: CITY OF LITTLETON, LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: XXX
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51
SHEET DESIGNATOR: GEN
SHEET NO: G003

File: C:\Users\jlane\DOCS\Docs\AE2S\14647-2025-001 Littleton Shadycroft Acres Sewer Design\Project Files\01-Civil\Plan Sheets\GEN.dwg
Plotted By: Joey Lane Date: Wednesday, December 17, 2025

PROJECT SPECIFIC NOTES

1. THE CONTRACTOR WILL BE HELD CONTINUOUSLY RESPONSIBLE FOR THE CLEANLINESS OF ALL ROADWAYS AT ALL TIMES. NO TOLERANCE WILL BE GRANTED FOR DIRTY, MUDDY, OR UNSAFE DRIVING CONDITIONS.
2. SAFETY FENCING AND/OR BARRICADES SHALL BE UTILIZED WHERE WORK IS IN CLOSE PROXIMITY TO RESIDENCES, BUSINESS, TRAILS OR OTHER PUBLIC AREAS AND AT OTHER PUBLIC LOCATIONS AS DIRECTED BY THE OWNER OR ENGINEER.
3. THE CONTRACTOR SHALL CONFORM TO THE CURRENT OSHA REGULATIONS FOR EXCAVATIONS AND CONFINED SPACE ENTRY, IF APPLICABLE.
4. UNLESS PERMISSION IS GRANTED IN WRITING BY A PRIVATE PROPERTY OWNER, THE CONTRACTOR SHALL CONFINE CONSTRUCTION OPERATIONS WITHIN THE EASEMENTS AND PUBLIC RIGHT-OF-WAY LIMITS, AND SHALL USE DUE CARE IN PLACING CONSTRUCTION TOOLS, EQUIPMENT, EXCAVATED MATERIALS, PIPELINE MATERIALS, AND SUPPLIES SO AS TO CAUSE THE LEAST POSSIBLE DAMAGE TO PROPERTY AND INTERFERENCE WITH TRAFFIC.
5. THE CONTRACTOR SHALL AT ALL TIMES TAKE PRECAUTIONS FOR PROTECTION OF EXISTING PUBLIC AND PRIVATE INSTALLATIONS THAT MAY BE ENCOUNTERED DURING CONSTRUCTION. PRIOR TO THE INSTALLATION OF ANY SEWER, THE EXISTING UTILITIES WHICH CROSS OR PARALLEL THE PROPOSED SEWER SHALL BE EXPOSED BY THE CONTRACTOR TO DETERMINE ANY POSSIBLE CONFLICTS WITH THE PROPOSED WORK. MAINTAIN 18-INCHES MINIMUM CLEARANCE BETWEEN ALL UTILITY CROSSINGS. ANY DAMAGED INSTALLATIONS, PUBLIC OR PRIVATE, SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE TO ORIGINAL OR BETTER CONDITION.
6. REPAIR OR REPLACEMENT WORK ON EXISTING UTILITIES, INCLUDING OVERHEAD AND POWER UNDERGROUND AND UNDERGROUND FIBER OPTIC LINES, SHALL BE PERFORMED BY THE UTILITY OWNER, UNLESS PERMISSION IS GRANTED BY THE UTILITY OWNER FOR THE CONTRACTOR TO PERFORM THE WORK. ALL COSTS ASSOCIATED WITH PROTECTION, REPAIR OR REPLACEMENT OF EXISTING UTILITIES DUE TO CONTRACTOR'S ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE OWNER AND ENGINEER ARE NOT RESPONSIBLE FOR ANY OMISSIONS OR VARIATIONS IN THE LOCATION OF THE UTILITIES ENCOUNTERED IN THE WORK. THE CONTRACTOR SHALL COORDINATE ANY UTILITY RELOCATION REQUIRED TO COMPLETE THE WORK WITH THE OWNER OF THE UTILITY. THIS COORDINATION SHALL BE ACCOMPLISHED IN SUFFICIENT TIME TO ALLOW THE RELOCATION WORK TO BE COMPLETED WITHOUT INTERFERENCE OR DELAY TO THE CONSTRUCTION WORK. ALL COSTS FOR RELOCATION OF UTILITIES SHALL BE AT THE CONTRACTORS EXPENSE.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL AND THE COST FOR TRAFFIC CONTROL, AS REQUIRED FOR CONSTRUCTION ACTIVITIES. TRAFFIC CONTROL PLANS MUST BE SUBMITTED AND APPROVED BY THE CITY OF LITTLETON PRIOR TO ISSUANCE OF A CITY OF LITTLETON RIGHT-OF-WAY CONSTRUCTION PERMIT. THE COST OF THE RIGHT-OF-WAY CONSTRUCTION PERMIT IS THE RESPONSIBILITY OF THE CONTRACTOR.
8. CONTRACTOR SHALL NOTIFY, IN WRITING, ALL AFFECTED HOMEOWNERS AND BUSINESSES AT LEAST 48 HOURS PRIOR TO CONSTRUCTION ACTIVITIES IMPACTING THE PROPERTY OWNER'S DAILY ACTIVITIES. NOTICES ARE INTENDED TO KEEP RESIDENTS AND BUSINESSES INFORMED OF CONSTRUCTION ACTIVITIES, SCHEDULING, TEMPORARY SERVICE OUTAGES, AND TEMPORARY DENIAL OF ACCESS WHICH MAY OCCUR DURING THE PROJECT.
9. WHERE OPEN CUT OF EXISTING ASPHALT SURFACED ROADS IS PERFORMED, ALL ASPHALT CUTS SHALL BE PATCHED WITH 3 INCH MINIMUM, FULL DEPTH HOT MIXED ASPHALT ON TOP OF 3 INCH CLASS 6 ROADBASE. ONE LANE OF PAVEMENT MUST BE OPEN WHEN CONTRACTOR IS NOT WORKING TO ALLOW FOR EMERGENCY ACCESS TO PRIVATE PROPERTY.
10. THE CONTRACTOR IS RESPONSIBLE FOR THE PROCUREMENT OF ALL PERMITS AND BUILDING PERMITS FOR THE CONSTRUCTION OF THE IMPROVEMENTS SHOWN AND NOTIFYING ALL UTILITY COMPANIES AFFECTED BY THIS CONSTRUCTION.
11. COMPACTION OF ALL TRENCHING MUST BE ATTAINED. COMPACTION SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS IN THESE CONTRACT DOCUMENTS AND THE CITY OF LITTLETON.
12. WORK HOURS SHALL BE BETWEEN 7AM AND 7PM, MONDAY THROUGH FRIDAY, OR AS ALLOWED BY THE APPLICABLE RIGHT-OF-WAY PERMITS. NO WORK WILL BE PERMITTED ON WEEKENDS WITHOUT APPROVAL BY THE OWNER OR AGENCY HAVING JURISDICTION. CONTRACTOR SHALL GIVE OWNER A MINIMUM 48 HRS. NOTICE PRIOR TO WORKING ON WEEKENDS.
13. ALL GROUNDWATER PUMPED FROM PIPELINE TRENCHES SHALL BE DISCHARGED PER THE REQUIREMENTS OF A GROUNDWATER DISCHARGE PERMIT.
14. EXISTING IRRIGATION PIPING AND SPRINKLERS ARE NOT SHOWN. CONTRACTOR SHALL LOCATE, PROTECT, AND PRESERVE IRRIGATION SYSTEMS. REPLACEMENT OF IRRIGATION SYSTEM DAMAGED BY CONSTRUCTION ACTIVITIES SHALL BE PERFORMED BY CONTRACTOR TO EQUAL OR BETTER CONDITION.
15. EXISTING TOPOGRAPHY, SURFACE FEATURES, AND UTILITIES SHOWN ON DRAWINGS ARE FROM A FIELD SURVEY PERFORMED BY PRECISION SURVEYING AND MAPPING, LLC. (9025 E KENYON AVE #150 DENVER, CO 80237, (303) 753-9799).
16. CONTRACTOR SHALL OBTAIN ALL REQUIRED SOIL EROSION AND SEDIMENTATION CONTROL PERMITS AND INSTALL EROSION CONTROL MEASURES AS REQUIRED BY THE CITY OF LITTLETON.
17. THE CONTRACTOR SHALL RESTORE ALL AREAS DISTURBED BY HIS OPERATION. THE CONTRACTOR SHALL REMOVE ALL TEMPORARY GRADING.
18. THE CONTRACTOR SHALL MAINTAIN EXISTING STORM WATER DRAINAGE AND CREEK DRAINAGE COURSES AT ALL TIMES DURING THE WORK. ALL COSTS FOR MAINTAINING DRAINAGE SHALL BE INCIDENTAL TO THE PROJECT EXCEPT AS OTHERWISE MAY BE PROVIDED FOR IN THE PROPOSAL.
19. ALL SANITARY SEWER MAINS SHALL BE INSTALLED IN A STRAIGHT ALIGNMENT AND UNIFORM SLOPE BETWEEN MANHOLES. CHANGES IN PIPELINE DIRECTION SHALL OCCUR ONLY AT MANHOLES.
20. A AWG 10 SOLID COPPER TRACER WIRE SHALL BE INSTALLED ABOVE ALL NEW SEWER MAIN PIPELINES.
21. CONTRACTOR SHALL LOCATE, SUPPORT AND PROTECT ALL EXISTING BURIED UTILITIES AS NECESSARY FOR IMPROVEMENT WORK SHOWN.
22. ALL AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESTORED TO EXISTING OR BETTER CONDITIONS.
23. ALL TURF AREAS DISTURBED BY CONSTRUCTION ACTIVITIES SHALL BE RESODDED (OR AT THE CITY'S DISCRETION RESEEDED) AND RESTORED TO EXISTING OR BETTER CONDITIONS. ALL SANITARY SEWER SHALL BE INSTALLED PER EXPANSIVE SOIL BEDDING DETAIL 2 ON SHEET C501.
24. MANHOLES SHALL BE CONSTRUCTED PER DETAIL 5 / C501, EXCEPT WHEN CONNECTING TO EXISTING SEWER LINE AS NOTED ON PLAN AND PROFILE SHEETS WHERE DETAIL 4 / C501 SHALL BE USED.

PROJECT SURVEY CONTROL INFORMATION:

1.) HORIZONTAL CONTROL IS BASED ON A MODIFIED NAD 83-COLORADO STATE PLANE CENTRAL DATUM. DRAWING COORDINATES ARE SCALED TO GROUND BY A SCALE FACTOR OF 1.0002880631 UTILIZING THE FOLLOWING LOCATION AS THE POINT OF ORIGIN (AKA #1):
LATITUDE=N39°35'03.37787"
LONGITUDE=W105°00'58.14076"
ELLIPSOID HEIGHT=5426.15'

2.) VERTICAL CONTROL IS BASED ON NAVD88 DATUM UTILIZING GEOID18.

SITE CONTROL TO BE USED FOR CONSTRUCTION LAYOUT:

INFORMATION LISTED BELOW AS: POINT NUMBER, NORTHING, EASTING, ELEVATION AND DESCRIPTION.

1, 1638062.4540, 3136370.7490, 5480.90, SET NO. 5 REBAR W/RED PLASTIC CAP "PSM CONTROL"
2, 1638067.1000, 3137378.4920, 5470.60, SET NO. 5 REBAR W/RED PLASTIC CAP "PSM CONTROL"
3, 1638055.1050, 3138944.0480, 5505.42, SET NO. 5 REBAR W/RED PLASTIC CAP "PSM CONTROL"

BURIED UTILITY NOTE:

UTILITY LOCATES AS SHOWN HEREON ARE TO ASSIST IN THE PLANNING/DESIGN PROCESS ONLY. DUE TO THE METHODOLOGY OF ELECTROMAGNETIC LOCATING PROCESSES, LOCATING IS NOT AN EXACT SCIENCE AND IS ONLY ACCURATE TO APPROXIMATELY 18". THEREFORE, TO OBTAIN THE EXACT LOCATION OF ANY/ALL BURIED UTILITIES, THEY WOULD NEED TO BE POTHOLED. SAID MARKS ARE NOT INTENDED FOR CONSTRUCTION USE.

ACCORDING TO THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 38 "THE STANDARD GUIDELINES FOR THE INVESTIGATING AND DOCUMENTING OF EXISTING UTILITIES. THE UTILITY LOCATES AS SHOWN ON THE DRAWINGS WERE LOCATED TO A QUALITY LEVEL B.

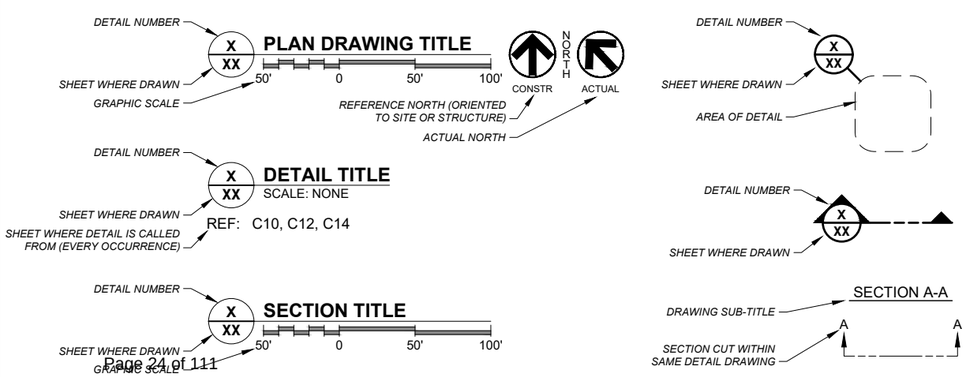
CIVIL ABBREVIATIONS

&	- AND	DWG.	- DRAWING	PC	- POINT OF CURVATURE
∠	- ANGLE	E.	- EAST	PC	- PRECAST
@	- AT	E-W	- EAST TO WEST	P.C.C.	- PORTLAND CEMENT CONCRETE
℄	- CENTERLINE	EA.	- EACH	PE	- POLYETHYLENE
°	- DEGREES	E.F.	- EACH FACE	PE or P.E.	- PLAIN END
Δ	- DELTA	EJ	- EXPANSION JOINT	PEP	- POLYETHYLENE PIPE
Ø	- DIAMETER	ELEC.	- ELECTRICAL	PI	- POINT OF INTERSECTION
□	- SQUARE	ELEV.	- ELEVATION	PO	- PUSH ON
±	- PLUS / MINUS	EP	- END OF PROJECT	POLY	
ABS	- ACRYLONITRILE-BUTADIENE-STYRENE	EQ.	- EQUAL	PRV	- PRESSURE REDUCING VALVE
ACI	- AMERICAN CONCRETE INSTITUTE	EVC	- END VERTICAL CURVE	PSI	- POUNDS PER SQUARE INCH
ACP	- ASBESTOS CEMENT PIPE	E.W.	- EACH WAY	PT	- POINT OF TANGENCY
ADD'L	- ADDITIONAL	EXIST.	- EXISTING	PLV	- PLUG VALVE
ADDM.	- ADDENDUM	EXP.	- EXPANSION	PVC	- POLYVINYL CHLORIDE
ADJ.	- ADJUSTABLE	FDN.	- FOUNDATION	PVI	- POINT OF VERTICAL INTERSECTION
AGGR.	- AGGREGATE	FIN.	- FINISH	R or RAD	- RADIUS
ALT.	- ALTERNATE	FL	- FLOW LINE OR FLANGE	R.	- RISER
APPR.	- APPROACH	FLR.	- FLOOR	RCCP	- REINFORCED CONCRETE CYLINDER PIPE
APPROX.	- APPROXIMATE	FM	- FORCE MAIN	RCP	- REINFORCED CONCRETE PIPE
APPURT.	- APPURTENANCE	FRP	- FIBERGLASS REINFORCED PLASTIC	RDL	- ROOF DRAIN LINE
ARCH.	- ARCHITECT or ARCHITECTURAL	FT.	- FOOT	RES	- RESERVOIR
AR MH	- AIR RELEASE MANHOLE	G&S	- GROOVE AND SHOULDER	REQ'D.	- REQUIRED
ARV	- AIR RELEASE VALVE	GA.	- GAGE	REQ'MTS.	- REQUIREMENTS
ASSY.	- ASSEMBLY	GALV.	- GALVANIZED	RJ	- RESTRAINED JOINT
ASTM	- AMERICAN SOCIETY FOR TESTING MATERIALS	GR.	- GRADE	R/W	- RIGHT OF WAY
AVE	- AVENUE	GRD.	- GROUND	S.	- SOUTH
AVV	- AIR / VACUUM VALVE	GV	- GATE VALVE	S-N	- SOUTH TO NORTH
BFV	- BUTTERFLY VALVE	H	- HATCH	SAN	- SANITARY
BITUM.	- BITUMINOUS	HDD	- HORIZONTAL DIRECTIONAL DRILLING	SCH.	- SCHEDULE
BL	- BUILDING LINE	HDPE	- HIGH DENSITY POLYETHYLENE	SD	- STORM DRAIN
BLDG.	- BUILDING	HORZ.	- HORIZONTAL	SECT.	- SECTION
BLK.	- BLOCK	HR.	- HANDRAIL	SF	- SQUARE FEET
B.O.	- BY OTHERS	HT.	- HEIGHT	SIM.	- SIMILAR
BP	- BEGINNING OF PROJECT	HYD	- HYDRANT	SS	- SANITARY SEWER
BRG.	- BEARING	I.D.	- INSIDE DIAMETER	SSSL	- SANITARY SEWER SERVICE LEAD
BSMT.	- BASEMENT	I.E.	- INVERT ELEVATION	ST	- STREET
BVC	- BEGIN VERTICAL CURVE	IN.	- INCH	STA	- STATION
C-C	- CENTER TO CENTER	INSUL	- INSULATION	STD.	- STANDARD
C&G	- CURB AND GUTTER	INV.	- INVERT	STL.	- STEEL
CB	- CATCH BASIN	JT.	- JOINT	STN. STL.	- STAINLESS STEEL
CDF	- CONTROLLED DENSITY FILL	K	- RATE OF CURVATURE	STR.	- STRUCTURAL
CF	- CUBIC FEET	L	- LENGTH OF CURVE	STRUCT	- STRUCTURAL
CI	- CAST IRON	LB	- POUND	SUP.	- SUPPORT
CIP	- CAST IRON PIPE	LCCP	- LINED CONCRETE CYLINDER PIPE	SWPP	- STORM WATER POLLUTION PROTECTION
C.I.P.	- CAST IN PLACE	LF	- LINEAR FEET	SY	- SQUARE YARD
CJ	- CONSTRUCTION JOINT	LVC	- LENGTH OF VERTICAL CURVE	TEMP.	- TEMPORARY
CL	- CENTERLINE	LVL	- LEVEL	THK.	- THICK
CMP	- CORRUGATED METAL PIPE	MAX.	- MAXIMUM	TOC	- TOP OF CASTING
CO	- CLEANOUT	MECH	- MECHANICAL	T.O.P.	- TOP OF PIPE
CONC.	- CONCRETE	MFG.	- MANUFACTURER	TOS	- TOP OF STEEL
CONSTR.	- CONSTRUCTION	MH	- MANHOLE	TYP.	- TYPICAL
CONT.	- CONTINUOUS	MJ or M.J.	- MECHANICAL JOINT	UON	- UNLESS OTHERWISE NOTED
CNTRL.	- CONTROL	MIN.	- MINIMUM	USACE	- U.S. ARMY CORPS OF ENGINEERS
CSP	- CORRUGATED STEEL PIPE	MNDOT	- MINNESOTA DEPARTMENT OF TRANSPORTATION	VCP	- VITRIFIED CLAY PIPE
CSV	- CURB STOP VALVE	MTDOT	- MONTANA DEPARTMENT OF TRANSPORTATION	VERT.	- VERTICAL
CTR	- CENTER	MTR.	- METER	W.	- WEST
CU	- COPPER	N.	- NORTH	W-E	- WEST TO EAST
CY	- CUBIC YARD	N-S	- NORTH TO SOUTH	W/	- WITH
DEPR.	- DEPRESSION	NA	- NOT APPLICABLE	W/O	- WITHOUT
DTL	- DETAIL	NDDOT	- NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	WM	- WATERMAIN
DI or D.I.	- DUCTILE IRON	NPT	- NIPPLE	WRF	- WATER RECLAMATION FACILITY
DIA.	- DIAMETER	NTS	- NOT TO SCALE	WSL	- WATER SERVICE LEAD
DIM.	- DIMENSION	O.C.	- ON CENTER	WTF	- WATER TREATMENT FACILITY
DIP	- DUCTILE IRON PIPE	O.D.	- OUTSIDE DIAMETER	WTP	- WATER TREATMENT PLANT
DIST.	- DISTANCE	OH.	- OVERHEAD	WWF	- WELDED WIRE FABRIC
DR	- DRIVE	OPNG.	- OPENING	WWTP	- WASTE WATER TREATMENT PLANT
DRWY	- DRIVEWAY	OSHA	- OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION		

SHEET DESIGNATORS

SHEET DESIGNATOR	DESCRIPTION	SHEET SERIES
GEN	GENERAL SHEETS	000
PP	PLAN & PROFILE	100
SD	STANDARD DETAILS	500

DRAWING, SECTION AND DETAIL CONVENTIONS



AE2S

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED DAVID C. VIDRAN 26430 PROFESSIONAL ENGINEER 12-19-25

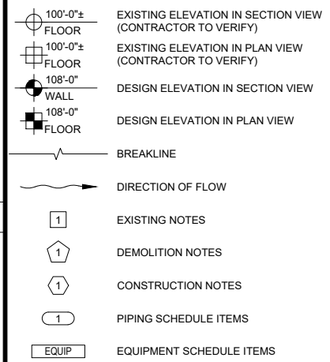
STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

GENERAL NOTES

1. THE INFORMATION DEPICTED WITHIN THESE DRAWINGS IS COMPILED FROM LEGACY DRAWINGS AND FIELD SURVEYS FROM PREVIOUS PROJECTS, SITE VISITS, CONSTRUCTION OBSERVATION TIES AND PHOTOGRAPHS, AND THE MEMORIES OF CITY STAFF AND CONSTRUCTION OBSERVERS.
2. THE LOCATIONS OF KNOWN UNDERGROUND UTILITIES ARE SHOWN ON THE CONSTRUCTION DRAWINGS IN AN APPROXIMATE WAY ONLY. ADDITIONAL ACTIVE AND INACTIVE UTILITIES MAY BE PRESENT.
3. COORDINATE ALL ON-SITE STAGING WITH OWNER TO AVOID CONFLICTS WITH EXISTING UTILITIES.
4. MAINTAIN OWNER ACCESS TO SITE AT ALL TIMES.

CIVIL DRAWING SYMBOLS



SHADYCROFT ACRES SANITARY SEWER EXTENSION

PROJECT TITLE:

SHEET TITLE: **PROJECT NOTES, ABBREVIATIONS, DRAWING CONVENTIONS**

CLIENT: **CITY OF LITTLETON**, LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO:25-51

SHEET DESIGNATOR: **GEN**

SHEET NO: **G004**

Advanced Engineering and Environmental Services, LLC www.ae2s.com

File: C:\Users\jlane\DOCS\CDocs\AE2S\14647-2025-001 Littleton Shadycroft Acres Sewer Design\Project Files\01-Civil\Plan Sheets\GEN.dwg

GENERAL NOTES

1. SURVEY POINTS SHALL BE SET A MAXIMUM DISTANCE OF 100 FEET APART. ALL MANHOLES MUST BE STAKED FOR LOCATION AND GRADE. ALL STAKES SHALL BE FLAGGED TO INCREASE THEIR VISIBILITY.
2. ALL SANITARY SEWER MAINS AND SYSTEM PLANS AND CONSTRUCTION SHALL CONFORM WITH THE PLATTE CANYON WATER AND SANITATION DISTRICT (THE DISTRICT) SANITARY SEWER STANDARDS AND SPECIFICATIONS SHALL BE SUBJECT TO CONSTRUCTION OBSERVATION BY CITY OF LITTLETON (CITY) AND PERSONNEL OR REPRESENTATIVES. CONTRACTOR, SHALL SCHEDULE A PRECONSTRUCTION MEETING WITH THE CITY AND ENGINEER AT LEAST 48 HOURS PRIOR TO THE START OF CONSTRUCTION. PLANS WITH THE CITY REVIEW STAMP WILL BE DISTRIBUTED AT THE PRECONSTRUCTION MEETING. NO CONSTRUCTION WILL BE PERMITTED UNTIL FORMAL COMPLETION OF EASEMENTS AND RECORDINGS, AND PRIOR TO THE PRECONSTRUCTION MEETING.
3. UNDERGROUND UTILITIES IN THE AREA OF CONSTRUCTION HAVE BEEN LOCATED FROM FIELD INVESTIGATION AND THE BEST AVAILABLE UTILITY RECORDS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL UTILITY LINES WHETHER SHOWN ON THE PLANS OR NOT. THE CONTRACTOR SHALL COORDINATE HIS ACTIVITIES WITH THE AFFECTED UTILITY COMPANIES AND SHALL NOTIFY THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC), PHONE NUMBER 81 1, 48 HOURS PRIOR TO STARTING CONSTRUCTION.
4. THE LENGTH OF SANITARY SEWER LINES IS THE HORIZONTAL DISTANCE BETWEEN CENTER OF MANHOLE TO CENTER OF MANHOLE. THEREFORE, DISTANCES SHOWN ON THE PLANS ARE APPROXIMATE AND COULD VARY DUE TO VERTICAL ALIGNMENT AND MANHOLE DIMENSIONS.
5. THE CONTRACTOR SHALL HAVE IN HIS POSSESSION AT ALL TIMES (1) SIGNED COPY OF PLANS APPROVED BY THE CITY.
6. RECORD DRAWINGS AS REQUIRED IN THE SPECIFICATIONS ARE TO BE SUBMITTED BY THE CONTRACTOR PRIOR TO THE CITY'S SUBSTANTIAL COMPLETION ACCEPTANCE OF THE CONSTRUCTION.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING AND REPLACING ANY EXISTING SIGNS, STRUCTURES, FENCES, ETC., ENCOUNTERED ON THE JOB AND RESTORING THEM TO THEIR ORIGINAL CONDITION.
8. THE CONTRACTOR IS RESPONSIBLE FOR:
   - 8.1. NOTIFYING THE CITY 48 HOURS IN ADVANCE OF ANY NEED TO SHUT DOWN ANY PORTION OF THE EXISTING SANITARY SEWER SYSTEM.
   - 8.2. NOTIFYING THE CITY 48 HOURS IN ADVANCE OF THE WORK.
   - 8.3. IN CASE OF AN EMERGENCY AFTER WORKING HOURS, CALL THE CITY OFFICE AT 303-795-3863 FOR RECORDED INSTRUCTIONS.
9. ALL MANHOLE COVERS SHALL BE ADJUSTED TO THE FINAL FINISHED GRADE BY THE CONTRACTOR.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ANY GROUNDWATER ENCOUNTERED DURING THE CONSTRUCTION OF ANY PORTION OF THIS PROJECT. GROUNDWATER SHALL BE PUMPED, PIPED, REMOVED AND DISPOSED OF IN A MANNER WHICH DOES NOT CAUSE FLOODING OF EXISTING STREETS NOR EROSION ON ABUTTING PROPERTIES IN ORDER TO CONSTRUCT THE IMPROVEMENTS SHOWN ON THESE PLANS. NO CONCRETE SHALL BE PLACED WHERE GROUND WATER IS VISIBLE OR UNTIL THE GROUNDWATER TABLE HAS BEEN LOWERED BELOW THE PROPOSED IMPROVEMENTS. ANY UNSTABLE AREAS, AS A RESULT OF GROUNDWATER, ENCOUNTERED DURING THE CONSTRUCTION OF THE PROPOSED IMPROVEMENTS SHALL BE STABILIZED AS AGREED UPON BY THE CONTRACTOR, THE CITY, AND THE ENGINEER AT THE TIME OF THEIR OCCURRENCE.
11. IT SHALL BE THE ENGINEER'S RESPONSIBILITY TO RESOLVE PROBLEMS WITH THE CITY DUE TO CHANGED CONDITIONS ENCOUNTERED DURING THE PROGRESS OF ANY PORTION OF THE PROPOSED WORK. IF, IN THE OPINION OF THE CITY, PROPOSED ALTERATIONS TO THE SIGNED CONSTRUCTION PLANS INVOLVES SIGNIFICANT CHANGE TO THE CHARACTER OF THE WORK, OR TO THE FUTURE CONTIGUOUS PUBLIC OR PRIVATE IMPROVEMENTS, THE ENGINEER SHALL BE RESPONSIBLE FOR SUBMITTING REVISED PLANS TO THE CITY FOR REVIEW PRIOR TO ANY FURTHER CONSTRUCTION RELATED TO THAT PORTION OF THE WORK.
12. THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY, AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, ENDEMNIFY AND HOLD HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT. EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE ENGINEER, OR THE CITY.
13. THE PIPE USED FOR SANITARY SEWER MAINS SHALL BE IN ACCORDANCE WITH ASTM D3034, SDR - 26, PVC PIPE IN PAVED RIGHT OF WAY'S AND EASEMENTS. UNLESS NOTED OTHERWISE. ALL PIPE SHALL BE GREEN IN COLOR.
14. SUBSTANTIAL COMPLETION ACCEPTANCE OF THE NEW SANITARY SEWER MAINS IS CONTINGENT UPON RECEIVING COPIES OF:
   - 14.1. SANITARY SEWER TRENCH COMPACTION TEST RESULTS, AND
   - 14.2. RECORD DRAWINGS.
15. THE SANITARY SEWER SYSTEM WILL BE TESTED IN ACCORDANCE WITH THE CITY STANDARDS AND SPECIFICATIONS. THE CITY WILL REQUIRE THE CONTRACTOR TO CONDUCT AND SUBMIT THE FOLLOWING:
   - 15.1. FLUSHING, CCTV VIDEOS, AND MEASUREMENT OF DIPS OR SAGS, IN THE PIPELINES.
   - 15.2. LOW PRESSURE AIR TEST 100% OF THE NEW PVC PIPE SYSTEM, AND
   - 15.3. AIR VACUUM TEST OF 100% OF MANHOLES.
16. MANHOLE RIMS SHALL BE SET AT AN ELEVATION RELATIVE TO THE PAVEMENT, IN ACCORDANCE WITH THE GOVERNING CITY STANDARDS. WHETHER THE MANHOLE IS IN A PAVED OR UNPAVED GRADE, A MINIMUM OF ONE (1) AND A MAXIMUM OF FOUR (4) ROWS OF CONCRETE RINGS SHALL BE USED TO ADJUST THE RIM ELEVATIONS TO FINAL GRADE. THE MAXIMUM ACCEPTABLE VERTICAL ADJUSTMENT UTILIZING CONCRETE RINGS IS TWELVE (12) INCHES. NO MULTIPLE 2" AND 3" CONCRETE RINGS ARE ALLOWED.
17. CONNECTIONS TO EXISTING CITY SEWER LINES WILL BE PERMITTED UPON ACCEPTANCE OF THE NEW SANITARY SYSTEM. EXISTING PIPE AT THE POINT OF CONNECTION SHALL NOT BE "BROKEN OUT" UNTIL THE NEW SYSTEM IS ACCEPTED.
18. THE CONTRACTOR SHALL VERIFY EXISTING PIPE INVERTS TO BE CONNECTED TO PRIOR TO CONSTRUCTION STAKING.
19. THE CONTRACTOR SHALL TAKE CARE TO PROPERLY SHAPE ALL MANHOLE INVERTS AND BENCHES IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS TO PROMOTE SMOOTH FLOW THROUGH THE MANHOLE. THE CHANNELS MUST BE FULL DEPTH AS A MINIMUM. INVERTS OF LINES INTERSECTING AT 90 DEGREE AND A HIGHLY DIVERGENT OR FLAT SLOPES ARE ESPECIALLY CRITICAL. A CAMERA MUST BE ABLE TO PASS THROUGH THE MANHOLE CHANNEL. MANHOLE INVERTS SHALL BE CONSTRUCTED WITH A SMOOTH TROWEL FINISH, AND BENCHED WITH A LIGHT BROOM, NON-SKID FINISH.
20. THE CITY, IT'S REPRESENTATIVE, AND/OR THE ENGINEER, IS NOT A GUARANTOR OF THE CONSTRUCTING CONTRACTORS' OBLIGATIONS AND PERFORMANCE OF CONTRACT.
21. OBSERVATIONS OF WORK IN PROGRESS AND ON-SITE VISITS ARE NOT TO BE CONSTRUED AS A GUARANTEE BY THE CITY OR ENGINEER OF THE CONTRACTOR'S CONTRACTUAL COMMITMENT.
22. THE CITY, AND/OR ENGINEER, IS NOT RESPONSIBLE FOR SAFETY IN, ON, OR ABOUT THE PROJECT SITE, NOT FOR COMPLIANCE BY THE APPROPRIATE PARTY OF ANY REGULATIONS RELATING THERETO.

EROSION AND SEDIMENT CONTROL NOTES

1. MINIMUM BMPS - THE CONTRACTOR SHALL IDENTIFY BMPS TO CONTROL POTENTIAL POLLUTANTS INCLUDING BUT NOT LIMITED TO SEDIMENT, CONSTRUCTION SITE WASTE, TRASH, DISCARDED BUILDING MATERIALS, CONCRETE TRUCK WASHOUT, CHEMICALS, SANITARY WASTE, AND CONTAMINATED SOILS, PRIOR TO DISCHARGE FROM THE SITE OR THE MS4 WHICHEVER COMES FIRST. AT A MINIMUM, BMPS MUST ADDRESS THE FOLLOWING ACTIVITIES, AS APPLICABLE:
   - 1.1. LAND DISTURBANCE AND STORAGE OF SOILS
   - 1.2. VEHICLE TRACKING
   - 1.3. LOADING AND UNLOADING OPERATIONS
   - 1.4. OUTDOOR STORAGE OF CONSTRUCTION SITE MATERIALS, BUILDING MATERIALS, FERTILIZERS, TRASH, CHEMICALS, ETC.
   - 1.5. BULK STORAGE OF MATERIALS
   - 1.6. VEHICLE AND EQUIPMENT MAINTENANCE AND FUELING
   - 1.7. SIGNIFICANT DUST OR PARTICULATE GENERATING PROCESSES
   - 1.8. ROUTINE MAINTENANCE ACTIVITIES INVOLVING FERTILIZERS, PESTICIDES, DETERGENTS, FUELS, SOLVENTS, AND OILS
   - 1.9. CONCRETE TRUCK/EQUIPMENT WASHING, INCLUDING THE CONCRETE TRUCK CHUTE AND ASSOCIATED FIXTURES AND EQUIPMENT
   - 1.10. DEDICATED ASPHALT AND CONCRETE BATCH PLANTS.
   - 1.11. OTHER AREAS OR OPERATIONS WHERE SPILLS CAN OCCUR.
   - 1.12. OTHER NON-STORMWATER DISCHARGES INCLUDING CONSTRUCTION DEWATERING NOT COVERED UNDER THE CONSTRUCTION DEWATERING DISCHARGES GENERAL PERMIT AND WASH WATER THAT MAY CONTRIBUTE POLLUTANTS TO THE MS4.
2. REQUIRED STANDARD NOTES -
   - 2.1. THE CONTRACTOR, OR THEIR DESIGNEE IS RESPONSIBLE FOR OBTAINING APPLICABLE PERMITS AND THE INSTALLATION AND MAINTENANCE OF ALL BEST MANAGEMENT PRACTICES (BMPS) FOR EROSION AND SEDIMENT CONTROL, EVEN IF SPECIFIC TASKS MAY BE DESIGNATED TO OTHERS.
   - 2.2. FOR ALL SITES DISTURBING ONE (1) OR MORE ACRES, THE STATE OF COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT (CDPHE) REQUIRES A "STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION ACTIVITY" PERMIT. A COPY OF THAT ISSUED PERMIT SHALL BE SUBMITTED TO THE ENGINEERING DIVISION PRIOR TO ISSUANCE OF A LOCAL CITY PERMIT.
   - 2.3. ALL BMPS SHALL BE INSTALLED PROPERLY AND INSPECTED BY A CITY REPRESENTATIVE PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY ON THE SITE THAT DISTURBS THE GROUND. BMPS SHALL BE INSPECTED, CLEANED, AND MAINTAINED BY THE CONTRACTOR OR DESIGNEE AS NEEDED DURING CONSTRUCTION.
   - 2.4. ISSUANCE OF A GRADING OR BUILDING PERMIT WITH AN APPROVED SWMP PROVIDES AUTHORIZATION FOR THE CITY TO ENTER THE PREMISES FOR PURPOSES OF INSPECTIONS AND COMPLIANCE WITH THE APPROVED PLANS, PROVISIONS OF MUNICIPAL CODE TITLE 7 CHAPTER 7, AND THE CITY'S STORM DRAINAGE DESIGN AND TECHNICAL CRITERIA.
   - 2.5. THE CITY MAY REQUIRE THAT THE CONTRACTOR OR THEIR DESIGNEE PROVIDE ADDITIONAL EROSION OR SEDIMENT CONTROL MEASURES, SHOULD WATER OR WIND EROSION PROBLEMS OCCUR OR SHOULD THE IMPLEMENTED STORMWATER MANAGEMENT PLAN (SWMP) AND BEST MANAGEMENT PRACTICES (BMPS) NOT FUNCTION ADEQUATELY OR AS INTENDED.
   - 2.6. INSPECTIONS AND NEEDED MAINTENANCE OF BMPS ARE REQUIRED A MINIMUM OF EVERY 14 DAYS AND AFTER STORM EVENTS, OR ALTERNATELY EVERY 7 DAYS. THE CITY RESERVES THE RIGHT TO REQUIRE THE OPERATOR TO SUBMIT COPIES OF INSPECTION REPORTS OR OTHER STORMWATER MANAGEMENT DOCUMENTS AT ANY TIME.
   - 2.7. SWMPS SHALL ACCOMMODATE CONSTRUCTION PHASING, INCLUDING CLEARING AND GRUBBING, UTILITIES, ROADS, VERTICAL CONSTRUCTION, FINAL GRADING, AND STABILIZATION, AND SHALL HAVE REDUNDANT DOWNSLOPE BMPS IN PLACE TO ENSURE ADEQUATE EROSION AND SEDIMENT CONTROL DURING ALL PHASES.
   - 2.8. THE CONTRACTOR OR THEIR DESIGNEE IS RESPONSIBLE TO CLEAN ALL PUBLIC STREETS AND SIDEWALKS WHERE SEDIMENT OR MUD IS TRACKED ONTO THE PAVED SURFACE. THE OPERATOR, PROPERTY OWNER, OR THEIR DESIGNEE SHALL CLEAN THE PUBLIC WAY IMMEDIATELY OR WITHOUT DELAY UPON BEING NOTIFIED BY THE CITY. IT MAY ALSO BE NECESSARY TO PERIODICALLY CLEAN THE PUBLIC STORM SEWERS AND DOWN GRADIENT PROPERTIES DURING THE DEVELOPMENT OF THE SITE.
   - 2.9. THE CONTRACTOR OR THEIR DESIGNEE SHALL BE RESPONSIBLE FOR IMPLEMENTATION AND FIELD UPDATES/CHANGES TO THE STORM WATER MANAGEMENT PLAN (SWMP) THAT INCLUDES THE PLAN VIEW LAYOUT AND INSTALLATION DETAILS OF APPROPRIATE CONTROL MEASURES, AND MAINTENANCE PROCEDURES.
   - 2.10. IF THE CONTRACTOR OR THEIR DESIGNEE FAILS TO IMPLEMENT ANY OF THE PROVISIONS OF THE SWMP AND IGNORES THE CITY'S VERBAL OR WRITTEN REQUEST FOR IMMEDIATE REMEDY, THE CITY MAY MAKE ARRANGEMENTS OR HIRE A PRIVATE PROPERTY OWNER OR DESIGNEE TO PERFORM MAINTENANCE, INSTALLATION OR REPLACEMENT OF BMPS, OR CLEAN THE PUBLIC WAYS. CHARGES FOR SERVICES WILL BE SENT TO THE OPERATOR, PROPERTY OWNER OR DESIGNEE FOR PAYMENT. ENFORCEMENT PROCEDURES ARE OUTLINED IN LITTLETON MUNICIPAL CODE 7-7-12.
   - 2.11. THE CITY MAY ISSUE A "STOP WORK" ORDER TO STOP ANY PERMITTED SITE CONSTRUCTION WORK FROM PROCEEDING UNTIL THE BMPS PROVIDED ON THE SWMP AND APPROVED PLANS ARE INSTALLED, IMPLEMENTED AS INTENDED, MAINTAINED, OR UNTIL CORRECTIVE MEASURES ARE TAKEN AND ANY NECESSARY CLEANUP IS PERFORMED. THE OWNER BEARS ALL COSTS ASSOCIATED WITH ANY DELAYS IN THE PROJECT.
   - 2.12. THE CONTRACTOR OR THEIR DESIGNEE SHALL NOT UTILIZE THE PUBLIC STREET AS A STAGING ARCA FOR THE TEMPORARY STORAGE OF BUILDING MATERIALS, EXCAVATED MATERIALS, OR CONSTRUCTION EQUIPMENT, EXCEPT AS APPROVED BY THE CITY. USE OF OFFSITE PRIVATE PROPERTY FOR STAGING MAY BE SUBJECT TO REVIEW BY THE COMMUNITY DEVELOPMENT DEPARTMENT.
   - 2.13. A CONSTRUCTION DEWATERING DISCHARGE PERMIT SHALL BE OBTAINED FROM CDPHE PRIOR TO PUMPING OF ANY SURFACE OR SUB-SURFACE WATER INTO ANY CITY PUBLIC WAY OR STORM DRAINAGE SYSTEM. ADEQUATE SEDIMENT CONTROL BMPS SHALL BE REQUIRED AT THE PUMP'S INLET AND OUTLET.
   - 2.14. ALL SOIL AREAS DISTURBED SHALL BE GRADED, SEEDED, AND MULCHED OR OTHERWISE VEGETATED OR COVERED, TO STABILIZE THE GROUND SURFACE WITHIN 14 DAYS OF COMPLETION OF GRADING OPERATIONS. THE CITY SHALL APPROVE THE SEED MIX AND RATE OF APPLICATION PRIOR TO SEEDING THE AREA. IF DISTURBED SOIL AREAS ARE TO BE LEFT DORMANT FOR OVER 14 DAYS, A TEMPORARY STABILIZING COVER IS REQUIRED, THE METHOD TO BE APPROVED BY THE CITY. WEEDS ARE NOT AN ACCEPTABLE TEMPORARY OR PERMANENT STABILIZATION COVER.
   - 2.15. BMPS SHALL REMAIN IN-PLACE AND OPERATIONAL UNTIL ALL SITE PAVING, PERMANENT LANDSCAPING, OR ADEQUATE VEGETATIVE COVER ESTABLISHMENT IS COMPLETED. ADEQUATE VEGETATION COVER IS DEFINED AS A UNIFORM VEGETATIVE COVER WITH A PLANT DENSITY (STEM OR STALKS) OF AT LEAST 70% OF THE PRE-DISTURBANCE CONDITION. TEMPORARY IRRIGATION MAY BE NECESSARY TO ESTABLISH PLANT GROWTH. ADEQUATE VEGETATIVE COVER WILL BE DETERMINED BY CITY STAFF WITH AN ON-SITE INSPECTION PRIOR TO ANY PERMIT RELEASE, INCLUDING TERMINATION OF A CDPHE STORMWATER PERMIT.
   - 2.16. AFTER THE SITE HAS BEEN STABILIZED AS DETERMINED BY CITY STAFF, THE CONTRACTOR OR THEIR DESIGNEE SHALL REMOVE ALL BMPS AND CLEAN ANY STORM SEWERS WHERE CONSTRUCTION SEDIMENT MAY HAVE DEPOSITED.
3. GRADING PERMIT ISSUANCE
   A GRADING PERMIT MAY BE ISSUED AFTER:
   - 3.1. REVIEW AND APPROVAL OF THE STORMWATER MANAGEMENT PLAN (SWMP) BY THE ENGINEERING DIVISION.
   - 3.2. INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES ON THE SITE.
   - 3.3. APPROVAL OF CONTROL MEASURE INSTALLATION BY A CITY INSPECTOR, AND;
   - 3.4. SUBMITTAL OF PROPER COLLATERAL/SURETY, IF REQUIRED. SEE LITTLETON MUNICIPAL CODE 7-7.

   ISSUANCE OF A GRADING OR BUILDING PERMIT WITH AN APPROVED SWMP PROVIDES AUTHORIZATION FOR THE CITY TO ENTER THE PREMISES FOR PURPOSES OF INSPECTIONS AND COMPLIANCE WITH THIS CHAPTER.

CITY OF LITTLETON CONSTRUCTION NOTES

1. ALL ROADWAY RESURFACING WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, ASSOCIATED STANDARD SPECIAL PROVISIONS, COLORADO DEPARTMENT OF TRANSPORTATION STANDARD PLANS, AND CITY OF LITTLETON PUBLIC WORKS REGULATIONS, UNLESS MODIFIED BY CITY STANDARD DETAILS, PROJECT DRAWINGS OR SPECIFICATIONS INCLUDED HEREIN.
2. AFTER AN AWARD HAS BEEN MADE, A PRECONSTRUCTION MEETING WILL BE SCHEDULED. THE CONTRACTOR SHALL PROVIDE ALL SUBMITTALS FOR REVIEW AND APPROVAL PRIOR TO THE PRECONSTRUCTION CONFERENCE.
3. THE CONTRACTOR SHALL FIELD LOCATE, VERIFY AND BE RESPONSIBLE FOR ALL FEATURES, INCLUDING ALL UNDERGROUND AND ABOVE GROUND UTILITIES, PRIOR TO BEGINNING THE WORK (SEE CDOT SUBSECTION 105.11). FOR UTILITY COORDINATION, THE CONTRACTOR SHALL CONTACT UTILITY NOTIFICATION CENTER 811. ALL POTHOLES SHALL BE RESTORED IN ACCORDANCE WITH CITY OF LITTLETON PUBLIC WORKS REGULATIONS, WHICH SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
4. ALL TRAFFIC CONTROL DEVICES DELIVERED TO THE SITE SHALL BE FREE OF GRAFFITI AND OTHER UNNECESSARY MARKS AND SHALL BE MAINTAINED AS SUCH FOR THE DURATION OF THE PROJECT.
5. ANY PROPOSED NIGHT WORK (7 P.M. TO 7:00 A.M.), INCLUDING PUMPS OR GENERATORS USED FOR BYPASS PUMPING AND/OR FLOW CONTROL AND RECONNECTION OF SERVICES REQUIRES THE APPROVAL OF THE PUBLIC WORKS DIRECTOR OF THE CITY OF LITTLETON. IF THE CONTRACTOR DESIRES TO WORK AT NIGHT, THEY SHALL SUBMIT A REQUEST IN WRITING TO THE PROJECT MANAGER FOR THE PUBLIC WORKS DIRECTOR'S APPROVAL.
6. THE CITY RESERVES THE RIGHT TO INCREASE OR DECREASE TOTAL QUANTITIES TO MEET THE CITY'S NEEDS. REPRICING OF THE ITEMS WILL NOT BE PERMITTED DUE TO CHANGE IN THE PLAN QUANTITY. IT IS THE CITY'S INTENT TO LIMIT WORK TO THOSE AREAS IDENTIFIED IN THE CONTRACT DOCUMENTS.
7. CONTRACTOR SHALL MAKE ALL REASONABLE EFFORTS TO LIMIT DISTURBANCE OUTSIDE OF WORK AREA. DAMAGE TO PUBLIC OR PRIVATE PROPERTY SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S SOLE EXPENSE.
8. ALL EXCESS MATERIAL SHALL BE DISPOSED OF OFF-SITE, OR AT A SITE APPROVED BY THE ENGINEER. DISPOSAL SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
9. THE CONTRACTOR SHALL FURNISH ALL LABOR, EQUIPMENT, MATERIALS, AND PERMITS NECESSARY FOR CONTROLLING SURFACE AND SUBSURFACE WATER. CONTRACTOR SHALL OBTAIN A STATE OF COLORADO DEWATERING PERMIT, IF REQUIRED. COST OF WATER CONTROL WILL NOT BE PAID SEPARATELY AND SHALL BE INCLUDED IN THE BID ITEM "SEWER LINE INSTALL".
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING WORKERS A PORTABLE TOILET FACILITY FOR THE DURATION OF WORK, WHICH SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID SEPARATELY.

Plotted By: Joey Lane Date: Wednesday, December 17, 2025

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Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS			
SYM	DATE		APPR

PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

SHEET TITLE:
GENERAL NOTES

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO:25-51

SHEET DESIGNATOR: GEN

SHEET NO: G005

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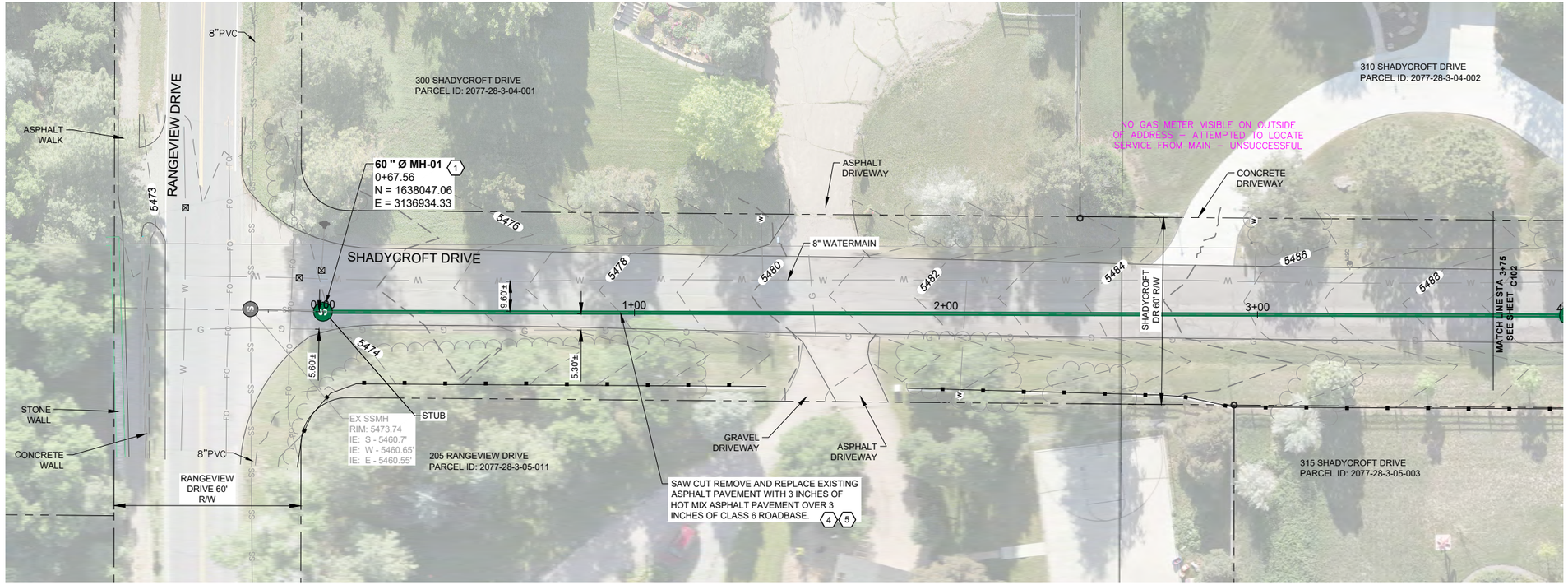

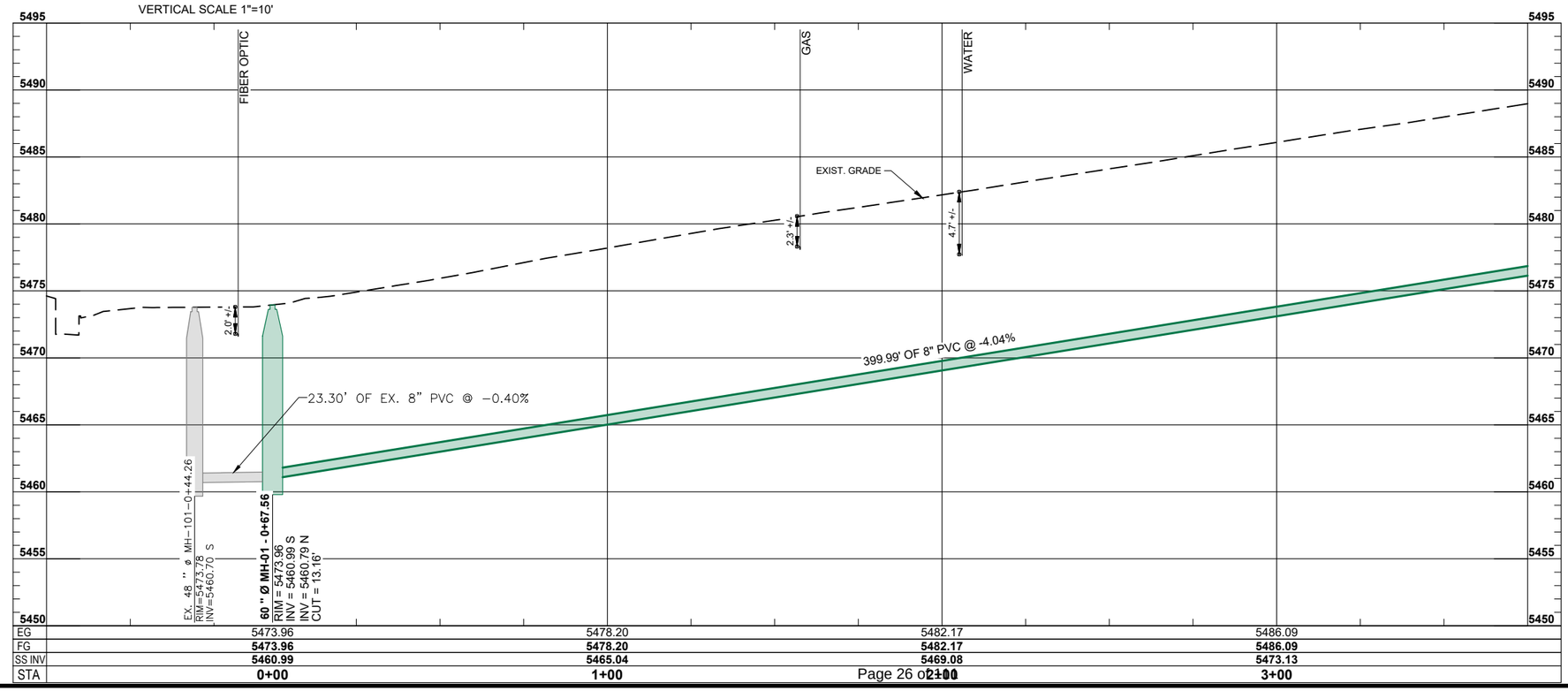

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

NORTH

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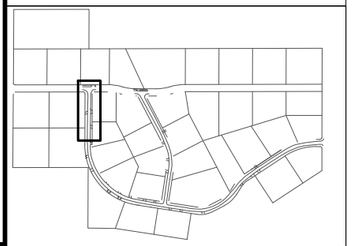
Scale in Feet



CONSTRUCTION NOTES

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PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51
SHEET DESIGNATOR: PP
SHEET NO: C101

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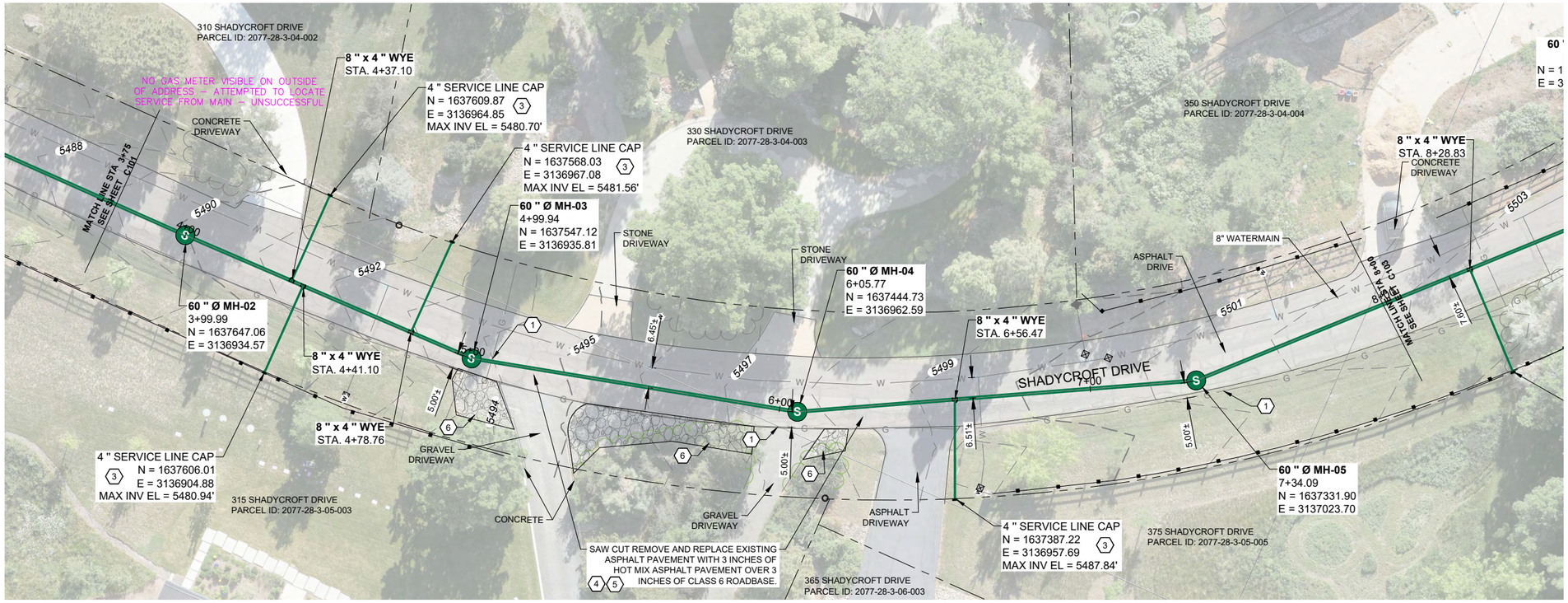
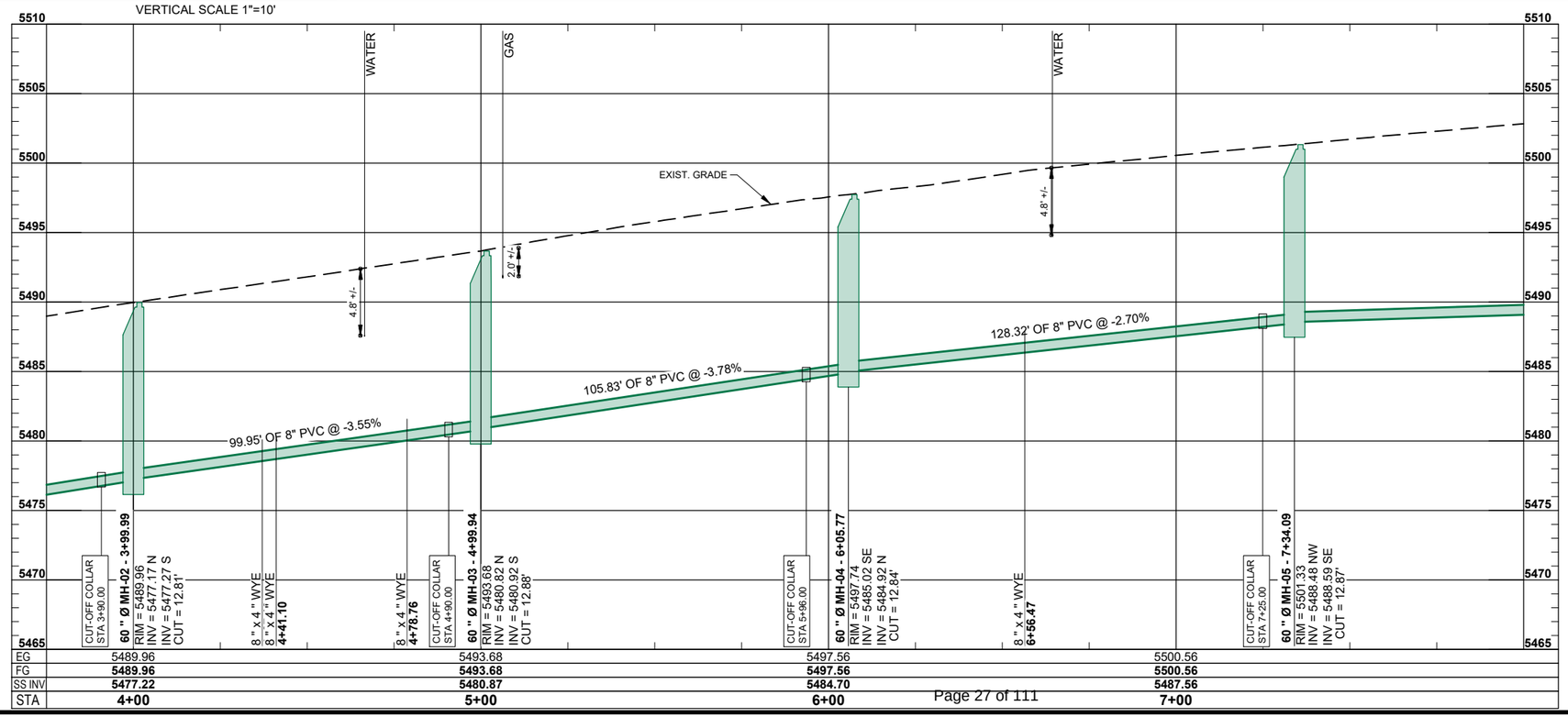
Plotted By: Joey Lane Date: Wednesday, December 17, 2025





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FG	**5489.96**	**5493.68**	**5497.56**	**5500.56**
SS INV	**5477.22**	**5480.87**	**5484.70**	**5487.56**
STA	**4+00**	**5+00**	**6+00**	**7+00**

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

NORTH

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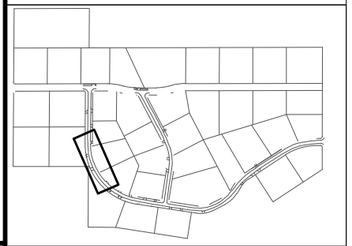
Scale in Feet



CONSTRUCTION NOTES

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6. REESTABLISH EXISTING RIPRAP DRAINAGE ROCK IN THIS AREA AFTER SEWER INSTALLATION.
7. LATERALS MAY TERMINATE OR BE SHIFTED BASED ON FIELD CONDITIONS UPON APPROVAL FROM CITY OF LITTLETON AND MUST BE DOCUMENTED IN AS-BUILTS.

PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO:25-51
SHEET DESIGNATOR: **PP**
SHEET NO: **C102**

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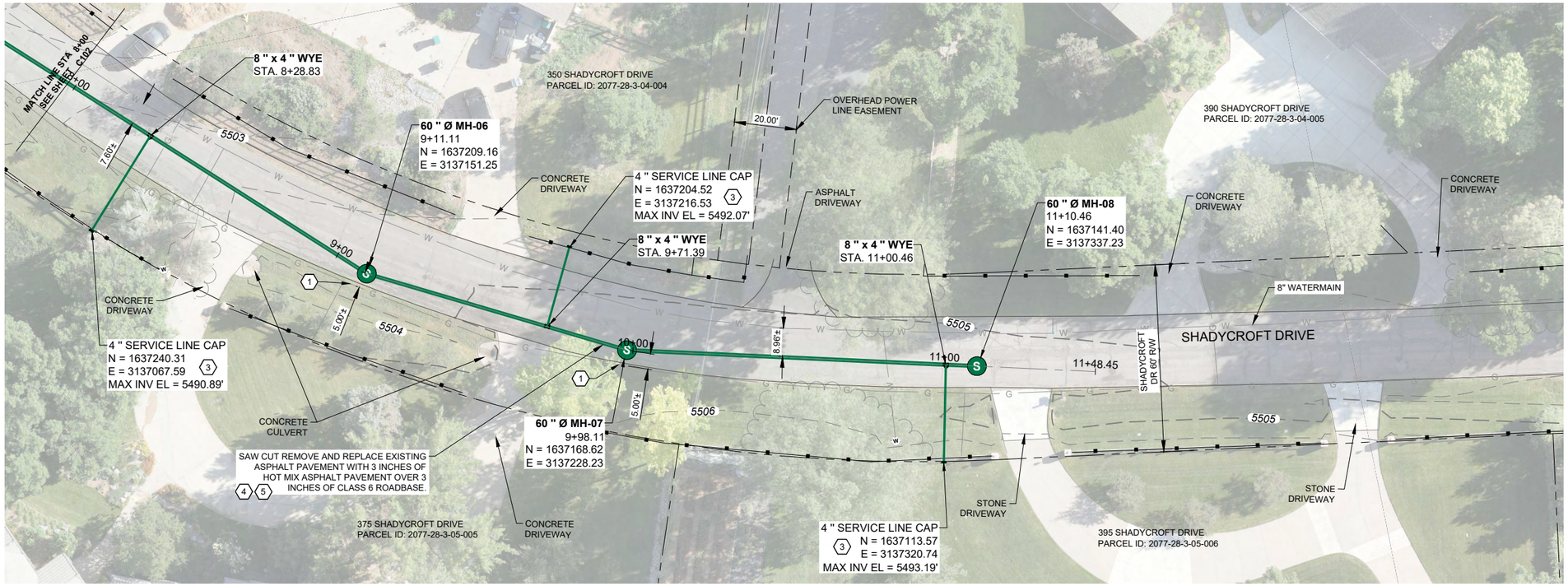
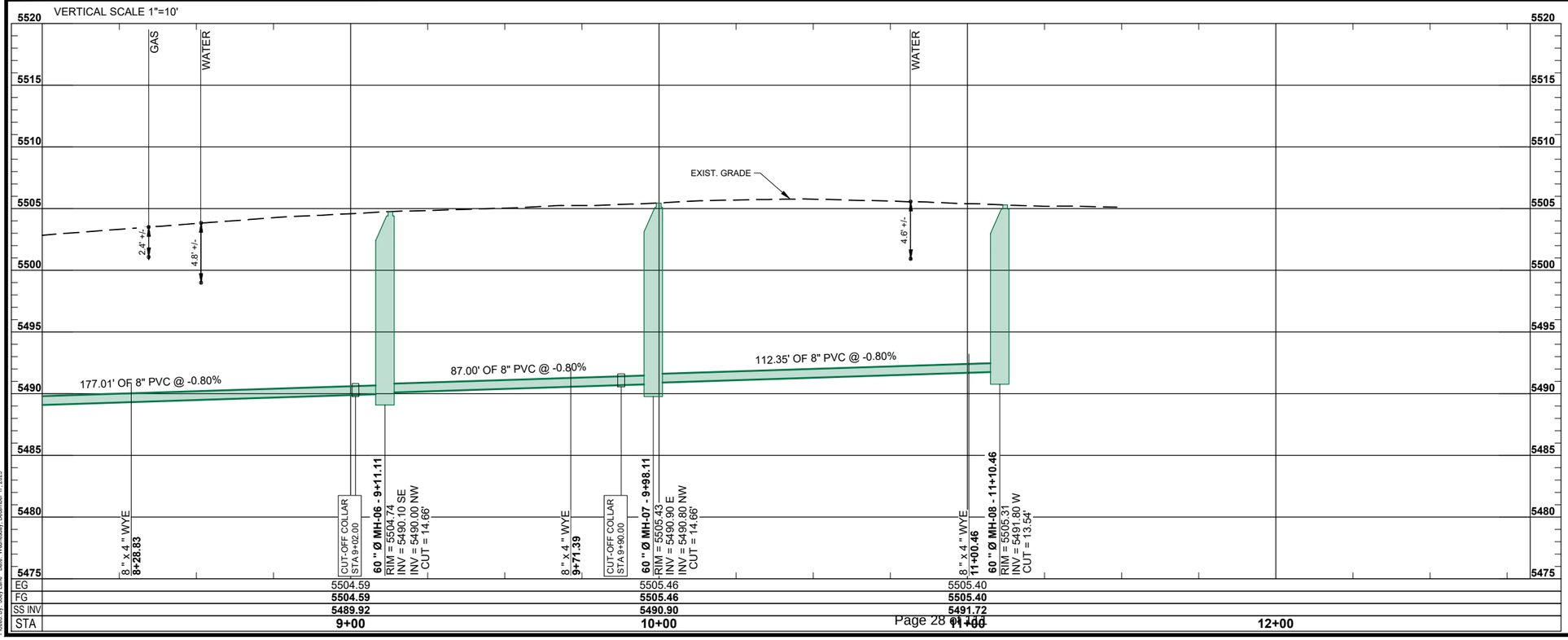
Plotted By: Joey Lane Date: Thursday, December 18, 2025





Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED
DAVID C. VIDIAN
26430
PROFESSIONAL ENGINEER
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

NORTH

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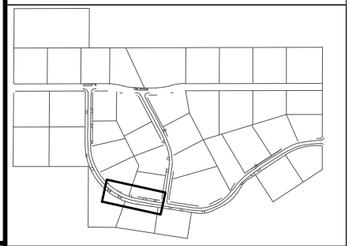
Scale in Feet



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PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO:25-51
SHEET DESIGNATOR: **PP**
SHEET NO: **C103**

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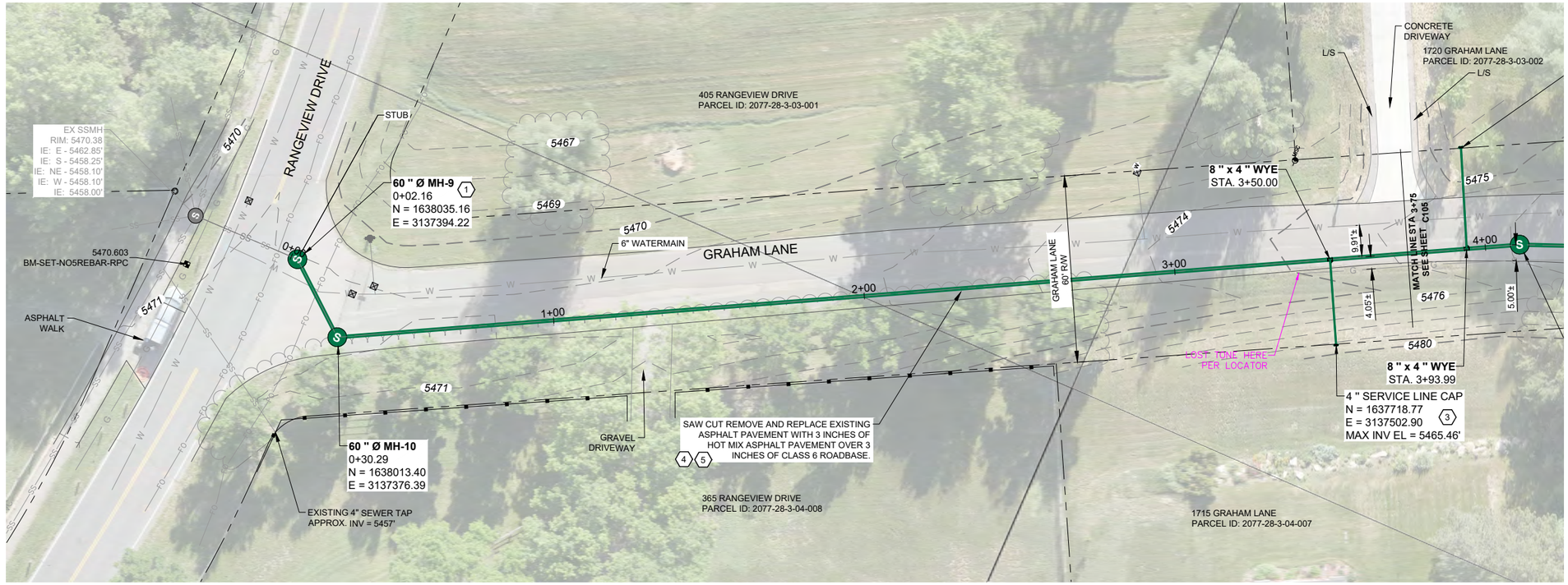
Plotted By: Joey Lane Date: Wednesday, December 17, 2025



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FG	**5471.04**	**5471.07**	**5471.91**	**5474.14**
SS INV		**5459.82**	**5461.25**	**5462.69**
STA	**0+00**	**1+00**	**2+00**	**3+00**

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Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS			
	SYM	DATE	APPR

NORTH

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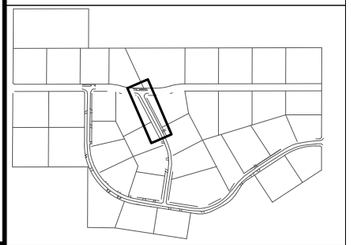
Scale in Feet



CONSTRUCTION NOTES

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PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51

SHEET DESIGNATOR: **PP**
SHEET NO: **C104**

Advanced Engineering and Environmental Services, LLC www.ae2s.com

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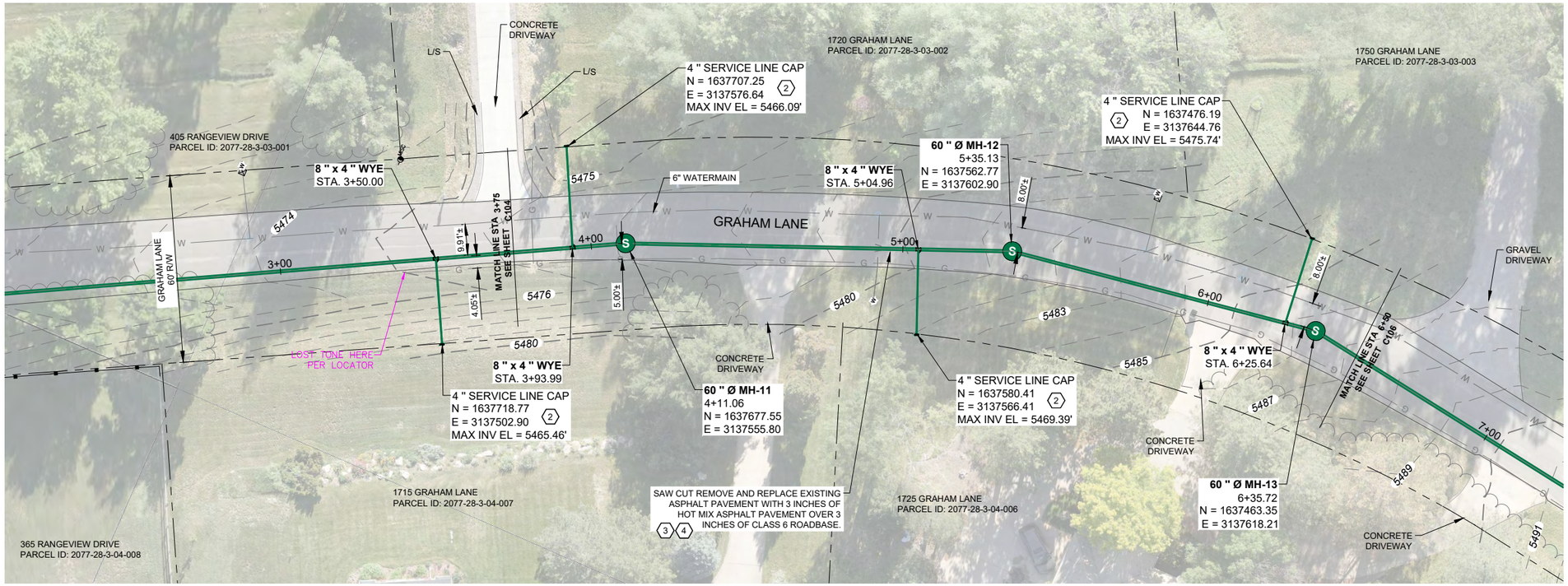

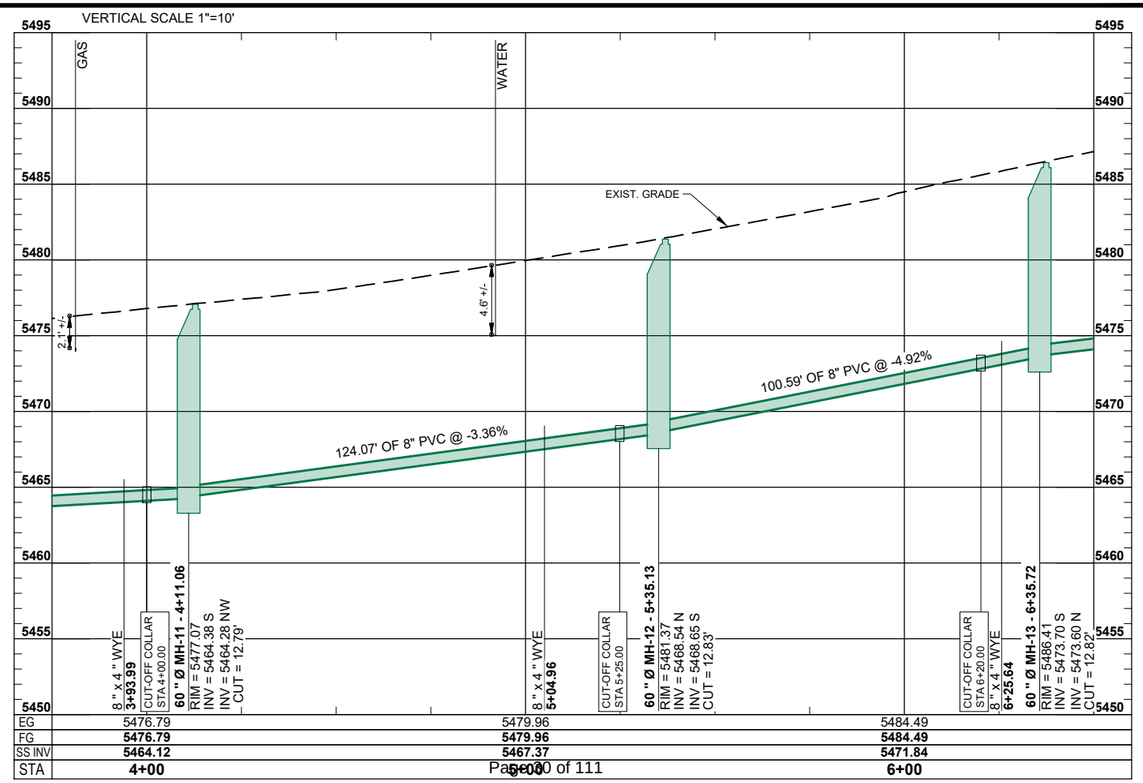

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COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
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CONSTRUCTION NOTES

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PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51
SHEET DESIGNATOR: PP
SHEET NO: C105

Advanced Engineering and Environmental Services, LLC www.ae2s.com

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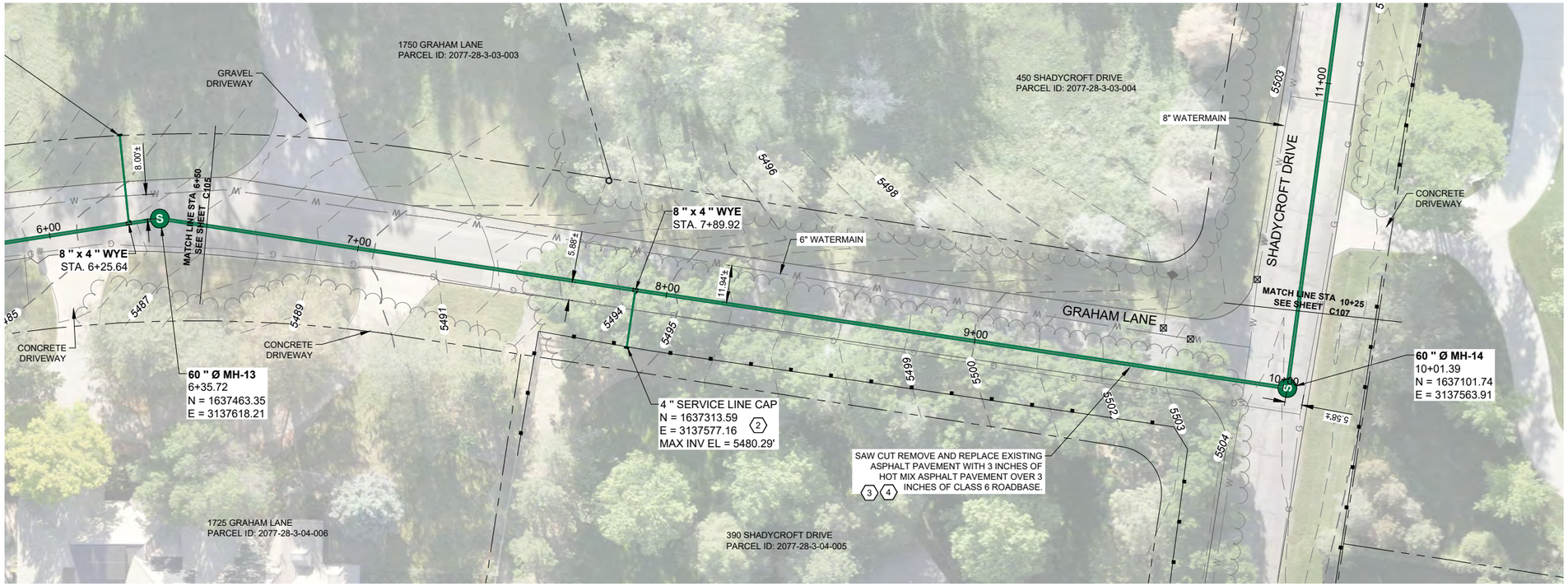
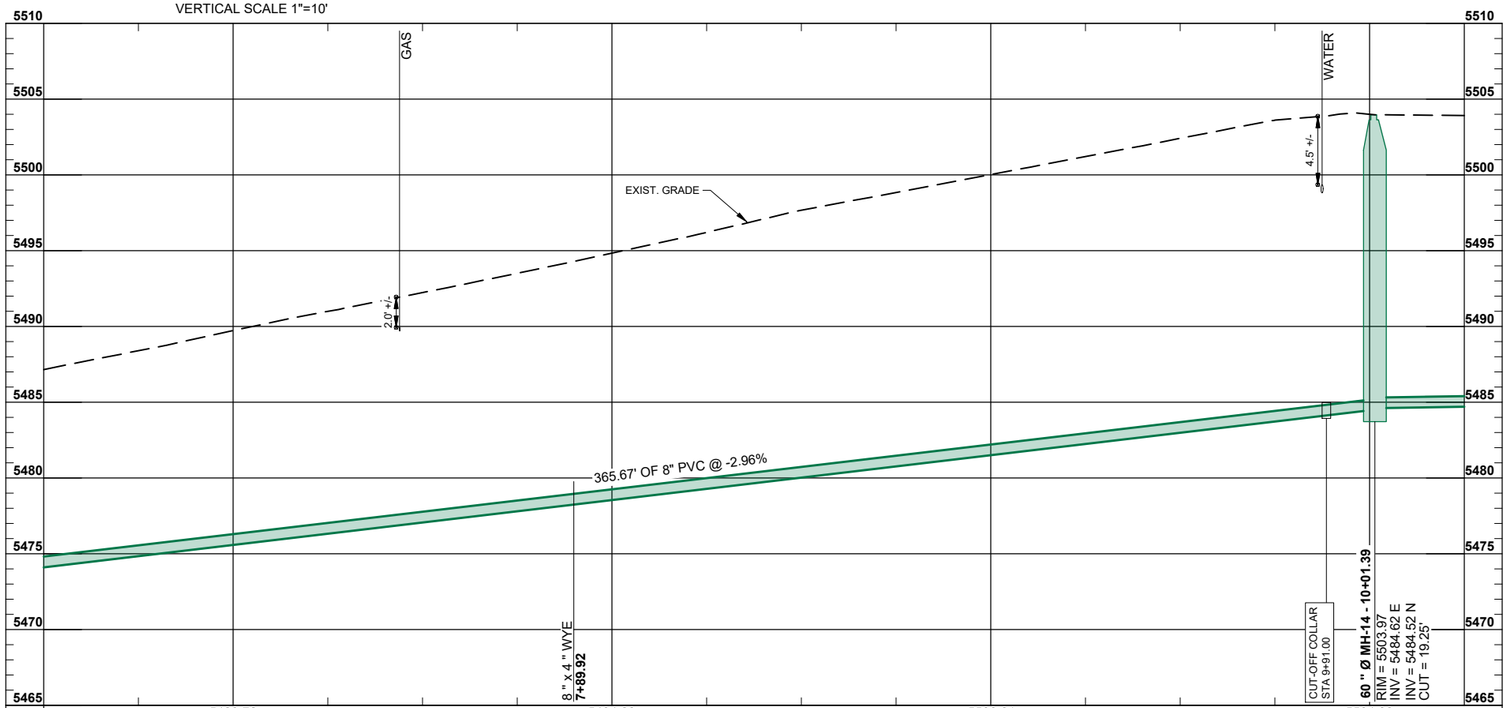
Plotted By: Joey Lane Date: Wednesday, December 17, 2025





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COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
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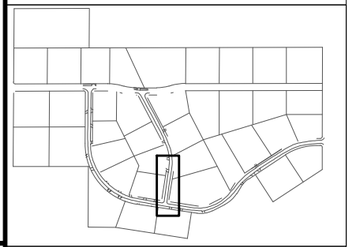

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PROJECT TITLE:

SHADYCROFT ACRES SANITARY SEWER EXTENSION

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:

SANITARY SEWER PLAN & PROFILE

CLIENT:		
CITY OF LITTLETON LITTLETON, CO	PREPARED BY: JTL CHECKED BY: EGH APPROVED BY: DCV	
PROJECT NO: P14647-2025-001	SHEET DESIGNATOR: PP	SHEET NO: C106
DATE: DECEMBER 19, 2025		
COL. PROJECT NO:25-51		

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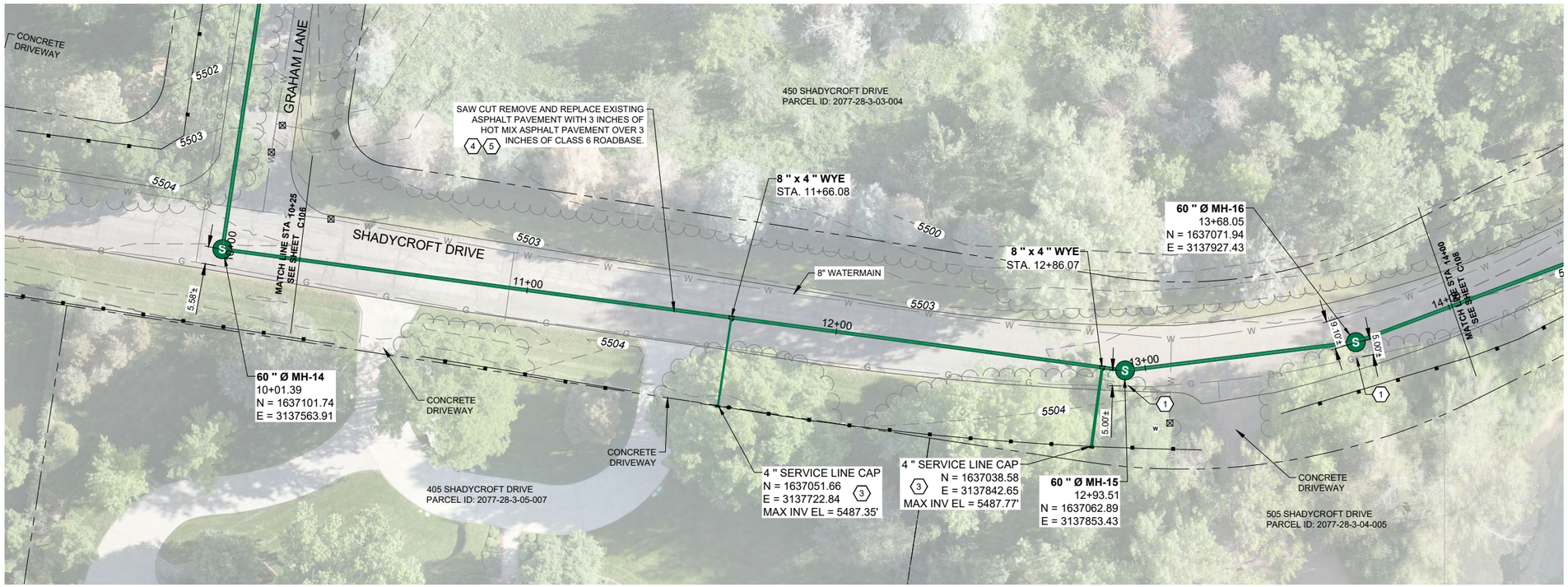
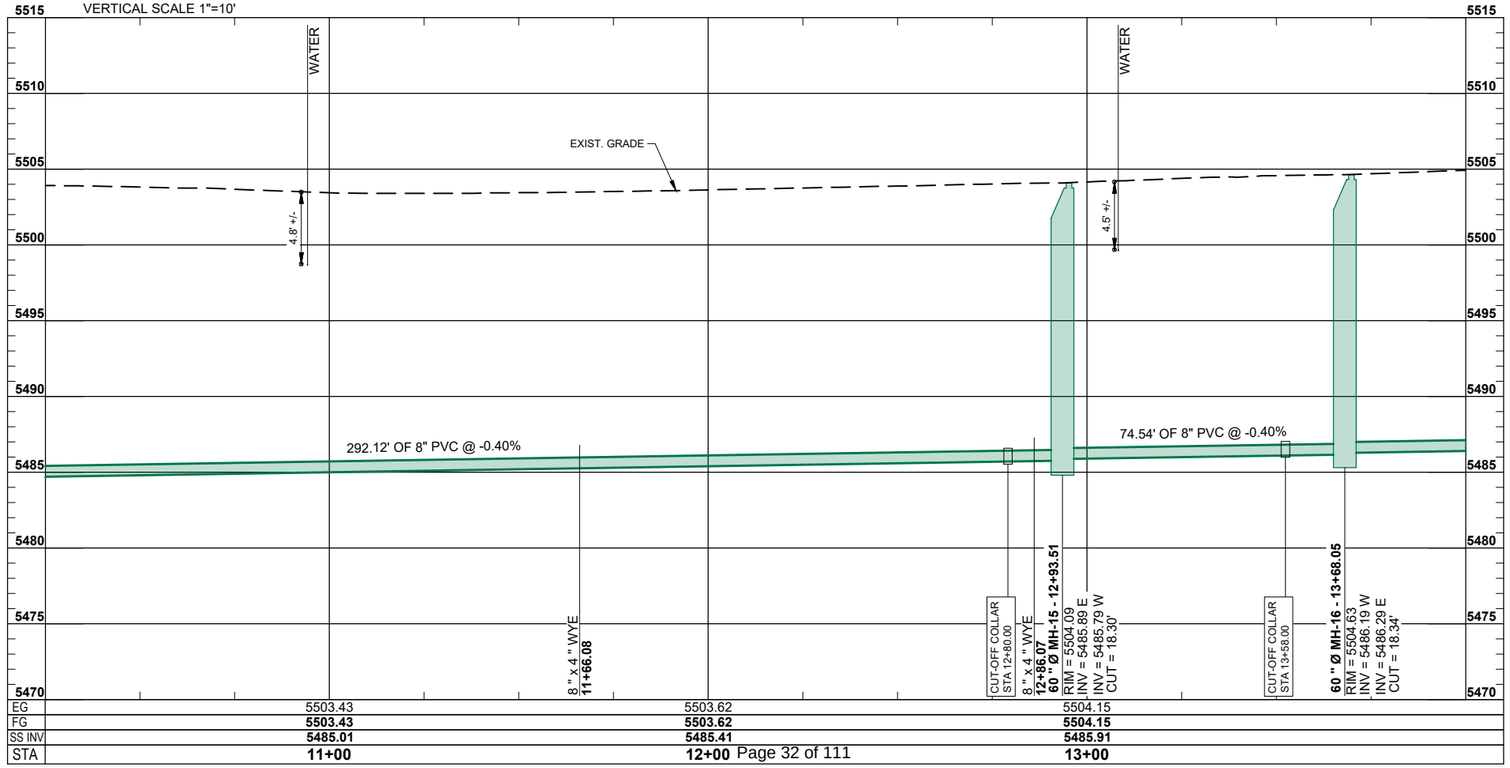
Plotted By: Joey Lane Date: Wednesday, December 17, 2025





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COLORADO REGISTERED
DAVID C. VIDIAN
26430
PROFESSIONAL ENGINEER
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

NORTH

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Scale in Feet

CONSTRUCTION NOTES

1. IF NECESSARY, RELOCATE GAS LINE AROUND MANHOLE TO FACILITATE MANHOLE AND SEWER INSTALLATION.
2. THE LOCATIONS OF KNOWN UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. CONTRACTORS SHALL FIELD VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES BEING CROSSED AND PARALLELED PRIOR TO SEWER INSTALLATION.
3. INSTALL THE 10 GA SERVICE LINE TRACER WIRE INTO A 6" DI SHORT VALVE BOX DIRECTLY ABOVE END OF NEW SERVICE LINE.
4. LIMIT PIPELINE TRENCH WIDTH AND PAVEMENT REMOVAL AND REPLACEMENT BY USE OF TRENCH SHORING TRENCH BOX.
5. WHEN EDGE OF PIPE TRENCH IS WITHIN 3 FEET OF EDGE OF ASPHALT ROAD, REMOVE AND REPLACE ASPHALT PAVEMENT TO THE EDGE OF THE EXISTING ASPHALT ROAD.
6. LATERALS MAY TERMINATE OR BE SHIFTED BASED ON FIELD CONDITIONS UPON APPROVAL FROM CITY OF LITTLETON AND MUST BE DOCUMENTED IN AS-BUILTS.

PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION
Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO:25-51
SHEET DESIGNATOR: **PP**
SHEET NO: **C107**

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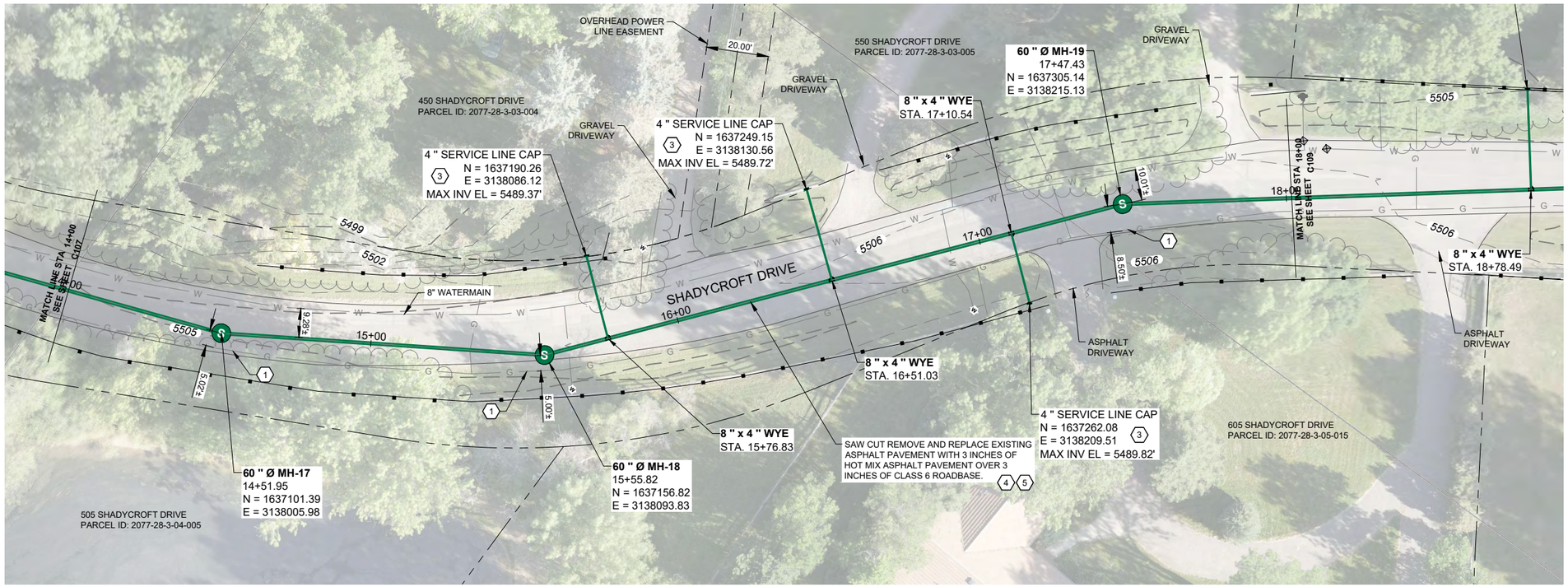
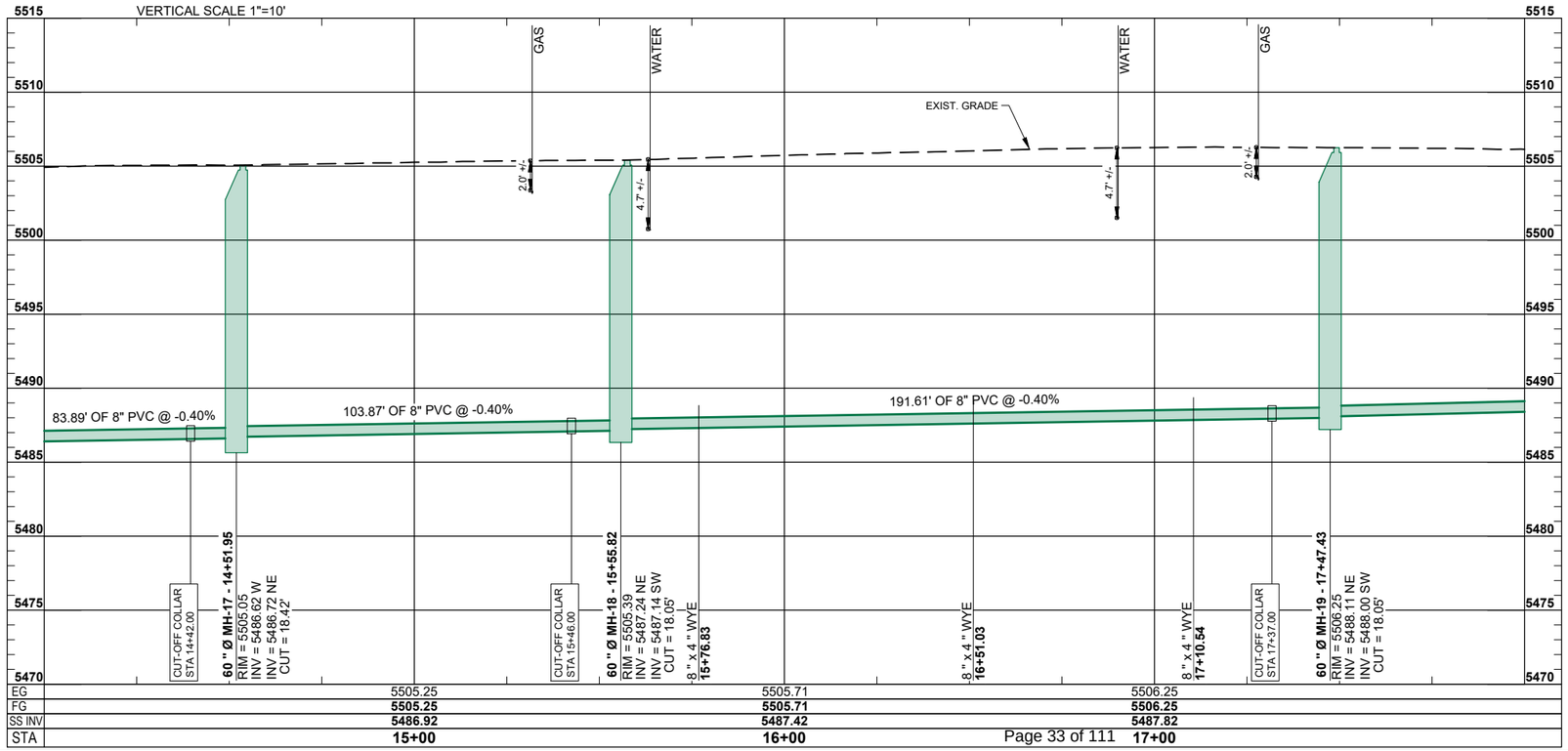
Plotted By: Joey Lane Date: Wednesday, December 17, 2025





Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

NORTH

0 20
Scale in Feet

CONSTRUCTION NOTES

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SHADYCROFT ACRES SANITARY SEWER EXTENSION
Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT: CITY OF LITTLETON, LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51
SHEET DESIGNATOR: PP
SHEET NO: C108

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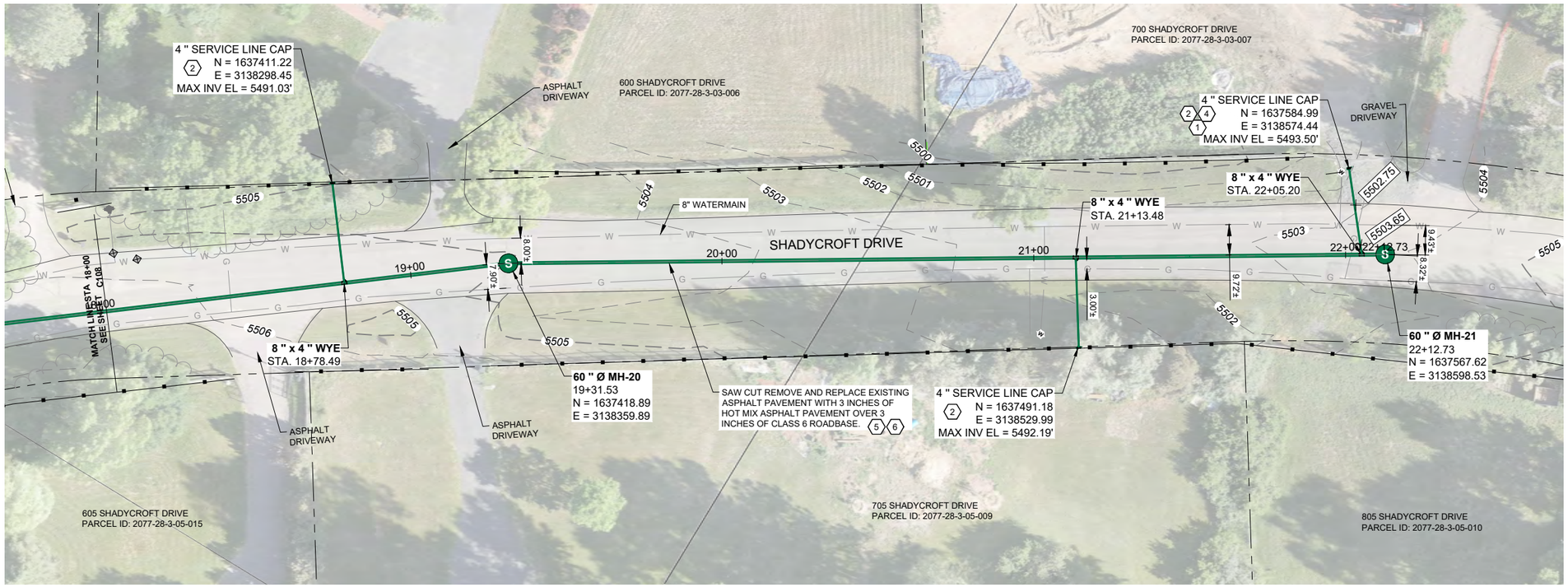
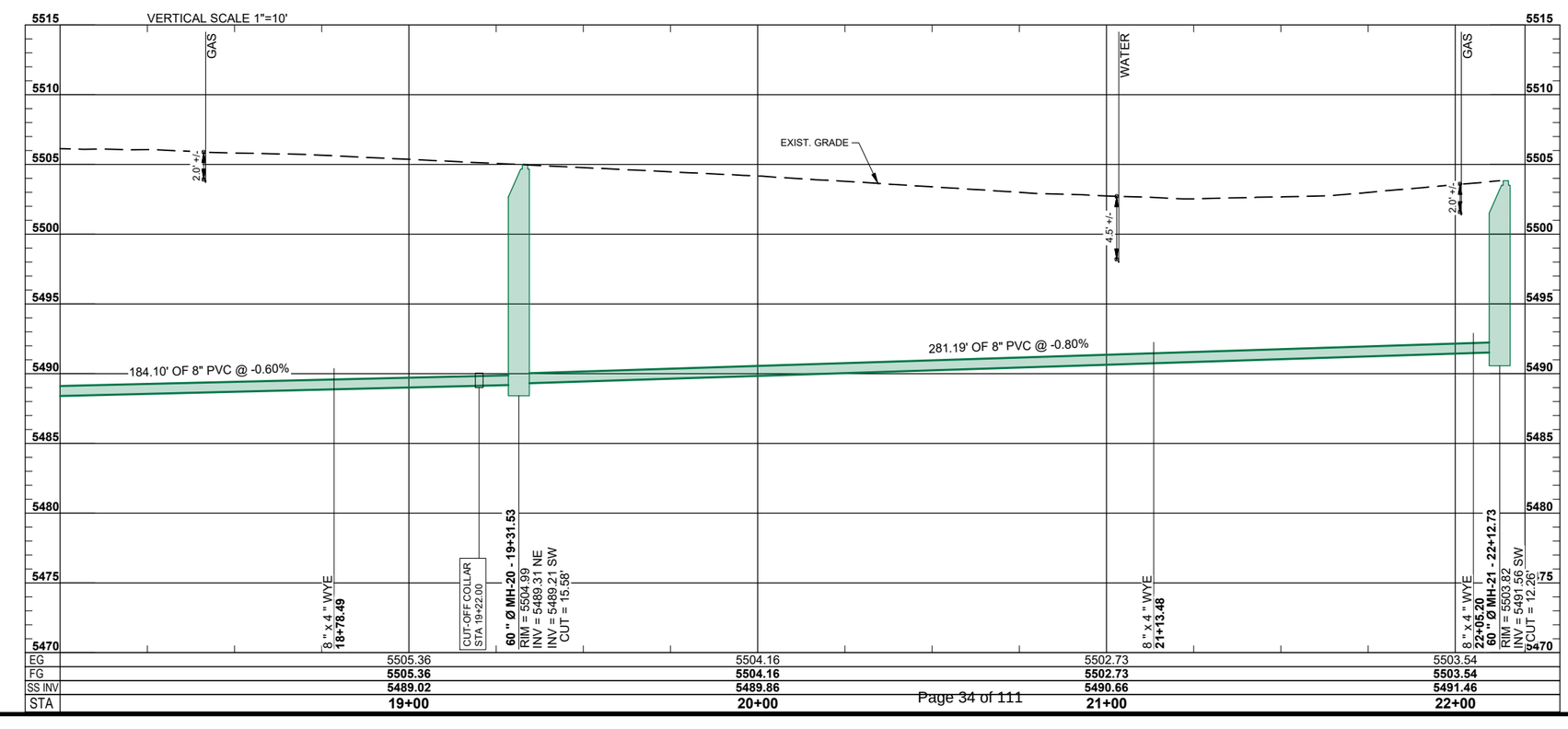
Plotted By: Joey Lane Date: Wednesday, December 17, 2025





Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

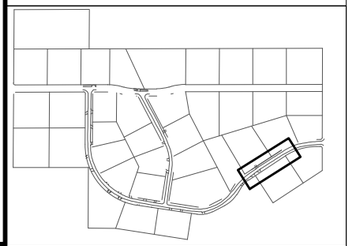
COLORADO REGISTERED PROFESSIONAL ENGINEER
DAVID C. VIDIKAN
26430
12-19-25

STATUS: BIDDING DOCUMENTS

REVISIONS	SYM	DATE	APPR

NORTH

0 20
Scale in Feet



CONSTRUCTION NOTES

1. REMOVE EXISTING PIPE PLUG AND CONNECT TO EXISTING 4 INCH SERVICE LINE PIPE. FIELD VERIFY CONNECTION REQUIREMENTS, LOCATION AND ELEVATION OF EXISTING SERVICE LINE PIPE AND INVERT ELEVATION OF 8" SEWER MAIN.
2. INSTALL THE 10 GA SERVICE LINE TRACER WIRE INTO A 6" DI SHORT VALVE BOX DIRECTLY ABOVE END OF NEW SERVICE LINE.
3. THE LOCATIONS OF KNOWN UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. CONTRACTORS SHALL FIELD VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES BEING CROSSED AND PARALLELED PRIOR TO SEWER INSTALLATION.
4. CONTRACTOR SHALL FIELD FIT CONNECTION TO EXISTING SANITARY SEWER SERVICE WITH ADDITIONAL FITTINGS AND ORIENTATIONS AS REQUIRED.
5. LIMIT PIPELINE TRENCH WIDTH AND PAVEMENT REMOVAL AND REPLACEMENT BY USE OF TRENCH SHORING TRENCH BOX.
6. WHEN EDGE OF PIPE TRENCH IS WITHIN 3 FEET OF EDGE OF ASPHALT ROAD, REMOVE AND REPLACE ASPHALT PAVEMENT TO THE EDGE OF THE EXISTING ASPHALT ROAD.
7. LATERALS MAY TERMINATE OR BE SHIFTED BASED ON FIELD CONDITIONS UPON APPROVAL FROM CITY OF LITTLETON AND MUST BE DOCUMENTED IN AS-BUILTS.

PROJECT TITLE:
SHADYCROFT ACRES SANITARY SEWER EXTENSION

SHEET TITLE:
SANITARY SEWER PLAN & PROFILE

CLIENT:
CITY OF LITTLETON
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: EGH
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO:25-51
SHEET DESIGNATOR: **PP**
SHEET NO: **C109**

Advanced Engineering and Environmental Services, LLC www.ae2s.com

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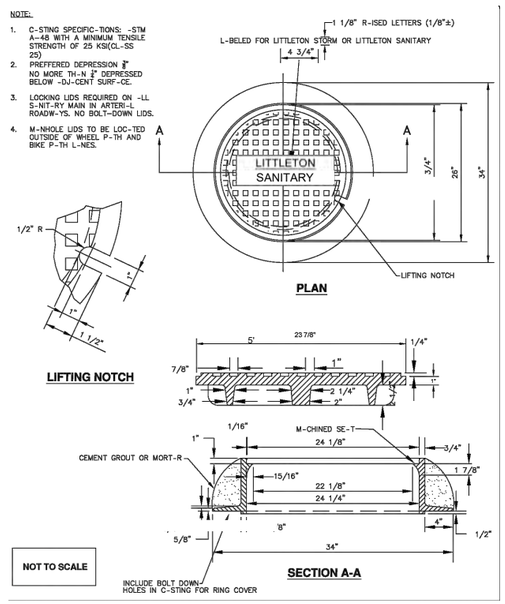
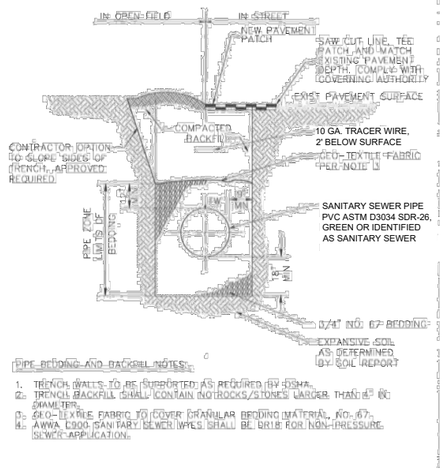
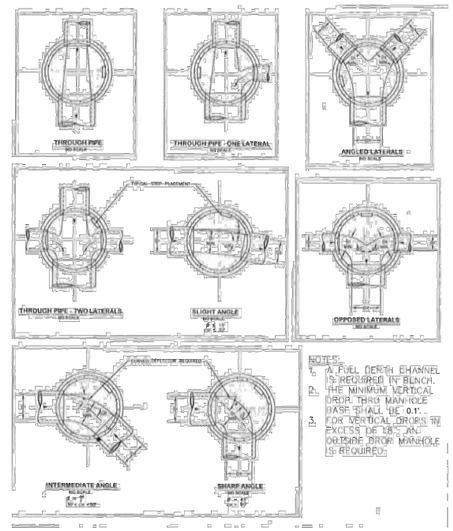


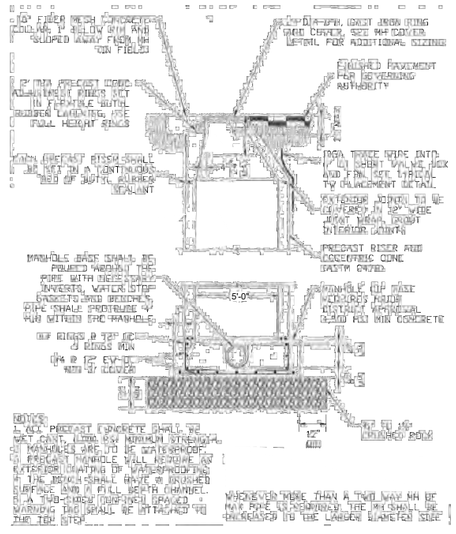
1 C501 **24" MANHOLE RING & COVER DETAIL**



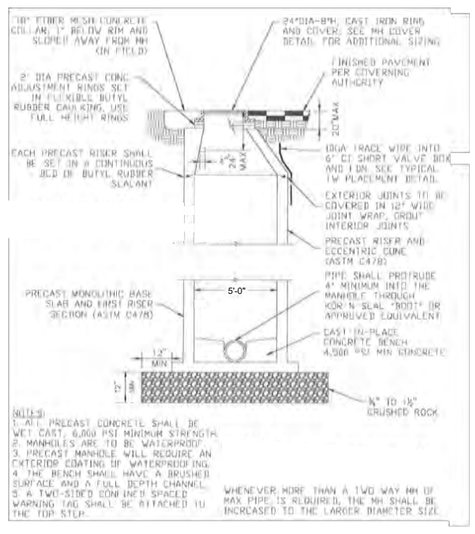
2 C501 **EXPANSIVE SOIL BEDDING DETAIL**



3 C501 **BASE AND DEFLECTOR DETAIL**



4 C501 **PRECAST MANHOLE CAST-IN-PLACE BASE DETAIL**



5 C501 **PRECAST MANHOLE PRECAST BASE DETAIL**

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

COLORADO REGISTERED DAVID C. VIDIKAN 26430 PROFESSIONAL ENGINEER 12-19-25

STATUS: **BIDDING DOCUMENTS**

REVISIONS	SYM	DATE	APPR

SHADYCROFT ACRES SANITARY SEWER EXTENSION

PROJECT TITLE:

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE: **STANDARD DETAILS**

CLIENT: **CITY OF LITTLETON**
LITTLETON, CO

PREPARED BY: JTL
CHECKED BY: XXX
APPROVED BY: DCV

PROJECT NO: P14647-2025-001
DATE: DECEMBER 19, 2025
COL. PROJECT NO: 25-51

SHEET DESIGNATOR: **SD**

SHEET NO: **C501**

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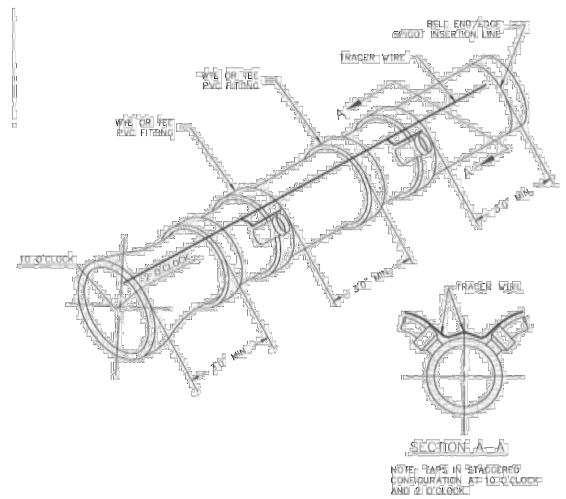
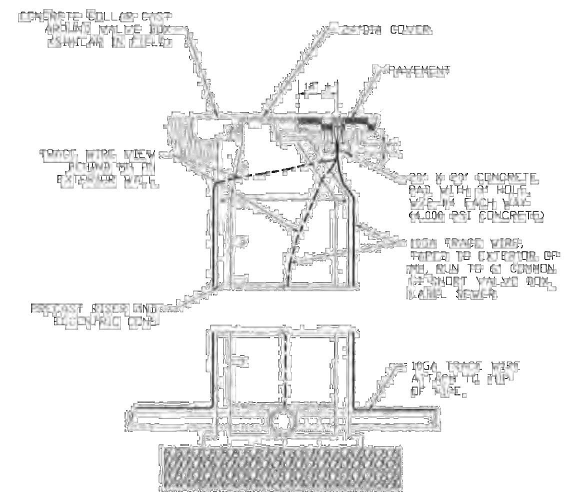


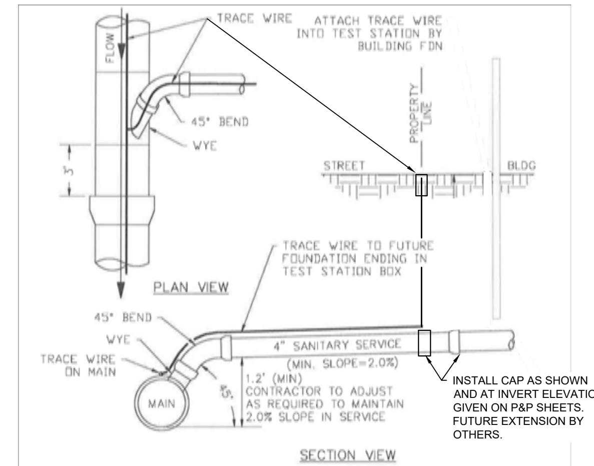
1. ON NEW SANITARY SEWER SERVICE INSTALLATIONS, EITHER PVC WYE OR TEE FITTINGS SHALL BE USED.
2. SANITARY SEWER SERVICE BRANCH CONNECTIONS SHALL BE POSITIONED AT EITHER THE 2 O'CLOCK OR THE 10 O'CLOCK POSITION ON THE CIRCUMFERENCE OF THE SEWER MAIN.
3. THE MINIMUM DISTANCE FROM EITHER THE BELL END OR SPIGOT-BELL END OF A PIPE SHALL BE 3 FEET CLEAR TO THE END/EDGE OF THE WYE-TEE FITTING. THE MINIMUM DISTANCE BETWEEN ENDS OF WYE-TEE FITTINGS SHALL BE 3 FEET CLEAR.
4. THE MINIMUM DISTANCE FROM THE OUTSIDE OF A MANHOLE TO THE END/EDGE OF THE WYE-TEE FITTING SHALL BE 3 FEET CLEAR.
5. A MAXIMUM OF 4 SEWER SERVICE CONNECTIONS SHALL BE ALLOWED PER 20-FEET LENGTH OF PIPE. A SPECIFIC SOILS INVESTIGATIONS SHOULD BE CONDUCTED TO ASSURE THAT THE EXTERNAL LOADING WILL BE WITHIN ALLOWABLE LIMITS REGARDLESS OF THE NUMBER OF TAPS INVOLVED.
6. WITH AWWA C-900 CLASS 235, DR18 PIPE, USE AWWA C-900 CLASS 235 PVC TEES FOR SERVICES, CONFORMING TO DR18 OR APPROVED EQUAL. SDR 26 PIPE AND FITTINGS ARE ANOTHER OPTION TO BE EVALUATED BY THE ENGINEER.

1 / C502 — DOMESTIC SEWER WYE CONNECTION DETAIL



NOTES:
1. SUPPLY 2' EXTRA FEET OF TRACE WIRE IN COMMON SHORT VALVE BOX

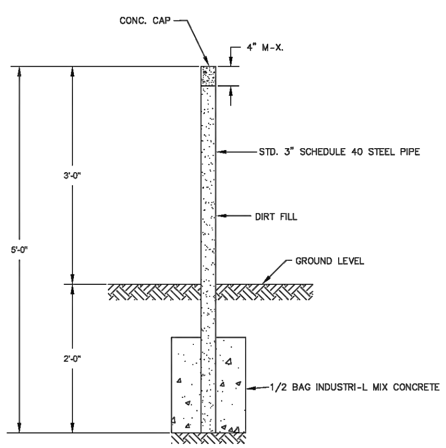
2 / C502 — TYPICAL PRECAST MANHOLE TRACE WIRE PLACEMENT DETAIL



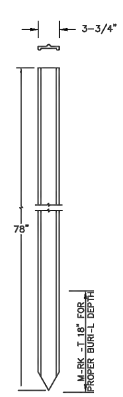
NOTES:
1) SANITARY SEWER SERVICE TAPS SHALL BE LOCATED ON THE MAIN AT THE 2 O'CLOCK OR 10 O'CLOCK POSITION.
2) SANITARY SEWER SERVICE TAPS SHALL NOT BE MADE WITHIN 3 FEET OF A PIPE JOINT OR 3 FEET FROM OUTSIDE EDGE OF MANHOLE BASE.
3) DEPTH OF BURY OF SANITARY SEWER SERVICE LINE AT ROW WILL BE SHOWN ON A DESIGN DRAWING AND BE APPROVED THE DISTRICT.
4) MINIMUM DISTANCE BETWEEN TWO 45° BENDS IS 3 FEET.
5) SEWER SERVICE CONNECTIONS SHALL BE MADE USING "WYE" PVC FITTINGS UNLESS OTHERWISE APPROVED BY CITY & ENGINEER

6) RISER SEGMENT SHALL BE EXTENDED AS NEEDED TO MAINTAIN THE SANITARY SERVICE AT A SLOPE OF 2% MIN-8% MAX.

3 / C502 — SEWER WYE BRANCH CONNECTION



STEEL PIPE POST



CARSONITE MARKER

NOTES:

1. IDENTIFIC-TION M-RKS ON POSTS SH-LL BE 3" DI-. CIRCLES BROKEN IN VERTIC-L CENTER () POINTING TO -PPURTEN-NCE WITH 1" STENCILS ON ON SIDE INDIC-TING TYPE OF -PPURTEN-NCE (MH, ETC.) -ND THE DIST-NCE IN FEET -ND INCHES FROM POST.
2. UTILITY M-RKER POST SH-LL BE C-RSONITE CUM-375 OR EQU-L WITH -NCHORS -ND -PPROPRI-TE DEC-LS FOR S-NIT-RY, STORM -ND W-TER.
3. M-NHOLE M-RKERS TO BE PL-CED IN -LL OPEN SP-CE -RE-S WHERE VEGET-TION H-S POTENTI-L FOR OVERGROWTH.

3. COLOR FOR S-NIT-RY SEWER – GREEN.
4. COLOR FOR STORM SEWER – YELLOW.
5. COLOR FOR W-TER – BLUE.

NOT TO SCALE

4 / C502 — MANHOLE ON SERVICE LINE MARKER POST

AE2S®

Certification of Individual Project Design Disciplines Are Included On Their Individual Drawings, Respectively

STATUS: BIDDING DOCUMENTS

REVISIONS			
SYM		DATE	APPR

PROJECT TITLE: SHADYCROFT ACRES SANITARY SEWER EXTENSION

Advanced Engineering and Environmental Services, LLC www.ae2s.com

SHEET TITLE: STANDARD DETAILS	
CLIENT: CITY OF LITTLETON, LITTLETON, CO	PREPARED BY: JTL CHECKED BY: XXX APPROVED BY: DCV
PROJECT NO: P14647-2025-001 DATE: DECEMBER 19, 2025 COL PROJECT NO: 25-51	SHEET DESIGNATOR: SD SHEET NO: C502

File: C:\Users\jlane\DC\ACCDocs\AE2S\14647-2025-001 Littleton Shadycroft Acres Sewer Design\Project Files\01-Civil\Plan Sheets\STANDARD DETAILS.dwg

Plotted By: Joey Lane Date: Wednesday, December 17, 2025

CITY PROJECT #25-51
SHADYCROFT ACRES SANITARY SEWER EXTENSION
CITY OF LITTLETON, COLORADO

PROJECT SPECIAL PROVISIONS
MODIFICATIONS TO COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS

The Technical Specifications for this project shall be the latest editions of the City of Littleton Engineering Design Standards (LEDS), the Platte Canyon Water and Sanitation District Sanitary Sewer System Standards and Specifications, Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction and associated Standard Special Provisions (SSP), CDOT M&S Standards, Municipal Government Pavement Engineers Council (MGPEC) Pavement Design Standards and Construction Specifications, and City of Littleton Public Works Regulations. The following special provisions supplement or modify the Standard Specifications and Supplemental Specifications and take precedence over the Standard Specifications, Supplemental Specifications, and plans.

PROJECT SPECIAL PROVISIONS

Table of Contents

NOTICE TO BIDDERS

Pursuant to subsections 102.04 and 102.05, it is recommended that proposers review the work site and plan details prior to submitting a bid.

The City of Littleton Procurement Manager is the Designated Contact; all inquiries and questions must be submitted in writing to the City of Littleton Procurement Manager. From the date of issuance of the RFP through completion of the selection process, any proposer who contacts City employees other than the Designated Contact may be disqualified from further participation in the selection process, at the City's sole discretion. This supersedes any other subsections containing conflicting instructions regarding who to contact during the bid process.

The City will not be responsible for any oral instructions or interpretations given by or to anyone. It shall be conclusively presumed that the proposer did, before submitting a bid, closely review the RFP, all exhibits/attachments, and other items relevant to the RFP.
The above-referenced individual is the only City representative with authority to provide any information, clarification, or interpretation regarding the plans, specifications, and any other contract documents or requirements.

PROJECT DESCRIPTION

As further described in the Plans and Specifications, this project entails the installation of new sanitary sewer mains to serve the Shadycroft Acres subdivision.

Work will generally consist of the following primary components:

1. Installation of approximately 3,330 linear feet of 8-inch sewer main
2. Installation of approximately 600 linear feet of 4-inch sewer service line piping
3. Installation of 21, 60-inch diameter precast concrete manholes
4. Installation of 20, 4-inch residential sewer service connections
5. Two connections to existing sewer mains
6. Road surface restorations including hot-mix asphalt pavement
7. Road shoulder restorations including driveways, landscaping, seeding, and sodding

The Contractor will be expected to maintain traffic control devices at all times within the work area, and ensure local traffic has access. A subcontractor approved in advance by the city is permitted to install and maintain traffic control devices regularly. Night and weekend work is not anticipated.

CONSTRUCTION NOTES

Alternative construction sequences may be submitted but are subject to approval by the Engineer. Acceptance of alternatives will be based upon impacts to the public and cost.

Stockpiling location of material must be approved by the Engineer, or a written approval from property owner submitted.

All excess material will be disposed of off-site, or at an approved site by the Engineer.

Due to budget limitations, the City reserves the right to increase or decrease the total quantity to meet their needs. Repricing of the items will not be permitted due to a change in the planned quantity.

COMMENCEMENT AND COMPLETION OF WORK

Minimum Salient features to be shown on the Contractor's Progress Schedule for all schedules (in the tabulation of quantities) are:

1. Permit applications
    - City of Littleton ROW Permit including traffic control plan (no cost)
2. Property notifications
3. Mobilization and Site Preparation
4. Utility Locating
5. Erosion & sediment control installation
6. Traffic control installation
7. Excavation
8. Pipe and structure replacement, repair, and/or installation
9. Testing and Inspections
10. Backfill and paving
11. Post-Construction CCTV
12. Site cleanup, restoration and revegetation
13. Final acceptance

Material testing is required for concrete, compaction and asphalt work. 24-48 hour advance notice required to the City inspector and material tester for material test scheduling.

Infrastructure inspections require 24-48 hour notice to schedule with City inspector. Inspections are required for all sanitary sewer, stormwater facilities, tracer wire, all testing for sanitary sewer and manholes, subgrade and forms, sidewalks, curb and gutter, paving (asphalt and or concrete).

REVISION OF SECTION 107 – LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

Section 107 of the Standard Specifications is hereby revised for this project as follows:

107.02 PERMITS, LICENSES, AND TAXES

Delete subsection 107.02 and replace with the following:

Unless otherwise specified, the Contractor shall procure all required permits and licenses; pay all charges, fees, and taxes, including permits procured for this project by others; and give all notices necessary and incidental to the due and lawful prosecution of the work. The costs of these permits will not be paid for separately, but shall be included in the work.

Prior to beginning work, the Contractor shall furnish the Engineer with a written list of all permits required for the proper completion of the contract. The list shall clearly identify the types of permits that must be obtained before work on any particular phase or phases of work can be started. Copies of the fully executed permits shall be furnished to the Engineer upon request.

The Contractor shall obtain at a minimum, but not limited to, the following permits:

1. City of Littleton Right-of-Way Permit (No cost to the Contractor)

107.07 Public Convenience and Safety shall include the following:

All construction activities shall be completed Monday through Friday between the hours of 7:00 am and 7:00 pm.

The Contractor shall not perform any work on Saturdays, Sundays, Holidays and non-working hours on all other days, unless approved by the Engineer. A change in the working hours must be submitted 48 hours in advance for approval by the Engineer.

Work that interferes with traffic on holidays or the day before any holiday or holiday weekend will not be permitted. Holidays on which this restriction applies shall be those holidays recognized by the City of Littleton.

The Contractor shall provide the following services on an ongoing basis throughout the duration of the project:

a. A contact person for the project shall be designated by the Contractor at the preconstruction conference. This individual shall be primarily responsible for maintaining communications with the Engineer and impacted residents/businesses; provide information on a regular basis to private individuals, local organizations interested in the project and the affected agencies.

b. The following agencies shall be coordinated with on an ongoing basis:

- City of Littleton
- South Metro Fire Rescue
- City of Littleton Police Department
- Adjacent Businesses/Residents

c. A letter of introduction and notice of work shall be delivered to all affected landowners and tenants at least five (5) business days and no more than ten (10) business days prior to mobilization and the commencement of work for each project site. The Contractor shall submit a draft notification letter to the City Project Manager for review and approval prior to distribution.

d. Updates shall be provided to affected persons on a weekly basis after mobilization and 48-hours prior to any significant changes to temporary traffic control setups.

e. The letter shall include the following as a minimum:

Contractor – Name, Address, Direct Phone Number
Field Superintendent – Name, Mobile Phone Number
Schedule (commencement date and duration) and description of work, including the approximate length of time operations will restrict use of roadway.
Information regarding private property and repair procedures

f. The contractor shall notify each adjacent property owner in writing a minimum of forty-eight (48) hours prior to the commencement of construction activities at the corresponding address or location.

g. Payment for the above requirements will not be made separately, but shall be included in the work.

107.10 Barricades and Signs shall include the following:

Construction traffic control signs or devices not in use shall be removed from the roadway and pedestrian walkway (sidewalk & trails). Laying the sign down in a horizontal position or turning the sign parallel is not permitted on the sidewalk and/or within private property such as residential yards.

Any missing or defaced signs shall be replaced within twenty-four (24) hours.

"NO PARKING" signs shall be placed a minimum of twenty-four (24) hours in advance of any surface treatment operations on all streets to be treated where on-street parking is permitted. Towing operations shall not be utilized without prior City approval.

For locations that do not have sufficient right-of-way available to store the sign(s) or device(s), they must be picked up or moved to an approved storage area. Signs that are placed in the medians must be dismantled, laid down, or relocated to the approved storage area.

REVISION OF SECTION 108 – PROSECUTION AND PROGRESS

SECTION 108 of the Standard Specifications is here by revised for this project as follows:

108.03 Schedule shall include the following:

The contractor shall provide a construction schedule at the pre-construction meeting for review by the Engineer.

108.05 Limitation of Operations shall include the following:

In residential areas, the Contractor shall limit hours of operation to **7:00 a.m. to 7:00 p.m. Monday thru Friday,** or as otherwise approved in writing by the Engineer.

REVISION OF SECTION 250 – ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

SECTION 250 of the Standard Specifications is here by revised for this project as follows:

250.03 General shall include the following:

Job materials and equipment may be stockpiled and stored at locations near the job site. A list of sites to be used for this purpose and written permission from the property owner shall be submitted to the Engineer for approval at least ten (10) days prior to any use. The proposed truck route for ingress and egress to such sites shall also be submitted to the Engineer for approval. Using such job-site storage requires the following:

1. Obtaining written permission from the property owner, which shall include a brief description of the area of the property to be used, the length of time the property will be used for this purpose, any access restrictions (i.e. times of day), and the name and phone number of the property owner. A copy of the written permission shall be submitted to the Project Manager at least ten (10) days prior to any use.

2. Keeping stockpiles and equipment confined to the approved area.

3. Providing security for job materials and equipment and for public safety at the site.

4. Keeping all access roads clean and in good condition.

5. Returning site to original condition.

Precautions shall be taken to ensure that stockpiles are carefully mixed just prior to use to ensure uniform distribution of the moisture, and that they do not become contaminated with over-sized seed rock, clay, silt or excessive amounts of moisture. The stockpile shall be kept in areas that drain readily. Segregation of the aggregate will not be permitted.

When surface treatment work is performed by contract, the Contractor shall be responsible for compliance with all requirements of this section. The Contractor shall hold the City and all its employees and representatives harmless from any injury or damage to property occurring as a result of Contractor's operations on property used for this purpose.

REVISION OF SECTION 603 – CULVERTS AND SEWERS

Section 603 of the Standard Specifications is hereby revised as follows:

Subsection 603.01 is deleted and replaced with the following:

This section of the specifications will govern the furnishing of all plant, labor, equipment, appliances and materials, and all incidental and appurtenant operations necessary for construction of sanitary sewer pipe, in strict accordance with the drawings and other terms and conditions of this contract.

Subsection 603.02 is modified to include the following:

MATERIALS

A. SEWER PIPE

1. General

The Contractor shall be responsible for having the pipe they propose to furnish tested to demonstrate conformance to the applicable specifications. Certified copies of the test reports shall be delivered to the Engineer before the pipe is installed. All sanitary sewer system materials furnished shall be new and undamaged.

The Engineer is authorized to reject any materials which do not comply with the specifications and tests herein established, or which do not comply with commonly accepted standards of quality whether or not included in these specifications. Any material rejected by the Engineer shall be promptly removed from the Project.

Polyvinyl Chloride (PVC) is the pipe material preferred by the City for use in sanitary sewer construction. Pipe materials proposed for use in the transportation of raw wastewater not included in these specifications must be reviewed by the City. Vitrified Clay Pipe (VCP) is not permitted for new sewer installations.

2. Polyvinyl Chloride Pipe (PVC)

PVC shall be in accordance with ASTM D-3034, SDR 35 and F679, "Standard Specifications for Poly (Vinyl Chloride) PVC Sewer Pipe and Fittings".
Joints shall be bell and spigot type with a rubber gasket and conform to ASTM-D-3212. Coextruded composite PVC DWV Schedule 40 IPS pipe shall conform to ASTM F1488.

Pipe joints shall be made using an integral bell and spigot type elastomeric gasketed push-on type joint. Solvent cement joints are strictly prohibited. Gaskets shall conform to ASTM F-477.

Straightness - Maximum allowable ordinate as measured from the concave side of the pipe shall not exceed 1/16" per foot of length.

Diameter - Pipe shall be so constructed that the initial internal vertical diameter does not decrease by more than 5 percent to provide the complete hydraulic carrying capacity conceived by the design engineer.

3. Synthetic Joint Materials

Permitted provided they meet the desired characteristics of adhesiveness, density, inertness, elasticity, cohesiveness, strength, rapid setting-up after pouring, resistance to hydrostatic pressures and permanence are first demonstrated and otherwise proven to the satisfaction of the Engineer.

4. Couplings

When connecting segments of pipe together during a point repair, couplings shall be rigid, shielded with adjustable stainless steel shear rings, such as FERNCO RC or approved equal. Flexible couplings will not be accepted. Bushings shall be used as required when changing pipe materials. The bushing shall be made of the same material as the compression coupling. Use solid sleeve couplings to perform PVC pipe repairs to maintain pipe grade and alignment.

B. BEDDING AND PIPE ZONE MATERIAL

Bedding and pipe zone material shall be clean squeegee sand and shall conform to the following limits when tested by means of laboratory sieves:

Squeegee Sand Sieve Size	Total Percent Passing by Weight
3/8-inch	100
No. 200	0-3

The material shall be well proportioned so that a dense fill is provided and shall be subject to the approval of the Engineer. Dimensions and depth of bedding shall be as shown on the plans.

C. PRIVATE SERVICE CONNECTIONS – TAPS

Wyes, tees, fittings and saddle wyes, tees shall be PVC injection molded gasketed fittings manufactures in accordance with ASTM F1336, D3212, D1784, F477, D2321, D3034 and F679.

1. Wyes
   PVC gasketed Wyes shall be used to make the connection to sewer mains for new construction. Wyes shall be installed during the construction of the sewer main. Wherever wyes are not used, connections shall be made by mechanical tap using a PVC service saddle per City Standard Details.

2. Approved Pipe
   PVC SDR35 (green) sewer services are acceptable if they conform to these specifications. Clay pipe services for new taps are not permitted. PVC pipe shall be used in all instances

unless otherwise approved. All joints for services shall be bell and spigot type with the appropriate gasket included. Solvent weld joints are acceptable.

3. Fittings
   Sewer fittings shall be PVC, gasketed joint and shall meet material requirements established in these Specifications.

4. Tapping Saddles
   Tapping saddles shall be fabricated to ensure that no protrusions of the saddle will extend into the sewer being tapped and shall fit the contour of the sewer. The saddles shall be molded PVC. Stainless steel clamp bands shall be used to secure the saddle to the main. Gasket type saddles shall not be installed.

CONSTRUCTION REQUIREMENTS

Subsection 603.03 is modified to include the following:
All underground utilities and structures shall be located and potholed (if necessary) in advance of construction. All pothole cores shall be restored in accordance with City of Littleton Public Works Regulations and shall be included in the cost of work and shall not be paid separately.

Where the location of a water line or the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be closer horizontally than ten feet (10') to a water supply main (outside pipe to outside pipe). The Engineer may waive or modify these minimum spacings when necessary. The decision shall be made by the Engineer on any questions or discrepancies which may arise concerning location or relocation of sewers adjacent to water lines.

Where sewer lines cross water mains or where they come within 10 horizontal feet of each other, the sewer pipe shall be a minimum of 24-inches clear distance vertically below the water main.

Where clearance is not feasible, sewer line shall be either cast iron pressure pipe with leaded joints without any joint closer than three feet (3') horizontally to the crossing or be fully encased in concrete. The thickness of the concrete, including that at the pipe joints, shall not be less than six inches (6").

Subsection 603.04 is modified to include the following:

1. General

   Excavations shall be made to the lines and grades as established by the approved plans. Pipe trenches shall be excavated to a minimum depth of 6-inches below the bottom of the pipe. Deviation from grades will be allowed only with prior approval by the City.

2. Correction of Faulty Grades

Where excavation is inadvertently carried below subgrade and/or foundation elevations, suitable provision shall be made at the expense of the contractor for adjustment of same, as directed by the City, to meet requirements incurred by the deeper excavation beneath pipe or structures.

3. Limit of Excavation

Except by expressed written permission of the City, the maximum length of open trench at one time shall be 300 feet or the distance necessary to accommodate the amount of pipe installed in a single day, whichever is smaller. The distance is the collective length at any location, including open excavation, pipe laying and appurtenances, and construction and backfill which has not been temporarily resurfaced. No trench shall be left open at any time that the contractor is not on the job site engaged in construction operations, without adequate protection (such as plates covering the trench). All trenches shall be surfaced at the end of each workday. If permanent surfacing at the end of a workday is unachievable, the trench shall be temporarily surfaced with flashfill or cold mix asphalt, which shall not be paid separately.

4. Trenching Operations

Trench Width - Existing asphalt or concrete surfacing shall be cut vertically in a straight line and removed from the jobsite prior to starting the trench excavation. This material shall not be used in any fill or backfill.

The trench shall be excavated so that a minimum clearance of 6-inches shall be maintained on each side of the pipe for proper placement and densification of the bedding and pipe zone or backfill material.

The maximum trench width, measured at the top of the pipe, shall be the outside diameter plus 16” for pipe under 12” in diameter, unless as specified by design or manufacturers specifications.

Excavation Below Grade - The trench bottom shall be excavated to 6-inches below the pipe and cut smooth to obtain an undisturbed grade for the bedding. For expansive soils, if identified in the soil report, the expansive soil shall require additional excavation, bedding and be in accordance with geotechnical recommendations.

Trench Support - The trench shall be adequately supported and the safety of workers provided for as required by the Occupational Safety and Health Administration (OSHA).
All safety measures, including trench support shall be included in the work and not paid separately.

5. Grading and Stockpiling

The contractor shall control grading in a manner to prevent water from running into excavations. Obstruction of surface drainage shall be avoided, and means shall be provided whereby stormwater can bypass to existing gutters, other surface drains or temporary drains. Any wastewater in excavations, or wastewater contaminated groundwater, shall be pumped out into

holding tanks or bypassed into downstream sewer manholes. Stockpiles shall be stored in a manner as not to damage any public right of way or public property.

6. Surplus Excavation Material

   All surplus excavation material shall be removed from the jobsite and disposed of properly. If the surplus excavation material is disposed of on private property, written permission shall be obtained from the owner and a copy given to the City.

7. Foundation in Rock

   Where rock is encountered, it shall be removed 9" below and 9" from the sides of the pipe, to accept bedding. The trench shall have no rock greater than 3" exposed in the pipe zone or in the back fill.

   Pipe Clearance in Rocks. Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least 9-inches below the pipe and fittings.
   Blasting will not be allowed by the city.

8. Dewatering
   All pipe trenches or structure excavation shall be kept free from water during pipe laying and other related work. The method of dewatering shall provide for a completely dry foundation at the final lines and grades of the excavation.

   Dewatering shall be accomplished by the use of well points, sump pumps, rock or gravel drains placed below subgrade foundations or subsurface pipe drains. All water shall be disposed of in a suitable manner without being a menace to public health or causing public inconvenience in accordance with any required permit. No water shall be drained into other work being completed or under construction.

   The dewatering operation shall continue until such time that it is safe to allow the water table to rise in the excavations. Pipe trenches shall contain enough bedding and backfill, to prevent pipe flotation of the carrier or casing pipe. When pipe is laid in a casing or tunnel longer than 30 pipe diameters, the pipe inside said casing or tunnel shall be secured so flotation does not occur when the pipe is empty.

   Water shall not be allowed to rise until the concrete has set a minimum of 24 hours and the forms have been removed. Water shall not be allowed to rise unequally against unsupported structural walls.

9. Foundations on Unstable Soil

   For unstable subgrade, as determined by the City and the Engineer, additional excavation and placement of ¾ to 2" crushed stone, wrapped in filter fabric will be required.

Subsection 603.05 is modified to include the following:

BEDDING

1. In standard trench

After completion of the trench excavation and proper preparation of the foundation, 6- inches of approved bedding material shall be placed on the trench bottom for support under the pipe under normal circumstances. All pipe shall be installed in such a manner as to insure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade, and the joint is made, the pipe zone material shall be carefully placed and tamped under the haunches of the pipe and in the previously dug bell holes. Tamping is herein defined as the act of placing approved pipe zone material under the haunches of the pipe, paying particular attention to voids, bell hole, and sling holes. The purpose of tamping is to ensure uniform support for the pipe. The limits of bedding and pipe zone material shall be from 6-inches below the bottom of the pipe to 12-inches above the top of the pipe. Approved backfill may then be installed to the ground line.

2. In Expansive Soil Trench

If expansive soils are encountered during excavation, approval of bedding method by the engineer shall be required prior to proceeding. After completion of the trench excavation and proper preparation of the foundation, 18-inch (18”) of No. 67 ¾-inch crushed rock shall be placed on the trench bottom for support under the pipe and to 12 inches above the top of the pipe. All pipe shall be installed in such a manner as to insure full support of the pipe barrel over its entire length. After the pipe is adjusted for line and grade, and the joint is made, the pipe zone material shall be carefully placed and tamped under the haunches of the pipe and in the previously dug bell holes. Installation of bedding in accordance with this section shall be required for sanitary sewer construction in expansive soils, unless noted otherwise and approved by the City.

3. In Frost

No pipe or appurtenant structure shall be installed upon frozen soil or at any time when the City deems there is danger of ice formation, or frost penetration at the bottom of the excavation. No pipe or appurtenant structure shall be installed unless backfilling can be completed before the formation of ice and frost.

Subsection 603.06, 603.07, 603.08 is modified to include the following:

Pipe, fittings, and appurtenances shall be loaded and unloaded by lifting to avoid shock or damage. Under no circumstances shall such material be dropped. If, however, any part of the coating or lining is damaged, the replacement or repair of the damaged pipe shall be done to the satisfaction of the City. Any pipe or materials that are not acceptable to the City shall be removed from the job site immediately. Pipe handling equipment and pipe handling methods shall be approved by the City.

Before placing pipe in the trench, each pipe or fitting shall be thoroughly cleaned of all foreign material, kept clean at all times thereafter, and carefully examined for cracks and other defects before installation. Bell ends and spigot ends are to be examined with particular care.
Joint lubricant shall be as supplied by the pipe manufacturer and approved by the City. Joint lubricant shall be non-toxic and water soluble.

Pipe shall be cut, whenever necessary, to conform to location of fittings, line, or grade. All cuts shall be straight and true, in a workmanlike manner to leave a smooth end without damaging the pipe. All burrs shall be removed from the ends of cut pipe, and the end lightly rasped or filed. All tools used in cutting pipe shall be approved by the City

The sanitary sewer line shall be laid and maintained to the required lines and grades as shown on the plans. Whenever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the approved plans is required, the City shall have the authority to change the plans and order a deviation from the line and grade.

All pipe shall be laid without break from structure to structure, with the bell ends of the pipe upgrade. Pipe shall be laid to the line and grade shown on the approved plans and in such a manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the flow line. The interior of the sanitary sewer pipe shall be cleaned of all dirt and superfluous material of all descriptions as the work progresses.

At all times when pipe laying is not in progress, the open end of the pipe shall be closed with a tight-fitting cap or plug to prevent the entrance of foreign matter into the pipe.

In no event shall the sanitary sewers be used as drains for removing water which has infiltrated into the trenches.

When placing sanitary sewer pipe in the trench, the ASTM specification for installing sewer pipe shall be used.

Pipe shall be laid true to line and grade as shown on plans approved by the City. Laser beam equipment must be used to provide line and grade.

All pipe shall be protected during handling against impact shocks and free fall and no pipe shall be placed in the sewer line that has been damaged while lowering into the trench. Bell holes shall be dug under the bells of all pipe, regardless of the type of bedding used in the trench and the entire length of barrel of all sewer shall rest firmly on the bedding material used in the trench and the weight of the sewer pipe in no case shall be supported by the bells of the pipe. After lowering into the trench, both the bell and spigot shall be thoroughly cleaned and free from any foreign material. When manufacturer's prefabricated joints are used in the laying of the sanitary sewer lines, such lines shall be joined using lubricants, primers, adhesives, solvents, etc., recommended by the manufacturers of said manufactured joints. All factory fabricated joints shall be placed, fitted, joined and adjusted in such a workmanlike manner as to obtain the degree of water tightness required and in compliance with recommended methods of manufacturer, and as approved by the City.

City may require all pipe installations not inspected to be re-opened for approval, at the cost of the Contractor and not to be paid separately.

Branch – Lateral Services

All taps must be made above the spring line of the pipe. The main line must be cleaned after tapping and the saddle securely connected in place, both inside and outside of the main. All joints must be tight to prevent infiltration of ground water, storm runoff, etc.

All methods of joining a sewer service to the existing wye or tee at the sewer line, or to an existing stub-in must be inspected by the City prior to connection.

In all cases where existing wyes or tees cannot be met, or available, mechanical methods must be used to tap the sewer line.

Only sanitary service lines will be allowed to be connected to sanitary sewer mains. All service line connections to City mains must be left open for inspection.

Sewer Service Connections to Interceptor Sewers - Service line connections to interceptor sewers will not be allowed. The City may grant a variance to this specification if, in the opinion of the City, this connection is the most practical way of serve a building. If a variance is granted, a manhole will be required to be constructed at the point of connection. See city standard details. ***An interceptor sewer, for the purpose of this specification, is described as a sewer main, usually 12- inches (12") in diameter or larger, that conveys sewage only from in-tract mains.***

City may require all service lines not inspected to be re-opened for approval, at the cost of the Contractor and not to be paid separately.

All service lines connected before a new main line is approved must be securely plugged and not connected to any building prior to approval of the main line.

Branches shall be installed in accordance with Drawing Details. Tee branches shall have their axis perpendicular to the longitudinal axis of the pipe. Wye branches shall have their axis approximately 45 degrees to the longitudinal axis of the pipe. Pipe wyes, tees and other types of branches shall be furnished and installed along with the sewer. Installation, earthwork and bedding for branches shall conform to the applicable provisions set forth for said sewer pipe. Unless otherwise specified, the branch of wye fittings shall be inclined upward at an angle not greater than 45 degrees from a horizontal line (2 and 10 o’clock). The contractor shall hand tamp the bedding under every wye branch when installed.

Connection to Existing Sanitary Sewer Line

In the event a connection is made to an existing public sanitary sewer main line, it shall be made in the following manner:

A hole shall be bored into the main pipeline by methods acceptable to the City. An injected molded PVC saddle wye, or PVC saddle tee, shall be utilized. Two stainless steel straps shall then be used to fasten the wye or tee saddle to the mainline, one strap being used on each side of the fitting. The method of installation, types of stainless steel straps used shall be compatible with the materials used as per the manufacturer's recommendation. A PVC wye fitting may be installed on an existing line by replacing and inserting a minimum of 2 feet of PVC pipe into the upstream and downstream side of the wye and connecting to the existing line with rigid couplings with a stainless steel shear ring and a concrete cradle.

Pipe at Manholes or Structures Pipe shall protrude 4" minimum into the manhole through a Kor-N-Seal rubber "boot" or approved equivalent. In a drop manhole the top pipe shall protrude 8" and have a smooth transition to form an open top for half of the exposed section. In cast-in-place manhole bases, pipe bells shall not be cast into manholes or structures. The pipe shall have a water stop gasket fastened with a stainless steel strap at the casting zone of the manhole base.

Subsection 603.09 is modified to include the following:

All backfill in the public right-of-way shall be Controlled Low Strength Material (CLSM) (Flashfill or Flowfill), unless otherwise approved by City. Submittals for use of CLSM shall include a mix design from a ready-mixed concrete producer. CLSM shall conform to CDOT specifications. All backfill shall be included the cost of work and shall not be paid separately.

Backfill shall be compacted, tested, and inspected in accordance with City of Littleton Public Works Regulations. In lieu of this, all soil material shall be compacted to the specified relative compaction.

Maximum dry density of all soil types encountered or used will be determined in accordance with AASHTO T 99, AASHTO T 180 or modification thereof. The backfill shall be compacted to a relative density of 95% for sand material as determined by ASTM D4253 and D4254 or 95% of the maximum dry density for cohesive soils as determined by ASTM D698.

Tests shall be taken every 200 feet horizontally and 12 inches vertically. It is expected that the trench excavation will provide suitable backfill material for areas outside of the ROW. Wet, soft, or frozen material, asphalt chunks, or other deleterious substances shall not be used for backfill. If the excavated material is not suitable for backfill, as determined by the City, suitable material shall be hauled in and utilized, and the rejected material hauled away and disposed of properly.

Backfilling shall be conducted in a manner to prevent damage to the pipe or its coating and shall be kept as close to the pipe laying operation as possible. Backfilling procedures shall conform to the additional requirements, if any, of appropriate agencies or private right-of-way agreements.

Compaction Tests - Compaction tests will be taken by an approved testing laboratory at locations approved by the City or other governing agency. All expenses involved in these tests will be borne by the Applicant. Copies of test results must be made available to the City. In all cases where the tests indicate compaction less than that required in these specifications, additional compaction and tests will be required until these specifications are met. Final acceptance of the sanitary lines by the City will be

contingent upon satisfactory compaction results. All compaction tests must be taken, reviewed, and approved prior to testing of the sanitary line.

CLEANUP

Work sites shall be cleaned daily to the satisfaction of the City in the interest of public safety. Upon completion of the work, all debris, sediment, rubbish, unused materials, concrete forms and other material shall be immediately removed from the jobsite. All excess excavation shall be disposed of as specified.

SURFACE RESTORATION

1. Unsurfaced Areas - All surface cuts shall be, at a minimum, restored to a condition equal to that prior to construction. All streets shall be restored in accordance with the regulations and requirements of the governing agency having control or jurisdiction over the street, roadway, or right-of-way.

2. Surfaced Areas - All surface cuts shall be, at a minimum, restored to a condition equal to that prior to construction. All gravel or paved streets shall be restored in accordance with City of Littleton Public Works Regulations and the requirements of the governing agency having jurisdiction over the street, roadway, or right-of-way.

TESTING/QUALITY ASSURANCE FOR INFILTRATION AND EXFILTRATION:
The Contractor shall test the sewer system for leakage and/or infiltration or exfiltration on any sections chosen. This testing shall be considered part of the work and shall not be paid for separately. The Contractor shall provide such temporary dams and/or weirs, in designated manholes, and the separate disposal of flow from pipe or trench upstream from the section being tested as directed.

The total seepage and infiltration or exfiltration of ground water as determined by tests shall in no case exceed a rate of 200 gallons per day, per mile, per inch diameter of pipe, or 2,000 gallons per mile of sewer for twenty-four (24) hours, whichever is the lesser amount.

If the performed tests show that seepage and/or infiltration/exfiltration exceeds the specified amount, correction shall be made at Contractor's expense.

General - Post construction pipe testing shall be completed in the following sequence and as further detailed below:

1. Flushing, video and measurement of dips or sags.
2. Low pressure air test of PVC pipe.
3. Air vacuum test of manholes.
4. Deflection test may be required by the City.
5. Deficiency "punch" list.

Flushing - Prior to any testing, the lines shall be thoroughly flushed and jetted to remove debris, dirt or other foreign matter. The lowest manhole (or manholes) within the project shall be plugged with a watertight plug on the downstream outlet of the manhole and all water, silt and debris shall be pumped from this manhole and disposed of properly. After cleaning the new sanitary sewer line, the Contractor will dump clean water down the sanitary sewer line prior to the video observation. The Contractor will video and measure, with the City present, the new line with a graduated cylinder in 1/8th of an inch up to 1" marking being pulled ahead of the video camera. 3/8" dip or sag is considered unacceptable and will require City evaluation. Any infiltration in the line and the manhole must be repaired to stop infiltration by the Contractor.

Low Pressure Air Test - All low-pressure air tests shall be done in accordance with the latest revision of ASTM F1417 which references, UNI-BELL, UNI-B-6 Specification. Each section of sanitary sewer between two successive manholes shall be tested by plugging all pipe outlets with suitable test plugs. Air shall be slowly added until the internal pressure is raised to 4.0 psi. A continuous monitoring gauge with a minimum division of 0.10 psi and an accuracy of +/-0.40 psi shall be used. The compressor used to add air to the pipe shall have a blow-off valve set at 9 psi to assure that at no time the internal pressure in the pipe exceeds 9 psi. The internal pressure of 4 psi shall be maintained for at least two minutes to allow the air temperature to stabilize after which the air supply shall be disconnected, and the pressure allowed to decrease to 3.5 psi. The time in minutes that is required for the internal air pressure to drop from 3.5 psi to 3.0 psi shall be measured and the results compared with the values listed in the ASTM table. If the pressure drop from 3.5 psi to 3.0 psi occurs in less time tabulated or calculated values, the pipe shall be repaired and, if necessary, replaced and relayed until the joints and pipe shall hold satisfactorily under this test. If the line being tested is in a groundwater condition, the internal air pressure valve of 4.0 psi shall be increased to include the addition of groundwater pressure on the pipe. The additional pressure shall be calculated by adding 0.433 psi internal air pressure for each foot of water over the sealed pipes, invert, but the maximum allowable internal air pressure in the pipe shall not exceed 9.0 psi. Therefore, the low-pressure air test may be used in a groundwater condition if the average depth of water over line does not exceed 11.5 feet. Should the average groundwater depth exceed 11.5-feet, the infiltration tests shall be performed.

Air Vacuum Test – Air vacuum testing will be required in accordance with ASTM C1244 on 100% of the manholes from the top of the cone. The concrete adjustment rings are not to be tested.

A deflection test may be required by the City if the vertical diameter is viewed to have decreased or the pipe is out of round or elliptical after backfill and compaction.

AIR TEST – MINIMUM TIME PRESSURE LOSS

Pipe Diam. (Inches)	Minimum Time (Min:Sec)	Length Pipe (Feet)	Time Longer for Length (Sec)
8	3:47	298	0.760 L
10	4:43	239	1.187 L
12	5:40	199	1.709 L
15	7:05	159	2.671 L
18	8:30	133	3.846 L

21	9:55	114	5.235 L
24	11:20	99	6.837 L

METHOD OF MEASUREMENT

Subsection 603.12 is modified to include the following:
Sewer pipe replacement of different types and sizes is measured by the linear foot in the horizontal dimension, complete in place and accepted, including all fittings.

The length of pipe is measured from inside walls of manholes without deduction for fittings or for each of the various sizes installed and will be paid for according to the applicable contract unit price per lineal foot, of the various sizes and depths.

BASIS OF PAYMENT

Subsection 603.13 is modified as follows:
All measurement and payments will be based on completed work performed in strict accordance with the drawings and specifications.

Sewer pipe will be paid for at the contract unit price for each pay item and will include all materials, labor, and equipment necessary to complete the work, including excavation, bedding, pipe, fittings, backfill, restoration of service taps, testing, and post-project televising (CCTV) of the pipe interior.

Restoration of service taps shall include all materials, labor, and equipment necessary to complete the connection, including but not limited to trimming/removing or short extensions of service line, replacement of a wye or tee if necessary, and other fittings.

Payment shall constitute full compensation for work performed, complete, including all incidentals thereto. No extra payment will be made for bends, connections to existing sewers, or wye branches, except as otherwise noted.

REVISION OF SECTION 604 – MANHOLES, INLETS, AND METER VAULTS

Section 604 of the Standard Specifications is hereby revised as follows:

Subsection 604.01 is deleted and replaced with the following:

This section of the specifications will govern the furnishing of all plant, labor, equipment, appliances and materials, and all incidental and appurtenant operations necessary for construction of sanitary sewer manholes and structures, in strict accordance with the drawings and other terms and conditions of this contract.

Subsection 604.02 is modified to include the following:

MATERIALS

A. General

Sewer manholes shall be a minimum of 48 inch in diameter. The top section shall be an eccentric cone. Concrete adjustment rings shall be used to match final pavement elevations.

Manholes shall have a minimum 0.1-foot drop between inverts and shall not have intersecting lines at angles less than 90 degrees. A camera must be able to pass through a manhole channel.

Where manholes must be extended to finished grade, concrete adjustments or riser rings minimum 4" thick shall be used, must not exceed 12" and shall be composed of the largest height combination of rings. No multiple 2" and 3" height rings. If greater than 12" is necessary, additional barrel sections must be added.

All adjustment rings shall be embedded in butyl sealant strips and be watertight. No brick or steel grade rings are permitted. Slanted final grade adjustments due to street slopes shall be made with brick chips and concrete mortar.

B. Manhole Steps

Manhole steps are not to be installed in sanitary sewer manholes unless otherwise directed by the contract documents or Owner. If steps are used, they shall be copolymer polypropylene plastic with Grade 60 reinforcement or approved equal and aligned straight, not staggered and centered over a concrete bench.

C. Precast Manholes

1. Precast bases furnished under this specification shall be manufactured in accordance with ASTM C 478, latest revision with the following additional requirements.

Precast concrete bases require approval from the Engineer prior to fabrication. Precast concrete barrel sections shall be composed of CDOT Class D concrete.

2. All pipe to manhole connections shall be watertight flexible connections made in cored drilled or cast in place holes with NPC Kor-N-Seal rubber boots, manufactured by Trelleborg Pipe Seals Milford, Inc. or approved equal, meeting all ASTM C923 requirements. For connections to remain flexible, grouting shall follow the manufacturer's recommendations.

Prior to installing pipe connection boots, all exposed reinforcing shall be coated with coal tar or epoxy paint. Any lifting attachment areas, damaged coating areas, or uncoated area shall be field coated.

3. Precast barrel joints shall be watertight and constructed with butyl sealant strip equaling in three-quarter inch by three-quarter inch (¾" x ¾") and continuously placed with no gaps or separations. A 12" wide exterior wrap shall be applied to all joints. The interior joints shall be grouted.

D. Cast-In-Place Manhole Bases

1. Manhole base shall be poured-in-place on a minimum 12" thick bed of ¾" to 1 ½" crushed rock. The base of the MH shall be a minimum of 8" below the bottom of the lowest pipe and be steel reinforced per the City Standard Details.

2. The base shall be constructed of premixed CDOT Class D concrete. Base reinforcing steel (#4 rebars at 12" on center each way) shall be in accordance with the "Standard Manhole Detail". Bases shall be poured monolithically with the adjoining barrel section and shall be reinforced with #4 bars on 12" centers each way.

3. All inlet and outlet pipes in the base shall have installed on them an approved water stop rubber gasket prior to the concrete pour.

4. The channel depth of the bench shall be a minimum of the full depth diameter of the largest pipe.

E. Drop Manhole

1. Drop manholes (outside drop only) are to be constructed when there is an 18" or larger drop in invert from incoming sewer pipe to the outgoing invert of the manhole.

2. Drop manhole base shall be constructed large enough to form a base for a cradle, supporting lower pipe entering the bottom of the manhole. The bottom entering pipe shall be supported with concrete up to the spring line.

3. The maximum amount of outside vertical drop shall be 6-feet. All drop manholes exceeding the limit will be reviewed by the City prior to design.

4. All drop manholes shall be constructed in accordance with the Standard Detail and inspected and approved by the City prior acceptance.

5. All drop manholes interiors must be completely lined with a Spectra Shield sprayed liner or an approved equal.

F. Flat top manholes

Flat top manholes shall be used with permission from the city. Flat covers shall be a minimum of 8" thick and designed to withstand H-20 traffic loading.

G. Other Manhole Criteria

1. All manholes shall be plumb within one-eighth (1/8") per one foot (1").

2. The contractor shall give special emphasis to the backfilling and compaction directly against and around manholes (12" Horizontal Contact Zone), appurtenances and structures.

3. Manholes shall have a 24-inch cast iron ring (frame) and cover with the word "SEWER" and with a pick hole lifting notch. The standard depth for the ring is 8- inches. Manhole ring and cover shall be three hundred and thirty-eight (338) pounds or greater, confirming to ASTM A48 Class 35B and meet H-20-wheel loading.

Manhole frames and covers shall be dipped in a coaltar varnish. Covers shall be solid and shall be machined so that they will not rock under traffic. Aluminum manhole rings and covers are not allowed.

4. Where final manhole rim elevations are below the 100-year floodplain water surface elevation, a watertight boltdown ring and cover shall be provided. Pick holes shall be constructed so water may not pass through the pick hole and enter the manhole.

5. Platform: All manholes in excess of eighteen feet (18') in depth as measured from the cover to the invert, shall have an intermediate platform located 10' clear from the invert. The intermediate platform shall have grating over the manway, be aligned with the top opening and shall be in accordance with the City Standard Detail for Deep Manholes.

6. When required by the city, exterior joints of manholes shall be coated with a waterproof bituminous membrane or equal. The membrane is to be applied after joints are grouted and shall lap the join a minimum of 6 inches. Membrane material shall be submitted for approved by the city prior to construction and applied per manufacturer's recommendations.

H. SERVICE CONNECTIONS TO MANHOLES

In general, sewer service lines will not be allowed to connect to manholes. The city may, at its sole discretion, allow one service line to connect to a manhole located on the end of a sewer main in a cul-de-sac. The service line must be installed prior to placing the manhole base.

No sewer service shall connect to the main line closer than 3-feet from the outside of manhole.

CONSTRUCTION REQUIREMENTS

Subsection 604.03 and .04 is modified to include the following:

A. EXCAVATION

1. General –

All underground utilities and structures shall be located and potholed, if necessary, in advance of construction.

Existing asphalt or concrete surfacing shall be cut vertically in a straight line and removed from the jobsite prior to starting the trench excavation. This material shall not be used in any fill or backfill.

Excavations shall be made to the lines and grades as established by the approved plans. Deviation from grades will be allowed only when approved by the City. Except as otherwise dictated by construction conditions, the excavation shall be of such dimensions as to allow for the proper installation of the manhole per the standard details, and to permit the construction of the necessary pipe connections.

Except by expressed written permission of the City, the maximum length of open excavation at one time shall be 300 feet or the distance necessary to accommodate work in a single day, whichever is smaller. No hole shall be left open at any time that the contractor is not on the job site engaged in construction operations, without adequate protection (such as plates).

The bottom shall be excavated to 6-inches below the extends of the structure and cut smooth to obtain an undisturbed grade for the bedding. For expansive soils if identified in the soil report, the expansive soil shall require additional excavation, bedding and be in accordance with geotechnical recommendations.

Where excavation is inadvertently carried below subgrade and/or foundation elevations, suitable provision shall be made at the expense of the contractor for adjustment of same, as directed by the City to meet requirements incurred by the deeper excavation beneath pipe structures.

The excavation shall be adequately supported, and the safety of workers provided for as required by OSHA, Occupational Safety and Health Administration.

All surplus excavation material shall be removed from the jobsite and disposed of properly. If the surplus excavation material is disposed of on private property, written permission shall be obtained from the owner and a copy given to the City.

B. GRADING AND STOCKPILING

The contractor shall control grading in a manner to prevent water from running into excavations. Obstruction of surface drainage shall be avoided and means shall be provided whereby storm can bypass to existing gutters, other surface drains or temporary drains. Any wastewater in excavations, or wastewater contaminated groundwater, shall be pumped out into holding tanks or bypassed into downstream sewer manholes. Stockpiles shall be stored in a manner as not to damage any public right of way or public property.

C. FOUNDATION IN ROCK

Where rock is encountered, it shall be removed 9” below and 9” from the sides of the structure, to accept bedding. The excavation shall have no rock greater than 3” exposed.
Ledge rock, boulders, and large stones shall be removed to provide a clearance of at least 9-inches below structure.
Blasting will not be allowed by the city.

D. INSTALLATION

1. Cast In Place Manholes

After base section forms are stripped, the base shall be reviewed for cracks and honeycombs. Cracks and honeycomb areas shall be patched and resurfaced prior to final curing. Cored pipe openings in bases shall be reviewed for exposed reinforcing steel. Any exposed reinforcing steel shall be coated with coaltar or epoxy paint.

Manholes steps are not to be installed in sanitary manholes unless otherwise directed by the City or the contract documents.

2. Precast Manholes

Forsheda F 910 gaskets (or equal) shall be used to join 4-inch through 18-inch ASTM D 3034 PVC pipe to precast bases. For PVC pipe over 18 inches, a specific gasket submittal is required as Forsheda does not manufacture gaskets for pipe greater than 18 -23 inches in diameter. Prior to placing the pipe through the Forsheda gasket, a 1-inch thick bead of bentyl resin Corseal CS 102 or CS 202 concrete sealant shall be placed between the pipe and core hole.
The top section shall be eccentric cone, and shall be approximately one foot (1’) below finished grade of the street so the ring and cover can be brought to the finished grade with one (1) brick course or one concrete ring riser section (precast concrete donut) when final grade of the street is established.

Manhole barrel sections shall be embedded in bituminous mastic (Ram-Neck or approved equal) and shall be water tight. All inside joints shall be filled with a mixture of mortar and Type II cement.

3. In Frost

No appurtenant structure shall be installed upon frozen soil or at any time when the City deems there is danger of ice formation, or frost penetration at the bottom of the excavation. No pipe or appurtenant structure shall be installed unless backfilling can be completed before the formation of ice and frost. Pipe at manholes or structures shall protrude 4" minimum into the manhole through a Kor-N-Seal rubber "boot" or approved equivalent. In a drop manhole the top pipe shall protrude 8" and have a smooth transition to form a open top for half of the exposed section. In cast-in-place manhole bases, pipe bells shall not be cast into manholes or structures. The pipe shall have a water stop gasket fastened with a stainless steel strap at the casting zone of the manhole base.

Subsection 604.05 is modified to include the following:

The Contractor shall give special emphasis to the backfilling and compaction directly against and around manholes, and structures. Compaction beyond will be accomplished by mechanical equipment (vibratory and/or rolling equipment) to industry standards and soil report recommendations or 95% Modified Proctor Maximum Dry Density. As a minimum, compaction tests at the structure shall be taken every vertical foot (12"), or as specified by the governing agency.

Compaction Tests - Compaction tests will be taken by an approved testing laboratory at locations approved by the City or other governing agency. All expenses involved in these tests will be borne by the Contractor unless otherwise specified. Copies of test results must be made available to the City. In all cases where the tests indicate compaction less than that required in these specifications, additional compaction and tests will be required until these specifications are met. Final acceptance of the sanitary lines by the City will be contingent upon satisfactory compaction results. All compaction tests must be taken, reviewed, and approved prior to testing of the sanitary line.

CLEANUP

Upon completion of the work, all rubbish, unused materials, concrete forms and other like material shall be removed from the jobsite. All excess excavation shall be disposed of as specified and the areas shall be left in a state of order and cleanliness.

SURFACE RESTORATION

1. Unsurfaced Areas - All surface cuts shall be, as a minimum, restored to a condition equal to that prior to construction. All streets shall be restored in accordance with the regulations and requirements of the governing agency having control or jurisdiction over the street, roadway, or right-of-way.

2. Surfaced Areas - All surface cuts shall be, as a minimum, restored to a condition equal to that prior to construction. All gravel or paved streets shall be restored in accordance with the regulations and requirements of the governing agency having control or jurisdiction over the street, roadway, or right-of-way

METHOD OF MEASUREMENT

Subsection 604.06 is not modified.

BASIS OF PAYMENT

Subsection 604.07 is not modified.

REVISION OF SECTION 630 – CONSTRUCTION ZONE TRAFFIC CONTROL

Section 630 of the Standard Specifications is hereby revised as follows:

Subsection 630.01 is revised to include the following:

1. Working hours shall be as outlined in the Commencement and Completion of work, or as otherwise approved in writing by the Engineer.
2. The use of alternate one-way traffic may be approved on a case-by-case basis.
3. All work done outside the times above must be approved by the Engineer in writing.

As required by, in descending order of precedence, these plans and special specifications, the current Standard Specifications, as augmented by the Colorado Department of Transportation M and/or S standards, and the current version of the Manual on Uniform Traffic Control Devices (MUTCD) for Streets and Highways.

Subsection 630.10 through 630.11 shall be modified to read:
Traffic control throughout the construction area is the responsibility of the Contractor. Before starting construction, the Contractor shall submit, in writing, the proposed Method of Handling Traffic (MHT) for the initial phase of construction. When a different MHT is required for a subsequent construction phase, it must be submitted two weeks prior to starting that phase. All proposed methods of handling traffic shall be approved, in writing, by the Engineer. No phase of construction shall start until an acceptable MHT has been received and approved by the Engineer. The proposed methods shall include, as a minimum, the following:

A detailed diagram which shows the location of all sign placements, including advance construction signs (if not previously approved) and speed limit signs; method length and time duration for lane closures; and location of flag persons.

A tabulation of all traffic control devices shown in the detailed diagram including, but not limited to: construction signs, vertical panels; vertical panels with lights; Type 1 and Type 2 barricades; cones and drum channelizing devices; concrete barrier (temporary); advance warning flashing or sequencing arrow panels.

Approval of the proposed MHT is intended to indicate all devices to complete the project safely. Such approval does not relieve the contractor of liability specifically assigned to him under the contract. The Contractor shall erect and maintain warning lights, signs, barricades, and sufficient safeguards around all excavations, embankments, stockpiles, equipment, and obstructions.

Non-metallic drums may be substituted for vertical panel channelizing devices if site dimensions allow.

The Contractor shall, at the preconstruction conference, designate one of their employees, other than the Superintendent, to be responsible for traffic control management. This responsibility shall include management for the contractor’s signing and all other details covered by the specifications which

contribute to the convenience, safety, and orderly movement of traffic and to the comfort of the traveling public. The designated employee will have the Certification of the Traffic Control Supervisor as a Worksite Traffic Supervisor by the American Traffic Safety Services Association (ATSSA) in lieu of completion of the CDOT minimum training requirements.

Traffic control managements shall be maintained on a 24-hour per day basis. The contractor shall make arrangements so that the Traffic Control supervisor or their approved representative will be available on every working day, "on call" at all times and available upon the Engineer's request at other than normal working hours. The Traffic Control Supervisor shall have an up-to-date copy of Part VI of the MUTCD, pertaining to traffic controls for street and highway constructions, and the approved MHT available at all times.

The contractor shall apply for and receive a City of Littleton right-of-way use permit (at no cost to the contractor) prior to commencing operations.

Due to the mobility of the operation, the contractor will need to provide traffic control consistent with the MUTCD. For sweeping operations, the contractor will need to provide an MHT.

The flagger's STOP/SLOW sign paddle shall be 18 inches with letters six inches high.

Subsection 630.13 is revised to include the following:

4. General working hours shall be 7:00 a.m. to 7:00 p.m. Monday through Friday.
5. Work adjacent to schools shall be limited to 9:00 a.m. to 3:00 p.m.
6. Work hours may be adjusted as needed by City Traffic Division.
7. The use of alternate one-way traffic may be approved on a case-by-case basis and must be approved in advance.
8. All work done outside approved work hours must receive written approval in advance by the Engineer.
9. Any work performed outside approved work hours may not be accepted and will be subject to $500 per day per occurrence fee.

630.17 METHOD OF MEASUREMENT and 630.16 BASIS OF PAYMENT are hereby deleted in their entirety and replaced with the following:

Traffic control shall be paid on a lump sum basis to be paid for as follows: 50 percent of the Schedule amount upon first utilization and the remaining 50 percent of the Schedule amount when 75 percent of the original schedule amount has been earned.

PAY ITEM	**UNIT**
Traffic Control	Lump Sum

FORCE ACCOUNT ITEMS

DESCRIPTION

This special provision contains the City's estimate for force account items included in the Contract. Such estimated amounts will be added to the total bid to determine the Project Commitment Amount and the amount of the performance and payment bonds. Force Account work shall be performed as directed by the Engineer.

BASIS OF PAYMENT

Payment will be made in accordance with subsection 109.04. Payment will constitute full compensation for all work necessary to complete the item.

Force account work valued at $5,000 or less, that must be performed by a licensed journeyman in order to comply with federal, state, or local codes, may be paid for after receipt of an itemized statement endorsed by the Contractor.

Force Account Item	Quantity	Estimated Amount
F/A Minor Contract Revisions	F.A.	$50,000.00

CITY SEWER PROJECTS – ADDITIONAL CONSTRUCTION PROVISIONS

1. Preconstruction Conference and Submittals
   After award, a preconstruction meeting will be scheduled. The Contractor shall submit all required submittals for review and approval prior to the preconstruction conference.

2. Utility Locates and Verification
   The Contractor shall field locate, verify, and be responsible for all existing features, including all underground and aboveground utilities, prior to beginning work (see CDOT Subsection 105.11). For utility coordination, the Contractor shall contact the Utility Notification Center (811). All potholes shall be restored in accordance with City of Littleton Public Works Regulations and shall not be paid for separately.

3. Utility Protection and Crossings
   The Contractor shall be cognizant of all utility crossings. Damage to public or private utilities resulting from Contractor negligence shall be repaired by the Contractor at the Contractor's sole expense.

4. Traffic Control
   All traffic control devices delivered to the site shall be free of graffiti and unnecessary markings, installed in accordance with the approved traffic control plan, and maintained in acceptable condition for the duration of the project.

5. Night Work
   Any proposed night work (7:00 p.m. to 7:00 a.m.), including the use of pumps or generators for bypass pumping, flow control, or reconnection of services, requires written approval from the Public Works Director of the City of Littleton. Requests shall be submitted in writing to the Project Manager.

6. Work Limits and Property Protection
   The Contractor shall make all reasonable efforts to limit disturbance outside the work area. Any damage to public or private property shall be repaired by the Contractor at the Contractor's sole expense.

7. Site Cleanliness and Safety
   The Contractor shall maintain the worksite in a safe and clean condition at all times. Trash, dirt, sediment, and debris within and adjacent to the site shall be cleaned daily. All construction fencing shall be properly installed and maintained.

8. Excess Material Disposal
   All excess material shall be disposed of off-site or at a location approved by the Engineer. Disposal shall not be paid for separately and shall be included in the cost of the Work.

9. Temporary Facilities

The Contractor shall provide portable toilet facilities for workers for the duration of the project. This cost shall be included in the Work and not paid separately.

10. Sewer Tap Reconnections
    The Contractor shall be responsible for reconnection of all sewer taps. All associated work, including repair and restoration of damages caused by failure to reconnect, shall be the Contractor's full responsibility and included in the cost of the Work.

11. Tracer Wire
    Newly installed subsurface utilities shall include tracer wire consisting of a minimum 12-gauge wire secured to the top of the pipe at 5-foot intervals and terminated at a surface access box located directly above the utility. Tracer wire jacket shall be green for sanitary sewer, grounded, and installed per APWA standards. Tracer wire shall be included in the cost of the Work.

12. Permanent Asphalt Patching
    Asphalt patches shall be sawcut with straight edges at 90-degree angles and match existing pavement thickness or have a minimum depth of six inches, whichever is greater. For patches exceeding 100 square feet, subgrade, HMA, and concrete testing by a third-party consultant is required. Patches within 8 feet of each other shall be combined.

13. Video Inspection
    All sanitary and storm sewer pipes shall be video inspected and submitted to the City Project Manager prior to acceptance and initiation of warranty.

14. Testing Requirements
    All sanitary and storm sewer pipes and structures shall be tested in accordance with these specifications and submitted to the City Project Manager prior to acceptance and initiation of warranty.

MEASUREMENT AND PAYMENT

Quantities indicated in the Bid Form are for Bidding and contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer and Owner shall determine payment. No other items of Work required by the Drawings or Specifications shall be measured or paid for separately but shall be included as part of the listed item to which the Work pertains.

Plan quantities are based on assumed existing conditions and/or as stated in payment sections or notes. An increase or decrease from the number of units shown in the Bid Form shall not cause a change in the unit price except for as allowed by the General Conditions.

Work required by the Contract Documents but not listed as a bid item shall be considered incidental to the Contract. Clean-up and restoration of all Work areas, storage areas, and traffic and haul routes shall be considered incidental to the Contract and shall be performed as required by the Contract Documents or as directed by the Engineer. Repair of new and existing surfaces or features damaged by Contractor's Work operations shall be performed incidental to the Contract and shall consist of restoration in-kind to the satisfaction of the Engineer.

BID ITEM NO. 1 - MOBILIZATION

A. Mobilization. Mobilization will be paid for at the Contract Unit Price per lump sum. The lump sum price bid for mobilization shall include all costs associated with Contractor's project mobilization and shall include the following items, but not limited to:

1. Submittal of preliminary documents, including material shop drawings, schedules, and other documents as required.
2. Attending preconstruction conference.
3. Permitting and cost of permits.
4. Providing temporary facilities required for field operations.
5. Mobilizing equipment and manpower, including construction superintendent, as necessary for field operations.
6. Bonds and insurance.
7. Incidental tree branch trimming.
8. Existing fencing removal and replacement.
9. Existing condition photos at each property prior to sanitary sewer main and service line installation.

BID ITEM NO. 2 - TRAFFIC CONTROL

A. Traffic Control: Traffic control will be paid for at the Contract Unit Price per lump

sum. The lump sum price shall include all costs to prepare and submit traffic control plans for approval to City of Littleton, furnish and install traffic control signage and devices, and perform traffic control and flagging during project construction. Traffic control is to be performed in rights of way where construction activities will impact vehicle, pedestrian and bicycle traffic which may or may not be shown on the drawings.

BID ITEM NO. 3 – 8-INCH DIAMETER SDR-26 PVC SEWER MAIN

A. Sewer main. Eight-inch diameter sewer line pipe will be paid for at the Contract Unit Price per linear foot based on measurements obtained from the final stationing as installed for each pipe type and size. Prices bid for Sewer main shall include sewer main staking; excavation; trench shoring and support; ground water dewatering, controlling surface and subsurface water; locating existing utilities; furnishing and installing pipe, pipe zone bedding; trench backfill; ground water barriers; site cleanup including ditches and road shoulders; flushing and cleaning; lamping, pressure and leakage testing, and all other work required by the drawings and specifications which is not paid for as a separate bid item.

B. Polyvinyl Chloride (PVC) is the pipe material preferred by the City for use in sanitary sewer construction. Pipe materials proposed for use in the transportation of raw wastewater not included in these specifications must be reviewed by the City. Vitrified Clay Pipe (VCP) is not permitted for new sewer installations.

C. PVC shall be in accordance with ASTM D-3034, SDR 26 and F679, "Standard Specifications for Poly (Vinyl Chloride) PVC Sewer Pipe and Fittings".

D. The measurement of the length of each line or run of pipe of each size will begin and end at:

1. The end of the pipe where connecting to an existing pipe or manhole.
2. The center line intersection of run and branch on tees, crosses, or laterals where a branch line connecting therewith is constructed under this Contract. Where a branch fitting is installed under this Contract, and the branch or connecting line is to be constructed by others at some future date or under another contract, the pay measurement will include the entire laying length of the branch or branches of such fitting.
3. The measurement of each line of pipe of each size which is to be paid for on a unit price basis will be continuous through and shall include the full laying lengths of all fittings and manholes.

BID ITEM NO. 4 – 4-INCH DIAMETER SEWER SDR-26 PVC SERVICE LINE

A. Service Line. Four-inch diameter sewer service pipe will be paid for at the Contract

Unit Price per linear foot for each pipe type and size. Prices bid for service line pipes shall include excavation; trench shoring and support; ground water dewatering; locating existing utilities, furnishing and installing pipe, pipe zone bedding; trench backfill; site cleanup; flushing and cleaning; lamping, pressure and leakage testing and all other work required by the drawings and specifications which is not paid for as a separate bid item.

B. The measurement of the length of each line or run of pipe of each size will begin and end at:

1. The wye fitting from the sewer main to the end of the pipe at the PVC service line cap.
2. The measurement of each line of pipe of each size which is to be paid for on a unit price basis will be continuous through and shall include the full laying lengths of all fittings installed between the ends of each line. Connecting pipes for sewer service lines will be paid for as part of the service line installation.

BID ITEM NO. 5 - CONNECTION TO EXISTING SEWER MAIN

A. Connections to Existing Sewer Main. Connections to existing sewer mains shall be paid for at the Contract Unit Price per each connection made. Connection shall include all the costs incurred for making the complete connection to an existing pipeline, over and above the cost of the Cast-in-Place Concrete Base Manhole. Each lump sum price shall include all field investigations, cutting and removal of existing piping, verifying the correct connection condition, furnishing and installing the appropriate connecting piping, PVC fittings, all excavation and backfilling work; temporary plugs, pressure and leakage testing; and all other costs not included under other bid items.

BID ITEM NO. 6 – 4-INCH SEWER SERVICE LINE CONNECTION

A. Sewer Service Line Lateral Pipeline Connection: Four-inch sewer service line lateral pipeline connections to the 8-inch sewer main pipeline will be paid for at the Contract Unit Price for each new sewer service lateral. The lump sum shall include all costs incurred in the sewer service line connection installation. Such payment shall be compensation in full for the connection to the sewer main and wye connection, removal of obstructions, excavation, backfilling, compaction, temporary pipe plugs and testing. Payment for road and surface restorations will be paid under other pay items. Payment for 4” diameter sewer service line pipe installation will be paid under another pay item.

BID ITEM NO. 7 – 60-INCH DIAMETER PRECAST CONCRETE MANHOLE

A. Precast Concrete Manhole Installation: Payment for furnishing and installing

standard precast concrete sanitary sewer manholes shall be paid for at the Contract price per each manhole acceptably installed. The price shall include all costs incurred in the complete installation of the manhole. Such payment shall be compensation in full for all excavation, backfilling, compacted gravel or crushed stone bedding, shoring, ground water dewatering, concrete work and reinforcing, protection of adjacent facilities, manhole frames and covers, coatings and linings, damp proofing, manhole joints, bottom channels and sanitary sewer connections. All manholes shall conform to the Standard Precast Manhole detail shown on the Plans. This item does not include outside drop manholes or standard precast shallow manholes. Cuts shall be measured from existing grade to the invert elevation of the exiting sewer. Payment for the road and surface restorations will be paid under different pay items.

BID ITEM NO. 8 – 60-INCH DIAMETER PRECAST CONCRETE MANHOLE WITH CAST-IN-PLACE BASE

A. Precast Concrete Manhole with Cast-in-Place Base Installation: Payment for furnishing and installing precast concrete sanitary sewer manholes with cast-in-place concrete manhole bases shall be paid for at the Contract price per each manhole acceptably installed. The price shall include all costs incurred in the complete installation of the manhole. Such payment shall be compensation in full for all excavation, backfilling, compacted gravel or crushed stone bedding, shoring, formwork, ground water dewatering, concrete work and reinforcing, protection of adjacent facilities, manhole frames and covers, coatings and linings, damp proofing, manhole joints, bottom channels and sanitary sewer connections. All manholes shall conform to the Standard Precast Manhole detail shown on the Plans. This item does not include outside drop manholes or standard precast shallow manholes. Cuts shall be measured from existing grade to the invert elevation of the exiting sewer. Payment for the road and surface restorations will be paid under different pay items.

BID ITEM NO. 9 – PAVEMENT REMOVAL

A. Pavement Removal: Removal of existing asphaltic concrete pavement shall be paid at the Contract Unit Price per square yard of asphalt pavement removed. Payment shall be compensation in full for the complete demolition of the existing asphalt road surface by milling or other means of removal and hauling off and disposal of asphalt removal of existing asphalt pavement, including all cost of saw cutting.

BID ITEM NO. 10 – HOT-MIX ASPHALT REPLACEMENT

A. Asphaltic Concrete Pavement Replacement: Replacement of asphaltic concrete pavement shall be paid per Ton of asphalt pavement replaced. Payment shall be compensation in full for the complete furnishing and installing of the new hot bituminous pavement road surface material and application of tack coat to existing abutting surfaces, including all cost of hauling, handling, rolling, compaction, and furnishing new hot mix asphalt pavement surfacing. New hot-mix asphalt pavement thickness shall be 3-inches. Uniform payment adjustments shall be made for thicker pavement surfaces.

BID ITEM NO. 11 – CLASS 6 GRAVEL ROAD BASE UNDER ASPHALT PAVEMENT

A. Class 6 Road Base Under Asphalt: Class 6 gravel road base under asphalt will be paid per Ton of gravel road base installed under asphalt where required. Payment shall be compensation in full for the complete furnishing and installation of the gravel and compaction. Minimum gravel road base thickness below asphalt pavement shall be 3-inches.

BID ITEM NO. 12 – CLASS 6 GRAVEL DRIVE AND ROAD SHOULDER SURFACE RESTORATION

A. Class 6 Gravel Drive and Road Base Surface Pavement Restoration: Class 6 gravel road base surfacing will be paid per Ton of gravel road base installed. Payment shall be compensation in full for the complete furnishing and installing of the gravel and compaction. Uniform payment adjustments shall be made for thicker pavement surfaces. Minimum drive and surface restoration thickness shall be 4-inches.

BID ITEM NO. 13 – CONCRETE DRIVEWAY APRON REMOVAL AND REPLACEMENT

A. Concrete Driveway Apron Removal and Replacement: Removal and Replacement of existing driveway aprons will be paid per square yard of concrete or asphalt driveway to be removed and replaced for sanitary sewer main and service line construction. Driveways shall be replaced to match existing elevations and materials of construction. Surface restoration required for driveway removal and replacement shall be included in this item.

BID ITEM NO. 14 – PIPELINE TRENCH OVER EXCAVATION AND TRENCH STABILIZATION

A. Pipeline Trench Over Excavation and Trench Stabilization. Over excavation and

Trench Stabilization will be paid for at the Contract Unit Price per Cubic Yard of material installed. The unit price bid for this item shall include over excavation below that required as detailed and specified on the project for manhole and pipe installations and the cost of furnishing and installing stabilization material beneath pipe embedment or granular fill material as approved by CITY and described in the trenching and backfilling section.

B. Quantities of trench stabilization material shall be preapproved by CITY and verified with haul tickets.

BID ITEM NO. 15 – IMPORTED BACKFILL

A. Imported Backfill: Imported backfill will be paid for at the Contract Unit Price per Cubic Yard of material installed. The unit price bid for this item shall include all costs associated with importing and installing suitable backfill material as approved by the CITY and described in the trenching and backfilling section and disposal of unsuitable trench backfill material removed from the pipeline trench.

BID ITEM NO. 16 – CLSM FLOWABLE FILL PIPE ENCASEMENT AND TRENCH BACKFILL

A. CLSM Flowable Fill Pipe Encasement and Trench Backfill: CLSM Flowable Fill/Flash Fill will be paid for at the Contract Unit Price per cubic yard. Price paid shall be payment in full for all labor, materials, tools, equipment and incidentals necessary for backfilling of pipeline trenches, encasing sewer main pipes and where determined in the field and approved by the Owner and/or CITY, and all other items necessary to complete the job, whether specifically mentioned or implied, on the plans or in the specifications. This item will be used only with prior approval of the CITY. Entrained air, water ratio, and

BID ITEM NO. 17 – SOD TURF GRASS SURFACE RESTORATION

A. Sodding and Landscaping Repair Surface Restoration: Where not in paved or graveled roadway surfaces, surface restoration will be accomplished by sodding. Sodding shall be paid for at the Contract Unit Price per square yard. Sodding shall include all finish grading; application of fertilizer and soil amendments, topsoil, surface preparation; furnishing and installing sod turf grass, temporary watering, and all labor and materials and maintenance to support a viable stand of sod turf grass as specified for all vegetated areas disturbed by construction. This item shall also include repairing any landscaping that is damaged during construction.

BID ITEM NO. 18 – SEEDING TURF GRASS SURFACE RESTORATION

A. Seeding and Surface Restoration: Where not in paved or sodded surfaces, surface restoration will be accomplished by seeding. Seeding shall be paid for at the Contract Unit Price per square yard. Seeding shall include all finish grading; application of fertilizer, soil amendments, and soil preparation, furnishing and installing seed, mulch and mulch tack coat; temporary watering, and all labor and materials and maintenance to support a viable stand of grass as specified for all vegetated areas disturbed by construction.

BID ITEM NO. 19 – RIPRAP ROCK SURFACE RESTORATION

A. Riprap Surface Restoration: Riprap rock and surface restoration shall be paid for at the Contract Unit Price per Ton of installed material. The unit price for this item shall include all costs for the complete furnishing and installation of the riprap, and geotextile fabric installed below the riprap rock back to existing conditions where indicated on the project drawings. Minimum riprap rock in-place thickness shall be 6-inches.

BID ITEM NO. 20 – SIGN REMOVAL AND REPLACEMENT

A. Remove and Replace Sign: Removing and replacing signs will be paid for at the Contract Unit Price per each sign. The unit price bid for this item shall include all costs for removing existing signs, and installing new signs as shown and described in the Contract Documents. This price shall cover all labor, equipment, materials, and incidentals necessary to remove the sign, replace, and install it in the existing location, including any excavation, backfill, or foundation adjustments required for a complete and finished installation.

BID ITEM NO. 21 – EROSION AND SEDIMENT CONTROL

A. Furnishing, installation and maintenance of all erosion and sediment control measures and stormwater BMPs shall be paid as a lump sum. This bid price item shall include all costs for removing and installing additional BMPs as noted by CITY during the course of construction.

BID ITEM NO. 22 – F/A MINOR CONTRACT REVISIONS

A. Force Account work shall be performed as directed by the Engineer. Payment will be made in accordance with subsection 109.04. Payment will constitute full

compensation for all work necessary to complete the item.

END OF SECTION

STAGING AND STOCKPILING AREAS

1.01 STAGING AREAS

A. Contractor shall coordinate and utilize only areas with the construction limits for construction facilities, storage of materials and equipment, parking, and staging operations.

B. The areas and grounds utilized shall be left clean and restored to original condition.

C. Contractor shall be responsible for coordination of construction, staging, and temporary stockpile activities.

1.02 STOCKPILE AREAS

A. Contractor shall stockpile materials in an area acceptable to Owner.

B. Contractor shall coordinate construction, staging, and stockpile activities and Owner shall not be responsible for any additional charges due to moving of staging and/or stockpile materials multiple times.

C. Temporary and final stockpiles shall be maintained during construction and protected from erosion.

D. The areas and grounds utilized shall be left clean and restored to original condition.

END OF SECTION

CLOSEOUT PROCEDURES

1.01 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

C. Owner will occupy all portions of the Project.

1.02 SUBSTANTIAL COMPLETION

A. Prior to substantial completion CONTRACTOR shall review Contract Documents for items which are not complete or need to yet be completed including submittal of all manuals, and testing reports. CONTRACTOR shall make a list of incomplete work, the value of the incomplete work, and reasons why work is incomplete. CONTRACTOR shall complete all items required to be completed as part of substantial completion.

B. CONTRACTOR shall provide a written notice to ENGINEER that the work, or specific portions of the work, is substantially complete and ready for review. If there are any items remaining to be corrected or completed CONTRACTOR shall submit a list of these items along with the notice of substantial completion. Along with the list of items the CONTRACTOR should provide a written explanation of why these items are not considered necessary for substantial completion.

C. Upon receipt of CONTRACTOR'S notice of substantial completion, ENGINEER will proceed with inspection for substantial completion.

D. Following the substantial completion inspection by the ENGINEER and ENGINEER'S subconsultants, ENGINEER will either prepare certificate of substantial completion or notify the CONTRACTOR in writing that substantial completion has not been meant listing the various reasons.

E. CONTRACTOR shall promptly complete the items required to meet substantial completion and submit a second notice of substantial completion to the ENGINEER.

F. ENGINEER will review the work a second time do determine the status of substantial completion.

G. When ENGINEER considers the project to be substantially complete, ENGINEER will prepare the preliminary certificate of substantial completion along with a substantial completion punch list of items to be completed prior to final payment.

ENGINEER will deliver preliminary certificate and punch list to OWNER and consider any objections by the OWNER as provided in the Conditions of the Contract.

H. Upon agreement by OWNER and ENGINEER of substantial completion and punch list items, ENGINEER will execute and deliver to the CONTRACTOR and OWNER a final certificate of substantial completion along with substantial completion punch list of items to be completed prior to final payment.

1.03 FINAL COMPLETION

A. Following substantial completion CONTRACTOR shall complete remaining work and items to be corrected as part of substantial completion punch list as well as final cleaning and transferring site to OWNER.

B. When CONTRACTOR considers that all work is complete, CONTRACTOR shall provide written notice of final completion to ENGINEER.

C. Following receipt of final completion certification, ENGINEER and ENGINEER'S subconsultants shall review the work to verity that the requirements for final completion have been met.

D. Upon review of work for final completion ENGINEER will either request the CONTRACTOR to make closeout submittals or will notify CONTRACTOR that the work is not complete with a list of incomplete or defective
work. CONTRACTOR shall promptly take steps to correct all listed deficiencies and incomplete work before sending a second written notice of final completion certification to ENGINEER.

E. If final completion is not met following first review, ENGINEER will review work a second time to determine if the requirements for final completion have been met.

F. When ENGINEER considers all work to be complete in accordance with the Contract Documents, ENGINEER shall request the CONTRACTOR to make closeout submittals.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean site; sweep paved areas, rake clean landscaped surfaces.

C. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed Shop Drawings, Product Data, and Samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling current and future references by Owner and Engineer.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
3. Field changes of dimension and detail.
4. Details not on original Contract drawings.

G. Submit documents to Engineer with claim for final Application for Payment.

END OF SECTION

TURF AND GRASSES

PART 2 PRODUCTS

2.01 MATERIALS

A. Sod: Colorado grown Kentucky Bluegrass blend having a healthy, vigorous root system. The blend shall contain a minimum of three improved varieties of which at least one is an aggressive type.

B. Seed:

1. Fresh, clean new-crop seed in compliance with the tolerance for purity and germination established by the AOSA
2. Seeds of legumes: Inoculated with a pure culture of nitrogen-fixing bacteria prepared specifically for legume species in accordance with the Manufacturer's instructions.
3. Weed free with a purity of 99%.
4. Germination shall exceed 85%.

5. Seeding mixture shall be applied at a PLS rate of 120 lbs per acre.
   a. Seed mix shall be the "Upland Seed Mix" as specified by the South Suburban Parks and Recreation District

SPECIES	SCIENTIFIC NAME	SEASON	% IN MIX	SEEDS/ LBS	LBS. PLS^2/AC
Big Bluestem	Andropogon gerardii	Warm	10	130,000	2.0
Sideoats Grama	Bouteloua curtipendula	Warm	10	191,000	1.4
Blue Grama	Bouteloua gracilis	Warm	10	825,000	0.3
Canada Wildrye	Elymus candensis	Cool	10	115,000	2.3
Thickspike Wheatgrass	Elymus lanceolatus spp. lanceoatus	Cool	5	154,000	0.8
Streambank Wheatgrass	Elymus lanceolatus spp. psammophilus	Cool	5	156,000	0.8
Slender Wheatgrass	Elymus trachycaulus	Warm	10	159,000	1.6
Needle and Thread	Hesperostipa comata	Cool	10	115,000	2.3
Western Wheatgrass	Pascopyrum smithii	Cool	10	110,000	2.4
Indian Grass	Sorghastrum nutans	Warm	10	170,000	1.5
Sand Dropseed	Sporobolus cryptandrus	Warm	10	5,298,000	0.1
		TOTAL	100		15.5 LBS. PLS^2/AC

6. Compensate for the percentage of purity and germination by providing sufficient additional seed to equal the specified PLS product. The formula for determining the quantity of PLS: Pounds of Seed (Bulk) x Purity x Germination = Pounds of PLS.

C. Straw Mulch for Seed:

1. Certified under the Colorado Department of Agriculture Weed Free Forage Certification Program and inspected as regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS. Each certified weed free mulch bale shall be identified by one of the following:
2. One of the ties binding the bale shall consist of blue and orange twine.
3. The bale shall have a regional Forage Certification Program tag indicating the Regional Forage Certification Program Number.
4. Do not unload certified weed free mulch bales or remove their identifying twine, wire, or tags until the ENGINEER has inspected and accepted them.
5. Straw in a stage of decomposition (discolored, brittle, rotten, or moldy) or old, dry mulch which breaks in the crimping process will not be accepted.

D. Seed Hydromulching – Wood Cellulose Fiber Mulch:

1. Specially processed wood fiber containing no growth or germination inhibiting factors.
2. Organic green dye to facilitate the inspection of material placement.
3. Manufactured such that after addition and agitation in slurry tanks with water, the material fibers shall become uniformly suspended to form a homogenous slurry.
4. When hydraulically sprayed on the ground, the material shall allow moisture absorption and percolation.

E. Seed Tackifier:

1. Derived from natural, organic plant sources containing no growth or germination inhibiting materials.
2. Capable of hydrating in water.
3. Readily blendable with other slurry materials.
4. Natural guar, organic polysaccharide containing no additives.
5. Coverage rate of 40 lbs/acre.

F. Fence: Seeded and sodded areas shall be protected against damage from pedestrian or vehicle traffic as specified by the ENGINEER; fence material shall be clearly visible and suitable for deterring traffic.

PART 3 EXECUTION

3.01 GENERAL

A. Areas disturbed by the CONTRACTOR's operation such as, but not limited to, sewer main installation, earthwork, construction, construction traffic, and the storage of equipment or materials shall be restored to existing condition. Established sod turf grass shall be installed in all grass areas disturbed by construction. Where identified by the City of Littleton, other areas within the limits of the public road right-of-way

may be seeded.

3.02 PREPARATION

A. Sod Preparation:

1. Sod by evenly spreading 1 1/3 inches of compost over the area.
2. Install fertilizer as specified in SECTION 32 91 00.
3. Till in thoroughly to a minimum depth of 6 inches.
4. Grade areas to a smooth, even surface with loose, uniformly fine texture.
5. Roll to compact. Rake to remove ridges, fill depressions, and meet finish grades.
6. Remove debris, stones larger than 3/4 inch, and other objects that may interfere with planting and maintenance operations.
7. Restore prepared areas to the specified condition if eroded or otherwise disturbed after preparation and prior to planting.

B. Seed Preparation:

1. Seed by evenly spreading fertilizer over the area at a rate of 1,500 lbs/acre.
2. Install fertilizer as specified in Section 32 91 00.
3. Till in thoroughly to a minimum depth of 6 inches.
4. Grade areas to a smooth, even surface with loose, uniformly fine texture.
5. Roll to compact. Rake to remove ridges, fill depressions, and meet finish grades.
6. Remove debris, stones larger than 3/4 inch, and other objects that may interfere with planting and maintenance operations.
7. Restore prepared areas to the specified condition if eroded or otherwise disturbed after preparation and prior to planting.

3.03 INSTALLATION

A. Sodding:

1. Lay sod on dry soil.
2. Lay with the longest dimension parallel to contours and in continuous rows.
3. Tightly butt the ends and the sides of sod together. Stagger and compact vertical joints between sod strips by rolling so that sod is incorporated with the ground surface. Ensure tight joints between adjacent pieces. Ensure sod is not stretched or overlapped.
4. Add topsoil along exposed edges to match adjacent grade. Feather topsoil out approximately 1 foot from the edge of the sod. Broom screened topsoil over the entire sodded area to fill voids; do not smother sod.
5. Roll when soil and sod are moist. Roll sod lightly as soon as possible after it is laid. The roller shall weigh 100 lbs to 160 lbs/ft/roller. Delay rolling until just prior to the second watering.

6. Assure that finished areas of sod are graded such that positive drainage of storm and irrigation water will occur and ponding of water is minimized.
7. Thoroughly water sod immediately after laying to a depth sufficient to thoroughly wet the underside of the new sod strips and the soil below the sod.
8. Maintain a spongy, wet surface for 7 days then begin to lessen the water requirement.

B. Seeding

1. Start seeding within 3 days of the completion of soil preparation.
2. Hydroseed slopes steeper than 3 to 1. Flatter slopes shall be drill seeded. Mechanical seeding may be used where weight or access of machinery is a problem.
3. Mechanical: Broadcast seed in two different directions and compact the seeded area with a cultipacter or roller.
4. Sow seed at a uniform rate: Type I, 1 lb/1,000 sf.
5. Use a rangeland drill type seeder with a packer wheel.
6. Broadcasting is only allowed in areas too small to use a rangeland drill type seeder. Where seed is broadcast, increase the seeding rate by 100%.
7. Broadcast seed shall be raked in or covered with a minimum of 1/4 inch of soil.

C. Hydroseeding:

1. Application rate: 2,500 lbs/acre plus two times the seed application requirements.
2. Apply on moist soil after free surface water has drained away.
3. Prevent drift and displacement of the mixture into other areas.
4. Upon application, allow moisture absorption and percolation into the ground.

D. Hydromulching:

1. Apply immediately upon the seed being drilled.
2. Apply wood cellulose fiber uniformly at a rate of 2,500 lbs/acre.
3. Apply uniformly across the surface of the soil in the designated area.
4. Mix tackifier at a rate of 40 lbs/acre with wood cellulose fiber or in accordance with the Manufacturer's instructions.
5. Apply water with fine spray after mulching to saturate the top 2 inches of the soil; repeat daily as required to keep the 2-inch profile moist during the 14 to 30 day germination period.

E. Straw Mulching:

1. After seeding has been completed or when required for erosion control, hay or straw shall be uniformly applied, with no bare soil showing, at a rate of 2 tons/acre. It shall be crimped in with a crimper or other approved equipment. The ENGINEER may order hand-crimping on areas where mechanical methods cannot be used.
2. The seeded area shall be mulched and crimped within 4 hours after seeding. Areas not mulched and crimped within 4 hours after seeding or prior to

precipitation or damaging winds on-site shall be reseeded with the specified seed mix at the CONTRACTOR's expense prior to mulching and crimping.

3.04 QUALITY CONTROL

A. Sod materials shall be subject to inspection and acceptance. Prior to acceptance, the ENGINEER reserves the right to reject sod materials if, in the ENGINEER's opinion, the materials fail to meet the requirements herein.

B. Inspection Control:

1. Inspection control is primarily for quality; however, other requirements shall not be waived even though visual inspection results in acceptance. Notify the ENGINEER in writing 2 days in advance of the intended sod farm prior to cutting for inspection. Inspection at the growth site shall not rule out the right of rejection at the Work site.
2. Promptly remove rejected sod from the Work site.
3. The ENGINEER will periodically inspect during sodding, at its completion, and at the end of the warranty period.

C. Sod Standards:

1. Sod shall be healthy, thick turf having undergone a program of regular fertilization, mowing, and weed control that is free of objectionable weeds and uniform in green color, leaf texture, and density. It shall have a healthy, vigorous root system and when inspected be free of disease, nematodes, pests, and pest larvae.
2. Each piece of sod shall have a sandy-loam soil base that will not break, crumble, or tear during sod installation.
3. Thickness: Minimum 3/4 inch, excluding top growth and thatch.
4. Thatch: Not to exceed 1/2 inch uncompressed.

D. Size: Cut in 18 inch wide strips within 1 day of delivery.

E. Maintenance:

1. Sod maintenance includes:
   a. The maintenance period shall begin immediately after each area is sodded and shall continue until the Substantial Completion date or a minimum of 30 days, whichever is later. During this time, water, mow, spray, weed, aerate, fertilize, and perform related work as necessary to ensure that sodded areas are in a vigorous growing condition.
   b. Providing supervision, labor, material, and equipment to maintain turf areas.
   c. Ensuring materials are as specified in this Section.
   d. Initial watering shall begin when Work is complete, and the irrigation system is operable under full control.
   e. Watering sod sufficiently to moisten subsoil at least 4 inches deep in a

manner that does not cause erosion or damage to adjacent finished surfaces. Water shall be free of substances harmful to plant growth.

f. Providing water from an underground sprinkler system, quick-couplers, or other source.

g. Mowing and trimming around trees (keeping mulch in saucers and beds), walls, fences, etc., and maintaining turf at 2 1/2 inches to 3 inches in height; do not remove more than 1/3 of grass leaf in a single mowing; remove grass clippings from pavement areas.

h. Resodding spots larger than 1 sf not having a healthy, uniform stand of grass.

i. Weed control as required using selective herbicides approved by the ENGINEER.

j. Final acceptance:

1) At the end of the warranty period, the ENGINEER will, upon written notice of end of the warranty period, inspect the Work for final acceptance. Ensure the written request is received at least 10 days before the anticipated date for final inspection.

2) The ENGINEER will inspect and approve repairs and replacements.

3) Sod areas will be accepted when:

(a) Roots are thoroughly knit to the soil.

(b) There is an absence of visible joints.

(c) Each area shows a uniform stand of specified grass in a healthy condition that is free of weeds, diseases, and other visible imperfections.

(d) At least 30 days have elapsed since the completion of the Work under this Section.

2. Seed maintenance includes:

a. Keeping the surface moist to establish a satisfactory stand.

b. Repairing washouts by filling with topsoil, fertilizing, seeding, and mulching.

c. Replacing mulch wherever and whenever it is washed or blown away.

d. Weed control.

e. Repairing and maintaining fences until a satisfactory stand of grass is established.

f. Reseeding unsatisfactory areas, or portions thereof, immediately at the end of the maintenance period if a satisfactory stand is not established.

g. Reseeding or replanting during the next planting season if the scheduled end of maintenance period falls after consistent ground freeze.

h. Reseeding or replanting the entire area if a satisfactory stand does not develop by July 1 of the following year.

3.05 PROTECTION

A. As determined by the ENGINEER, erect a temporary fence around each newly seeded or sodded area.

END OF SECTION

Kumar & Associates, Inc.
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GEOTECHNICAL ENGINEERING STUDY
AND PAVEMENT THICKNESS DESIGN
SHADYCROFT ACRES SANITARY SEWER EXTENSION
SHADYCROFT DRIVE AND GRAHAM LANE
LITTLETON, COLORADO

Prepared by:

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Prepared For:

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Attention: Mr. David Vidikan, P.E.

Project No. 25-1-497

December 5, 2025

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SUMMARY

1. Surficial materials encountered at the boring locations consisted of a thin veneer of topsoil in Boring 3, or asphalt pavement in the other borings with pavement thicknesses ranging from about 2.5 to 4.5 inches. The asphalt in four (4) of the borings was underlain by a thin zone of aggregate base course.

   Beneath the surficial materials, pre-existing fill materials extended to naturally deposited (natural) soils at depths ranging from 3 to 5 feet below existing grade. Borings 1 and 3 were terminated in the natural soils at depths of about 20 feet. The natural soils in the other borings were underlain by bedrock at depths ranging from about 15 to 18 feet. Borings 2, 4, 5, and 6 were terminated in the bedrock at depths of about 20 feet.

   Groundwater was encountered in Borings 3 and 6 at depths of about 17 and 18 feet, respectively. A temporary piezometer was installed in Boring 3 in order to obtain a stabilized groundwater measurement given the proximity to the pond to the south. Groundwater was encountered at a depth of about 16.3 feet in Boring 3 when the follow-up measurement was made 14 days subsequent to drilling.

2. It is our opinion that there is a low risk that the sewer line will impact water levels within the pond located at 505 Shadycroft Drive post-construction due to the low permeability soils. This risk can be further reduced through installation of cut-off collars, particularly bracketing the portion of the alignment near the pond. This is discussed further in the “GEOTECHNICAL ENGINEERING CONSIDERATIONS” section of the report.

PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical engineering study and pavement thickness design performed for the proposed Shadycroft Acres Sanitary Sewer Extension project in Littleton, Colorado. The project site is shown on Fig. 1. The field exploration and laboratory testing programs used to obtain the data were performed in accordance with the scope of work presented in our revised Proposal No. P-25-126B to AE_2S dated June 19, 2025.

The results of the field exploration and laboratory testing were analyzed to develop recommendations and construction considerations for the pipeline including excavation, pipe bedding and backfill, and pavement thickness design.

This report has been prepared to summarize the data obtained during this study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered.

At the time of this report, construction plans were in the preliminary stages. We should be provided with plans once they are available to reevaluate the considerations and recommendations presented herein.

PROPOSED CONSTRUCTION

We understand the project will consist of converting existing properties supported by On-site Wastewater Treatment Systems (OWTS) to sanitary sewer services. Based on plans provided, we understand there will be two sewer alignments: an approximately 1,112-foot alignment within the western portion of Shadycroft Drive right-of-way (ROW) extending from South Rangeview Drive, and an approximate 2,213-foot alignment within the Graham Lane ROW as well as the eastern portion of Shadycroft Drive extending from South Windermere Street. Construction along the proposed alignments will also include 21 new manholes. Burial depths and pipe diameters were not known at the time of this report. We understand the sewer line construction will be completed using conventional cut and cover methods, the sizes of which will be based on the associated infrastructure and adjacent development constraints. We also understand disturbed pavement in trench excavations will be patched to match existing pavement thicknesses.

If the proposed construction varies significantly from that described above or depicted in this report, we should be notified to reevaluate the recommendations provided in this report.

SITE CONDITIONS

The site is located within a single-family residential neighborhood generally bounded on the north by Rangeview Drive, on the east by South Windemere Street, on the south by the High Line Canal, and on the West by South Prince Street. A privately owned pond is located just south of Shadycroft Drive near the midpoint of the proposed sewer alignment. The streets are asphalt paved without curb and gutters. Vegetation along the streets consisted of a mix of manicured grass, and deciduous and coniferous trees. Topography across the site is somewhat undulating with the general inclination down from east to the west. Overall relief across both alignments is about 35 feet.

SUBSURFACE CONDITIONS

Field Exploration Program: The subsurface conditions at the site were explored by drilling six exploratory borings along the alignments at the approximate locations shown on Figs. 1. The borings were drilled at approximate evenly spaced intervals.

The borings were advanced through the surficial materials into the underlying soils and bedrock, where encountered, with 4-inch-diameter continuous-flight solid-stem augers. The borings were logged by a representative of Kumar & Associates, Inc. (K+A). Samples of the materials encountered were obtained with a 2-inch I.D. California liner sampler driven into the various strata with blows from a 140-pound hammer falling 30 inches. The California liner sampling procedure is similar to the standard penetration test described by ASTM International (ASTM) Method D1586 and is used locally generally for obtaining relatively undisturbed samples of cohesive soils and bedrock materials. Penetration resistance values (blow counts), when properly evaluated, indicate the relative density or consistency of the soils. Depths at which the samples were obtained, and the blow counts, are shown on the boring logs on Fig. 2.

Subsurface Soil Conditions: Surficial materials encountered at the boring locations consisted of a thin veneer of topsoil in Boring 3, or asphalt pavement in the other borings with thicknesses ranging from about 2.5 to 4.5 inches. The asphalt in four (4) of the borings was underlain by a thin zone of aggregate base course ranging from about 1.5 to 4.5 inches-thick. The pavement sections and thicknesses encountered in the borings are indicated next to the logs on Fig. 2 and described in the Legend and Notes on Fig. 3.

Beneath the surficial materials, pre-existing fill materials extended to naturally deposited (natural) soils at depths ranging from 3 to 5 feet below existing grade. Borings 1 and 3 were terminated in

the natural soils at depths of about 20 feet. The natural soils in the other borings were underlain by bedrock at depths ranging from about 15 to 18 feet. Borings 2, 4, 5, and 6 were terminated in the bedrock at depths of about 20 feet.

The fill materials encountered consisted of lean clay with variable sand content. The fill was slightly moist to moist and brown. The exact lateral and vertical extents, and degree of compaction of the fill, across the site were not determined as part of this study.

The natural soils predominately consisted of lean clay with isolated silty sand zones. The lean clay had a variable sand fraction and was moist and light brown to brown. The silty sand was fine- to coarse-grained, moist, and brown. Based on sampler blow counts, the clay soils were generally medium stiff to very stiff and the silty sand was medium dense.

Where encountered, bedrock generally consisted of claystone with occasional sandstone zones. The claystone was moist and brown. The sandstone was moist and light brown to gray-brown with occasional iron staining. Based on sampler blow counts the bedrock was hard to very hard.

Groundwater was encountered in Borings 3 and 6 at depths of about 17 and 18 feet, respectively. With the exception of Boring 3, the borings were backfilled upon completion of drilling and the surface patched with asphalt cold patch. A temporary piezometer was installed in Boring 3 in order to obtain a stabilized groundwater measurement given the proximity to the pond to the south. Groundwater was encountered at a depth of about 16.3 feet in Boring 3 when the follow-up measurement was made 14 days subsequent to drilling. The piezometer pipe was removed and the bore hole was backfilled following the stabilized groundwater measurement.

LABORATORY TESTING

Samples obtained from the exploratory borings were visually classified in the laboratory by the project engineer. Laboratory testing was performed on representative samples to evaluate in-situ moisture content and dry unit weight, liquid and plastic limits, swell-consolidation behavior, moisture-density relationships, and electrical resistivity. These tests were performed in accordance with the applicable ASTM standard test procedures. The percentage of water-soluble sulfates in soil was evaluated in general accordance with the Colorado Department of Transportation (CDOT) CP-L 2103 test procedure. The results of the laboratory tests are shown to the right of the logs on Fig. 2, plotted graphically on Figs. 4 through 8, and summarized in Table I.

Index Properties: Samples were classified into categories of similar engineering properties in general accordance with the Unified Soil Classification System. This system is based on index properties including gradation characteristics, liquid limit, and plasticity index. In-situ moisture contents and dry density, liquid limit, plasticity index, and the percent of soil passing the U.S. No. 4 and 200 sieves are summarized in Table 1.

Swell-Consolidation: Swell-consolidation tests were conducted on representative samples of the soils and bedrock materials to determine their swell and/or compressibility under loading and when submerged in water. Each sample was prepared and placed in a confining ring between porous discs, subjected to a surcharge pressure of 200 psf, and allowed to consolidate before being submerged. The samples were inundated with water, and the change in sample height when deformation ceased was measured with a dial gauge. The samples were then loaded incrementally to maximum surcharge pressures ranging between 3,000 psf and 20,000 psf, and the sample heights were monitored until deformation practically ceased under each load increment.

Results of the swell-consolidation tests are presented on Figs. 4 through 6 as plots of the curve of the final strain at each increment of pressure against the log of the pressure. Based on the results of the swell-consolidation tests, the samples of the pre-existing fill materials exhibited a low to moderate swell potential (1.2%) to high swell potential (8.8%) under an applied surcharge pressure when wetted. The claystone bedrock exhibited a moderate swell potential (4.4%) under an applied surcharge pressure when wetted.

Moisture-Density Relationships: A standard Proctor (ASTM D698) test was performed on a composited sample of the pre-existing fill materials. The standard Proctor test results are shown on Fig. 7. The testing indicated the material had a maximum dry density of 105.2 pcf at an optimum moisture content of 13.6.

GEOTECHNICAL ENGINEERING CONSIDERATIONS

It is our opinion that post construction settlement exceeding normally accepted tolerances is not anticipated since the overburden has been subjected to loadings associated with construction, traffic, and utility construction, and provided the bottom of the trench excavation is prepared and the trench backfill is placed in accordance with the “EXCAVATION CONSIDERATIONS” section of this report. For much of the proposed alignments, the proposed sewer invert elevations are above anticipated groundwater elevation; however, perched groundwater may be encountered,

and should be anticipated, within the bedrock or at the bedrock surface should pipe inverts extend so deep.

Portions of the sewer line and associated manholes will be below groundwater. We recommend waterproofing the pipes and manholes in these areas. As previously mentioned, Borings 3 encountered stabilized groundwater at a depth of about 16.3 feet below existing grade when checked 14 days subsequent to drilling. Boring 3 was located about 30 feet north of the edge of the pond located at 505 Shadycroft Drive. The groundwater and slightly elevated moisture contents of the soils in Boring 3 may be a result of pond seepage. The on-site clay soils expected to exhibit low permeability characteristics. The trench excavation will be backfilled using the on-site materials. The pipe bedding material will be granular and is generally free draining.

To limit water migration through the bedding material, we recommend the cut-off collars (commonly referred to as cut-off walls or trench dams) be installed in the trench. It is our opinion that there is a low risk that the sewer line will impact water levels within the pond post-construction due to the low permeability soils. This risk can be further reduced through installation of cut-off collars, particularly bracketing the portion of the alignment near the pond. Recommendations for cut-off collars are presented in the “PIPELINE RECOMMENDATIONS” section of this report.

Sloughing soils in the trench cuts may result in loss of pavement subgrade support along the excavation. In order to further reduce the risk of sloughing, a combination of limiting the time excavations remain open and use of trench boxes placed against the excavation side walls should be considered. A discussion regarding trench excavation and use of trench boxes is presented in the “EXCAVTION CONSIDERATIONS” section of this report. The on-site soils and bedrock varied from granular to cohesive. Cohesive soils, and claystone bedrock, are generally less susceptible to sloughing than granular soils. The overburden granular soils encountered in the borings generally contained cohesive fines which should further reduce the risk of the material sloughing. Temporary unretained excavations should be no steeper than OSHA requirements based on the soil types indicated below.

EXCAVATION CONSIDERATIONS

We believe that overburden soils and bedrock may be excavated with conventional heavy-duty excavation equipment. However, excavations extending more than a few feet into the underlying bedrock may classify as Rock Excavation. Bedrock is defined as Rock Excavation if it does not satisfy the Ripping Test criteria as described in Section 203 of CDOT’s Standard Specifications

for Road and Bridge Construction. Based on blow counts, we believe the bedrock generally will not classify as Rock Excavation.

We believe that some of the alignment may encounter groundwater during excavation. We believe that dewatering the excavations may be accomplished using a sump pump system as outlined in this section.

Surface water runoff into the excavations can act to erode and potentially destabilize the trench slopes and result in soft ground conditions along the trench bottom and should not be allowed. Diversion berms and other measures should be used to prevent surface water runoff into the trenches.

Temporary Excavation Slopes: We assume that the temporary excavations will be constructed using appropriate trench box system. All excavations should be constructed in accordance with OSHA requirements, as well as state, local and other applicable requirements. OSHA requires that excavations requiring trenching over 20 feet deep be designed by a registered professional engineer. Based on the nature of the subsurface soils and bedrock at the site and OSHA excavation guidelines, the on-site natural clay soils and bedrock should be classified as OSHA Type B soils. The existing fill and natural granular materials should be classified as OSHA Type C soils.

Excavated slopes may soften or loosen due to construction traffic and erode from surface runoff. Measures to keep surface runoff from excavation slopes, including diversion berms, should be considered.

Excavation Dewatering: Excavations extending below groundwater should be properly dewatered prior to and during the excavation process to help maintain the stability of the excavation side slopes and stable subgrade conditions for fill placement.

Selection of a dewatering system should be the responsibility of the contractor. Dewatering quantities will depend on excavation size, water table drawdown, and soil permeability. Based on laboratory test results, the natural clay soils and bedrock are anticipated to be of low permeability. The granular materials encountered in Borings 5 and 6 will have a higher permeability.

The construction dewatering systems should be capable of intercepting groundwater before it can reach the face of excavation side slopes, and to maintain a groundwater level at least 3 feet below

the bottom of the excavation. Dewatering should continue until construction and associated backfilling extends above the groundwater table.

PIPELINE RECOMMENDATIONS

Pipe Bedding and Backfill: Due to the expansive nature of the soils and bedrock, bedding material supporting the pipe bottom should consist of a minimum of 18-inch compacted layer of imported granular material meeting the pipe manufacturer's recommendations for pipe bedding. Prior to placing the bedding, the subgrade should be excavated and loose material removed to provide firm subgrade support. If soft soil conditions persist in the trench bottoms, it may be necessary to sub-excavate to a greater depth and replace such soils with a deeper bedding section to provide proper pipe support. Bedding material should be compacted using a vibratory plate or other approved densification methods.

The pipe-zone material placed above the bedding and surrounding the pipe should consist of granular material similar to that described above for pipe bedding and should be compacted to at least 75% relative density (ASTM D4253 and ASTM D4254). The pipe-zone material should also be placed and compacted in accordance with the requirements of the pipe manufacturer. Special care should be taken to provide adequate compaction below the haunches of the pipe using a concrete vibrator, vibratory plates, or other light compaction equipment as needed. Pipe-zone material should be placed and compacted in equal lifts on both sides of the sewer line during construction before the addition of the next lift to avoid laterally loading one side of the pipe.

Backfill placed above the pipe-zone materials to the surface should consist of suitable on-site soils obtained from the pipeline excavation. Suitable soils should have a maximum size of 3 inches and should be generally free of organics, wood, or other deleterious material that could decay over time. Most of the soils encountered in the exploratory borings satisfy the material requirements for general fill based on laboratory testing of selected samples. Ideally, claystone bedrock should not be used as trench backfill. The backfill should be compacted to at least 95% of the standard Proctor (AASHTO T-99) maximum dry density and placed at a moisture content between optimum and +3 percent of optimum for soils classifying as A-6 and A-7 and compacted to at least 95% of the modified Proctor (AASHTO T-180) maximum dry density and placed within 2 percentage points of optimum for soils classifying between A-1 and A-5. Granular soils with minimal fines content of 10 percent or less should be compacted to at least 80% relative density (ASTM D4253 and ASTM D4254).

The overburden soils and bedrock excavated below the groundwater level may have elevated moisture contents making it difficult for reuse as trench backfill material.

Utility Trench Cut-Off Collars: Our experience is that bedding material can typically be as large as about 2 inches. The highly permeable nature of this material allows ground water to freely flow in the bedding, which can result in migration of the supporting soils into the bedding zone.

We recommend that cut-off collars be installed along the alignment at distances no greater than about 500 feet and where the slope of the pipe exceeds 3%. Additional cut-off collars should be installed in the portion of the sewer line within close proximity to the pond at 505 Shadycroft Drive. The cut-off collars are intended to slow the water velocities within the bedding and trench to limit loss of support due to fines migrating into the bedding. We also recommend waterproofing sanitary sewer and manholes along the alignment in areas that extend below the groundwater level.

Cut-off collars should consist of a relatively impermeable material such as properly processed fat clay or a controlled low strength material (CLSM) such as a cementitious flowable fill. Our experience is that CLSM is used more often in this application since it is easy to form and install quickly.

Where cut-off collars are installed, we recommend that the pipe be cleaned to promote good adhesion of the material to the pipe. A minimum of 12 inches of soil cover above the cut-off collar will help mitigate erosion of the collar material due to surface water.

We recommend that the cut-off collar be designed such that the collar extends at least 1-foot into the trench side wall and bottom.

Construction Monitoring and Instrumentation: The proposed pipeline sections will be located within existing city streets and utility easements adjacent to existing sidewalks, structures, and private landscape areas. To mitigate against potential damage to adjacent structures, and provide information for evaluating potential claims of damage, consideration should be given to performing a pre-construction survey of existing sidewalks, buildings and other structures located adjacent to the proposed excavations. The condition of existing structures, including existing cracks or

other distress features should be documented in writing and photographs should be taken as appropriate. Ideally, representatives of the owners of the adjacent structures, client, geotechnical engineer, and contractor should perform the reconnaissance.

WATER-SOLUBLE SULFATES

The concentration of water-soluble sulfates measured in a representative sample of the pre-existing fill material was below detectible limits of the laboratory testing equipment. This concentration represents a Class S0 severity of exposure to sulfate attack on concrete exposed to these materials. The degree of attack is based on a range of Class S0 (not applicable), Class S1 (moderate), Class S2 (severe), and Class S3 (very severe) severity of exposure as presented in ACI 201.2R.

Based on the laboratory test results, we believe special sulfate resistant cement will generally not be required for concrete exposed to the overburden soils and claystone bedrock.

BURIED METAL CORROSION

The potential for corrosion of buried metal placed beneath the ground surface at the site was evaluated based on the results of laboratory testing performed on a representative sample of the overburden soils. The sample was tested to determine electrical resistivity and pH. The results of the pH testing indicated a pH value of 6.83. This pH value is slightly acidic and should not accelerate corrosion.

The results of the laboratory electrical resistivity testing indicate the tested samples of clay overburden soils had minimum electrical resistivity value of 964 ohm-cm. A resistivity value of 1,280 ohm-cm was estimated at the optimum moisture content for the sample tested. The resistivity test results are presented on Fig. 8 and summarized in Table I.

Based on the resistivity test results, the clay soils would generally be classified as being susceptible to creating a potentially highly corrosive environment due to stray currents at moisture contents above about 10% and mildly corrosive at lower moisture contents. The corrosivity classifications are in accordance with a classification system published by the U.S. Bureau of Reclamation and the National Association of Corrosion Engineers.

Corrosion of buried metal is a complex process and requires an understanding of the combined effects of the parameters measured for this study, as well as other conditions not evaluated as

part of this study. We recommend a qualified corrosion engineer review the information presented herein to determine the need for an appropriate level of corrosion protection for buried metals at the site.

DESIGN AND CONSTRUCTION SUPPORT SERVICES

K+A should be retained to review the project plans and specifications for conformance with the recommendations provided in our report. We are also available to assist the design team in preparing specifications for geotechnical aspects of the project and performing additional studies, if necessary, to accommodate possible changes in the proposed construction.

We recommend that K+A be retained to provide construction observation and testing services to document the intent of this report and the requirements of the plans and specifications are being followed during construction. This will allow us to identify possible variations in subsurface conditions from those encountered during this study and to allow us to re-evaluate our recommendations, if needed. We will not be responsible for implementation of the recommendations presented in this report by others, if we are not retained to provide construction observation and testing services.

LIMITATIONS

The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory borings at the location indicated on Fig. 1, and the proposed type of construction. This report may not reflect subsurface variations that occur between the nature and extent of variations across the site may not become evident until excavations are performed. If during construction, subsurface or groundwater conditions appear to be different from those described herein, K+A should be advised at once so that a re-evaluation of the recommendations presented in this report can be made. K+A is not responsible for liability associated with interpretation of subsurface data by others.

Swelling soils and bedrock are present at this site. Such materials are stable at their natural moisture content but will undergo high volume changes with changes in moisture content. The extent and amount of perched water beneath the pavements as a result of area precipitation and irrigation, and inadequate surface drainage, is difficult, if not impossible, to foresee.

The recommendations presented in this report are based on current theories and experience of our engineers on the behavior of swelling soil and bedrock in this area. The City should be aware that there is a risk in constructing pavements in an area of highly expansive soil and bedrock. Following the recommendations given by a geotechnical engineer, careful construction practice and prudent maintenance by the owner can, however, decrease the risk of foundation, slab, and pavement movement due to expansive materials.

AJY/ls
Rev. by: RRK
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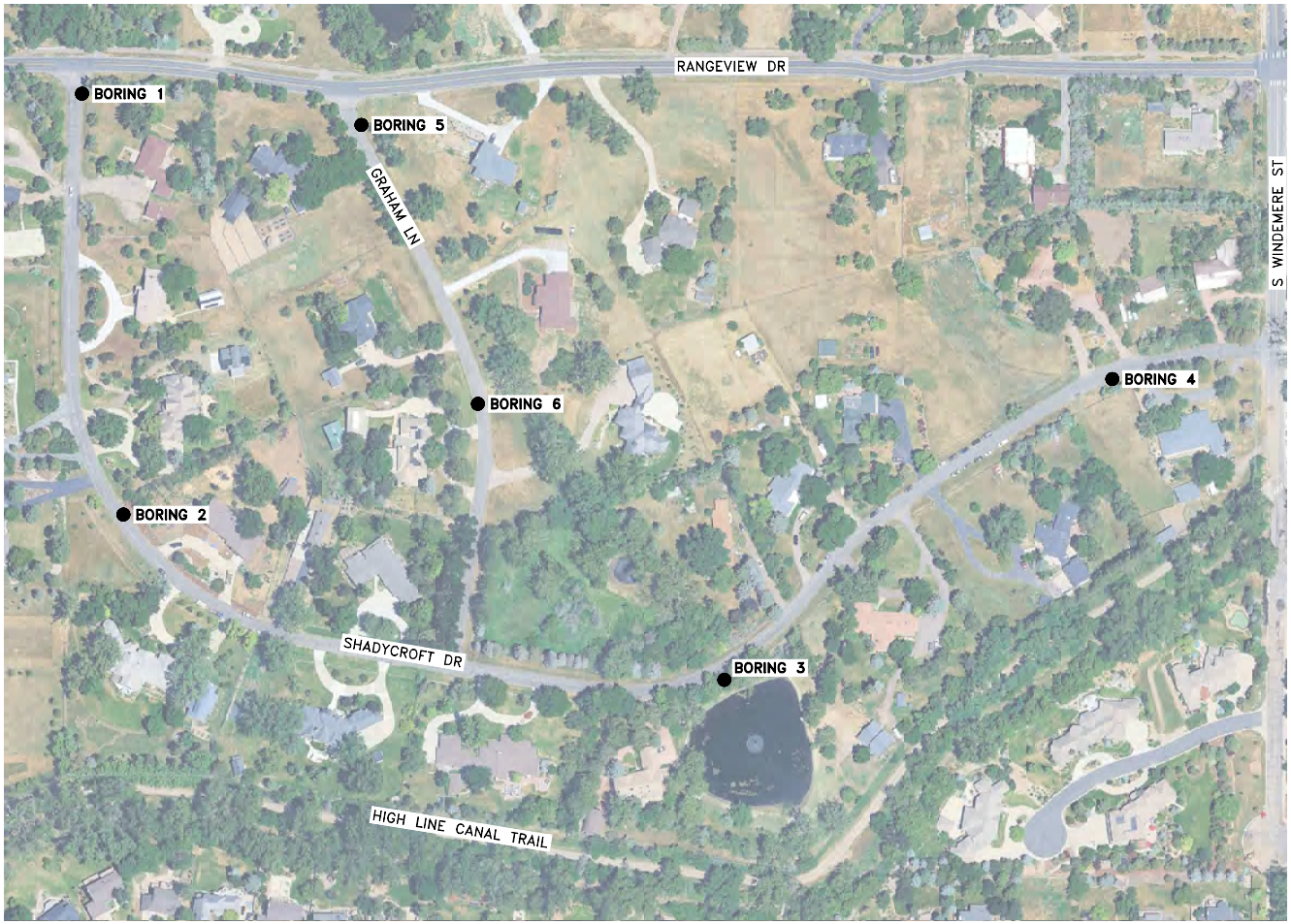

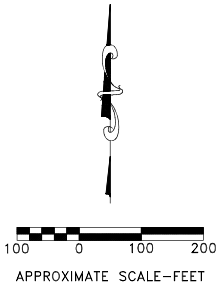

VICINITY MAP
NOT TO SCALE

25–1–497	Kumar & Associates	SHADYCROFT ACRES SEWER EXTENSION – SHADYCROFT DRIVE AND GRAHAM LANE, LITTLETON, COLORADO	LOCATION OF EXPLORATORY BORINGS — Fig. 1

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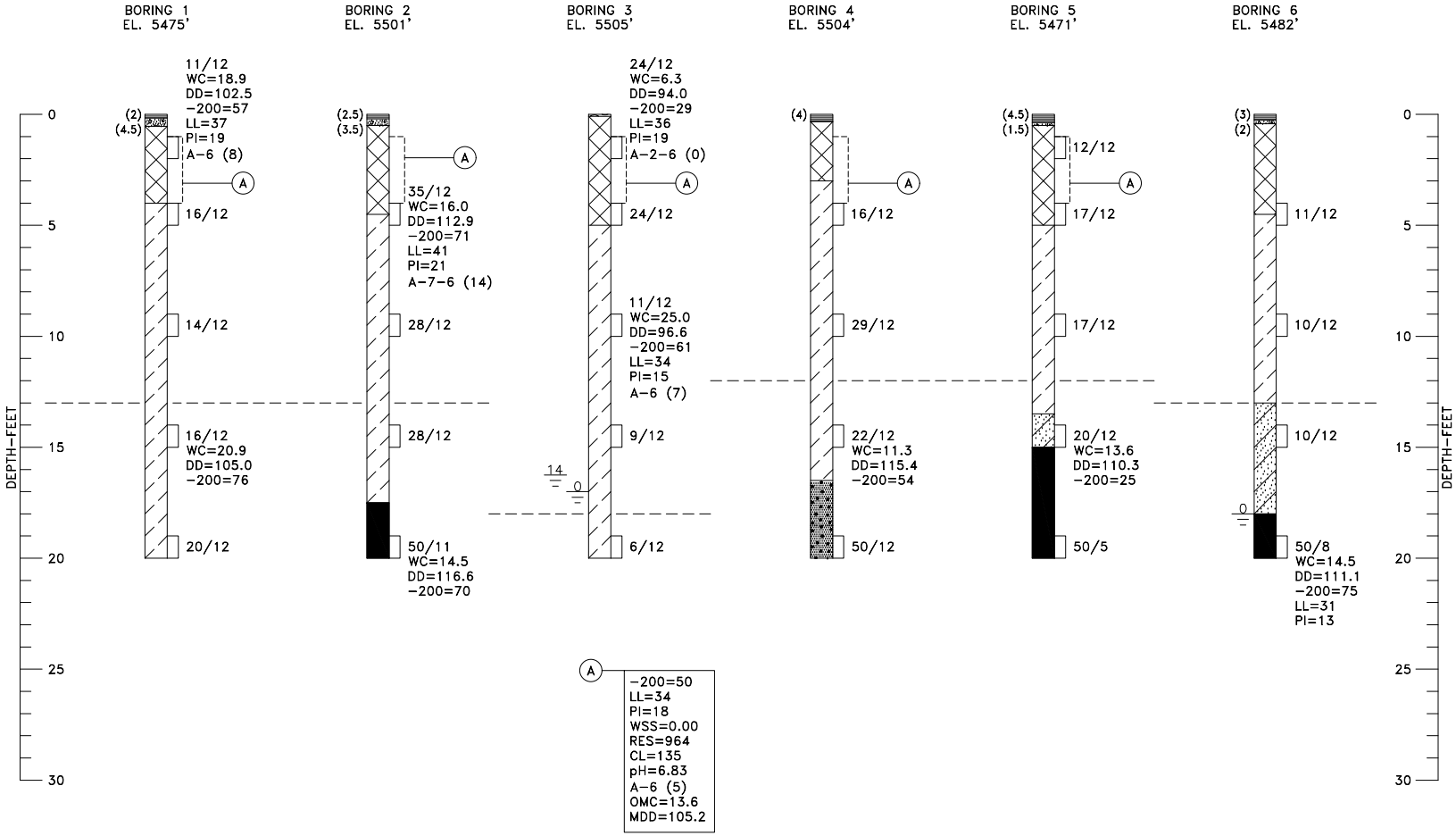

25-1-497	Kumar & Associates	SHADYCROFT ACRES SEWER EXTENSION – SHADYCROFT DRIVE AND GRAHAM LANE, LITTLETON, COLORADO	LOGS OF EXPLORATORY BORINGS	Fig. 2

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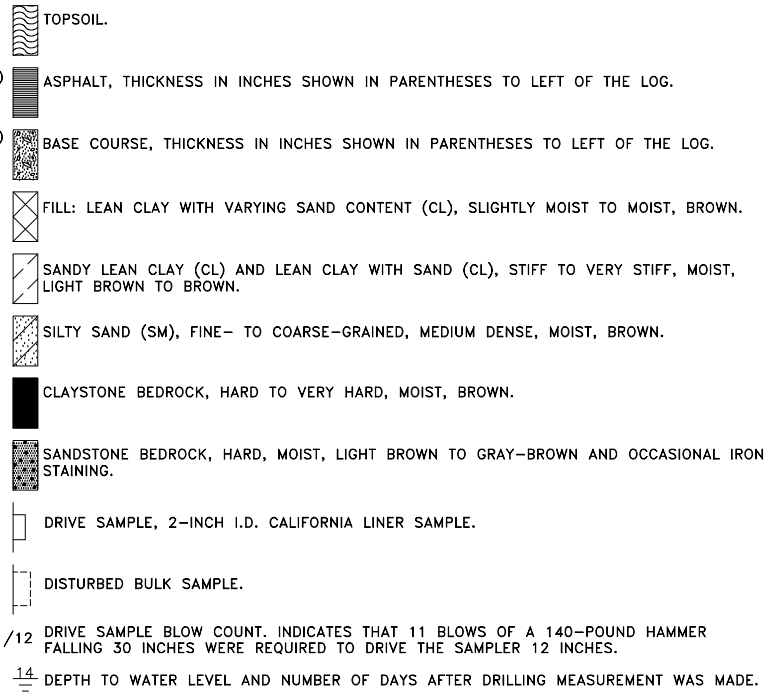
LEGEND



NOTES

1. THE EXPLORATORY BORINGS WERE DRILLED ON AUGUST 28, 2025 WITH 4-INCH-DIAMETER CONTINUOUS-FLIGHT POWER AUGERS.
2. THE LOCATIONS OF THE EXPLORATORY BORINGS WERE LOCATED BY GPS COORDINATES OBTAINED FROM GOOGLE EARTH• •AND LOCATED IN THE FIELD WITH A HANDHELD GPS UNIT.
3. THE ELEVATIONS OF THE EXPLORATORY BORINGS WERE OBTAINED BY INTERPOLATION BETWEEN CONTOURS ON THE SITE PLAN PROVIDED.
4. THE EXPLORATORY BORING LOCATIONS AND ELEVATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE METHOD USED.
5. THE LINES BETWEEN MATERIALS SHOWN ON THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE TRANSITIONS MAY BE GRADUAL.
6. GROUNDWATER LEVELS SHOWN ON THE LOGS WERE MEASURED AT THE TIME AND UNDER CONDITIONS INDICATED. FLUCTUATIONS IN THE WATER LEVEL MAY OCCUR WITH TIME.
7. LABORATORY TEST RESULTS:
   WC = WATER CONTENT (%) (ASTM D2216);
   DD = DRY DENSITY (pcf) (ASTM D2216);
   -200= PERCENTAGE PASSING NO. 200 SIEVE (ASTM D1140);
   LL = LIQUID LIMIT (ASTM D4318);
   PI = PLASTICITY INDEX (ASTM D4318);
   WSS = WATER SOLUBLE SULFATES (%) (CP-L 2103);
   RES = MINIMUM LABORATORY RESISTIVITY (ohm-cm.) (ASTM G 57);
   CL = CHLORIDE CONTENT (ppm) (AASHTO T291):
   pH = HYDROGEN ION CONCENTRATION (ASTM E 70);
   A-6 (8) = AASHTO CLASSIFICATION (GROUP INDEX) (AASHTO M 145);
   OMC = OPTIMUM MOISTURE CONTENT (%) (ASTM D698);
   MDD = MAXIMUM DRY DENSITY (pcf) (ASTM D698).

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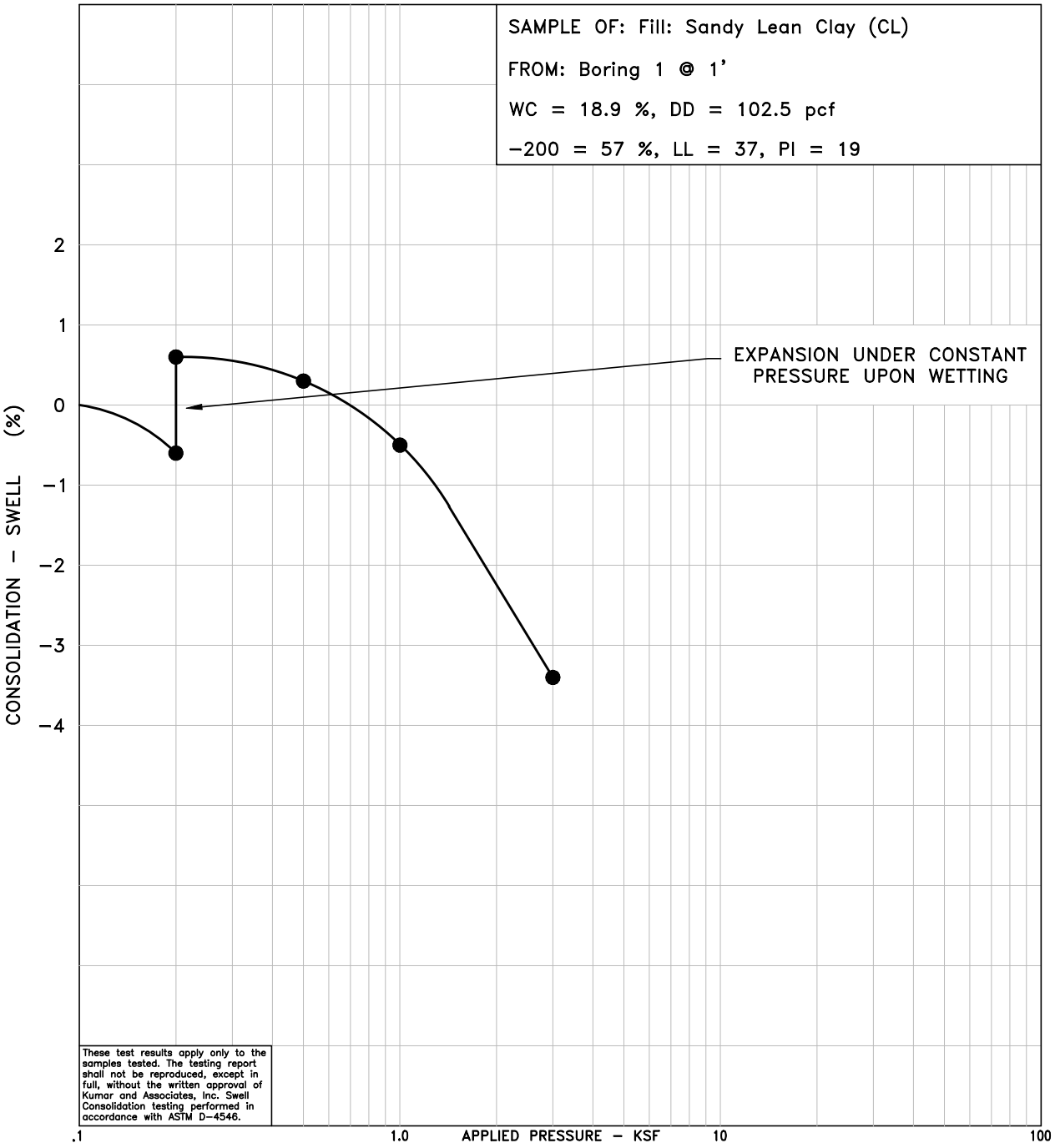
25-1-497	Kumar & Associates	SHADYCROFT ACRES SEWER EXTENSION - SHADYCROFT DRIVE AND GRAHAM LANE, LITTLETON, COLORADO	LEGEND AND NOTES	Fig. 3



25-1-497	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 4

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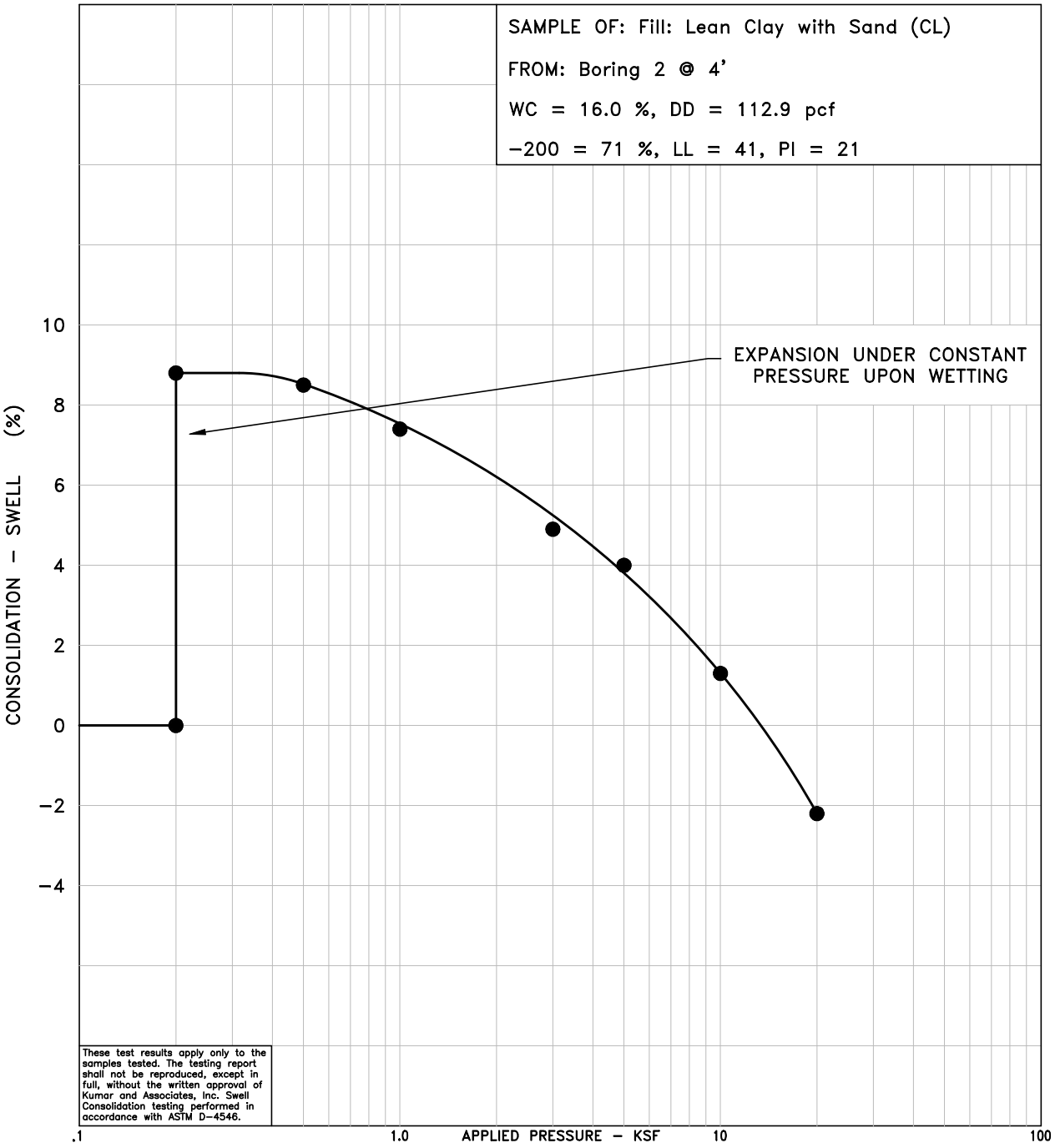

25-1-497	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 5

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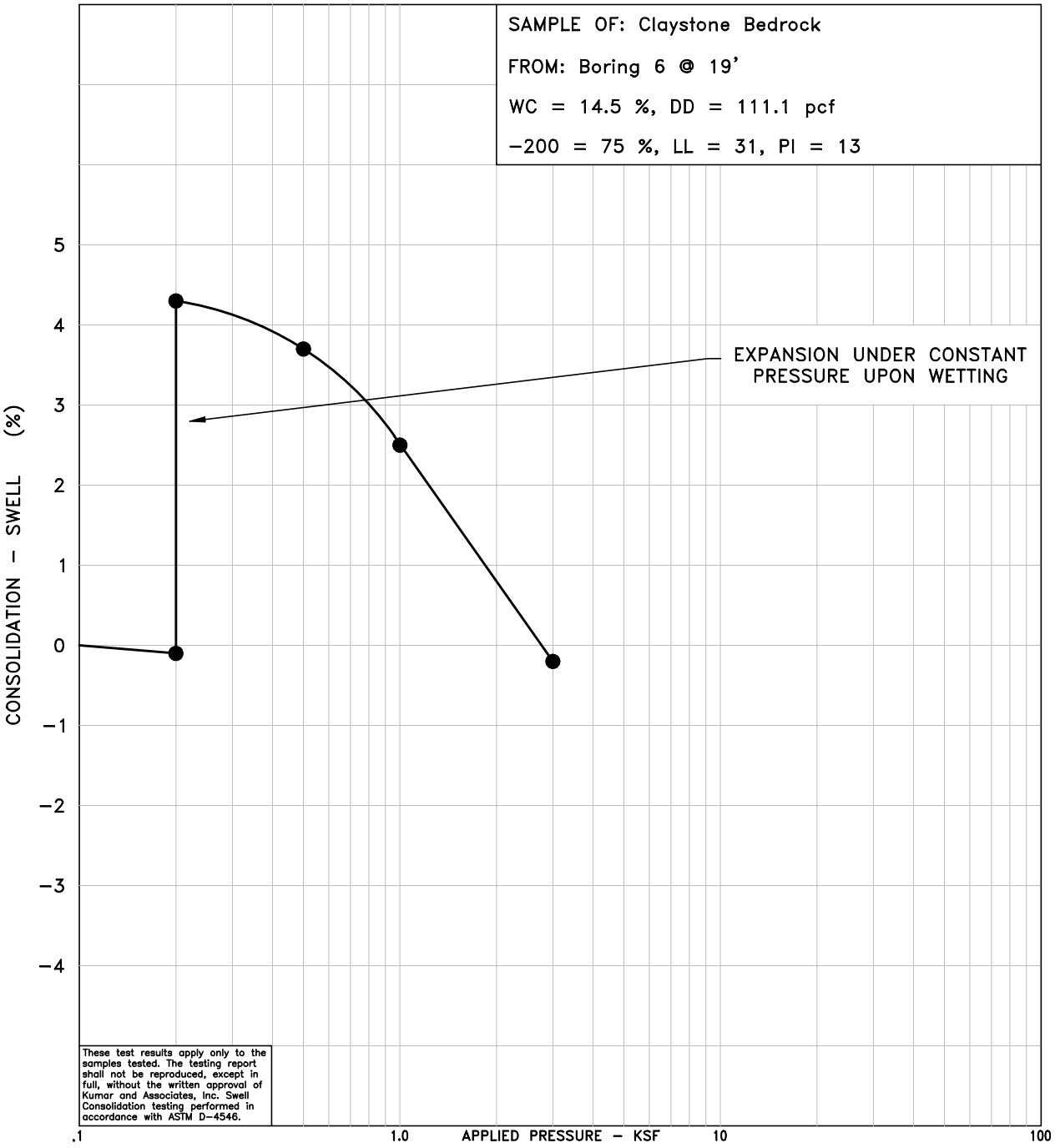

25-1-497	Kumar & Associates	SWELL-CONSOLIDATION TEST RESULTS	Fig. 6

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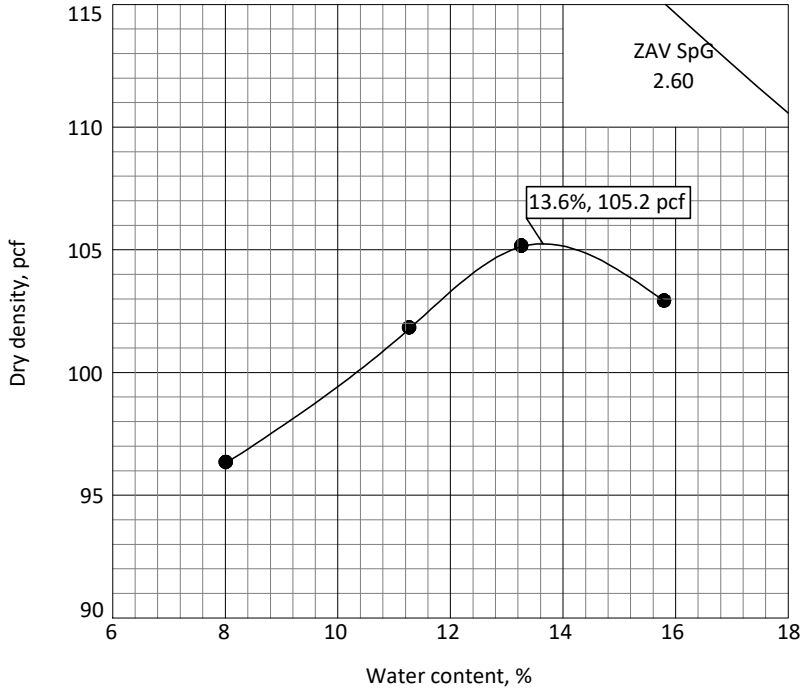
COMPACTION TEST REPORT

Curve No. 4329



Preparation Method	
Rammer: Wt.	5.5 lb. Drop 12 in.
Type	Manual
Layers: No.	3 Blows per 25
Mold Size	0.03333 cu. ft.
Test Performed on Material Passing	#4 Sieve
%>#4	0 %<No.200 50
Atterberg (D 4318): LL	34 PI 18
NM (D 2216)	Sp.G. (D 854) 2.6
USCS (D 2487)	CL
AASHTO (M 145)	A-6 (5)
Date: Sampled	8/29/25
Received	8/29/25
Tested	9/8/25
Tested By	AS

COMPACTION TESTING DATA
ASTM D 698-12 Method A Standard

	1	2	3	4	5	6
WM + WS	5923.0	6063.0	6151.0	6152.0		
WM	4346.7	4346.7	4346.7	4346.7		
WW + T #1	460.2	374.4	417.0	581.1		
WD + T #1	442.7	352.1	390.7	543.9		
TARE #1	224.6	154.4	192.6	308.6		
WW + T #2						
WD + T #2						
TARE #2						
MOIST.	8.0	11.3	13.3	15.8		
DRY DENS.	96.3	101.8	105.1	102.9		

SIEVE TEST RESULTS

Opening Size	% Passing	Specs.

TEST RESULTS

Maximum dry density = 105.2 pcf

Optimum moisture = 13.6 %

Project No. 25-1-497 **Client:** AE_2S

Project: Shadycroft Acres Sewer Extension

○ **Location: Borings 1-5** **Depth: 1'-5'** **Sample Number: 4329**

Material Description

Sandy Lean Clay

Remarks:

These test results apply only to the samples which were tested. the testing report shall not be reproduced, except in full, without the written approval of Kumar and Associates, Inc. Moisture/density relationships performed in accordance with ASTM D698, D1557. Atterberg limits performed in accordance with ASTM D4318 sieve analysis performed in accordance with ASTM D422, D1140.

Checked by: JJM

Title: Lab Manager

25-1-497	Kumar & Associates	MOISTURE-DENSITY RELATIONSHIPS	Fig. 7

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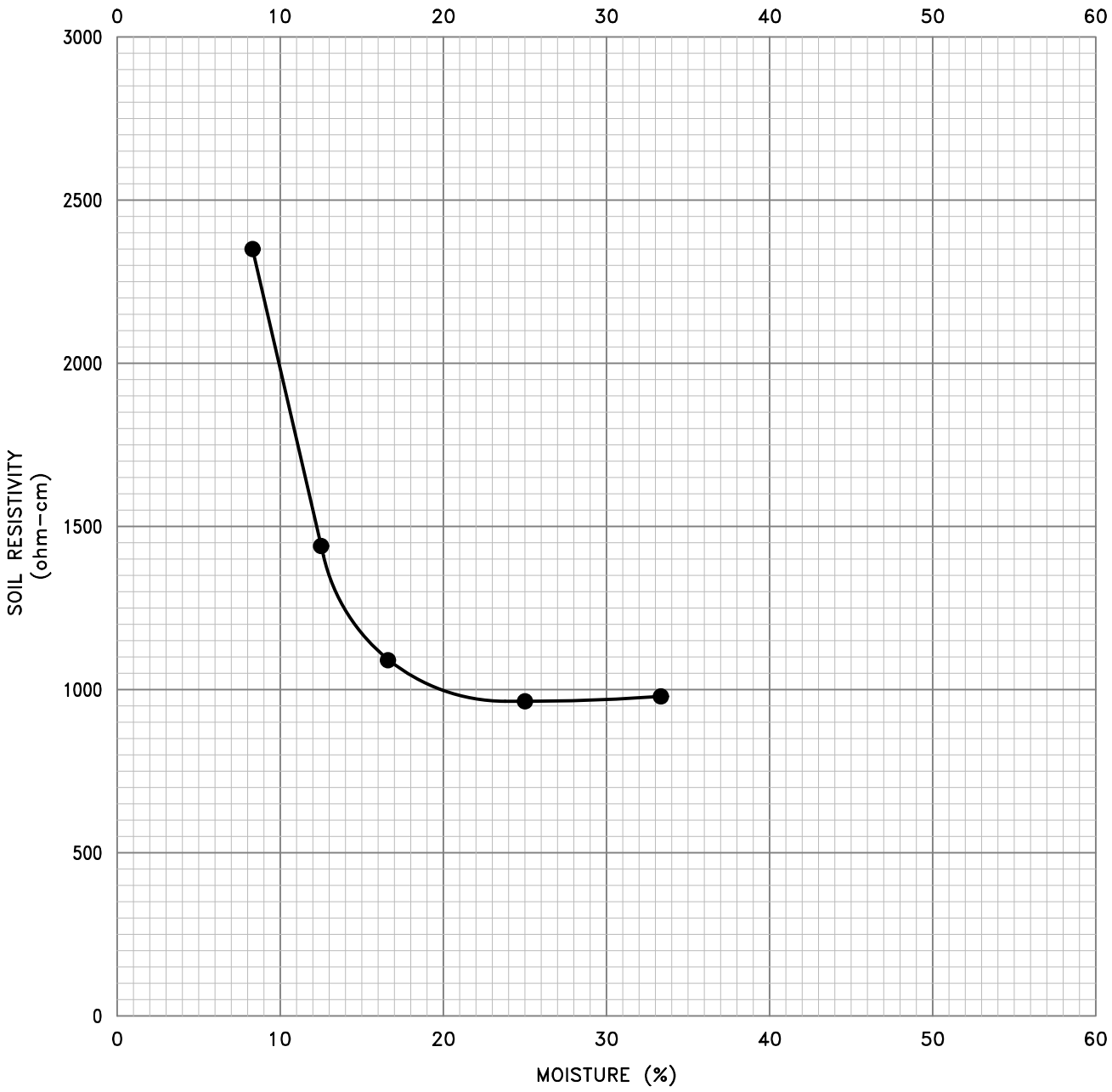

CURVE SYMBOL	SAMPLE IDENTIFICATION	SOIL OR BEDROCK TYPE	MINIMUM RESISTIVITY (ohm-cm)	RESISTIVITY AT OPTIMUM MOISTURE CONTENT* (ohm-cm)
●	Borings 1-5 @ 1'-5'	Sandy Lean Clay	964	1,280

* PER ASTM D698

25-1-497	Kumar & Associates	LABORATORY RESISTIVITY RESULTS	Fig. 8

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Table I
Summary of Laboratory Test Results

Project No.: 25-1-497
Project Name: Shadycroft Acres Sewer Extension - Shadycroft Drive and Graham Lane, Littleton, Colorado
Date Sampled: 9/25/25
Date Received: 8/29/25

Sample Location		Date Tested	Natural Moisture Content (%)	Natural Dry Density (pcf)	Percent Passing No. 200 Sieve	Atterberg Limits		Water Soluble Sulfates (%)	Minimum Electrical Resistivity (ohm-cm)	Chloride Content in Soils (ppm)	pH	AASHTO Classification (Group Index)	Soil or Bedrock Type
Boring	Depth (Feet)					Liquid Limit (%)	Plasticity (%)						
1	1	8/29/25	18.9	102.5	57	37	19					A-6 (8)	Fill: Sandy Lean Clay (CL)
1	14	8/29/25	20.9	105.0	76								Lean Clay with Sand (CL)
2	4	8/29/25	16.0	112.9	71	41	21					A-7-6 (14)	Fill: Lean Clay with Sand (CL)
2	19	8/29/25	14.5	116.6	70								Claystone Bedrock
3	1	8/29/25	6.3	94.0	29	36	19					A-2-6 (0)	Fill: Clayey Sand (SC)
3	9	8/29/25	25.0	96.6	61	34	15					A-6 (7)	Sandy Lean Clay (CL)
4	14	8/29/25	11.3	115.4	54								Sandy Lean Clay (CL)
5	14	8/29/25	13.6	110.3	25								Silty Sand (SM)
6	19	8/29/25	14.5	111.1	75	31	13						Claystone Bedrock
1-5	1-5	9/8/25	13.6*	105.2*	50	34	18	0	964	135	6.83	A-6 (5)	Fill: Sandy Lean Clay (CL)

*Optimum moisture content and maximum dry density as determined by standard Proctor (ASTM D698)