

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 TAK Broadband, LLC, a Colorado limited liability company (“Contractor”). The Contractor and the City are referred to as a “Party” or collectively the “Parties.”

RECITALS AND REPRESENTATIONS

WHEREAS the City issued a solicitation for bids no. 11-2025, and the Contractor submitted a bid to perform the work; and

WHEREAS the City has elected to accept the Contractor’s bid.

NOW, THEREFORE, in consideration of the mutual covenants herein set forth, the Parties agree as follows:

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	General Conditions
Exhibit D	Construction Contract Forms
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. 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.** 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, with only new, undamaged and first quality equipment, materials and supplies. 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. No work shall commence until a Notice to Proceed has been issued, and if required by the City, until after approval by the City Council in accordance with the City Charter and City Code.

- 1.3 **Commencement and Completion of the Project.** The Contractor understands and agrees that all Work required under this Contract shall be fully completed, as set forth in the Contract Documents, within **154 calendar days of the date of the 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 for the estimated quantities and costs as set forth in the Bid Schedule, **Exhibit B**, in the total amount of **\$586,370.00**. The City shall make payment(s) to Contractor in the manner and at such times as set forth in the General Conditions of such amounts as are required by the Contract Documents. 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. The City has appropriated sufficient funds for the completion of this work.
- 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 **Insurance.**

1.7.1 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.

1.7.2 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.

1.7.3 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.

1. 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.

2. 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.
3. 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.
4. 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.

1.7.4 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.

- 1.7.5 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.
- 1.7.6 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.
- 1.7.7 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 (presently \$387,000 per person and \$1,093,000 per occurrence) 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.
- 1.8 **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.

- 1.9 **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.
- 1.10 **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.
- 1.11 **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.
- 1.12 **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.
- 1.13 **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.

- 1.14 **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.
- 1.15 **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.
- 1.16 **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.
- 1.17 **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.
- 1.18 **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.
- 1.19 **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 Section 1.3 of the General Conditions, **Exhibit C**. 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.

- 1.20 **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
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Notice to Contractor:	TAK Broadband, LLC 4401 S Technology Drive Sioux Falls, SD 57106
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- 1.21 **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 and compensation in the foregoing circumstances.
- 1.22 **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.

DATED this ____ day of _____, 2025.

CITY OF LITTLETON, COLORADO

ATTEST

Kyle Schlachter
MAYOR

Colleen Norton
CITY CLERK

APPROVED AS TO FORM:

Reid Betzing
CITY ATTORNEY



CONTRACTOR

Trent Edwards
CEO

Date

Exhibit A

Scope of Work

The Contractor shall perform fiber installation, splicing, and terminating, conduit and pullbox installation, and other related improvements along Rio Grande St and Court Pl between Crestline Ave and Littleton Blvd; along Littleton Blvd between Court Pl and Broadway; on Datura St and Gallup between Littleton Blvd and Lake Ave; and on County Line Rd between Santa Fe and South Park Cir.

The City's right-of-way permit fee will be waived for Contractor.

Construction and construction management and inspection services are locally funded.

Exhibit B

BID SCHEDULE

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	PROJECT TOTALS	
				TOTAL QUANTITY	TOTAL COST
202-00055	REMOVAL OF FIBER OPTIC CABLE	LF	\$1	5390	\$2,965
202-00200	REMOVAL OF SIDEWALK	SY	\$66	20	\$1,316
203-01597	POTHOLING	HOURL	\$155	100	\$15,500
208-00002	EROSION LOG TYPE 1 (12 INCH)	LF	\$32	600	\$19,059
208-00035	AGGREGATE BAG	LF	\$94	120	\$11,339
208-00045	CONCRETE WASHOUT STRUCTURE	EACH	\$740	1	\$740
208-00051	STORM DRAIN INLET PROTECTION (TYPE I)	LF	\$205	30	\$6,150
208-00052	STORM DRAIN INLET PROTECTION (TYPE II)	LF	\$188	30	\$5,630
208-00103	REMOVAL AND DISPOSAL OF SEDIMENT (LABOR)	HOURL	\$86	20	\$1,711
208-00105	REMOVAL AND DISPOSAL OF SEDIMENT (EQUIPMENT)	HOURL	\$66	20	\$1,316
208-00106	SWEEPING (SEDIMENT REMOVAL)	HOURL	\$66	20	\$1,316
212-00032	SOIL CONDITIONING	ACRE	\$2,240	0.1	\$224
212-00700	ORGANIC FERTILIZER	LB	\$66	30	\$1,987
212-00701	COMPOST (MECHANICALLY APPLIED)	CY	\$74	7	\$516
212-00704	MYCORRHIZAE	LB	\$262	6	\$1,572
212-00708	SEEDING (NATIVE) BROADCAST	ACRE	\$12,442	0.1	\$1,244
212-01200	LANDSCAPE RESTORATION	LS	\$3,141	1	\$3,141
213-00003	MULCHING (WEED FREE)	ACRE	\$16,458	0.1	\$1,646
213-00061	MULCH TACKIFIER	LB	\$49	10	\$488
216-00101	SOIL RETENTION BLANKET (STRAW-COCONUT) (PHOTODEGRADABLE CLASS 1)	SY	\$15	100	\$1,510
607-11525	FENCE (PLASTIC)	LF	\$4	100	\$375
608-00006	CONCRETE SIDEWALK (6 INCH)	SY	\$145	20	\$2,900
612-00260	LOCATION MARKER (FIBER OPTIC) (DOME)	EACH	\$57	18	\$1,019
613-00206	2 INCH ELECTRICAL CONDUIT (BORED)	LF	\$9	16860	\$150,841
613-01200	2 INCH ELECTRICAL CONDUIT (PLASTIC)	LF	\$15	340	\$4,997
613-07023	PULL BOX (24"X36"X24")	EACH	\$1,053	13	\$13,688
613-07040	PULL BOX (30"X48"X24")	EACH	\$1,559	5	\$7,793
613-07195	PROOF CONDUIT	LF	\$1	7380	\$8,856
614-87015	BUFFER TUBE FAN OUT KIT	EACH	\$487	6	\$2,924
614-87024	FIBER OPTIC TERMINATION PANEL (24 FIBER)	EACH	\$1,228	2	\$2,455
614-87144	FIBER OPTIC TERMINATION PANEL (144 FIBER)	EACH	\$4,438	1	\$4,438
614-87350	TEST FIBER OPTIC CABLE	LS	\$3,875	1	\$3,875
614-87496	FIBER OPTIC CABLE (SINGLE MODE) (96 STRANDS)	LF	\$3	2270	\$7,298
614	FIBER OPTIC TERMINATION PANEL (48 FIBER)	EACH	\$1,975	2	\$3,950
614	ETHERNET SWITCH (INSTALL ONLY)	EACH	\$662	5	\$3,310
614	12 PORT PRE-TERMINATED PATCH PANEL AND PIGTAIL	EACH	\$743	5	\$3,717
614	SPLICE ENCLOSURE	EACH	\$834	7	\$5,840
614	INDOOR/OUTDOOR FIBER OPTIC CABLE (SINGLE MODE) (24 STRANDS)	LF	\$3	4595	\$12,713
614	INDOOR/OUTDOOR FIBER OPTIC CABLE (SINGLE MODE) (144 STRANDS)	LF	\$10	665	\$6,685
614	FIBER OPTIC CABLE (SINGLE MODE) (432 STRANDS)	LF	\$5	10380	\$47,402

626-00000	MOBILIZATION	LS	\$850	1	\$850
630-00000	FLAGGING	HOUR	\$71	20	\$1,412
630-00007	TRAFFIC CONTROL INSPECTION	DAY	\$529	44	\$23,294
630-00012	TRAFFIC CONTROL MANAGEMENT	DAY	\$1,150	110	\$126,500
630-80341	CONSTRUCTION TRAFFIC SIGN (PANEL SIZE A)	EACH	\$47	56	\$2,635
630-80342	CONSTRUCTION TRAFFIC SIGN (PANEL SIZE B)	EACH	\$59	16	\$941
630-80350	VERTICAL PANEL	EACH	\$47	30	\$1,412
630-80358	ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL (C TYPE)	EACH	\$3,529	2	\$7,059
630-80363	DRUM CHANNELIZING DEVICE (WITH LIGHT) (FLASHING)	EACH	\$71	50	\$3,529
630-80380	TRAFFIC CONE	EACH	\$11	150	\$1,588
630-85020	MOBILE ATTENUATOR	EACH	\$2,353	2	\$4,706
	FORCE ACCOUNT				
	=====				
700-70010	F/A MINOR CONTRACT REVISIONS	FA	\$30,000	1	\$30,000
700-70016	F/A FUEL COST ADJUSTMENT	FA	\$1,000	1	\$1,000
700-70380	F/A EROSION CONTROL	FA	\$5,000	1	\$5,000
700-70589	F/A ENVIRONMENTAL HEALTH & SAFETY MANAGEMENT	FA	\$2,000	1	\$2,000
TOTAL					\$586,370



Exhibit C General Conditions

SECTION 1 SCOPE OF WORK

1.1. PLANS AND SPECIFICATIONS:

1.1.1. The Contractor shall perform all items of Work covered and stipulated in the Specifications, Bid Schedule, Contract, General Conditions and Special Provisions, together with any authorized alterations, Extra Work and Change Orders, all in accordance with the Plans. The Contractor shall furnish, unless otherwise provided in the Specifications and/or Special Provisions, all materials, implements, machinery, equipment, tools, supplies, transportation and labor necessary to perform and complete the Work.

1.1.2. The Contractor shall be responsible for taking all steps reasonably necessary 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. **SPECIAL WORK:** Should any construction or conditions which are not thoroughly stipulated or set forth by the Specifications be anticipated on any proposed Project, Special Conditions for such Work may be prepared and attached hereto as **Exhibit F**, and shall be considered as part of the Specifications, the same as though contained fully therein. Should any Special Conditions conflict with the Specifications, the Special Conditions will govern.

1.3. CHANGES AND INCREASED OR DECREASED QUANTITIES OF WORK:

1.3.1. Without invalidating the Contract, the Project Manager and/or City reserves and shall have the right, without notice to any Sureties, by written Change Order, to make any changes, from time to time, to the character and quantity of the Work, including but not limited to, the Drawings, Specifications, Plans or Addenda, as

may be considered necessary or desirable to complete fully and acceptably the Work in a satisfactory manner. Such Change Order shall set forth with specificity the changed Work to be done and shall set forth any changes or extensions to the time of completion.

1.3.2. Increase in Cost and Required Approvals.

- i. Such Change Orders shall not increase the total cost of the Work, based on the original estimate of quantities and unit prices contained in the Bid Schedule, by more than 10% (ten percent) without the approval of the City of Littleton City Manager or authorized designee. Contractor shall be entitled to the cost of said increased units at the original price within the original bid, but not to an adjustment of unit price.
- ii. In the event said Change Order increases the total cost of the Contract based upon the unit price bid by more than 10% (ten percent), an equitable adjustment will be made and the Contract modified accordingly by a written Change Order, to be approved by the City of Littleton City Manager or authorized designee, and subject to City Council approval; provided, however, that except for claims based on errors in the Contract, no claim for change hereunder will be allowed for cost incurred more than twenty (20) days before the Contractor gives written notice as herein required; and in the case of errors in the Contract for which the City is responsible, the adjustment will be increased costs, reasonably incurred by the Contractor in attempting to comply with such errors in the Contract.
- iii. Any Change Order or other amendment that increases the total cost of the Contract to be equal to or greater than five hundred thousand and 00/100 dollars (\$500,000.00) shall require the approval of City Council.
- iv. In case a satisfactory adjustment in price cannot be reached for any item requiring a written Change Order, the City reserves the right to terminate the Contract as to said item as it applies to the terms in question and make such arrangements as may be deemed necessary to complete the Work.
- v. The Contractor shall require subcontractors to certify to the best of their knowledge and belief that the cost and pricing data submitted are accurate, complete, and current as of the date of execution, which date shall be as close as possible to the date of agreement on the negotiated price of the Change Order.
- vi. The Contractor shall not start Work on any alteration until the agreement, whether by Change Order or more formal amendment, setting forth the adjusted prices has been executed by the City and the Contractor, subject to all requirements of Title 1, Chapter 15 of the City of Littleton Code and the City's procurement policy. All changes or approvals for increasing the

Work as required and authorized herein, shall be in written form and approved and signed by the City prior to the Work being done. All such writings and approvals shall be specific as to the nature of the Work and the quantities involved. Any Work performed without prior written approval of the City shall not be binding on the City.

1.3.3. *Field Order for Minor Changes.* The Project Manager ("Project Manager") may at any time, by issuing a Field Order, order minor changes in the Work not involving an increase or decrease in the Contract amount and not involving a change in the time for completion. If the Contractor believes that any order for minor changes in the Work involves changes in the Contract amount or time for completion, the Contractor shall not proceed with the minor changes so ordered and shall within seven (7) days of the receipt of such order notify the Project Manager in writing of the estimate of the changes in the amount and time for completion. Such estimate shall thereafter be treated as a Change Order Request.

1.3.4. *Equitable Adjustment.*

- i. If the Contractor intends to assert a claim for an equitable adjustment under this Section, the Contractor shall, within 30 (thirty) days after receipt of a written Change Order or the furnishing of a written notice of requested changes by the Project Manager, submit to the Project Manager a written statement setting forth the general nature and monetary extent of such claim. No claim by the Contractor for an equitable adjustment hereunder will be allowed unless asserted as described above.
- ii. In the event the Contractor and the City are unable to agree upon the Contractor's entitlement to an equitable adjustment or upon the amount thereof, or in the event that it is in the best interest of the City to have the Work proceed pending negotiation of amount of an equitable adjustment, the City may direct the Contractor to perform the Work in accordance with the Change Order, direction, instruction, interpretation, or determination, with any Work price adjustments and progress payments for the Work to be determined on a Force Account basis in accordance with Section 7.6 of the General Conditions. The Contractor shall continue diligently to perform the Work in accordance with the City's order, direction, instruction, interpretation, or determination during negotiations with respect to the Contractor's entitlement to an equitable adjustment hereunder or to the amount of any Work price adjustment hereunder or to the amount or any Work price adjustment or time extension. The Contractor and the City may agree on certain aspects of an equitable adjustment and take those aspects out of operation of Force Account provisions.

1.3.5. *Payments for Change Orders.*

- i. Payment will not be made for Work or materials which are required under the Contract Documents and which are not specifically mentioned, indicated

or otherwise provided for in the Bid Schedule, if, in the opinion of the Project Manager, the Work or materials are susceptible of classification under or reasonably inferred to be included. in the Bid Schedule.

- ii. In the event the Contractor is ordered to perform Work under this Section for which payments are not determined hereunder, which in the opinion of the City it is impracticable to have performed by the Contractor's own employees, the Contractor will, subject to the written approval of the Project Manager, be paid the actual cost of such Work and, in addition thereto, an amount of 10% (ten percent) of the actual costs to cover the Contractor's superintendence, administration and other overhead expenses. The terms and conditions of any subcontract which the Contractor may propose to enter into in connection with Work under the provisions of this Section, shall be subject to the written approval of the City before such subcontract is executed.
- iii. In cases other than those described above, the City and the Contractor (on its own behalf and on behalf of its subcontractors) shall endeavor to negotiate a reasonable price and line adjustment in a Change Order on terms appropriate to the changed Work. The Contractor will be required to submit a sufficiently detailed price bid supported with sufficient documentation so that the City can determine that (1) the bid reflects all impacts on the Work from Work additions, deletions and modifications shown in the Change Order; (2) the proposed prices are set out in such a way that their reasonableness can be evaluated against prices based on adequate price competition, unit prices, established catalog or market prices of commercial items sold in substantial quantities to the general public, prices set by law or regulation, recognized published price lists and indices, independently developed cost estimate and other appropriate price comparisons; and (3) cost-increase provisions relating to Work changes are complied with, including but not limited to City of Littleton City Manager or City Council approvals. If any prices or other aspects are conditional, such as on firm orders being made by a certain date or the occurrence or non-occurrence of an event, the Contractor shall identify these aspects in the Change Order Request. A negotiated Change Order shall set forth prices, scheduling requirements, time extensions and all costs of any nature arising out of the issuance of a Change Order except for those cost and time aspects explicitly reserved on the face of the Change Order.

- 1.3.6. *Claims for Concealed or Unknown Conditions.* If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents; or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing Party shall be given to the other Party promptly before conditions

are disturbed and in no event later than seven (7) days after first observance of the conditions. Site conditions which an experienced and prudent contractor could have anticipated by visiting the site, familiarizing themselves with the local conditions under which the work is to be performed and correlating observations with the requirements of the Contract Documents, shall not be considered as claims for concealed or unknown conditions, nor shall the locations of utilities which differ from locations provided by the utility companies. The Project Manager will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or the required time for, performance of any part of the Work, will recommend an equitable adjustment in the cost and/or time. If the Project Manager determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Project Manager shall so notify the Contractor in writing, stating the reasons. Claims by either Party in opposition to such determination must be made within twenty-one (21) days after the Project Manager has given notice of the decision. If the City and Contractor cannot agree on an adjustment in the cost and/or time, the adjustment shall be subject to further proceedings pursuant to Section 1.3.4 and Section 1.3.9 of the General Conditions, which shall apply to claims by either Party, notwithstanding language in said Sections that they apply only to claims brought by the Contractor.

- 1.3.7. *Inspection, Recordkeeping.* For any Change Orders, the Contractor shall maintain, and the City or the City's representatives shall have the right to examine books, records, documents and other evidence and accounting principles and practices sufficient to reflect properly all direct and indirect costs of whatever nature claimed to have been incurred and anticipated to be incurred for the performance of the Contract changes. At the request of the City, the Contractor shall submit any documents reasonably necessary to permit adequate evaluation of the cost or pricing data submitted including, but not limited to, computations, projections, price competition, catalog and market prices, etc. If inadequate or incomplete documentation is submitted, the City may refuse to complete negotiation until such a time that satisfactory documentation is submitted. The requirements of Section are in addition to other audit, inspection and record keeping provisions elsewhere in the Contract Documents.
- 1.3.8. Changes involving aggregate increases and decreases in excess of one hundred thousand dollars and 00/100 (\$100,000.00) shall be subject to the following:
 - a. A change, defined for the purposes of this Section, involves aggregate increases and decreases in excess of one hundred thousand dollars and 00/100 (\$100,000.00) if the total value of Work affected, without regard to any increases or decreases, exceeds this amount. For example, a Change Order adding Work in the amount of seventy-five thousand dollars and 00/100 (\$75,000.00) and reducing Work in the amount of fifty-thousand dollars and 00/100 (\$50,000.00) will be considered to involve aggregate increases and decreases of \$125,000.00.

b. Pricing shall be reduced accordingly, and the Contract shall be modified in writing accordingly to reflect such reduction, if any price (including profit and fee) negotiated in connection with any price adjustment was increased by any significant sums because:

(1) The Contractor furnished cost or pricing data which were not complete, accurate, or current as certified in the Contractor's pricing data; or

(2) Adjustments or any subcontract provisions therein required, furnished costs or pricing data which were not complete, accurate, and current as certified in the subcontractor's pricing data.

Any reduction in the Contract price due to defective subcontractor data of a prospective subcontractor, when the subcontract was not subsequently awarded to such subcontractor, will be limited to the amount (plus applicable overhead and profit markup) by which the actual subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor, provided the actual subcontract price was not affected by defective cost or pricing data; or the Contractor shall require subcontractors to certify to the best of their knowledge and belief that the cost and pricing data submitted are accurate, complete, and current as of the date of execution, which date shall be as close as possible to the date of agreement on the negotiated price of the Change Order.

1.3.9. In case a satisfactory adjustment in price cannot be reached for any item requiring a Change Order, the City reserves the right to terminate the Contract as to said item as it applies to the terms in question and make such arrangements as may be deemed necessary to complete the Work.

1.4. **OMITTED ITEMS:** The Project Manager may, in writing, order omitted from the Work any item other than Major Items, which are found by the Project Manager or City to be unnecessary to the Project and such omission shall not be a waiver of any condition of the Contract nor invalidate any of the provisions thereof. Major Items may be omitted by amendments to the Contract. The Contractor will be paid for all Work performed toward the completion of the item prior to such omission as provided in Section 7.5 of the General Conditions.

1.5. **EXTRA WORK:**

1.5.1. When additional Work is necessary for the proper completion of the Project for which no quantities or prices were given in the Contract, the same shall be called "Extra Work" and shall be performed by the Contractor when so directed in writing by the Project Manager. Extra Work shall be performed by the Contractor in accordance with these Specifications in a skillful and workmanlike manner and as

may be directed by the Project Manager.

1.5.2. Prices for Extra Work shall be itemized and covered by a Change Order. Pricing shall be submitted by the Contractor and approved by the City prior to the actual starting of such Work, in accordance with Section 1.3 of the General Conditions. Should the Parties be unable to agree on unit prices for the Extra Work or if this method of pricing is impractical, the Project Manager may instruct the Contractor to proceed with the Work by day labor or Force Account as hereinafter provided in Section 7.6. of the General Conditions. Claims for Extra Work not authorized in writing by the Project Manager prior to the Work being performed will be rejected and the Contractor shall not be compensated for.

1.5.3. Extra Work shall not include materials, labor or equipment which is incidental or appurtenant to the Work indicated on the drawings and in the Specifications. Such Work shall be completed and paid for as part of the Work to which it is appurtenant.

1.6. **UNAUTHORIZED WORK:** Work performed beyond the lines and grades shown on the Contract drawings, approved Work and Shop Drawings and Extra Work done without written authorization will be considered unauthorized work and the Contractor will receive no compensation therefore. If required by the City, unauthorized work shall be remedied, removed or replaced by the Contractor at the Contractor's expense. Upon failure of the Contractor to remedy, remove or replace unauthorized Work, the City may take action as provided in Section 2.11 of the General Conditions.

1.7. **MAINTENANCE AND CONTROL OF TRAFFIC:**

1.7.1. Unless the Contract specifically provides for the closing to traffic of any local road or highway while construction is in progress, such road or highway shall be kept open to all traffic by the Contractor. The Contractor shall also provide and maintain in a safe condition temporary approaches, crossings or intersections with roads and highways.

1.7.2. The Contractor will provide their own traffic control, including flagging, traffic control supervisor, and traffic control devices for the duration of the Project per the most current edition of the Manual on Uniform Traffic Control Devices ("MUTCD"). Traffic control plans will be required for City review and approval prior to commencement on Work.

1.7.3. The Contractor shall bear all expense of maintaining traffic over the section of road affected by the Work to be done under this Contract, and of constructing and maintaining such approaches, crossings, intersections and any accessory features without direct compensation, except as otherwise provided.

1.8. **REMOVAL AND DISPOSAL OF STRUCTURES AND OBSTRUCTIONS:** All structures or obstructions found on the site and shown on the Plans which are not to remain in place or which are not to be used in the new construction shall be removed as

directed by the Project Manager. Unless specified in the Contract, this Work will not be paid for separately but will be included in the price bid for that portion of the Work requiring the removal of the obstruction. All material found on the site or removed therefrom shall become the property of the Contractor unless otherwise indicated. Materials determined by the Project Manager to be unsuitable for backfill shall be disposed of off the site at the Contractor's expense.

1.9. USE OF MATERIALS FOUND ON THE WORK:

- 1.9.1. The Contractor, with the approval of the Project Manager, may use in the proposed construction, any stone, sand, or gravel found on the site. The Contractor will not be paid for such excavation unless specifically stated in the Contract, and the Contractor shall replace with other suitable material, without compensation, all of that portion of the material so removed and used as was contemplated for use in the embankments or otherwise. If it was intended that any or all of the material so excavated and used was to have been wasted, then the Contractor will not be required to replace it. The Contractor shall not excavate any material from the site which is not within the excavation as indicated by the slope and grade lines, without being authorized in writing by the Project Manager.
- 1.9.2. Specific job mix designs conforming to specifications for any Work shall be submitted for Project Manager approval within 10 (ten) days of the Notice to Proceed, or a minimum of seven (7) days prior to use of the material. This material approval applies to asphaltic concrete paving materials, concrete, aggregate base course, and fine grading material.

1.10. FINAL CLEAN UP:

- 1.10.1. During the Project's final cleanup, the Contractor shall remove from the site(s) all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. The streets and adjacent properties in the Project shall be repaired to as good or better condition than existed prior to construction. This shall include removal of all dirt or mud from streets and lawns. No extra payment shall be made for these items. The Contractor shall leave the site(s) in a neat and presentable condition.
- 1.10.2. The Contractor shall provide written notification to the Project Manager that the Work is complete and the site is ready for final inspection. If the Project Manager determines that the Work is not complete, they will immediately notify the Contractor in writing stating the reasons. If the Project Manager determines the Work is complete, the City will inspect the Work within seven (7) r days and prepare a final cleanup list. When the final cleanup list is completed by the Contractor and inspected by the Project Manager, the Project Manager will initiate the acceptance and final payment procedures as set forth in Section 7.9 of the General Conditions. The final cleanup shall be completed before the expiration of the Contract's term as set forth in the Contract Documents.

1.11. **DELAYS:** No payment, compensation, damages, or adjustment of any kind, other than extension of time if received in writing from the City shall be made to, or claimed by, the Contractor because of hindrances or delays from any cause in the commencement, prosecution, or completion of the Work, whether caused by the City or any other party and whether avoidable or unavoidable other than as set forth in a Change Order described fully above.

SECTION 2 CONTROL OF THE WORK

2.1. **AUTHORITY OF PROJECT MANAGER:** The Project Manager shall decide any and all questions which may arise as to the quality and acceptability of the materials furnished, the Work performed, the manner of performance and the rate of progress of the Work. The Project Manager shall decide all questions which may arise as to the interpretation of the Plans and Specifications, all questions as to acceptable fulfillment of the Contract, all disputes and mutual rights by the contractors if there be more than one contractor on the Work, and all questions as to compensation. The decision of the Project Manager shall be final and shall have executive authority to make effective such decisions and to enforce the Contractor to carry out all orders promptly.

2.2. **PLANS AND SHOP DRAWINGS:**

This Section 2.2 shall be included in all subcontracts hereunder at all times.

2.2.1. The Contractor shall bring discrepancies between different Plans, or between Plans and Specifications, or regulations and codes covering the Work to the attention of the Project Manager in writing. In the event such discrepancies exist and the Project Manager is not so notified, the Project Manager shall reserve the right to exercise sole arbitration authority. It is mutually agreed that all authorized alterations affecting the requirements and information given on the approved Plans shall be in writing and approved by the Project Manager.

2.2.2. The Plans will be supplemented by Shop Drawings as necessary to adequately control the Work or as specified. Shop Drawings are not part of the Contract Documents. Shop Drawings may consist of drawings, diagrams, illustrations, schedules, calculations, and other data prepared by the Contractor, subcontractor, manufacturer, supplier, or distributor, which illustrate how specific portions of the Work shall be fabricated and/or installed in accordance with the Plans and Specifications. Any Work performed prior to the City's approval of Shop Drawings will be at the Contractor's risk and expense.

2.2.3. The Project Manager may request additional details and require the Contractor to make changes in the design which are necessary to conform to the provisions and intent of these Specifications without additional cost to the City.

- 2.2.4. Approval of the Shop Drawings by the Project Manager shall not be construed as a complete check and verification but will indicate that general conformance with the design concept and general compliance with the information given in the Contract has been achieved. Any information or action to be taken as set forth in the Shop Drawings is subject to the requirements of the Plans and Specifications. The Contractor shall be responsible for all dimensions and quantities shown on the Shop Drawings. The Project Manager shall be notified in writing and shall take appropriate action for any information in the Shop Drawings that deviates from the requirements of the Contract Documents.
- 2.2.5. Approval by the Project Manager of the Contractor's Shop Drawings shall not relieve the Contractor of its obligation to meet all requirements of the Plans and Specifications and shall not relieve the Contractor of its responsibility for the correctness of the Shop Drawings.
- 2.2.6. Five (5) sets of Shop Drawings shall be submitted to the Project Manager either in hard copy format or electronic format. No faxed copies will be accepted. After inspection, two sets will be returned to the Contractor; one for the Contractor's use and the other for the fabricator or supplier's use. Shop Drawings being returned will be stamped to indicate the following:
- i) Shop Drawings approved for use in construction will have one of the following statements checked: Approved; No Exception Taken; or Approved as Noted; or
 - ii) Shop Drawings to be corrected or redrawn and resubmitted for approval will have one of the following statements checked: Revise as Noted; Resubmit; or Rejected.

If Shop Drawings are returned for correction, corrections shall be made and the corrected drawings shall be resubmitted by the Contractor in the same manner as the first submittal. The time required for approval of each submittal will not exceed four (4) weeks after Shop Drawings are received by the Project Manager.

It is the intent that no more than two submittals will be required. If, however, additional submittals are required by actions of the Contractor, the additional time for Shop Drawing approval will be borne by the Contractor. If additional submittals are required, or if Shop Drawing approval is delayed by actions of the Project Manager, and if the Contractor's controlling operations are delayed or interfered with by reason of the delay in Shop Drawing reviews, an extension of time commensurate with the delay in completion of the Work thus caused will be granted as provided herein.

Specifications for the Shop Drawings:

- i) Electronic Shop Drawings and work drawings are preferred.
- ii) All manually-drafted Shop Drawings shall be 34 inches long and 22 inches wide overall. There shall be a two-inch margin on the left side of the sheet and one-half inch margin on the other three sides. A

blank space, six inches by three inches, shall be left near the lower right-hand corner for an approval stamp. Computer drafted 11-inch by 17-inch drawings may be submitted.

- a. Where design notes or catalogue cuts are required, they may be submitted on 8 1/2 inch by 11-inch sheets in lieu of the size mentioned above.
- ii) There shall be a title block in the lower right-hand corner of each sheet. The title block shall show the City's name, structure number, the location of the structure, and the contents of the sheet.
- iii) The Contract price will include the cost of furnishing all Shop Drawings. Shop Drawings and working drawings submitted to the Project Manager by the Contractor, subcontractor or any lower tier subcontractor pursuant to the Work, may be duplicated by the City and the City may use and disclose in any manner and for any purpose such Shop Drawings and working drawings delivered under this Contract.

2.3. OPERATING MANUALS AND PARTS LISTS: The Contractor shall submit four (4) complete operating manuals and parts lists to the Project Manager for all items of mechanical and electrical equipment incorporated into the Work.

2.4. AS-BUILT DRAWINGS: The Contractor shall maintain a set of drawings at the site, with all changes or deviations from the original drawings neatly marked thereon in brightly contrasting color. This shall be a separate set of drawings, not used for construction purposes, which shall be kept up-to-date as the job progresses and shall be made available for inspection by the Project Manager at all times. Upon completion of the Contract, this set of drawings shall be delivered to the Project Manager.

2.5. CONFORMITY WITH PLANS AND ALLOWABLE DEVIATIONS: Finished surfaces shall conform with lines, grades, cross sections and dimensions shown on the approved Plans. Any deviation from the approved Plans and working drawings, as may be required by the demands of construction, will in all cases be determined by the Project Manager and authorized in writing.

2.6. COORDINATION OF SPECIFICATIONS, PLANS AND SPECIAL PROVISIONS: The Specifications, Plans, Special Provisions, and all supplementary Plans and documents are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be cooperative to describe and provide for a complete Work. In case of discrepancy, figured dimensions, unless obviously incorrect, shall govern over scaled dimensions. Plans shall govern over Specifications and Special Provisions shall govern over both Plans and Specifications. The Contractor shall not use to its advantage any apparent error or omission in the Plans or Specifications. In the event the Contractor discovers any apparent error or discrepancy, the Contractor shall immediately request the Project Manager's interpretation and decision, and such decision shall be final. In the event contradiction and/or conflicts occur

in the Specifications not otherwise covered by Special Provisions, the Specifications deemed by the Project Manager to be most restrictive shall govern.

2.7. **CONSTRUCTION SURVEYING:** The Contractor will furnish and set all construction stakes. The Project Manager will review the stakes. The Contractor shall be held responsible for the proper preservation of all marks and stakes. If, in the opinion of the Project Manager, any marks or stakes have been willfully or carelessly disturbed or destroyed by the Contractor, its employees, or subcontractors, the cost of replacing them will be charged against the Contractor and be deducted from the final payment.

2.8. **RIGHT OF ENTRY:** At all times, the City shall have the right to enter and inspect the Project premises.

2.9. **AUTHORITY AND DUTIES OF INSPECTORS:**

2.9.1. All Work shall be subject to inspection and testing by the City at all reasonable times and at all places prior to acceptance. Inspectors, employed by the City, are authorized to inspect all Work done and all material furnished. Such inspection may extend to all of any part of the Work and to the preparation, fabrication, or manufacture of the materials to be used. The Inspector is not authorized to revoke, alter, or waive any requirements of the Plans and Specifications. The Inspector is authorized to call to the attention of the Contractor any failure of the Work or materials to conform to the Specifications and Contract Documents.

2.9.2. The Inspector shall have the authority to reject materials or suspend the Work until any question at issue can be referred to and decided by the Project Manager. If the Contractor refuses to suspend operations on verbal order, the Inspector shall issue a written order giving the reason for shutting down the Work. Work performed during the absence of the Inspector will not be accepted nor paid for by the City.

2.9.3. Inspections by the City or others shall not relieve the Contractor from its obligations to perform the Work in accordance with the requirements of the Contract Documents and to also inspect its own Work.

2.9.4. Any plan of action, method of work or construction procedure suggested to the Contractor by the City or City contractors, whether orally or in writing, if adopted or followed by the Contractor in whole or in part, shall be at the sole risk and responsibility of the Contractor.

2.9.5. The Inspector shall neither act as foreman or perform other duties for the Contractor nor interfere with the management of the Work by the Contractor. Any advice which the Inspector may give the Contractor shall, in no way, be construed as binding to the Project Manager in any way or releasing the Contractor from fulfilling any of the terms of the Contract.

2.10. **INSPECTION:**

- 2.10.1. Until final payment, all parts of the work may be subject to inspection and testing by the City. The Contractor shall furnish, at its own expense, all reasonable access, assistance, and facilities required by the City for such inspection and testing. The Contractor shall furnish the Project Manager with every reasonable facility for ascertaining whether the Work performed and materials used are in accordance with the requirements and intent of the Specifications and Contract. In the event of night Work, the Contractor shall furnish proper lighting to adequately perform and inspect the Work being performed.
- 2.10.2. Upon request from the Project Manager, the Contractor shall, at any time before acceptance of the Work, remove or uncover such portion of the finished Work as may be directed. After examination, the Contractor may restore said portions of the Work to the standard required by the Specifications. Should the Work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the coverage or making good of the parts removed, may be paid for as Extra Work; but should the Work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed, shall be at the Contractor's expense. Any Work performed or materials used by the Contractor without suitable supervision or inspection by the City shall be ordered removed and replaced at the Contractor's expense.
- 2.10.3. If the Contractor does not promptly replace rejected material or correct rejected workmanship, the City may (a) by separate Contract or otherwise, replace such material or correct such workmanship and charge the cost thereof to the Contractor; or (b) terminate the Contractor's right to proceed in accordance with this Agreement pursuant to Section 4.10 of the General Conditions. Such inspection and test is for the sole benefit of the City and shall not relieve Contractor of the responsibility of providing quality control measures to assure that the Work strictly complies with the Contract. No inspection or test by the City shall be construed as constituting or implying acceptance. Inspection or test shall neither relieve Contractor of responsibility for damage to or loss of the material prior to acceptance, nor in any way affect the continuing rights of the City after acceptance of the completed Work.
- 2.10.4. Any Work outside the normal five (5) day, forty (40) hour week will require the Project Manager or Inspector on the job. All inspection so required shall be done at the Contractor's expense and the cost thereof may be deducted from the final payment. Overtime inspection may be conducted by the City at the Contractor's expense at one hundred dollars and 00/100 (\$100.00) per hour. The payment by the Contractor of overtime inspection fees shall not relieve the Contractor from the liquidated damages provisions as specified in Section 4.8 of the General Conditions.

2.11. REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK:

2.11.1. All Work which has been rejected or condemned by the City shall be repaired, or if it cannot be satisfactorily repaired, be removed and replaced at the Contractor's expense. At the Project Manager's discretion, the following unauthorized work shall neither be measured nor paid for by the City, and may need to be removed at the Contractor's sole expense:

- i. Work performed beyond the lines and grades shown on the Plans, or as given, except as herein provided; or
- ii. Work performed without giving timely notice to the Project Manager so the Project Manager may elect to be present to observe the Work in progress; or
- iii. Any Extra Work or unclassified Work performed without prior City written authority and price agreement.

2.11.2. If directed by the City, should the Contractor fail to satisfactorily repair or remove and replace rejected, unauthorized, or condemned Work immediately after receiving formal notice from the Project Manager, the City may, at its sole discretion, recover for such defective Work on the Contractor's Bond or by action in a court having proper jurisdiction over such matters, or the City may employ labor and equipment and satisfactorily repair or remove and replace such Work and charge the cost of the same to the Contractor, which cost will be deducted from any payments due to the Contractor.

2.12. SUPERVISION AND SUPERINTENDENCE:

2.12.1. The Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. The Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. The Contractor shall be responsible to see that the completed work complies with the Contract Documents.

2.12.2. The Contractor shall designate and keep on any work site at all times during its progress, a competent superintendent who shall not be replaced without prior written notice to the Project Manager. The Contractor shall provide contact information for the superintendent who may be reached twenty-four (24) hours per day. The superintendent will be the Contractor's representative at the site and shall have authority to act on behalf of the Contractor. All communications given to the superintendent shall be as binding as if given to the Contractor. During periods when the Work is suspended, the Contractor shall make appropriate arrangements for any emergency work which may be required.

2.12.3. Whenever the superintendent is not present on any particular part of the Work where the Project Manager may desire to inform the Contractor relative to interpretation of the Plans and Specifications or to disapprove or reject materials or Work performed, the Project Manager may so inform the foreman or other

worker in charge of the particular part of the Work in reference to which the information is given. Information so given shall be as binding as if given to the superintendent.

- 2.12.4. The Contractor will be supplied with four (4) copies of the Plans, and three (3) copies of the Specifications and Special Provisions. The Contractor shall have available on the work site at all times one copy each of said Plans, Specifications and Special Provisions, exclusive of the set designated for as-built drawings in Section 2.4 of the General Conditions. Additional copies of Plans, Specifications and Special Provisions can be obtained by the Contractor at the cost of reproduction.

SECTION 3 CONTROL OF MATERIAL

3.1. MATERIAL:

- 3.1.1. Unless otherwise indicated in this Contract, equipment, material and products incorporated in the Work covered by this Contract, shall be new and of the grade specified for the purpose intended. Unless otherwise specifically indicated, reference to equipment, material, product, or patented process by trade names, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition, and the Contractor may, with permission from the Project Manager, use any equipment, material, article, or process which is equivalent to that named, subject to the requirements of this Section.
- 3.1.2. Within the scope of their authority, the Project Manager shall be the sole judge of the quality and suitability of proposed alternative equipment, material, article or process. The burden of proving the quality and suitability of the alternative shall be upon the Contractor. Information required by the Project Manager in judging an alternative shall be supplied by the Contractor at the Contractor's expense.

3.2. APPROVAL AND ACCEPTANCE OF MATERIALS:

- 3.2.1. Samples of all materials to be tested may be taken by the Project Manager or their authorized representative at the discretion of the Project Manager. Materials may be sampled either prior to shipment or after being received at the work site. All sampling, inspection, and testing shall be done in accordance with the Specifications contained in the Contract Documents.
- 3.2.2. The Contractor shall provide such facilities as the City may require for conducting field tests and for collecting and forwarding samples. The Contractor shall not use or incorporate into the Work any materials represented by the samples until tests have been approved by the City. Any material, which after approval, has for any reason become unfit for use, shall not be incorporated into the Work.

3.2.3. Tests or approvals by the Project Manager or others shall not relieve the Contractor from its obligations to perform the Work in accordance with the requirements of the Contract Documents.

3.3. CITED SPECIFICATIONS; SAMPLES AND TESTS:

3.3.1. Except as otherwise provided, sampling and testing of all materials, and the laboratory sampling and testing of equipment required under these Specifications, shall be in accordance with the current edition of the American Society for Testing Materials ("ASTM") publication of standards, adopted and in effect on the date of the City's solicitation for bids.

3.3.2. When designated, sampling and testing of materials shall be in accordance with the current edition of the American Standards Association ("ASA") Specifications; the current edition of The American Association of State Highway and Transportation Officials ("AASHTO") publication Standard Specification for Highway Materials and Methods of Sampling and Testing; the current edition of the American Water Works Association Specifications; the current edition of the Federal Specifications or the current edition of MIL Specifications adopted and in effect on the date of City's solicitation for bids.

3.3.3. The testing of all samples and materials shall be made at the expense of the City, when specified herein as by the City, unless the tests reveal nonconformance in which case said costs shall be reimbursed by the Contractor to the City. The Contractor shall furnish the required samples without charge to the City. The Contractor shall give sufficient notification of the placing of orders for materials in order to permit the Project Manager to arrange for appropriate testing.

3.4. **STORAGE:** Materials shall be stored to insure the preservation of their quality and fitness for the Work. When necessary, they shall be placed on wooden platforms, or other hard, clean surfaces and not on the ground and shall be placed under cover when directed. Stored materials shall be located to facilitate prompt inspection.

3.5. **SUBSTITUTION OF MATERIALS AFTER AWARD OF CONTRACT:** Substitution of equipment and materials of makes and types other than those specified and/or those approved in advance by the Project Manager will be considered for approval only as hereafter provided:

- i. Proposed substitutes shall be equal or superior to items specified or previously approved.
- ii. The Contractor shall submit any requests on its letterhead in duplicate within two (2) weeks after the date of Contract execution. The request for substitutions shall include a complete written list submitted at one time and must be accompanied by a statement outlining reasons for each requested substitution. The request shall include catalog number, technical data, cuts diagrams and such other descriptive data or samples as may be required,

and a detailed statement listing all significant details in which each item requested for approval differs from the item specified. Such listing or the failure to list such information shall not relieve the Contractor from providing properly functioning and/or fitting materials, regardless of the approval action taken by the Project Manager. If so requested by the Project Manager, the Contractor shall submit samples of both the specified material or equipment and the proposed substitute. In case of a difference in price, the City shall receive all benefits of the difference for any substitutions, and the Contract amount shall be altered by Change Order to credit the City with any savings so obtained.

3.6. DEFECTIVE MATERIALS: All materials not conforming to the requirements of the Specifications shall be considered defective. Whether in place or not, such material shall be removed immediately from the work site, unless otherwise permitted by the Project Manager. No rejected material, the defects of which have been subsequently corrected, shall be used without prior approval from the Project Manager. Upon failure of the Contractor to comply promptly with any order the Project Manager made under the provisions of this Section, the City shall have authority to remove defective materials and to deduct the cost of removal and replacement with specified materials from any moneys due or to become due to the Contractor, or said costs of removal and replacement may be recovered in any action by the City against the Contractor's Bond.

3.7. PROPERTY RIGHTS IN MATERIALS: The Contractor shall have no property right in materials after they have been attached, affixed or incorporated in the Work or the soil, or after payment has been made by the City to the Contractor for materials delivered to the work site or stored subject to or under the control of the City.

3.8. DAMAGE TO THE WORK AND RESPONSIBILITY FOR MATERIALS:

3.8.1. The Contractor shall be responsible for materials delivered and Work performed until completion and Final Acceptance of the entire construction thereof.

3.8.2. The Contractor shall bear the risk of injury, loss or damage to any and all parts of the Work for whatever cause, whether arising from the execution or from the non-execution of Work. The Contractor shall rebuild, repair or restore Work and materials which have been damaged or destroyed from any causes before completion and acceptance of the Work and shall bear the expense thereof. The Contractor shall provide security and drainage and erect temporary structures as necessary to protect the Work and materials from damage.

3.8.3. The Contractor shall be responsible for materials not delivered to the work site for which any progress payment has been made to the same extent as if the materials were so delivered.

SECTION 4 PERFORMANCE AND PROGRESS

4.1. **SUBCONTRACTING OR ASSIGNMENT OF WORK:**

- 4.1.1. No contractual relationship will be recognized under the Contract other than the contractual relationship between the City and Contractor.
- 4.1.2. No portion of the Contract shall be subcontracted, assigned or otherwise disposed of except with the written consent of the City and Surety, which consent shall not be unreasonably withheld.
- 4.1.3. 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.

4.2. **COMMENCEMENT OF WORK:** The Contractor shall begin the Work within the prescribed amount of days set by the City in the written Notice to Proceed. The Contractor shall notify the Project Manager at least forty-eight (48) hours in advance of the time it intends to begin Work. Work shall be completed in the prescribed amount of days set by the City in the Contract Documents, including any Change Orders or amendment. The Contractor shall conduct Work in such a manner and with sufficient materials, equipment, and labor as is considered necessary to ensure its completion within the time limit set forth in the Contract. Should the prosecution of Work for any reason be discontinued by the Contractor, with the consent of the Project Manager, the Contractor shall notify the Project Manager at least forty-eight (48) hours in advance of resuming operations.

4.3. **LIMITATION OF OPERATIONS:** Each item of Work shall be performed to completion without delay and in no instance will the Contractor be permitted to transfer its force from uncompleted Work to new Work without the permission of the Project Manager. The Contractor shall not open up Work to the prejudice of Work already started.

4.4. **PROGRESS SCHEDULE:**

- 4.4.1. The Contractor shall prepare and submit to the Project Manager for approval five (5) days prior to the Preconstruction Conference, a practicable schedule, showing the order in which the Contractor proposes to carry on the Work, the date on which it will start the several salient features (including procurement of materials and equipment) and the contemplated dates for completing the same. The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of Work scheduled for completion at any time. The Contractor shall enter on the chart the actual progress at such intervals as directed by the Project Manager and shall immediately deliver three (3) copies thereof. If the Contractor fails to submit a progress schedule within the time herein prescribed, the Project Manager may withhold approval of progress payment estimates until such time as the Contractor submits the required progress schedule.

4.4.2. The Contractor shall perform the Work in accordance with the latest approved progress schedule. If the progress of items along the critical path is delayed, the Contractor shall revise its planning to include additional forces, equipment, shifts or hours as necessary to meet the time or times of completion specified in this Contract. Additional costs resulting therefrom will be borne by the Contractor. The Contractor shall make such changes when progress at any check period does not meet at least one of the following two tests:

- i. The percentage of dollar value of completed Work with respect to the total amount of the Contract is within 10% (ten percent) of the percentage of the Contract time elapsed; or
- ii. The percentage of dollar value of completed Work is within 10% (ten percent) of the dollar value which should have been performed according to the Contractor's network analysis previously approved by the Project Manager.

4.4.3. Failure of the Contractor to comply with the requirements under this Section will be grounds for determination that the Contractor is not performing the Work with such diligence as will ensure completion within the time of completion specified in this Contract. Upon such determination, the City may terminate the Contractor's right to proceed with the Work, or any separate part thereof, in accordance with the provisions contained herein. The City may extend the time periods reflected by Section 4.4.2 (i) or (ii) above, if it does not reasonably reflect upon the Contractor's prosecution of the Work.

4.5. CHARACTER OF WORKMEN AND EQUIPMENT:

4.5.1. The Contractor shall employ such superintendents, foremen, and workmen as are careful and competent, and the Project Manager may demand the dismissal of any person employed or subcontracted by the Contractor in, about, or upon the Work who misconduct themselves or act incompetently or negligently in the proper performance of their duties, or neglects or refuses to comply with the directions given. Such person or subcontractor shall not be employed again thereon without the written consent of the Project Manager. Should the Contractor continue to employ, or again employ such person or subcontractor, the Project Manager may withhold all payments which are or may become due, or the Project Manager may suspend the Work until such orders are complied with.

4.5.2. In the employment of labor, preference shall be given, other conditions being equal, to residents of the area wherein the Work is being performed, but no other preference (except as may be required by special labor provisions) or discrimination among citizens of the United States shall be made. No convict labor shall be employed.

4.5.3. The Contractor shall furnish such equipment as is considered necessary for the prosecution of the Work in an acceptable manner and at a satisfactory rate of progress. All equipment, tools, and machinery used for handling materials and

executing any part of the Work shall be subject to the approval of the Project Manager and shall be maintained in a satisfactory working condition. Equipment used on any portion of the Work shall be such that no injury to the Work, roadways, adjacent property, or other objects will result from its use. The Contract may be terminated if the Contractor fails to provide adequate equipment for the Work.

4.6. **TEMPORARY SUSPENSION OF WORK:** The City shall have the right to suspend, delay or interrupt the Work wholly or in part for such period as he may determine to be appropriate because of the failure on the part of the Contractor to properly perform the Work in accordance with the Contract, to carry out orders, or to remove defective material or Work. The Contractor shall not suspend the Work without written order given by the Project Manager, and prior to resuming Work shall give the Project Manager forty-eight (48) hours' prior notice to afford opportunity to reestablish supervision.

4.7. **DETERMINATION AND EXTENSION OF CONTRACT TIME FOR COMPLETION:**

4.7.1. The Contractor shall perform fully, entirely, and in a satisfactory and acceptable manner the Work, within the number of days stipulated in the Contract. Time will be assessed against the Contractor beginning with the actual date the Work is started in accordance with the Notice to Proceed. If the Contractor does not begin the Work within the limit as designated in the Notice to Proceed, the days shall start on the first day after the expiration of the limit as stated in the Notice to Proceed.

4.7.2. In adjusting the Contract time for the completion of the Project, all strikes, lockouts, unanticipated delays in transportation or any condition over which the Contractor has no control, and any suspensions ordered by the City for causes not the fault of the Contractor, shall be excluded from the computation of the Contract time for completion of the Work and the City may extend the time for completion in such amount as the conditions justify. In order to secure an extension of time for delays beyond its control, the Contractor, shall within 10 (ten) days from the beginning of any such delay, notify the Project Manager in writing of the causes of delay, where upon the Project Manager shall ascertain the facts and the extent of the delay and extend the time for completing the Work when, in their judgment, the findings of fact justify such an extension, and their finding of fact thereon shall be final and conclusive. No allowances will be made for delays or suspensions of the performance of the Work which are in the control of the Contractor.

4.7.3. If the satisfactory execution and completion of the Contract shall require Work or materials in greater amounts or quantities than those set forth in the Contract, then the Contract time shall automatically be increased in the same proportion as the cost of the additional Work bears to the original Work contracted for.

4.8. **FAILURE TO COMPLETE WORK ON TIME:**

4.8.1. The City and Contractor agree and recognize that time is of the essence for every time period set forth in the Contract Documents and that the City will suffer financial loss if the Work is not substantially complete within the time set forth in the Contract Documents. If the Contractor fails to fully perform and complete the Work in conformity with the provisions and conditions of the Contract within the specified time limit for such performance and completion, or within such further time as, in accordance with the provision of this Contract, shall be fixed or allowed for such performance and completion, the City and Contractor agree that as liquidated damages, and not as a penalty, for the delay in performance, the Contractor shall pay to the City the amount stipulated below for each and every calendar day that expires after the time set forth in the Contract Documents until the same is finally complete and ready for final payment as provided herein.

Original Contract Amount	Amount of Liquidated Damages Per Day
Less than \$100,000	\$300.00
\$100,000 and less than \$500,000	\$600.00
\$500,000 and less than \$1,000,000	\$1,000.00
\$1,000,000 and over	\$1,500.00

4.8.2. The City shall recover inspection charges and damages by deducting the amount thereof out of any moneys which may be due or may become due to the Contractor, and/or by an action at law against the Contractor or its Surety. It is understood and agreed that aside from any other penalty or damage, all costs of the Project Manager and inspection on behalf of the City may be charged to the Contractor and be deducted from any estimate or payment otherwise due and payable.

4.8.3. If the Contractor fails to pay such liquidated damages promptly upon demand therefor, the Surety shall pay such damages. In addition, and at the City's option, the City may withhold all or any part of such liquidated damages from any payment due the Contractor.

4.9. **ADJUSTMENT FOR SUSPENDED WORK:**

4.9.1. In the event the Contractor is ordered by the City, in writing, to suspend Work for some unforeseen cause not provided for in the Contract, and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the job during the period of shutdown. No allowance will be made for lost profits. The period of shutdown shall be computed from the date set out in the written order for Work to cease until the date of the written order for Work to resume. Claims for such compensation shall be filed with the City within 10 (ten) days of the date of written order to resume Work, or such claims will not be

considered. The Contractor shall submit with its claim substantiating papers covering the entire amount shown on the claim. The City shall take the claim under consideration, and may make such investigations as are deemed necessary, and shall be the sole judge as to the equitability of such claim and such decision shall be final.

- 4.9.2. Notwithstanding any provisions of this Contract to the contrary, no provision of this Section shall be construed as entitling the Contractor to compensation for delays due to inclement weather, delays due to failure of the Surety, for suspensions made at the request of the Contractor, or for any other delay provided for in the Contract Documents, Specifications, Special Provisions, Bid Schedule, Contract, Change Order or Field Order.

4.10. TERMINATION OF CONTRACT FOR DEFAULT:

- 4.10.1. The occurrence of any one or more of the following shall constitute an "Event of Default" of the Contract, for which the City may, at the City's option, terminate the Contract upon written notice to the Contractor:

- i. The Contractor fails to start the Work on the date given in the Notice to Proceed, or the Contractor in any way abandons the Work;
- ii. The Contractor's progress is insufficient to complete the Work within the specified time;
- iii. The Contractor's willful or deliberate failure or violation to comply with any requirement of the Contract, including the Plans and Specifications and Special Provisions, or execution of Work by the Contractor in bad faith or otherwise not in accordance with its obligations;
- iv. The Contractor fails to maintain any required Bonds, licenses, permits, and/or insurance as required in the Contract;
- v. The Contractor fails to promptly repair, replace or remove any defects in materials or Work or any defects in materials or Work of any other nature, the correction of which has been directed in writing by the Project Manager;
- vi. Substantial evidence of the Contractor's collusion for the purpose of illegally procuring a Contract or perpetrating fraud in the construction of Work;
- vii. The Contractor files a voluntary petition in bankruptcy if a receiver is appointed for the Contractor or any of its property, or the insolvency of the Contractor;
- viii. The Contractor allows any final judgment against it unsatisfied for a period of 10 (ten) days or longer, and makes an assignment for the benefit of creditors;
- ix. The Contractor or any of its officers or employees are convicted, plead nolo contendere, enter into a formal agreement in which they admit guilt, enter a plea of guilty, or otherwise admit culpability to criminal offenses of bribery, kickbacks, collusive bidding, bid-rigging, anti-trust, fraud, undue influence, theft, extortion, or any offense of similar nature, in connection with the Contractor's business;
- x. Other just causes for termination as determined by the City.

4.10.2. The City shall provide the Contractor and Surety with written notice of the City's intent to terminate. The Contractor and/or Surety shall have 10 (ten) days from receipt of notice to cure any default or to provide to the City a detailed plan, in writing, of how the Contractor will cure the causes for termination listed within the written notice. If a satisfactory effort has not been made by the Contractor or its Surety to correct the default within the prescribed period in the notice, or, if in the judgment of the City, any submitted written plan does not ensure satisfactory performance of the Work, the City may declare the Contract terminated and notify the Contractor and its Surety accordingly. Upon receipt of notice from the City that the Contract has been terminated, the Contractor shall immediately discontinue all operations. The City may then proceed with the Work in any lawful manner that it elects until completion.

4.10.3. The City reserves the right to take possession of any machinery, implements, tools, or materials of any description that shall be found upon the Work, to account for said equipment and materials, and to use the same to complete the Project. When the Work is thus finally completed, the total cost of the same will be computed. If the total cost is more than the Contract price, the difference shall be paid to the City either by the Contractor or its Surety. In case of termination, all expenses incident to ascertaining and collecting losses under the Bond, including City project management and legal services, shall be assessed against the Bond.

4.11. **TERMINATION FOR CONVENIENCE OF THE 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.

4.12. **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.

4.13. **TERMINATING 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 Section 7 of the General Conditions. 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 6.4 the Bond shall remain in effect for three (3) years, and except with regard to the representation regarding patent infringement found in Section 6.4 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. The Contractor shall warrant its work to be free from faulty materials or workmanship for the period of two (2) years after Final Acceptance, and upon written notice, the Contractor shall remove any defect due thereto and pay for any damage due to other Work resulting there from which shall appear within the two-year period. Remedied Work shall carry the same warranty as the original Work starting with the date of acceptance of the replacement or repair. Payment to the Contractor will not relieve the Contractor of any obligation under this Contract.

SECTION 5 WARRANTY

5.1. SCOPE OF WARRANTY:

- 5.1.1. The Contractor warrants that the Work and all of its components shall be free from defects and flaws in design, workmanship, and materials; shall strictly conform to the requirements of this Contract; and shall be fit, sufficient and suitable for the purposes expressed in, or reasonably inferred from, this Contract. The warranty herein expressed shall be in addition to any other warranties expressed or implied by law, which are hereby reserved unto the City. In all emergencies the Contractor shall immediately remedy, repair, or replace, without cost to the City and to the entire satisfaction of the City, defects, damages or imperfections due to faulty materials or workmanship appearing in said Work within said period of not less than two (2) years from the date of Final Acceptance. Remedied Work shall carry the same warranty as the original Work starting with the date of acceptance of the replacement or repair. Payment to the Contractor will not relieve the Contractor of any obligation under this Contract.
- 5.1.2. The Contractor, at no additional expense to the City, shall also remedy damage to equipment, the site, or the buildings or the contents thereof which is the result of any failure or defect in the Work, and restore any Work damaged in fulfilling the requirements of the Contract. Should the Contractor fail to remedy any such failure or defect within a reasonable time after receipt of notice thereof, the City will have the right to replace, repair, or otherwise remedy such failure or defect at the Contractor's expense.

5.1.3. Subcontractors', manufacturers', and suppliers' warranties and guarantees, expressed or implied, respecting any part of the Work and any material used therein shall be deemed obtained and shall be enforced by the Contractor for the benefit of the City without the necessity of separate transfer or assignment thereof.

5.1.4. The rights and remedies of the City provided in this Section are in addition to and do not limit any rights and remedies afforded by the Contract or by law. The Contractor specifically waives all the provisions of Chapter 8 of Article 20 of Title 13, C.R.S. regarding defects in the Work under the Contract.

5.2. **CITY'S RIGHT TO CORRECT:** If, within five (5) business days after the City gives the Contractor notice of any defect, damage, flaw, unsuitability, nonconformity, or failure to meet warranty subject to correction by the Contractor, or if the Contractor neglects to make, or undertake with due diligence to make the necessary corrections, then the City shall be entitled to make, either with its own forces or with contract forces, the corrections and to recover from the Contractor all resulting costs, expenses, losses, or damages, including attorneys' fees and administrative expenses.

5.3. **WARRANTY PERIOD:** Except where longer periods of warranty are indicated for certain items, the Contractor warrants Work under the Contract to be free from faulty materials and workmanship for a period of not less than two (2) years from date of Final Acceptance, with one (1) of those years being covered by the Bond, as specified in this Contract. In cases of warranty work, which is not an emergency, all necessary repairs shall be made within a reasonable time not to exceed twenty (20) days after notice of the required repair is received by the Contractor. For those items of warranty work which cannot be completed within said twenty (20)-day period, the Parties shall negotiate a reasonable period of time.

SECTION 6 LEGAL RELATIONSHIP AND RESPONSIBILITY TO THE PUBLIC

6.1. **LAWS TO BE OBSERVED:** The Contractor shall at all times observe and comply with all Federal, State and local laws, codes, ordinances, and regulations, which pertain to and affect the conduct of the Work, and the Contractor and its Surety shall indemnify and save harmless the City and all its officers, agents, employees, or any of their heirs, successors or assigns against any claim, judgment, demand, costs, liability or expenses, including but not limited to attorney's fees and costs of suit arising from or based on the violation of any such law, ordinance, regulations, order, or decree, whether such claim, judgment, demand, costs, liability or expenses arises from actions by the Contractor, its employees, agents or subcontractors. Nothing contained herein shall be deemed to create liability for the Contractor for any design defects not managed by the Contractor.

6.2. **PERMITS AND LICENSES:** The Contractor shall, at its own expense, procure all permits and licenses, pay all charges and fees, and give all notices necessary and incidental to the due and lawful prosecution of the Work. Any costs incurred for these permits must be included in the unit costs.

6.3. PAYMENT OF TAXES:

- 6.3.1. With the exception of being exempt from City of Littleton Sales and Use taxes, the Contractor shall pay all sales and use taxes required to be paid, shall maintain such records in respect to its Work, which shall be separate and distinct from all other records maintained by the Contractor and shall be available for inspection by the City at any and all reasonable times, and shall furnish the City with such data, as may be necessary to enable the City to obtain any refunds of such taxes which may be available to the City under the laws, ordinances, rules or regulations applicable to such taxes. The Contractor shall require each of its subcontractors to pay all sales and use taxes required and to maintain such records and furnish the Contractor with such data as may be necessary to enable the City to obtain a refund of the taxes paid by such subcontractors.
- 6.3.2. In accordance with C.R.S. §§ 39-26-114 and 39-26-203, and the related regulation of the State of Colorado Department of Revenue, the Contractor shall apply to the State of Colorado Department of Revenue and secure prior to commencing Work, an exemption certificate which when issued by the State of Colorado Department of Revenue will enable the Contractor to purchase all materials free of State Sales and Use Taxes and Regional Transportation District ("RTD") Tax, provided that any building permit fee shall be included in any Bid Schedule with respect to the Work. Further, no Littleton sales and/or use tax shall be included in any billing with respect to the Work. This provision shall apply to all contractors, subcontractors and material suppliers. When Littleton sales tax is paid to licensed Littleton vendors for materials, which become part of the Work by a Contractor, the City of Littleton will refund that tax to the Contractor upon receipt of an application from the Contractor at the conclusion of the Contract. Accompanying the application must be the material receipt(s) displaying a description of the item(s) purchased, date of purchase, amount of purchase, tax paid and any other documentation and information which may be required by the City to substantiate the payment and validate a refund.
- 6.3.3. Contractors who purchase materials that become part of the Work that do not honor the exemption, and thereby who pay sales tax, will not be reimbursed for that tax payment by the City. The Contractor shall bear the risk of any added or increased taxes occurring during the performance of the Work. A change in taxes shall under no circumstances entitle the Contractor to an adjustment under the Contract.

6.4. PATENTED DEVICES, 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.

6.5. SANITARY PROVISIONS: The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of its employees as may be necessary to comply with the requirements and regulations of the State Department of Health and the Occupational Safety and Health Administration ("OSHA"). As stated in OSHA Construction Standard 1926.51 C, the Contractor shall supply temporary sanitary facilities as per the following table:

<u>Number of Employees</u>	<u>Minimum Toilet Facilities</u>
20 or less	1 Toilet
21 to 50	1 Toilet and 1 Urinal per 40 workers
51 or more	1 Toilet and 1 Urinal per 50 workers

This requirement to provide sanitary facilities will neither be measured nor paid for separately by the City, but shall be considered incidental to and included in the cost of the Work.

6.6. PUBLIC CONVENIENCE AND SAFETY:

6.6.1. The Contractor shall be solely and completely responsible for conditions of the Work site, including safety of all persons and property during performance of the Work. The Contractor shall fully comply with all applicable Federal, State and local laws, and rules and regulations governing safety of the public and workers. The Contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions on its own responsibility reasonably necessary to protect the life and health of employees on the job and the safety of the public,

and to protect property in connection with the performance of the Work. Materials stored on the site shall be so placed and the Work shall, at all times, be so conducted as to cause no greater obstruction to traffic than is considered necessary by the Project Manager.

6.6.2. The Contractor shall not close any road to the public except by the express permission of the City. When the improvement under construction is being used by the traveling public, special attention shall be paid to keeping both the sub-grade and surfacing in such condition that the public can travel in comfort and safety. The Contractor shall cooperate with the Project Manager in the regulation of traffic. If the Contractor constructs temporary bridges or temporary stream crossings, the Contractor's responsibility for accidents shall include the roadway approaches as well as the structures of such crossing.

6.6.3. The right of the Project Manager to conduct construction review or observation of the Contractor's performance will not include review or observation of the adequacy of the Contractor's safety measures in, on, or near the Work site.

6.7. BARRICADES, SIGNS AND HAZARD MARKINGS:

6.7.1. The Contractor shall provide, erect and maintain all necessary barricades, signs, danger signals and lights for the protection of the Work and the safety of the public. All barricades, signs and obstructions erected by the Contractor shall be illuminated at night and all devices for this purpose shall be kept illuminated from sunset to sunrise.

6.7.2. The Contractor shall be held responsible for all damage to the Work due to failure of barricades, signs, lights and watchman to protect it, and whenever evidence of such damage is found prior to acceptance, the Project Manager may order the damaged portion immediately removed and replaced by the Contractor without cost to the City if, in the opinion of the Project Manager, such action is justified. The Contractor's responsibility for the maintenance of barricades, signs and lights shall not cease until Work has been accepted.

6.8. **USE OF EXPLOSIVES:** When the use of explosives is necessary for the Work, the Contractor shall use the utmost care so as not to endanger life or property, and whenever directed by the Project Manager the number and size of the charges shall be reduced. The Contractor shall notify the proper representatives of any public services corporation, the City, any company, or any individual at least eight (8) hours in advance of any blasting which may damage property on, along, or adjacent to the site. The Contractor shall comply with the requirements of Title 9, Article 7 of the C.R.S., as amended, titled "Explosive Permits". The Contractor shall also be required, at a minimum, to notify the Littleton Fire Department and the Littleton Police Department. All explosives shall be stored in a secure manner and all storage places shall be marked clearly "DANGEROUS EXPLOSIVES," and shall be in care of competent watchmen at all times.

6.9. PROTECTION AND RESTORATION OF PROPERTY:

- 6.9.1. The Contractor shall not enter upon private property for any purpose without first obtaining permission, and shall be responsible for the preservation of all public and private property, sod, trees, fences, monuments, underground structures, etc., on and adjacent to the site(s) and shall use every precaution necessary to prevent damage or injury thereto. The Contractor shall protect carefully, from disturbance or damage, all land monuments and property markers until an authorized agent has witnessed or otherwise referenced their location and shall not remove them until directed.
- 6.9.2. The Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect or misconduct in his manner, or method of executing said Work, or due to its non-execution of said Work, or at any time due to defective Work or materials, and said responsibility shall not be released until the Work has been completed and accepted by the City.
- 6.9.3. The Contractor's attention is directed to the importance of protecting all public utilities encountered on all projects. Such utilities may include, but are not limited to, telephone, telegraph and power lines, water lines, sewer lines, gas lines, railroad tracks, and other overhead and underground utilities, cable television lines and facilities. Before any excavation is to begin in the vicinity of water lines, railroad tracks or structures, sewer lines, cable television lines, gas lines or telephone conduits, each utility company concerned must be notified in advance of such excavation, and such excavation shall not be made until an authorized representative of the utility company concerned is on the ground and has designated the location of their facilities.
- 6.9.4. When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect or misconduct in the execution of the Work, or in consequence of the non-execution thereof on the part of the Contractor, the Contractor shall restore, at its own expense, such property to a condition similar or equal to that existing before such damage or injury was done by repairing, rebuilding, or otherwise restoring, as may be directed; or the Contractor shall make good such damage or injury in an acceptable manner. In case of the failure on the part of the Contractor to restore such property, or to have started action to make good such damage or injury, the City may upon forty-eight (48) hours' notice, proceed to repair, rebuild or otherwise restore such property as may be deemed necessary and the cost thereof will be deducted from any moneys due or which may become due the Contractor under the Contract or prosecuted as a claim against the Contractor's Bond.
- 6.9.5. The cost of insurance for damages due to Contractor's operation or cost of protecting utilities where required to permit construction under this Contract shall be included in the original Contract prices for the Work.

6.10. INDEMNIFICATION AND HOLD HARMLESS: The Contractor and its Surety shall indemnify and save harmless the City, its officers, agents, employees, successors and assigns from all suits, demands, actions, or claims of any nature whatsoever brought or made against the City, its officers, agents, employees, successors or assigns from any injuries or damages sustained by any person, firm or corporation or property or resulting from or arising out of any neglect in safeguarding the Work; or through the use of unacceptable materials in the construction of the improvement; or as a result of any act or omission by the Contractor; or from the use, misuse, storage or handling of explosives; or on account of any claims or amounts recovered for any infringement of patent, trademark or copyright; or from any claims or amounts arising or recovered under Worker's Compensation laws, or any other law, by-law, ordinance, order or decree. Moneys due to the Contractor under and by virtue of the Work, as shall be considered necessary by the City, may be retained, or in case no money is due, the Contractor's Bond shall be held until such suit(s), action(s), or claim(s) for injuries or damages have been settled and satisfactory evidence has been furnished to the City.

6.11. NO PERSONAL LIABILITY OF THE PROJECT MANAGER: The Project Manager is an agent of City, and the Project Manager, its agents, heirs, successors and assignees shall have no liability to any third-party as a result of performance of this Contract.

6.12. NO WAIVER OF LEGAL RIGHTS: Inspection by the Project Manager or authorized City representatives, payment of money, payment for or acceptance of any Work or any extension of time, or possession taken by the City shall not operate as a waiver of any provision of the Contract, or any power therein provided. A waiver of any breach or term of the Contract shall not be deemed to be a waiver of any other or subsequent breach. The City reserves the right to correct any error that may be discovered in any estimate that may have been paid, and to adjust the same to meet the requirements of the Contract and Specifications. The City reserves the right to claim and recover, by process of law, sums as may be sufficient to correct any error or make good any deficit in the Work resulting from such error, dishonesty, or collusion discovered in the Work after the final payment has been made.

6.13. RIGHTS-OF-WAY: 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.

SECTION 7 MEASUREMENT AND PAYMENT

7.1. **BONDS.**

- 7.1.1. 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 Section 5 of the General Conditions, maintain and keep in force the Bonds at the Contractor's expense.
- 7.1.2. 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.

7.2. **MEASUREMENT OF WORK PERFORMED:** The determination of the amount of Work acceptably completed under the terms of the Contract, or as directed by the Project Manager in writing, will be made by the Project Manager based on measurements taken by them or their authorized representatives. These measurements will be taken according to the United States standard measure. All surface and linear measurements will be taken horizontally unless otherwise shown on Plans or otherwise specified. Structures shall be measured to the neat lines as shown on the Plans, or as directed in writing by the Project Manager.

7.3. **SCOPE OF PAYMENT:**

- 7.3.1. The Contractor shall accept the compensation, as herein provided, in full payment for furnishing all materials, equipment, labor, tools, and incidentals necessary to complete the Work and for performing all Work contemplated and embraced under the Contract; for loss or damage arising from the nature of the Work, or from the action of the elements, or from any unforeseen difficulties which may be encountered during the completion of the Work until the final acceptance by the City; for all risks of every description connected with the completion of the Work; for all expenses incurred in consequence of the suspension or discontinuance of the Work as herein specified; for any infringement of patent, trademark, or copyright; and for completing the Work according to the Plans and Specifications. Neither the payment of any partial payment nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective Work or material. No moneys payable under the Contract or any part thereof, except the

partial payment for the first month period, shall become due and payable until the Contractor satisfies to the City that it has fully settled or paid for all materials and equipment used in or upon the Work and labor done in connection therewith. The City, if it so elects, may pay any or all such bills, wholly or in part, and deduct the amount or amounts so paid from any monthly or final partial payment excepting the first estimate.

7.4. PAYMENT FOR INCREASED OR DECREASED QUANTITIES: When alterations in the Plans or quantities of Work are ordered and performed without a written Change Order or amendment, the Contractor shall accept payment in full at the Contract unit price for the actual quantities of Work done, and only upon the City's review and approval of said Work. No allowance will be made for lost profits. Increased or decreased Work without a written Change Order will be paid for as stipulated herein.

7.5. PAYMENT FOR OMITTED ITEMS:

7.5.1. For any item omitted from the Work, the City will pay the Contractor a fair and equitable amount for costs incurred directly related to such item prior to the date of the City's order to omit the item, subject to Section 1.4 of the General Conditions. No allowance will be made for lost profits in reimbursements to the Contractor for omitted items of Work. Acceptable materials ordered by the Contractor or delivered to the Work site prior to the date of cancellation, alteration, or suspension of the Work by order of the Project Manager will be paid for at the actual cost to the Contractor and shall thereupon become the property of the City.

7.5.2. The Contractor shall immediately submit certified statements covering all money expended in preparation for any omitted item, and shall be reimbursed for any money expended in preparation for Work on any omitted item when such preparation has no value to the remaining items of the Contract, or for a proportionate amount based on the total Contract price over which such preparation would ordinarily be distributed when other items are included in such preparation.

7.6. EXTRA AND FORCE ACCOUNT WORK:

7.6.1. Extra Work, for which no price is provided in the Bid Schedule, shall be covered by Change Order to be signed by both Parties before such Work is commenced. Extra Work will be paid for either at a lump sum, or unit prices agreed upon, or on a Force Account basis, subject to Section 1.5 of the General Conditions. For all labor, teams, and foremen in direct charge of the specific operations accomplished on a Force Account basis, the Contractor shall receive the current local rate of wage, to be agreed upon before starting the Work, to which shall be added 15% (fifteen percent) of the sum thereof to cover cost of supervision, the rental of small tools and ordinary equipment, additional Bond, Unemployment Insurance, all overhead and any other costs not specifically stated. In addition, the Contractor shall be paid a sum equal to the Worker's Compensation insurance premium, the

actual costs of Social Security taxes computed on the base rate for the class of Work involved for the actual amount of the payroll, and the public liability and property damage insurance premium; provided, however, that nothing in this Section will change the legal status of the relationship between the Parties to this Agreement. For all materials furnished and used by the Contractor on a Force Account basis, the Contractor shall receive the actual cost of such materials, including transportation charges as shown by original receipted bills, to which shall be added 15% (fifteen percent) of said actual cost.

- 7.6.2. For machine power tools or equipment, including fuel and lubricant, used on Force Account Work, payment for the same will be made on a rental basis at the rate agreed upon between the Contractor and the Project Manager, to which rate no percentage shall be added.
- 7.6.3. The compensation as herein provided shall be received by the Contractor as payment for Extra Work done on a Force Account basis and subject to any conditions or limitations as specified in Section 1.5 of the General Conditions. The Contractor shall make no claim for Force Account Work, unless performed on written order and in accordance therewith. The Contractor's representative and the Inspector shall compare records of Extra Work done on a Force Account basis at the end of each day. Copies of these records shall be made upon suitable forms provided for this purpose and signed by both the Inspector and the Contractor's representative, one copy being forwarded to the Project Manager and one copy to the Contractor.
- 7.6.4. All claims for Extra Work done on a Force Account basis shall be submitted each month to the Project Manager by the Contractor upon certified statements, or upon forms furnished by the City. Work performed prior to a written order by the Project Manager will not be paid for.

7.7. PARTIAL PAYMENTS:

- 7.7.1. Partial progress payments shall be made by the City to the Contractor for the percentage of the Work completed, subject to inspection and approval by the Project Manager. The City shall determine when work has been completed, and progress payments shall not constitute a waiver of the City's right to require fulfillment of all terms of the Contract Documents and the delivery of all Work contemplated herein, complete and satisfactory to the City.
- 7.7.2. Once per month as the Work progresses, the Project Manager will make an estimate of the value of the Work performed and materials completed and in-place or delivered to the Work site in accordance with the Contract. Upon the Project Manager's request, the Contractor shall furnish a detailed estimate of the total Contract price showing the amount included therein for each category of Work, to provide a basis for determining the amount of progress payments. The market value of materials and equipment delivered to the Work site but not yet

incorporated in the Work may, at the discretion of the City, be included with a progress payment. However, payment by the City for such materials and equipment shall not relieve the Contractor of the responsibility for the care of such materials and equipment; the City shall not be deemed to have assumed ownership of the materials or equipment until incorporated into the completed and accepted Work. Such increases to progress payments, if authorized, are intended only to reduce the cost of doing business with the City.

7.7.3. In accordance with C.R.S. § 24-91-103, where the Contract price exceeds one hundred fifty thousand dollars (\$150,000.00), partial payments shall be authorized at the end of each calendar month, or as soon thereafter as practicable, to the Contractor upon satisfactory performance of the Contract. The City shall, from the total of the Contract estimate so ascertained, deduct an amount equivalent to five (5) percent of the whole, to be retained by the City until acceptance of the entire Contract and the balance of the sum equivalent to 95% (ninety-five percent) of the whole, shall be certified to by the Project Manager for payment.

7.7.4. The City shall retain from all progress payments an amount equal to all statutory claims filed against the Contractor pursuant to C.R.S. § 38-26-107. No partial payments except final payment will be made for a sum less than one thousand dollars (\$1,000.00). The estimates will be approximate only, and all partial or monthly estimates and payments shall be subject to correction in the estimate and payment rendered following discovery of an error in any previous estimates or payments. Should any defective Work or material be discovered, or should a reasonable doubt arise as to the integrity of any part of the Work completed previous to the final acceptance and payment, the costs shall be deducted from the first payment rendered after the discovery of such Work an amount equal in value to the defective or questioned Work, and this Work will not be included in a subsequent estimate or payment until the defects have been remedied or the causes for doubt removed.

7.8. **PUNCH LIST AND FINAL ACCEPTANCE.** The Work shall be finally accepted when, and only when, the whole and all parts thereof shall have been completed to the satisfaction of City in full compliance with, and as required by or pursuant to, this Contract. Upon receipt of the Contractor's Written Notice of Completion, the City shall make a review of the Work and notify the Contractor in writing of all Punch List Work, if any, to be completed or corrected. Following the Contractor's completion or correction of all Punch List Work, the City shall review the Work and prepare and deliver to the Contractor either a written notice of additional Punch List Work to be completed or corrected or a written notice of Final Acceptance of the Work.

7.9. **ACCEPTANCE AND FINAL PAYMENT:**

7.9.1. Two (2) weeks after acceptance of the Work including final cleanup, the City shall initiate the acceptance and final payment procedures. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

Upon completion of the acceptance and final payment procedures, the Work will be considered accepted, the Contract considered complete, and, upon compliance with the provisions of State law, the final payment shall be executed and submitted to the Contractor.

- 7.9.2. The acceptance by the Contractor of the last payment as aforesaid shall operate as and shall be a release of the City from all claims for liability arising from the performance of the Work under the Contract, excepting any claims that may arise during the warranty period.

7.10. **LIENS.**

- 7.10.1. *Title.* Nothing in this Contract shall be construed as vesting in the Contractor any right of property in any equipment, materials, supplies, and other items provided under this Contract after they have been installed in, incorporated into, attached to, or affixed to, the Work or Work site. All such equipment, materials, supplies, and other items shall, upon being so installed, incorporated, attached or affixed, become the property of the City, but such title shall not release the Contractor from its duty to insure and protect the Work in accordance with the requirements of this Contract.

- 7.10.2. *Waivers of Lien.* The Contractor shall, from time to time at the City's request and in any event prior to final payment, furnish to the City such receipts, releases, affidavits, certificates, and other evidence as may be necessary to establish, to the reasonable satisfaction of the City, that no lien against the work or the public funds held by the City exists in favor of any person whatsoever for or by reason of any equipment, material, supplies, or other item furnished, labor performed, or other thing done in connection with the Work or this Contract ("Lien"), and that no right to file any Lien exists in favor of any person whatsoever.

- 7.10.3. *Removal of Liens.* If at any time any notice of any Lien is filed, the Contractor shall, promptly and without charge, discharge, remove, or otherwise dispose of such Lien. Until such discharge, removal, or disposition, the City shall have the right to retain from any money payable hereunder an amount that the City, in its sole judgment, deems necessary to satisfy such Lien and to pay the costs and expenses, including attorneys' fees and administrative expenses, of any actions brought in connection therewith or by reason thereof.

- 7.10.4. *Protection of City Only.* This Section shall not operate to relieve the Contractor's Surety or Sureties from any of their obligations under the Bonds, nor shall it be deemed to vest any right, interest, or entitlement in any subcontractor or supplier. The City's retention of funds pursuant to this Section shall be deemed solely for the protection of its own interests pending removal of such Liens by the Contractor, and the City shall have no obligation to apply such funds to such removal but may, nevertheless, do so where the City's interests would thereby be served.

7.11. DEDUCTIONS.

7.11.1. *City's Right To Withhold.* Notwithstanding any other provision of this Contract and without prejudice to any of the City's other rights or remedies, the City shall have the right at any time, to deduct and withhold from any progress or final payment that may be or become due under this Contract, such amount as may reasonably appear necessary to compensate the City for any actual or prospective loss due to:

- i. Work that is defective, damaged, flawed, unsuitable, nonconforming, or incomplete;
- ii. Claims or liens filed or reasonable evidence indicating probable filing of claims or liens from third-parties, regardless of merit;
- iii. Failure of the Contractor to make payments properly and promptly to subcontractors for material or labor;
- iv. Failure of the Contractor to complete any portion of the Work in compliance with an approved schedule;
- v. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract value;
- vi. Failure of the Contractor to submit on a timely basis, any documentation required by the Contract Documents, including without limitation, monthly reports, schedules, or request for approval of subcontractors;
- vii. Unauthorized Work or deviations by the Contractor from the Contract Documents;
- viii. Damage to the City or to another contractor;
- ix. State or local sales, use, or excise taxes from which the City is exempt;
- x. Any other failure of the Contractor to perform any of its obligations under this contract; or
- xi. The cost to the City, including attorneys' fees and administrative costs, of correcting any of the aforesaid matters or exercising any one or more of the City's remedies set forth within the Contract Documents.

7.11.2. *Release and Use of Withheld Funds.* The City shall be entitled to retain any and all amounts withheld pursuant to Section 7.11.1 above until the Contractor has either performed the obligations in question or furnished security for such performance satisfactory to the City. The City shall be entitled to apply any money withheld or any other money due to the Contractor under this Contract to reimburse itself for any and all costs, expenses, losses, damages, liabilities, suits, judgments, awards, attorneys' fees and administrative expenses incurred, suffered, or sustained by the City and chargeable to Contractor under this Contract.

- 7.11.3. *Waiver under C.R.S. § 38-26-107.* Execution of the Contract Documents by the Contractor shall constitute waiver by the Contractor to claim any right of payment of interest upon any such retained funds, or to claim any right of payment of interest upon funds withheld under the provisions of C.R.S. § 38-26-107.

SECTION 8 DISPUTES AND REMEDIES

8.1. DISPUTE RESOLUTION PROCEDURE.

- 8.1.1. *Notice of Disputes and Objections.* If the Contractor disputes or objects to any requirement, direction, instruction, interpretation, determination, or decision of the City, the Contractor may notify the City in writing of the issue and of the amount of any equitable adjustment to the Contract price or Contract time to which the Contractor claims it will be entitled as a result thereof; provided, however, that the Contractor shall, nevertheless, proceed without delay to perform the Work as required, directed, instructed, interpreted, determined, or decided by the City, without regard to such dispute or objection. Unless the Contractor so notifies the City within two (2) business days after receipt of such requirement, direction, instruction, interpretation, determination, or decision, the Contractor shall be conclusively deemed to have waived all such disputes or objections and all claims based thereon.
- 8.1.2. *Negotiation of Disputes and Objections.* To avoid and settle without litigation any such dispute or objection, the City and the Contractor agree to engage in good faith negotiations. Within 10 (ten) business days after the City's receipt of the Contractor's written notice of dispute or objection, a conference between the City and the Contractor shall be held to resolve the dispute. Within 10 (ten) business days after the end of the conference, the City shall render its final decision in writing to the Contractor. If the Contractor objects to the City's final decision, then it shall, within 10 (ten) business days give the City notice thereof and, in such notice, shall state its final demand for settlement of the dispute. Unless the Contractor so notifies the City, the Contractor shall be conclusively deemed to have agreed to and accepted the City's final decision and to have waived all claims based on such final decision.

8.2. **DISPUTED CLAIMS FOR EXTRA WORK:** In case the Contractor deems extra compensation is due for Work or material not covered in the Contract Documents, or not ordered by the Project Manager as Extra Work, the Contractor shall notify the Project Manager in writing of its intention to make claim for such extra compensation before beginning Work on which the Contractor bases the claim, and shall afford the Project Manager every facility for keeping actual cost of the Work. Failure on the part of the Contractor to give such notification or to afford the Project Manager proper facilities for keeping strict account of actual cost shall constitute a waiver of the claim for such extra compensation. The filing of such notice by the Contractor and the keeping of costs by the

Project Manager shall not in any way be construed to prove the validity of the claim. When the Work has been completed, the Contractor shall, within 10 (ten) days, file its claim for extra compensation with the Project Manager, who will review for consideration.

8.3. CONTRACTOR'S REMEDIES. If the City fails or refuses to satisfy a final demand made by the Contractor pursuant to Section 8.2 above, or to otherwise resolve the dispute which is the subject of such demand to the satisfaction of the Contractor, within 10 (ten) days following receipt of such demand, the Contractor shall be entitled to pursue such remedies, not inconsistent with the provisions of this Contract, as it may have in law or equity.

8.4. CITY'S REMEDIES. If it should appear at any time prior to final payment that an Event of Default, and has failed to cure any such Event of Default, as defined within Section 4.10 of the General Conditions, the City shall have the right, at its election and without prejudice to any other remedies provided by law or equity, to pursue any one or more of the following remedies:

- i. The City may require the Contractor, within such reasonable time as may be fixed by the City, to complete or correct all or any part of the Work that is defective, damaged, flawed, unsuitable, nonconforming, or incomplete; to remove from the Work site any such work; to accelerate all or any part of the Work; and to take any or all other action necessary to bring the Contractor and the Work into strict compliance with this Contract.
- ii. The City may perform or have performed all work necessary for the accomplishment of the results stated in (i) above and withhold or recover from the Contractor all the cost and expense, including attorneys' fees and administrative costs, incurred by the City in connection therewith.
- iii. The City may accept the defective, damaged, flawed, unsuitable, nonconforming, incomplete, or dilatory Work or part thereof and make an equitable reduction in the Contract price.
- iv. The City may terminate this Contract without liability for further payment of amounts due or to become due under this Contract, pursuant to Section 4.10 of the General Conditions.
 - i. Upon any termination of this Contract or of the Contractor's rights under this Contract in accordance with Sections 4.10 or 4.11 of the General Conditions, and at the City's option exercised in writing, any or all subcontracts and supplier contracts of the Contractor shall be deemed to be assigned to the City without any further action being required, but the City shall not thereby assume any obligation for payments due under such subcontracts and supplier contracts for any Work provided or performed prior to such assignment.
- v. The City may withhold from any progress or final payment, whether or not previously approved, or may recover from the Contractor any

and all costs including attorneys' fees and administrative expenses, incurred by the City as the result of any Event of Default or as a result of actions taken by the City in response to any Event of Default.

- vi. The City may recover any damages suffered by the City.

8.5. CITY'S SPECIAL REMEDY FOR DELAY. If the Work is not completed by the Contractor in full compliance with and as required by or pursuant to this Contract, within the time as such time may be extended by Change Order, then the City may invoke its remedies under Section 8.4 of the General Conditions or may, in the exercise of its sole and absolute discretion, permit the Contractor to complete the Work but charge to the Contractor and deduct from any progress or final payments, whether or not previously approved, administrative expenses and costs for each day completion of the Work is delayed beyond the completion date, computed as set forth in Section 4.8 of the General Conditions, as well as any additional damages caused by such delay.

8.6. ATTORNEY FEES: In the event there is any dispute between the the Contractor or the Surety and the City, its officers, agents or employees, and the City, its officers, agents or employees prevail, the City, its officers, agents or employees shall be granted all of its costs, including but not limited to attorney's fees, court costs and expert witness fees.

SECTION 9 OTHER PROVISIONS

- 9.1. Wherever a number of days is specified in this Contract it shall mean calendar days unless otherwise specified.
- 9.2. 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. If the Contractor, after complying the maximum extent possible by the reassignment of its labor force, equipment and materials, alleges to have suffered damages due to delay, and the delay is caused in whole or in part by acts or omissions within the control of the City or persons acting on its behalf, then such a claim shall be treated as a Change Order request and shall be processed in accordance with the Change Order, audit and inspection requirements specified in the General Provisions or it shall be deemed forever waived. Nothing herein contained shall be interpreted so as to allow the Contractor to recover delay damages from the City for delays caused by acts of God, the acts or omissions of the Contractor, its subcontractors, employees or agents, or persons over which the City has no control.
- 9.3. Work performed by the Contractor under this Contract shall conform to reasonable and normal professional standards and the Contractor shall conduct itself at all times in a manner consistent with industry standards.
- 9.4. No reports, graphics or other material produced specifically for the City under this

Contract shall be the subject of an application for copyright or trademark by or on behalf of the Contractor.

- 9.5. No assignment of any claim or proceeds under this Contract shall be binding upon the City unless it shall be first notified thereof in writing.

DEFINITIONS

Whenever the following terms or pronouns are used in the Specifications and Contract Documents, the intent and meaning shall be as follows:

AWWA: American Water Works Association.

CHANGE ORDER: A written modification of the Contract, issued after award to the Contractor, authorizing an addition, deletion, or revision to the Work within the general scope of the Contract or authorizing an adjustment in the Contract price or time mutually agreed upon between the City and the Contractor.

CDOT: Colorado Department of Transportation.

CONTRACT OR CONTRACT DOCUMENTS: The written agreement executed between the City and the Contractor covering the performance of the Work and the furnishing of labor and materials, by which the Contractor is bound to perform the Work and furnish the labor and materials and by which the City is obligated to compensate at a mutually established and accepted rate or price.

CONTRACTOR: The individual, partnership, firm, or corporation executing the Contract, acting directly or through lawful agents or employees, primarily liable for the acceptable performance of the Work for which contracted, and for the payment of all legal debts pertaining to the Work.

DRAWINGS: The Plans, profiles, typical cross-sections, general cross-sections, elevations, schedules, and details which show locations, character, dimensions, and details of the Work.

DISTRICT: A legally constituted group of individuals who have joined together in order to facilitate construction of utility systems within the limits of their property. The district shall be represented by its authorized Board of Directors.

PROJECT MANAGER: The duly authorized representative of the City, acting directly or through an assistant or representative.

EQUIPMENT: All machinery, together with the necessary supplies for upkeep and maintenance, and all tools and apparatus necessary for the proper construction and acceptable completion of the Work.

EXTRA WORK: Work not provided for in the Contract as awarded but found to be essential to the satisfactory completion of the Contract, within its intended scope.

FIELD ORDER: A written order effecting minor change in the Work not involving an adjustment in the Contract price or an extension of the Contract time, issued by the Project Manager to the Contractor during construction.

FINAL ACCEPTANCE: An acknowledgment made by the City that all Work has been completed.

FORCE ACCOUNT: A method of payment, other than lump sum or unit price, for Work ordered by a Change Order.

INSPECTOR: An authorized representative of the City assigned to make all necessary inspection of the Work performed or being performed, or of the materials furnished or being furnished by the Contractor.

LABORATORY: The official testing laboratories of the City or such other laboratories as may be designated by the Project Manager.

NOTICE TO PROCEED: A written notice to the Contractor of the date on which it is to begin Work.

PAYMENT BOND: The approved form of security furnished by the Contractor and its Surety as a guarantee that the Contractor will pay in full all bills and accounts for materials and labor used in the construction of the Work, as provided by law.

PERFORMANCE BOND: The approved form of security furnished by the Contractor and its Surety as a guarantee of good faith and ability of the Contractor to execute the Work in accordance with the terms of the Plans, Specifications, and Contract. In lieu of a separate Performance Bond, a combination Performance, Labor and Material Payment Bond may be supplied by the Contractor.

PERFORMANCE, LABOR AND MATERIAL PAYMENT BOND: Security furnished by the Contractor and its Surety as a guarantee that the Contractor will pay in full all bills and accounts for materials and labor used in the Work and that it will execute the Work in accordance with the Contract.

PLANS: The official Plans, working drawings, or supplemental drawings or exact reproductions thereof, approved by the Project Manager which show the locations, character, dimensions, and details of the Work to be done and which are to be considered as part of the Contract, supplementary to the Specifications.

PROGRESS SCHEDULE: A construction schedule prepared by the Contractor in a bar-chart, critical path or other format acceptable to the Project Manager which includes the start and completion dates of all salient features of the Work.

SHOP DRAWINGS: All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a subcontractor, manufacturer, supplier, or distributor, which illustrate how specific portions of the Work shall be fabricated or installed.

SPECIAL PROVISIONS: The specific clauses setting forth conditions or requirements particular to the Work, covering work or materials involved in the bid and estimate, which are not thoroughly or satisfactorily stipulated in the General Provisions or Specifications.

SPECIFICATIONS: The directions, provisions, and requirements contained herein, supplemented by Special Provisions, pertaining to the method and manner of performing the Work, or to the quantities or the qualities of materials to be furnished under the Contract. Also includes Technical Specifications, part of the Contract Documents consisting of technical written descriptions for materials, equipment, construction systems, standards and workmanship.

STRUCTURES: Bridges, culverts, sewers, catch basins, retaining walls, manholes, headwalls, buildings, valve vaults and other features which may be encountered in the Work and not otherwise classified herein.

SUBCONTRACTOR: An individual, firm or corporation having a direct contract with the Contractor or the Contractor's subcontractor(s) for the performance of a part of the Work.

SUBSTANTIAL COMPLETION: The Work (or a specified part thereof) has progressed to the point where, in the opinion of the Project Manager, it is sufficiently complete in accordance with the Contract, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. For the purposes of final acceptance of the Work, Substantial Completion shall include cleanup of the Work site and all work areas.

SUPPLIER: Any person or organization who supplies materials or equipment for the Work, including that fabricated to a special design.

SURETY: The corporate body or individuals who are bound by the Performance Bond; Payment Bond; or Performance, Labor and Material Payment Bond, with and for the Contractor who is responsible for the entire and satisfactory fulfillment of the Contract and for the payment of all debts incurred in fulfilling the Contract.

UNIT PRICE WORK: Work to be paid for on the basis of unit prices.

Exhibit D Construction Contract Forms

Bond No. 7901254336

PERFORMANCE, LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS that
TAK Broadband, LLC (Contractor), as Principal (the "Principal")
and Nationwide Mutual Insurance Company, a corporation organized
under the laws of the State of Ohio, 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
Five Hundred Eighty Six Thousand Three Hundred Seventy and 00/100 Dollars
(\$ 586,370.00), for the payment and interest as provided by law for the
performance of the Contract between the Principal and the Owner, dated
2025, for the
Littleton Blvd Fiberoptics Installation project 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 Contract, 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 8th day of May 2025.

In the presence of:

TAK Broadband, LLC



(Contractor / Principal)

Nationwide Mutual Insurance Company



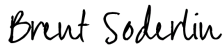
(Surety) Mariana Walker, Attorney-in-Fact



(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:

DocuSigned by:



BRENT SODERLIN

DIRECTOR OF PUBLIC WORKS AND UTILITIES

Power of Attorney

KNOW ALL MEN BY THESE PRESENTS THAT:

Nationwide Mutual Insurance Company, an Ohio corporation

hereinafter referred to severally as the "Company" and collectively as "the Companies" does hereby make, constitute and appoint:

C STEPHENS GRIGGS; CHARLES R TETER III; CHRISTY M BRAILE; DANIELLE R CAPPS; DEBRA J SCARBOROUGH; ERIN C LAVIN;
EVAN D SIZEMORE; HILLARY D SHEPARD; JEFFREY C CAREY; KELLIE A MEYER; KRISTIN D THURBER; LAUREN SCOTT;
MARIANA WALKER; MARY T FLANIGAN; PATRICK T PRIBYL; REBECCA S LEAL; TAHITIA M FRY; VERONICA LAWVER;

each in their individual capacity, its true and lawful attorney-in-fact, with full power and authority to sign, seal, and execute on its behalf any and all bonds and undertakings, and other obligatory instruments of similar nature, in penalties not exceeding the sum of

UNLIMITED

and to bind the Company thereby, as fully and to the same extent as if such instruments were signed by the duly authorized officers of the Company; and all acts of said Attorney pursuant to the authority given are hereby ratified and confirmed.

This power of attorney is made and executed pursuant to and by authority of the following resolution duly adopted by the board of directors of the Company:

"RESOLVED, that the president, or any vice president be, and each hereby is, authorized and empowered to appoint attorneys-in-fact of the Company, and to authorize them to execute and deliver on behalf of the Company any and all bonds, forms, applications, memorandums, undertakings, recognizances, transfers, contracts of indemnity, policies, contracts guaranteeing the fidelity of persons holding positions of public or private trust, and other writings obligatory in nature that the business of the Company may require; and to modify or revoke, with or without cause, any such appointment or authority; provided, however, that the authority granted hereby shall in no way limit the authority of other duly authorized agents to sign and countersign any of said documents on behalf of the Company."

"RESOLVED FURTHER, that such attorneys-in-fact shall have full power and authority to execute and deliver any and all such documents and to bind the Company subject to the terms and limitations of the power of attorney issued to them, and to affix the seal of the Company thereto; provided, however, that said seal shall not be necessary for the validity of any such documents."

This power of attorney is signed and sealed under and by the following bylaws duly adopted by the board of directors of the Company.

Execution of Instruments. Any vice president, any assistant secretary or any assistant treasurer shall have the power and authority to sign or attest all approved documents, instruments, contracts, or other papers in connection with the operation of the business of the company in addition to the chairman of the board, the chief executive officer, president, treasurer or secretary; provided, however, the signature of any of them may be printed, engraved, or stamped on any approved document, contract, instrument, or other papers of the Company.

IN WITNESS WHEREOF, the Company has caused this instrument to be sealed and duly attested by the signature of its officer the 20th day of August, 2021.

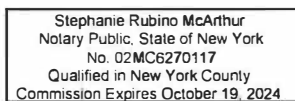


Antonio C. Albanese, **Vice President** of Nationwide Mutual Insurance Company

ACKNOWLEDGMENT

STATE OF NEW YORK COUNTY OF NEW YORK: ss

On this 20th day of August, 2021, before me came the above-named officer for the Company aforesaid, to me personally known to be the officer described in and who executed the preceding instrument, and he acknowledged the execution of the same, and being by me duly sworn, deposes and says, that he is the officer of the Company aforesaid, that the seal affixed hereto is the corporate seal of said Company, and the said corporate seal and his signature were duly affixed and subscribed to said instrument by the authority and direction of said Company.

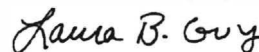


Notary Public
My Commission Expires
October 19, 2024

CERTIFICATE

I, Laura B. Guy, Assistant Secretary of the Company, do hereby certify that the foregoing is a full, true and correct copy of the original power of attorney issued by the Company; that the resolution included therein is a true and correct transcript from the minutes of the meetings of the boards of directors and the same has not been revoked or amended in any manner; that said Antonio C. Albanese was on the date of the execution of the foregoing power of attorney the duly elected officer of the Company, and the corporate seal and his signature as officer were duly affixed and subscribed to the said instrument by the authority of said board of directors; and the foregoing power of attorney is still in full force and effect.

IN WITNESS WHEREOF, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of said Company this 8th day of May, 2025.



Assistant Secretary



UNCOMMONLY INDEPENDENT

May 12, 2025

TAK Broadband, LLC
4401 South Technology Drive
Sioux Falls, SD 57106

Re: City of Littleton Colorado
Bond # 7901254336
Bond Amount: \$586,3700.00
Project Name: Littleton Blvd Fiberoptics Installation

To Whom It May Concern:

This letter will serve as your authority to date the Bonds and/or the Powers of Attorney on the above captioned project.

Very truly yours,

Nationwide Mutual Insurance Company

By: Mariana Walker
Mariana Walker
Attorney-in-Fact

NOTICE TO PROCEED
[Project Name and Number]

Date: _____

TO: **[Type Contractor Name]**
[Type Contractor Address]

You are hereby authorized to proceed on this date, **[Date]** with the work covered in the contract documents titled **[Project Name and Number]**. Work must commence within **[Number of Days in which construction must commence]** days of acceptance of this Notice to Proceed.

OWNER, CITY OF LITTLETON

By: _____ Title: _____

CONTRACTOR ACCEPTANCE OF NOTICE TO PROCEED

By: _____
this _____ day of _____, 20____.
Title: _____

CONTRACTOR'S RECEIPT FOR FINAL PAYMENT

[Project Name and Number]

Date: _____

TO: [Type Contractor Name]
[Type Contractor Address]

The undersigned has accepted the City of Littleton's Check No. _____ dated _____, 20____ in the amount of _____ Dollars (\$_____), as final payment of all sums due for work done under the Contract Documents titled **[Project Name and Number]**, as amended, and as complete performance by the Contractor of all obligations to be performed by it pursuant thereto. The Contractor acknowledges and agree that no future claims for additional payments shall be made.

CONTRACTOR

By: _____ Title: _____

FINAL ACCEPTANCE AND WARRANTY INITIATION

[Project Name and Number]

Date: _____

TO: [Type Contractor Name]
[Type Contractor Address]

You are hereby notified that on the ____ day _____, 20____, the City of Littleton has accepted the construction work completed by _____, for the construction work covered under the contracts documents titled **[Project Name and Number]**.

You are also notified that the warranty terms and conditions as set forth in the contract documents are initiated as of the date of this acceptance.

Final payment receipt form is attached within the contract documents for your convenience. Should this form not be returned within ten (10) calendar days, properly signed and approved, it will be assumed that lack of such performance constitutes informal giving of a receipt and satisfaction by the contractor for final settlement of all amounts due.

CITY OF LITTLETON

By: _____ Title: _____

NOTICE OF END OF BASIC WARRANTY PERIOD

[Project Name and Number]

Date: _____

TO: _____

You are hereby notified that on the ____ day of _____, 20____, the City of Littleton has ended the basic warranty period for the construction work completed by _____ for the construction work covered under the contract documents titled **[Project Name and Number]**. The basic warranty two (2) years from the date of Final Acceptance and warranty initiation.

You are also notified that the contract provisions concerning additional warranties on remedied work; patented devices, materials, and processes which may have been used in this construction; or other expressed warranties are not relinquished by the owner as a result of the issuance of this notice.

CITY OF LITTLETON

By: _____
Title: _____

**CITY OF LITTLETON
SPECIAL PROVISIONS
WEST LITTLETON BLVD COMMUNICATIONS UPGRADE
LITTLETON PROJECT NO. 21-37**

All work shall be performed in accordance with the City of Littleton Standard Specifications and the Standard Specifications. The following special provisions supplement or modify the Standard Specifications. When specifications or special provisions contain both English units and SI units, the English units apply and are the specification requirement. Where reference is made to the Standard Specifications, it shall mean the Colorado Department of Transportation's 2023 Standard Specifications for Road and Bridge Construction.

PROJECT SPECIAL PROVISIONS

Description	Page	Date
Notice to Bidders	1	February 24, 2025
Commencement and Completion of Work (Calendar Day)	2	February 24, 2025
Revision of Section 101 Definitions And Terms	3	February 24, 2025
Revision of Sections 102 and 105 Contractor Submittals	4	February 24, 2025
Revision of Section 105 Cooperation Between Contractors	5	February 24, 2025
Revision of Section 105 New Construction Inventory	6	February 24, 2025
Revision of Section 108 Disincentive for Offline ITS Devices	8	February 24, 2025
Revision of Section 202 Removal of Fiber Optic Cable	13	February 24, 2025
Revision of Section 202 Removal of Sidewalk	14	February 24, 2025
Revision of Section 203 Potholing	15	February 24, 2025
Revision of Section 212 Landscape Restoration	16	February 24, 2025
Revision of Section 250 Environmental Health and Safety Management	17	February 24, 2025
Revision of Section 608 Concrete Sidewalk (6 Inch)	18	February 24, 2025
Revision of Section 612 Location Marker	19	February 24, 2025
Revision of Section 613 Electrical Conduit	20	February 24, 2025
Revision of Section 613 Pull Box	21	February 24, 2025
Revision of Section 613 Proof Conduit	23	February 24, 2025
Revision of Section 614 Fiber Optic Cable (Single Mode)	24	February 24, 2025
Revision of Section 614 Buffer Tube Fan Out Kit	31	February 24, 2025
Revision of Section 614 Fiber Optic Termination Panel	32	February 24, 2025
Revision of Section 614 Ethernet Switch (install only)	34	February 24, 2025
Revision of Section 614 12 Port Pre-terminated Patch Panel and Pigtail	35	February 24, 2025
Revision of Section 614 Fiber Optic Splice Closure	36	February 24, 2025
Revision of Section 614 Fiber Optic Fusion Splice	38	February 24, 2025
Revision of Section 614 Test Fiber Optic Cable	40	February 24, 2025
Revision of Section 614 Fiber Optic Pre-connectorized Cable	46	February 24, 2025
Revision of Section 614 Grounding and Bonding	49	February 24, 2025
Revision of Section 626 Mobilization	55	February 24, 2025
Revision of Section 630 Construction Zone Traffic Control	56	February 24, 2025
Force Account Items	60	February 24, 2025
Utilities	61	February 24, 2025

NOTICE TO BIDDERS

Pursuant to subsections 102.04 and 102.05, it is recommended that bidders on this project review the work site and plan details prior to submitting a proposal. Prospective bidders may contact the following listed authorized City representative prior to the Bid Question Submittal Deadline listed in the Bid Documents and questions and responses will be posted online from the Rocky Mountain E-Purchasing System at www.govbids.com, if such is prepared.

City Procurement Manager: Megan Sullivan - MSullivan@littletongov.org

The above referenced individual or their designee are the only representatives of the City with authority to provide any information, clarification, or interpretation regarding the plans, specifications, and any other contract documents or requirements.

COMMENCEMENT AND COMPLETION OF WORK (CALENDAR DAY)

The Contractor shall commence work under the Contract on or before the 15th day following Contract execution or the 30th day following the date of award, whichever comes later, unless such time for beginning the work is changed by the City in the “Notice to Proceed.” The Contractor shall complete all work in 154 calendar days in accordance with the “Notice to Proceed.”

Time will not be charged while awaiting delivery of materials at the discretion of the Engineer.

The project will be grouped into three separate “phases” as described below:

Phase 1 – Littleton Blvd fiber optic backbone installation: Consists of all steps necessary to fully install the fiber optic backbone between Broadway and the Littleton Center. This includes installation of 432 strand fiber optic cable and associated conduit, pull boxes, and all required testing of the fiber optic cable.

Phase 2 – Littleton Blvd lateral connections: Consists of all proposed work along the path of the 432 strand fiber optic backbone that is not included in Phase 1. This includes establishing communications to traffic signals on Littleton Blvd, establishing connections to the Littleton Center and Littleton Municipal Courthouse, all splicing of the 432 strand fiber optic cable, and associated fiber optic testing.

Phase 3 – Datura St and County Line Rd connections: Consists of all work to establish communications to the Littleton Museum, Littleton Museum Collections Building, and the Bemis Public Library, as well as all work to establish communications to the traffic signal at County Line Rd & Southpark Cir. This includes both infrastructure installation and testing.

Phase 1 of the project shall be completed in full no later than October 1, 2025. This includes installation, testing, and acceptance of all elements of Phase 1. The remaining phases shall be completed in accordance with the calendar days timeframe noted above.

REVISION OF SECTION 101 DEFINITIONS AND TERMS

Section 101 of the Standard Specifications is hereby revised for this project as follows:

Technical Specifications related to construction materials and methods for the Work under this Contract shall consist of the *State Department of Highways, Division of Highways, State of Colorado, Standard Specifications for Road and Bridge Construction* dated 2021.

Certain terms utilized in the Specifications referred to in the paragraph above shall be interpreted to have different meaning within the scope of this Contract. A summary of redefinitions of Subsection 101.02 follows:

Delete subsection 101.09 and replace with the following:

101.09 CDOT Resident Engineer. CDOT Resident Engineer shall mean Engineer.

Delete subsection 101.28 and replace with the following:

101.28 Department. Department shall mean City of Littleton.

Delete subsection 101.29 and replace with the following:

101.29 Engineer. Engineer shall mean the City of Littleton City Traffic Engineer, or his or her designee.

Delete subsection 101.51 and replace with the following:

101.51 Project Engineer. Project Engineer shall mean Engineer.

Delete subsection 101.58 and replace with the following:

101.58 Region Transportation Director. Region Transportation Director shall mean Engineer.

Delete subsection 101.76 and replace with the following:

101.76 State. State shall mean City of Littleton.

Section 101 is hereby revised for this project to include the following:

CDOT. CDOT shall mean City of Littleton.

Section 101 is hereby revised for this project to include the following:

Traffic Engineering Services or TES. Traffic Engineering Services shall mean the City of Littleton.

Section 101 is hereby revised for this project to include the following:

Staff Bridge. Staff Bridge shall mean Engineer.

REVISION OF SECTIONS 102 AND 105 CONTRACTOR SUBMITTALS

Section 102 of the Standard Specifications is hereby revised for this project to include the following:

101.02 Shop Drawings. A general term that includes drawings, diagrams, illustrations, samples, schedules, calculations, and other data which provide details of the construction of the work and details to be used by the Engineer for inspection. Shop drawings shall be prepared by the Contractor, subcontractors, manufacturers, suppliers, or distributors. Shop Drawings are submitted to the Engineer for formal review and returned to the Contractor in accordance with subsection 105.02(c). Shop drawings include data and annotations which illustrate the specific material, equipment, product features, and items which are incorporated.

Section 105 of the Standard Specifications is hereby revised for this project to include the following:

Only submittals applicable to the project are required.

In subsection 105.02, Table 105-1 shall include the following:

Section No.	Description	Type	Contractor P.E. Seal Required?
613	Location marker	Shop Drawing	No
613	Conduit	Show Drawing	No
613	Pull boxes	Shop Drawing	No
614	Fiber optic cable	Shop Drawing	No
614	Termination panels	Shop Drawing	No
614	Patch cables, and connectors	Shop Drawing	No
614	Splice kits	Shop Drawing	No
614	Splice closures	Shop Drawing	No
614	Pre-terminated patch panel and pig tails	Shop Drawing	No

**REVISION OF SECTION 105
COOPERATION BETWEEN
CONTRACTORS**

Section 105 of the Standard Specifications is hereby revised for this project and includes the following:

Subsection 105.12 shall be revised as follows:

The Contractor is hereby advised that other construction projects will be working concurrently within the project limits. The Contractor must cooperate fully with the Engineer's direction regarding coordination of project schedules, traffic control, public information, and any other coordination deemed necessary by the Engineer.

All cost associated with the foregoing requirements shall be incidental to the contract.

REVISION OF SECTION 105 NEW CONSTRUCTION INVENTORY

Section 105 of the Standard Specifications are hereby revised for this project to include the following:

MATERIALS

Subsection 105.02(f), shall include the following:

In addition to standard paper documents, each as-built delivered to the City of Littleton will be accompanied by digital files relating to that submission

1. Digital files to be submitted must be in one of the following formats; in order of preference:
 - a. GIS File
 - i. File Geodatabase (.gdb)
 - ii. Shapefile (.shp)
 - b. AutoCAD to include all reference files, fonts, CTB file, and a layer index describing the data found on each layer

This work consists of the Contractor furnishing as-built documentation to the Engineer including coordinates and tabular data about attributes of newly constructed assets.

Requirements for submission

- Digital files shall be submitted referencing Colorado State Plane (CSP) Coordinates, Central Zone:

Projected Coordinate System: NAD_1983_StatePlane_Colorado_Central_FIPS_0502_Feet

Projection: Lambert_Conformal_Conic

False_Easting: 3000000.00031608

False_Northing: 999999.99999600

Central_Meridian: -105.50000000

Standard_Parallel_1: 38.45000000

Standard_Parallel_2: 39.75000000

Latitude_Of_Origin: 37.83333333

Linear Unit: Foot_US

Geographic Coordinate System: GCS_North_American_1983

Datum: D_North_American_1983

Prime Meridian: Greenwich

Angular Unit: Degree

-2-

REVISION OF SECTION 105 NEW CONSTRUCTION INVENTORY

- File names for plans should include the Project Name, Address, or Development Name followed by type of drawing. File should not contain any space or special characters. Underscores () are acceptable in the file name.
 - Format: [Project Name or Address]_asbuilt.gdb
 - Example: ENG21_0000_asbuilt.gdb
- Data Integrity Requirements
 - Line features should be digitized as continuous solid lines.
 - Polyline features (e.g. building boundaries) should be closed entities (snapped closed at nodes or endpoints).
 - No annotation shall be included in any feature layer and no feature shall be included in any annotation layer. Annotation for each layer shall be placed in annotation layers
 - All errors in the digital submission identified by City staff (such as polygons not properly closing, lines not connecting to features, etc.) must be reviewed and corrected by a licensed professional prior to proceeding with plan/permit processes and permit issuance.

METHOD OF MEASUREMENT

New Construction Inventory will not be measured or paid for separately but will be considered incidental to the items being installed. This work shall include all labor, materials, and equipment required to complete the work.

REVISION OF SECTION 108 DISINCENTIVE FOR OFFLINE ITS DEVICES

Section 108 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

The Contractor is responsible for all CDOT ITS devices and communications infrastructure contained within the limits of this project throughout the duration of the project.

Offline, as used in this specification, is defined as time during which data or video is not being received by a Colorado Operations Center or Traffic Management System Building or if a device is not operating at optimal performance.

CDOT ITS field devices covered under this special provision include, but are not limited to, CCTVs, MVRDs, RWISs, Ramp Meters, Traffic Signals, VMSs, ATRs, RSUs, and VSLs.

All planned outages need to follow the steps outlined in this section under General Instructions for Planned Services.

UNPLANNED ITS OUTAGES

An unplanned outage is considered to be any loss of network communications or device functionality that CDOT ITS did not receive proper advance notice of, as described above, and is due to the Contractor's negligence, and/or act or omission under their control as a result of project activities.

Impacts to ITS Network

If the Contractor damages a CDOT ITS fiber optic backbone, or if CDOT ITS loses communications or power to a node building or operations center as a result of the Contractor's negligence, act or omission under their control, the Contractor shall be charged a disincentive. This first-time network disincentive rate shall be \$1,000 per hour, and an additional \$2,000 per hour for a communications or power outage that results in loss of data and video to a node building or operations center.

- This disincentive rate shall increase to \$2,000 per hour the second time, and an additional \$3,000 per hour for a communications or power outage that results in loss of data and video to a node building or operations center. This increase of \$1,000 per hour will continue for any further outages to the CDOT Network.
- Additionally, the Contractor shall be responsible for any charges involved with investigating such an outage and restoration of the ITS network to full working condition. These disincentive rates are in addition to any costs that may be levied by private utility owners for loss of communications.
- ITS Devices: For unplanned outages or outages where CDOT ITS does not receive advance notification and the outage is a result of project activities, the Contractor shall be charged a disincentive of \$50 per hour for each device that is offline beginning at the time of the outage.

Impacts to Toll Revenue Collection

- Any closures of the Express Lanes, expected delays, or changes to the existing traffic configuration shall be coordinated with the Engineer at least 30 calendar days prior to the
- start of the work. The Express Lanes shall remain uninterrupted at all times during the construction phasing in both directions.
- All tolling equipment and infrastructure for the Express Lanes, including but not limited to license plate cameras, loops, automatic vehicle indicator antennas, variable toll rate message signs, cabinets, fiber communication, and power infrastructure shall remain uninterrupted at all times.

-2-

REVISION OF SECTION 108 DISINCENTIVE FOR OFFLINE ITS DEVICES

- Any impacts to toll revenue collection due to the closure of the Express Lane or disruption to the tolling equipment infrastructure, communication or power shall result in the contractor being assessed a disincentive of \$1,200.00 per hour.

CONSTRUCTION REQUIREMENTS

Anytime Contractor work impacts a CDOT ITS device or system, the Contractor shall notify CDOT ITS immediately upon discovery of an outage. This notice, as well as advanced notices described below for planned outages, shall be provided to CDOT ITS Network Operations Center (NOC) at CDOT_ITS_Support@state.co.us by the Contractor or Project Engineer.

GENERAL INSTRUCTIONS FOR PLANNED SERVICES

All work that is service impacting requires the NOC to be properly notified. Service impacting work includes any work that could impede operation centers or groups of employees from typical job duties. Notification requesters are CDOT employees and project staff including ITS, traffic and specialty crews, temporary employees, contractors, and all other staff performing service impacting work. Notification requesters are responsible to communicate impacts to all customers associated with their planned work. Notifications are required for all work with impacts to any ITS, traffic signals, tunnel devices systems, networks, servers, security, and all other systems used to operate the highways. Requesters are responsible to provide accurate details in their request based on the requirements and process outlined in this document.

Allowable offline periods for all ITS field devices & switches shall be a 48-hour period and allowable offline periods for tolling equipment & switches shall be a 24-hour period. After the allowable offline period has expired disincentive rates will be charged.

No more than two ITS device locations shall be inoperable at any one time unless previously approved by the Engineer and CDOT ITS, specifically for cases where interconnected locations make it impossible to meet this requirement. The Contractor shall carefully ensure that other locations are not made inoperable during work and, if they are, those will be included in the maximum of two offline ITS locations allowed, unless previously approved by the Engineer and CDOT ITS.

For Emergency Requests, the requester must submit all details as soon as possible to the NOC, and the NOC will broadcast the notification within a 1-hour window of receiving the request.

Planned Service Involving ITS Fiber

Requirements to be Included in Planned Work Involving ITS Fiber:

For a standard fiber services request, requesters must submit the following information at least 10 business days in advance from the activity/work date.

- **Title for notification:** displaying a clear message of the purpose or activity.
- **Date and Time:** Need to include the date, as well as the estimated start time and restoral time for the work. Verify work falls into allowable maintenance windows. More information can be found below in the Maintenance Window and Moratorium section.
- **Description of activity:** Describe in detail what work will be taking place and why the work is taking place, project name and number if applicable or if this is maintenance work.
- **Service impact:** Describe in detail what services and devices will be impacted while the work is being performed.

-3-

**REVISION OF SECTION 108
DISINCENTIVE FOR
OFFLINE ITS DEVICES**

- **Who will be affected:** Describe all customers impacted by the work or impact.
- **Location:** Describe all details including highway, direction, and mile marker or an area description from mile marker to mile marker.
- **MESD:** Submit ticket or change number if applicable as well as project name and number, if the notification is for an emergency, you must call the NOC to have a ticket created.
- **Audience:** Who does this notification affect and need to be sent out to?
- **Contact information:** Include your name, organization, email, and phone number. Also include the contact information for the contractor doing the fiber optic work in the field.

Planned Service with Temporary Offline ITS Devices

Requirements to be Included in the Temporary Offline Device Notification:

The following instructions are provided for information to the Contractor. The Contractor shall direct all questions regarding the Temporary Offline ITS Device Notification Form to the Project Engineer. Fill out the [Temporary Offline ITS Device Notification form](#) or email the following information to the Project Engineer and the ITS NOC at least 3 business days in advance of any planned device outage.

The form or email submission must include the following:

- Project Description / Location / Project # / Project Code (SA #)
- Provide this information, typically found on the title sheet of the plans.
- Project Engineer / Project Engineer Contact / Date
- Date the form will be submitted.
- Contractor / Contractor Representative / Contractor Rep Contact #
- Device Type / Highway / Direction / Mile Marker / Description of Device Location / Offline Date / Estimated Down Time / Online Date
- Contractor Notes: Fill in additional information the Contractor would like to communicate with the ITS NOC
- Maintenance Notes: To be filled in as needed by CDOT maintenance personnel.

Requirements to be Included with Planned Service in Node Buildings

The Contractor shall follow Revision 614 Contractor Node Building Entry Procedures when needing to access node buildings as part of their project.

All work involving the nodes power shall follow these requirements:

- NOC will be notified 14 business days in advance to allow CDOT to verify all backup power systems are working properly.
- Work can only be done during the approved maintenance windows.
- Power will be shut down in a responsible sequence that will not harm existing node components.
- All necessary precautions and preparations shall be made and coordinated with CDOT prior to power being turned off.
- Power may not be off for a period of longer than 45 minutes unless specifically authorized by the ITS Branch Manager.

-4-

REVISION OF SECTION 108 DISINCENTIVE FOR OFFLINE ITS DEVICES

Submitting a Request to Notify the NOC of Planned Work

Requesters can submit a request by emailing CDOT_ITS_Support@state.co.us with all of the details above included in the email.

MAINTENANCE WINDOWS AND MORATORIUMS

No work will be allowed to be done outside of maintenance windows or during moratoriums, unless approved by the ITS Branch Manager.

Purpose

The purpose is to document standard practices for maintenance periods for ITS, Traffic, Signals, and Tunnel devices, systems, networks, servers and security, and all other systems used to operate the highways. The CDOT ITS Branch has established a standard maintenance window and moratoriums that apply to all CDOT employees and projects including ITS, traffic and specialty crews, temporary employees, contractors, and all other staff with access to CDOT data centers, nodes, systems, and the fiber backbone.

The intent of a maintenance window and moratoriums is to avoid disrupting the operations of the transportation system, and therefore only allowing service impacting work during low traffic volume periods. Service impacting work includes any work that could impede operations centers or groups of employees from typical job duties.

Maintenance Windows

A maintenance window is defined as a designated time that is appropriate to perform service impacting work.

The established maintenance window is defined as:

- 8:00 pm to 4:00 am Sunday through Thursday (meaning work on a Thursday could begin at 8:00 pm and continue into Friday morning but should end by 4:00am).
- Specifically for planned fiber backbone cutovers the established maintenance window for projects is 9:00 pm to 4:00 am on a Sunday through Wednesday night, excluding holidays.

Moratoriums

A state of moratorium is defined as a designated time frame when all work that directly affects the ITS and Traffic network and systems is suspended. Moratoriums are put into effect to mitigate unplanned outages during holidays when a higher-than-average traffic volume is anticipated. A state of moratorium will be established for the following holidays:

- **Independence Day.** The moratorium will begin 2 business days* prior to the holiday and changes can resume the following business day.
- **Memorial Day.** The moratorium will begin the Thursday* prior to the holiday and changes can resume the following Tuesday.
- **Labor Day.** The moratorium will begin the Thursday* prior to the holiday and changes can resume the following Tuesday.
- **Thanksgiving Day.** The moratorium will begin Friday* prior to Thanksgiving Day and changes can resume the Monday following Thanksgiving Day.
- **Christmas Day and New Years Day.** The moratorium will begin 5 business days* prior to Christmas and changes can resume two business days after the New Year's Day holiday.

*Moratoriums begin at the beginning of the day

-5-

**REVISION OF SECTION 108
DISINCENTIVE FOR
OFFLINE ITS DEVICES**

During the moratorium there will be no changes to switches, routers, servers, fiber, radios or software configurations (production environments), no node or data center access and/or no power work will be performed that impacts the CDOT and ITS Traffic network.

The following work on CDOT systems will not be allowed during a moratorium:

- Access to all node buildings and the data centers.
- All work on switches that are connected to the backbone, plugged into the network or are within a node building or data center.
- Any fiber lateral and/or backbone work, including splicing or access to any pull boxes or manholes where the fiber resides (the only exception is to perform locates to protect the fiber asset) system upgrades, system configurations, firewall changes, or any other changes that have the potential to interrupt the daily operations of CDOT. Field devices can continue to be repaired and maintained during moratorium if the work is isolated to the device, such as fixing pixel boards, cleaning cameras, or resetting a knocked down device.

Exceptions to a Moratorium or Working Outside an Established Maintenance Window

All non-emergency exceptions to the moratorium or maintenance window will have to be approved by the ITS Branch Manager or acting Branch Manager. Any exceptions related to traffic units (signals, ramp meters...) must include the approval of the Region Traffic Engineer. Exceptions must be documented in writing (email) prior to any work occurring. The request for exception must include a scope of work.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

All work, materials, and equipment required to reset, reconfigure, and perform cutover will not be measured and paid for separately, but shall be considered incidental to the work.

This disincentive is not a penalty but is based on costs associated with the disruption of corridor operations, information to the traveling public, and general safety of the traveling public.

There will be no incentive paid for this work.

The disincentive will be deducted from any monies owed to the Contractor for work performed.

In addition to those disincentives described above, the Contractor will be responsible to pay any penalties charged by private utility owners as a result of damage to their facilities.

**REVISION OF SECTION 202
REMOVAL OF FIBER
OPTIC CABLE**

Section 202 of the Standard Specifications is hereby revised as follows:

DESCRIPTION

Subsection 202.01 shall be revised to include the following:

This work consists of the removal and disposal of fiber optic cable.

CONSTRUCTION REQUIREMENTS

Subsection 202.02 shall be revised to include the following:

The Contractor shall remove and dispose of all fiber optic cables which are identified as such on the project. Removal of Fiber Optic Cable pay item shall include removal of fiber optic cable and other incidental materials comprising such item. At locations where the fiber optic cable is being replaced or the existing cabling and materials within the same conduit and infrastructure is not being abandoned, Contractor shall take appropriate precautions and exercise care to avoid damaging any existing cabling and equipment.

METHOD OF MEASUREMENT

Subsection 202.11 shall be revised to include the following:

Removal of Fiber Optic Cable will be measured by the actual lineal feet of cable that is removed and accepted.

BASIS OF PAYMENT

Subsection 202.12 shall be revised to include the following:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Removal of Fiber Optic Cable	Linear Foot

Payment will be full compensation for all labor and materials required to complete the work.

**REVISION OF SECTION 202
REMOVAL OF SIDEWALK**

Section 202 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 202.01 shall include the following:

This work consists of removing concrete sidewalk to facilitate the installation of conduit and pull boxes.

CONSTRUCTION REQUIREMENTS

Subsection 202.01 shall include the following:

Sidewalk shall be removed by saw cut method.

METHOD OF MEASUREMENT

Subsection 202.11 shall include the following:

Removal of Sidewalk shall be measured by the square yard and shall include all labor and materials required to remove and properly dispose of the materials.

BASIS OF PAYMENT

Subsection 202.12 shall include the following:

Payment will be made under:

Pay Item

Removal of Sidewalk

Pay Unit

Square Yard

REVISION OF SECTION 203 POTHOLING

Section 203 of the Standard Specifications is hereby revised for this Project as follows:

CONSTRUCTION REQUIREMENTS

Subsection 203.05 (f) shall be revised to include the following:

All existing utilities shall be potholed at each crossing of the directional bore within the Project limits. Pothole repair shall meet the City of Littleton's standard for street repairs.

METHOD OF MEASUREMENT

Subsection 203.11 (e) shall be revised to include the following:

Labor and Materials required for surface restoration following Potholing activities shall not be measured and paid separately but shall be included in the Work.

BASIS OF PAYMENT

Subsection 203.12 shall be revised to include the following:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Potholing	Hour

**REVISION OF SECTION 212
LANDSCAPE
RESTORATION**

Section 212 of the Standard Specifications is hereby revised for this project as follows:

Subsection 212.03 shall include the following:

The Contractor shall replace any damaged landscape, including topsoil, sod (grass), irrigation system components, trees, shrubs, ground covers and mulch, to its original condition. Sod shall match existing. The Contractor shall coordinate with the Owner at least 5 working days in advance of starting work in the area. With proper and timely notification, the Owner shall mark and identify the irrigation system components. This is no way inclusive of all utilities or all of the irrigation system. No landscape shall be without watering services during the growing season. If the irrigation service is interrupted for more than three days, the Contractor shall be liable to hand/truck water and possibly all plant replacement in the affected landscape. Landscape Restoration shall be considered complete when the landscape and irrigation system is restored to its original condition and approved by the Owner. The Owner shall inspect all repair work to any irrigation components prior to burial and acceptance of said work. The Owner shall provide written acceptance of said work to the Engineer prior to the Engineer approving the work.

BASIS OF PAYEMENT

Subsection 212.08 shall include the following:

Pay Item	Pay Unit
Landscape Restoration	Lump Sum

Payment includes all labor, equipment and materials necessary to complete the work.

**REVISION OF SECTION 250
ENVIRONMENTAL
HEALTH AND SAFETY
MANAGEMENT**

Section 250 of the Standard Specifications is hereby revised for this project as follows:

Subsection 250.01 shall include the following:

Excavation and drilling activities associated with the proposed project may encounter soil and groundwater that may have been impacted by petroleum products or previous releases of hazardous substances. Workers shall be alert during excavations for any visual or olfactory signs of contamination. If soil and/or groundwater contamination is encountered, work will stop immediately and the procedures outlined in the project's material management plan and Section 250 of Standard Specifications for Road and Bridge Construction shall be followed. The Contractor shall be responsible for the required workers' health and safety.

If contaminated groundwater is encountered, all groundwater brought to the surface shall not be directly discharged (or allowed to run off) into a storm sewer, wetlands, ditch, or any waters of the State. The water shall be contained in tanks or drums and properly disposed in accordance with all local, state and federal regulations.

Subsection 250.03 shall include the following:

The Contractor shall prepare and follow the material management plan (MMP) to ensure hazardous materials and contaminated groundwater is handled properly. The MMP shall comply with the CDOT Standard Specifications.

The Contractor shall be responsible for the required worker health and safety and the public in accordance with all applicable local, state and federal regulations. If contaminated soil and/or groundwater are encountered, the Contractor's Health and Safety Officer and/or Monitoring Technician shall be called out to the site to supervise subsurface activities to ensure the safety of workers, as detailed in the CDOT Standard Specification 250 -Environmental, Health and Safety Management and this 250 Standard Specification revision. The City of Littleton will also be contacted.

For proper handling of asbestos-contaminated soil, if any, the Contractor will follow all applicable Solid and Hazardous Waste Regulations and the procedures listed in the project's material management plan (MMP). Asbestos contaminated soil removal must be performed by a Certified Asbestos Inspector (CABI) to determine what, if any, controls must be instituted to allow future activity in the excavation area.

Subsection 250.09 shall include the following:

All work including monitoring, sampling, handling, material disposal and analytical costs (if necessary) will be paid using the Force Account, Environmental Health and Safety Management.

**REVISION OF SECTION 608
CONCRETE SIDEWALK
(6 INCH)**

DESCRIPTION

Subsection 608.01 shall include the following:

This work consists of furnishing and installing concrete sidewalk following conduit or pull box installation.

BASIS OF PAYEMENT

Subsection 608.06 shall include the following:

Payment will be made under:

Pay Item

Concrete Sidewalk (6 Inch)

Pay Unit

Square Yard

REVISION OF SECTION 612 LOCATION MARKER

Section 612 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

Contractor shall furnish and install location markers for identifying fiber optic cable at locations shown on the plans.

MATERIALS

Location Marker (Fiber Optic) (Dome) shall be made of non-conductive high-density polymer, and shall be integrally white in color with an orange cap. All colors shall be stabilized against ultraviolet light such that they will not fade under continuous exposure to direct sunlight and conform to the American Public Works Association (APWA) Uniform Color Code for delineating underground utility lines. The marker shall retain dimensional stability in temperatures ranging from -40° F to 175° F.

The Location Marker (Fiber Optic) (Dome) shall include a label with the designation of "FIBER OPTIC CABLE". The label shall have black lettering on an orange background. The Contractor shall provide the label submittal to the Project Engineer.

CONSTRUCTION REQUIREMENTS

Location Marker (Fiber Optic) (Dome) shall be installed at all Pull Box locations that contain fiber optic cable as noted in the Plans.

METHOD OF MEASUREMENT

Location markers, labels and footing will be measured by the actual number of markers placed and accepted.

BASIS OF PAYMENT

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Location Marker (Fiber Optic) (Dome)	Each

Payment will be full compensation for all work, materials and equipment required to place the markers at the locations shown on the plans, including excavation, backfill, and patching.

REVISION OF SECTION 613 ELECTRICAL CONDUIT

Section 613 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 613.01 shall include the following:

This work consists of furnishing and installing underground conduit by trenched (plastic) and bored methods.

MATERIALS

Subsection 613.02 shall include the following:

The Contractor shall furnish Conduit materials in accordance with the requirements of the CDOT Standard Specifications and Standard Plans.

Where HDPE conduit is installed, and two (2) proposed conduits in a segment are specified in the plans, one conduit shall be orange in color, and the other shall be blue in color. Where one (1) HDPE conduit in a segment is specified in the plans, the conduit shall be orange in color.

CONSTRUCTION REQUIREMENTS

Subsection 613.07 shall include the following:

The Contractor shall install proposed conduit identified as plastic in the plans by open trenching method, unless otherwise approved by the Engineer at a minimum depth of 48 inches.

The Contractor shall install proposed conduit identified in the plans as bored by directional boring method, unless otherwise approved by the Engineer, at a minimum depth of 48 inches.

When bored conduit is specified on the plans, disruption of highway traffic will not be permitted.

Subsurface utility engineering (SUE) investigations were completed in January, 2022 for proposed segments of conduit to be bored. A SUE subset is included in the plans and SUE line work is overlaid on ITS subset.

The Contractor is referred to Revision of Section 105 New Construction Inventory for information specific to the as-built documentation that will be required for this project.

METHOD OF MEASUREMENT

Subsection 613.13 shall include the following:

Conduit will be measured by the actual linear feet of trench installed and shall include all labor and materials required for installation.

BASIS OF PAYMENT

Subsection 613.14 shall include the following:

Payment will be made under:

Pay Item

2 Inch Electrical Conduit (Bored)
2 Inch Electrical Conduit (Plastic)

Pay Unit

Linear Foot
Linear Foot

REVISION OF SECTION 613 PULL BOX

Section 613 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 613.01 shall include the following:

This work consists of furnishing and installing precast fiberglass-reinforced polymer concrete pull boxes at locations shown on the plans or established.

MATERIALS

Subsection 613.02 shall include the following:

Pull boxes in finished areas shall be designed for such installations and shall be stackable and manufactured of a precast fiberglass-reinforced polymer concrete material. Pull boxes shall be designed to support a minimum service load of 20,000 pounds over a 10 inch by 10 inch square. Pull boxes shall be verified by a 3rd Party Nationally Recognized Independent Testing Laboratory as meeting all test provisions of the current edition of the Society of Cable Telecommunications Engineers (SCTE) 77, Specification for Underground Enclosure Integrity, Tier 22 rating. Pull boxes shall be Underwriters Laboratories (UL) listed. Certification documents shall be submitted with material submittals.

Pull boxes 30 inches by 48 inches and larger shall have removable two-piece covers (also referred to as split lids) with a removable metal center support brace. Lid segment weight shall not exceed 100 pounds.

Pull box removable lids shall be provided with a skid-resistant surface and have the words "TRAFFIC" for traffic signal pull boxes and "TRAFFIC COMM" for City fiber optic traffic communications pull boxes physically impressed on their tops. Painting of words shall not be accepted. The cover shall be attached to the pull box body by means of screw-in bolts and shall have two lift slots in each lid to aid in the removal of the lid. Non-standard bolts shall not be used. Lift slots shall be rated for 3,000 pounds.

Pull boxes that are to be in traveled ways shall be outfitted with traffic bearing lids rated for HS 20-44 loads.

CONSTRUCTION REQUIREMENTS

Subsection 613.03 shall include the following:

A pull box shall be installed at locations specified on the plans, and as directed by the Engineer. The Contractor may be permitted to install, at their own expense, any additional pull box that is desired to help facilitate the work, with the approval of the Engineer.

A minimum of 12 inches of ¾ inch granite-gravel shall be installed as a base for the pull box. The granite-gravel shall be free of dirt and debris and spread evenly to facilitate a level base for the pull box. The Contractor shall ensure that sufficient compacting is made prior to the installation of granite-gravel to alleviate future settling. The granite-gravel base shall be covered with woven wire.

Pull boxes shall be installed so that the covers are level with curb or sidewalk grade or level with the surrounding ground when no grade is established. Pull boxes shall not be installed above the grade of the apron. Pull boxes installed on slopes greater than 5:1 shall include a 2 foot leveled area surrounding the apron. The concrete apron shall have a 1 percent slope away from the top of pull box to allow for drainage.

-2-

REVISION OF SECTION 613 PULL BOX

Pull boxes shall not be installed in ADA ramps. The Contractor shall remove and re-construct ADA ramps damaged by the work.

The Contractor shall restore all landscaping and other disturbed surface materials impacted by the work. The Contractor is referred to Section 107.12 Protection and Restoration of Property and Landscape, of the Standard Specifications.

The Contractor is referred to Revision of Section 105 New Construction Inventory for information specific to the as-built documentation that will be required for this project.

METHOD OF MEASUREMENT

Subsection 613.13 shall include the following:

Pull Box will be measured by the actual number of pull boxes installed and accepted, and shall include base, lid(s), center support brace, required wording or graphics on lid, skid-resistance surface, lift slots, stainless steel bolts, excavation, backfill, concrete apron, ¾ inch granite-gravel, and all other equipment and materials necessary to complete the work.

Pull Box (Install Only) will be measured by the actual number installed and accepted, and will include excavation, backfill, ground rod, concrete apron, ¾ inch granite-gravel, and all other equipment and materials necessary to complete the work.

BASIS OF PAYMENT

Subsection 613.14 shall include the following:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Pull Box (24"x36"x24")	Each
Pull Box (30"x48"x24")	Each

REVISION OF SECTION 613 PROOF CONDUIT

Section 613 of the Standard Specifications is hereby revised for this Project as follows:

DESCRIPTION

This work consists of locating, verifying continuity and ability to pull new cable through the conduit, clearing if necessary, and installing pull tape and tracer wire in existing conduit in accordance with the Plans.

MATERIALS

Each conduit shall be equipped with a pull tape installed with or after all cabling for future use. The pull tape shall have a minimum tensile strength of 1800 pounds. The pull tape shall include a continuous 22-gauge tracer wire. Splices in the pull tape and tracer wire may occur inside manholes and pull boxes and shall not be permitted inside conduit. Pull tape shall be installed in conduits with electrical conductors carrying 50V or less.

A minimum 12-gauge tracer wire shall be included in at least one conduit within all conduit banks. The tracer wire shall be orange in color. In conduit banks with multiple conduits, the 12-gauge tracer wire and pull tape shall be installed in the same conduit with the fiber optic cable.

CONSTRUCTION REQUIREMENTS

All conduit and fittings installation shall conform to the NEC.

The contractor shall locate the ends of existing conduit in the field at locations identified on the plans, and the existing conduit shall be cleaned and cleared, and pull tape installed through the conduit.

The Contractor shall immediately notify the Engineer if conduit is found to be damaged, or is damaged during construction activities.

Upon verification of acceptable condition of the existing conduit run, the conduit end shall be immediately sealed using an approved conduit plug.

For existing conduits that contain existing cabling, the contractor shall protect existing cables in place while proofing conduit. Contractor shall be responsible for repairing any damage they cause to existing cabling.

METHOD OF MEASUREMENT

Payment will be made under:

Pay Item

Proof Conduit

Pay Unit

Linear Foot

**REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 614.01 shall include the following:

This work consists of furnishing and installing single mode fiber optic cable, tracer wire, and nylon pull tape into proposed and existing conduit as indicated on the project plans.

MATERIALS

Subsection 614.08 shall include the following:

All fiber optic cables shall be suitable for outdoor conduit installation into underground conduits. Fiber optic cables for installation inside of Littleton facilities shall be indoor/outdoor rated, as described in the Plans.

All fiber optic cable shall have compatible characteristics with other proposed and existing fiber optic cables. All optical cables furnished on this project shall meet the current version and/or revision of the following fiber optic industry standards:

- (a) Electronic Industries Alliance (EIA)-359: Colors for Color Identification and Coding
- (b) International Telecommunications Union – Telecommunications Standardization Sector - Recommendation G.652.D: Characteristics of a Single-Mode Optical Fibre and Cable
- (c) Telecommunications Industry Association (TIA)-598: Optical Fiber Cable Color Coding
- (d) TIA-455: General Requirements for Standard Test Procedures for Optical Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components – Fiber Optic Test Procedures (FOTP) as listed below:
 - 1. FOTP-37 Low and High Temperature Cable/Maximum Bend Radius/Cable Aging
 - 2. FOTP-25 Impact Resistance
 - 3. FOTP-41 Compressive Strength
 - 4. FOTP-85 Cable Twist
 - 5. FOTP-104 Cable Cyclic Flexing
 - 6. FOTP-33 Maximum Tensile Load
 - 7. FOTP-3 Temperature
 - 8. FOTP-98 Cable Freezing
 - 9. FOTP-82 Water Penetration
 - 10. FOTP-81 Compound Drip Temperature
- (e) International Organization for Standardization (ISO) – 9001: Quality Management Systems
- (f) Rural Utilities Service (RUS) PE90a: Minimum Performance Specifications for Fiber Optic Cables
- (g) Telcordia GR-20: Generic Requirements for Optical Fiber and Optical Fiber Cable

All cables shall be new and unused non-armored outdoor cable consisting of non-dispersion shifted, low water peak single-mode fiber strands free of surface imperfections and inclusions. Each single mode fiber strand shall consist of a doped silica core surrounded by a concentric silica cladding. The fiber shall be of matched clad design.

-2-

**REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)**

(a) *Fiber Strands* shall meet the following minimum characteristics:

1. Typical core diameter of $9.0\mu\text{m} \pm 1\mu\text{m}$
2. Cladding Diameter of $125\mu\text{m} \pm 1\mu\text{m}$
3. Core concentricity error: $\leq 0.6\mu\text{m}$
4. Cladding Non-circularity: $\leq 1.0\%$
5. Coating Diameter (Colored): $245 \pm 5\mu\text{m}$
6. Maximum Attenuation (Loose Tube): 0.35 dB/km at 1310 nm wavelength and 0.25 dB/km at 1550 nm wavelength
- Revision of Section 614 Fiber Optic Cable (Single Mode)
7. Mode-Field Diameter: $9.20 \pm 0.30\mu\text{m}$ at 1310 nm wavelength and $10.40 \pm 0.50\mu\text{m}$ at 1550 nm wavelength
8. Attenuation at the Water Peak: 0.32 to 0.34 dB/km at $1383 \pm 3\text{ nm}$ wavelength
9. Cutoff Wavelength: $\leq 1260\text{ nm}$
10. Zero Dispersion Wavelength: 1300 nm to 1324 nm
11. Zero Dispersion Slope: $\leq 0.092\text{ ps} / (\text{nm}^2 * \text{km})$
12. Polarization Mode Dispersion: $\leq 0.06\text{ ps}/\sqrt{\text{km}}$
13. Maximum Polarization Mode Dispersion at 0.01% distribution (PMDq): $0.20\text{ ps}/\sqrt{\text{km}}$
14. Maximum Fiber Dispersion: $\leq 18\text{ ps}/(\text{nm} * \text{km})$ at 1550 nm.
15. Fiber Curl: $\geq 4.0\text{ m}$
16. Proof Tensile Test: 100 kpsi (0.69 GN/m²)
17. The fibers shall not adhere to the inside of the buffer tube.
18. The coating shall be a dual layered, UV cured acrylate applied by the fiber manufacturer. The coating shall be capable of being mechanically stripped with a force of 0.3 to 2.0 lbf.
19. Each single mode fiber strand shall be color coded with distinct and recognizable colors in accordance with the TIA-598.

(b) *Buffer Tubes*

1. Each buffer tube shall contain 12 fiber strands and each lateral fiber cable shall have one buffer tube with 12 fiber strands.
2. Optical fibers shall be placed inside a loose buffer tube.
3. Each buffer tube shall be color coded with distinct and recognizable colors in accordance with TIA-598.
4. If fillers are required, they shall be placed in the inner layer of the fiber optic cable. The color sequences of the buffer tubes shall begin from the inside layer and progress outward.
5. Buffer tube black stripe shall be inlaid in the buffer tube material by means of co-extrusion when required.
6. In buffer tubes containing multiple fibers, the coloring shall be stable during temperature cycling and shall not be subjected to fading or smearing onto each other. Colorings shall not cause fibers to stick together.
7. Each buffer tube shall contain dry water blocking swellable yarns to prevent water from entering the individual buffer tubes. Swellable water blocking material shall be non-nutritive to fungus, electrically non-conductive and homogeneous. It shall be free from dirt and foreign matter and not require cleaning prior to splicing and placement into the splice closure tray. All fiber strands shall be thoroughly cleaned prior to fiber splicing. All dry water blocking material shall be uniformly distributed throughout the buffer tubes.

-3-

**REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)**

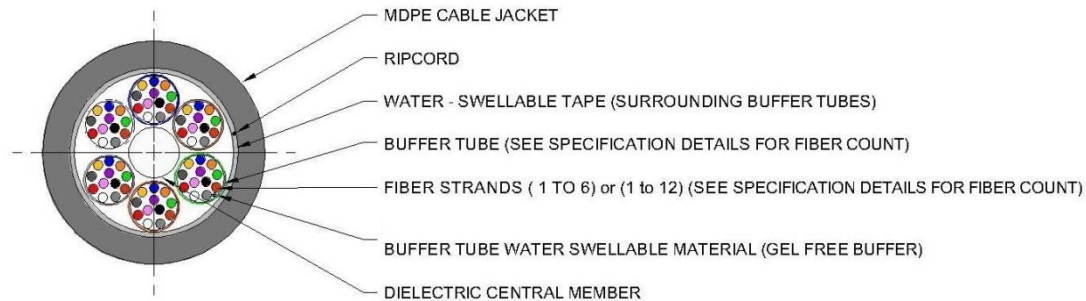
8. Buffer tubes shall be stranded around a central member of the cable using a reverse oscillation stranding process.
9. The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrink back requirements of RUS PE90a.

(c) Fiber Cable

1. Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed and shall not be placed to interrupt the consecutive positioning of the buffer tubes. Fillers shall nominally match the outer diameter of fiber filled buffer tubes.
2. The central anti-buckling member of the cable shall consist of all dielectric, glass reinforced plastic (GRP) rod.
3. For single layer cables, a water swellable, (blocking) tape shall be applied longitudinally around the outside of the buffer tubes and fillers. The tape shall be held in place by a single polyester binder yarn. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter. Water blocking material shall be applied uniformly throughout the fiber cable to inhibit the ingress of water into the cable. Gel filled water-blocking compound shall not be allowed in the cable core interstices of the fiber optic cables.
4. When the fiber cable is provided with dual layer buffer tubes, both the inner and outer layer shall be provided with water swellable tape.
5. Binders shall be applied with sufficient tension to secure the buffer tubes to the central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking, and dielectric with low shrinkage.
6. The cable shall contain at least one ripcord under the sheath for easy sheath removal.
7. Outer cable jacket shall have a consistent thickness throughout the entire cable length and shall be sheathed with medium density polyethylene (MDPE). Jacketing material shall be applied directly over the tensile strength members and water blocking tape. The MDPE jacket material shall be as defined by ASTM D1248, Type II, Category 4 and Grades J4, E7 and E8 and shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.
8. The cable jacket shall be free of holes, splits and blisters and be of a consistent thickness.
9. Cable jackets shall be marked with the manufacturer's name, sequential foot markings, fiber type and count, month and year of manufacture and a telecommunication handset symbol, as required by Section 350G of the National Electrical Safety Code (NESC). The actual length of the cable shall be within 0 to 1 percent of the length markings. The marking shall be in contrasting color to the cable jacket. The height of the marking shall be easily readable.
10. The Contractor shall submit to the Project Engineer a detailed fiber optic cable specification sheet from the manufacturer for approval. The specification sheet shall be highlighted describing the water blocking material used for both the cable interstices and buffer tubes. Failure to fully describe the type of water blocking material shall result in the submittal being rejected and resubmitted with all highlighted information.
11. The diameter of the fiber optic cables shall not exceed 0.50 inch for 12 single mode fibers and 24 single mode fibers; 0.70 inch for 144 single mode fibers; and 0.85 inch for 432 single mode fibers.
12. The weight of the fiber optic cables shall not exceed 65 pounds/1,000 feet for 12 single mode fibers and 24 single mode fibers; 125 pounds/1,000 feet for 144 single mode fibers; and 175 pounds/1,000 feet for 432 single mode fibers.
13. The maximum working tension of the fiber optic cable shall be 600 lbf.

-4-

**REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)**



Specification Detail 1

Typical Cross Section of Fiber Optic Cable to Be Provided Per This Specification
(Source: CDOT)

- (d) *Environmental Parameters:* The following minimum environmental parameters shall be met.
 1. Shipping, storage and operating temperature range of the cable shall be; -40°F to +158°F (-40°C to +70°C)
 2. Operating temperature range of the cable shall be; -40°F to +158°F (-40°C to +70°C)
 3. Installation temperature range of the cable shall be; -22°F to +140°F (-30°C to +60°C)
- (e) *Quality Assurance:* The following minimum quality assurance requirements shall be met.
 1. All optical fibers shall be 100 percent attenuation tested in accordance with Revision of Section 614 – Test Fiber Optic Cable. The attenuation of each fiber shall be provided with each cable reel.
 2. The cable manufacturer shall be ISO 9001 or TL 9000 registered.
- (f) *Packaging:* The following minimum packaging parameters shall be met.
 1. The complete cable shall be packaged for shipment on non-returnable wooden reels.
 2. Top and bottom ends of the cable shall be available for testing.
 3. Both ends of the cable shall be sealed to prevent the ingress of moisture.
 4. Each reel shall have a weatherproof reel tag attached identifying the reel and cable.
 5. Each cable shall be accompanied by a cable data sheet that contains significant information on the cable.
 6. The cable reels shall not be stored nor shipped on their sides.
- (g) *Tracer Wire and Pull Tape*
 1. The pull tape shall be a flat, woven, polyester tape with an insulated metallic conductor (tracer wire) interwoven within the tape.
 2. It shall be lubricated to reduce friction.
 3. It shall be durably printed with sequential footage markings.
 4. It shall have a minimum tensile strength of 900 pounds.
 5. The metallic conductor (tracer wire) shall be a minimum #12 AWG tin coated solid copper with an extrusion friendly copolymer insulation.
- (h) *Patch Cables* shall meet the following parameters:
 1. It shall be single mode fiber optic cable
 2. It shall be pre-connectorized duplex patch cables with LC connectors
 3. It shall have a polyurethane jacket

-5-

**REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)**

CONSTRUCTION REQUIREMENTS

Subsection 614.10 shall include the following:

Fiber optic cable shall be used for either main backbone cable or lateral cables that connect to communications cabinets and facilities. Splicing shall be conducted at splice locations shown on the Plans or as approved by the Engineer.

A minimum of one week prior to fiber optic work, the Contractor shall give the Engineer a detailed installation and splicing Method Statement and schedule. All installation, splicing, termination, and testing shall be listed on the schedule and Method Statement and revisions shall be re-submitted to the Engineer immediately. Installation of the fiber optic cable shall not be permitted until the Method Statement and schedule has been approved by the Engineer.

The Contractor shall be responsible for coordinating with third parties when installing and splicing proposed fiber optic cable adjacent to existing third party owned fiber optic infrastructure and when splicing proposed fiber optic cable to existing third party owned fiber optic cable. The Contractor shall keep the Project Engineer apprised of all coordination activities it performs with third parties as it pertains to this project.

The Contractor shall provide the Engineer with two copies of the cable manufacturer's installation instructions for all fiber optic cable. All installations shall be in accordance with the manufacturer's recommendations except as otherwise directed by the Engineer. All additional costs including fiber optic cable associated to damages caused by the Contractor's neglect of recommended procedures shall be the Contractor's responsibility.

Fiber optic cable including both backbone and lateral cables shall be installed in continuous runs as shown on the project plans. If cable end splices are not shown on the project plans, the Contractor shall include a detailed installation plan with the Method Statement showing cable installation lengths and cable end splice points. The fiber cable shall be installed in reel lengths that minimize the quantity of cable end splices. Under no conditions shall fiber optic cable be cut or spliced at intermediate points without express written direction from the Engineer.

The new fiber cable shall be installed in a manner which does not interfere with the integrity of existing cable and equipment and shall be installed in a manner which does not interfere with the maintenance of the traffic signal cable, wiring or equipment.

Blowing cable is an acceptable alternative to pulling cable. If the Contractor chooses to use this method, submittals for cable installation shall be submitted along with complete information on fiber installation equipment.

The maximum pulling tension shall be 600 pounds (2700 N) during installation (short term) and 200 pounds (890 N) long term installed.

All cables shall have a minimum bending radius based on the diameter of the cable and shall meet the following:

- (a) Under max pulling tension – 20 (Twenty times the cable outside diameter)
- (b) Unloaded, not under tension – 10 (Ten times the cable outside diameter)

-6-

**REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)**

The fiber optic cable shall be installed in the conduit with a split-mesh cable grip to provide a firm hold on the exterior covering of the cable.

The manufacturer's recommended maximum allowable pull tension for cable pull lengths shall not be exceeded. The Contractor shall use a pulley system with a numerical readout indicating the cable tension. The pulley system shall be capable of alerting the installer when the cable pulling tension approaches the manufacturer's maximum allowable tension. The Contractor may supplement this procedure with a breakaway tension limiter set below the lowest recommended tensile limit of the cables being pulled. Intermediate pulleys shall be used at all pull boxes or manholes along the installation run to prevent cable damage.

If cable installation limits are met and the entire length cannot be installed completely from the shipping reel, installation shall be continued from the mid-point of the run. The Contractor shall first pull one-half of the cable from the reel at the mid-point through the conduit to one end of the run. The other half of the cable shall be removed from the reel and carefully placed on the ground in a figure eight pattern with a minimum loop diameter of 10 feet. While installing the remaining cable, care shall be taken to avoid dragging against the ground resulting in damage or excess bending of the cable. The Contractor shall not kink, twist or bend the cable during installation coiling and uncoiling.

The cable shall be continuously lubricated as it enters the conduit. The Contractor shall only use pulling lubricants recommended by the cable manufacturer. Liquid detergent shall not be used.

The Contractor shall furnish and install a pre-lubricated pull tape and tracer wire in the same conduit as the fiber is being installed. Spare pull tape and tracer wire shall remain in conduits after the installation of fiber for locating purposes and for future cable installations. Splicing of the pull tape and tracer wire, for continuity purposes, shall conform to the requirements of the pull tape manufacturer.

If the Contractor must install new cable in conduits that contain existing fiber optic cable or electrical wiring, the Contractor shall be responsible for all damage to the existing cables and wires. After this installation the Contractor shall perform a functional test of all the equipment connected by the existing fiber cables and electrical wiring to ensure proper working conditions. All costs associated with equipment testing and repairs shall be included in the cost of the fiber optic cable.

If an existing fiber optic cable is damaged during construction, it shall be removed from both points of termination and replaced, at no cost to the project.

In no case shall the conduit fill ratio of new conduit exceed the requirements of the National Electrical Code.

Lateral cables shall be installed in continuous runs from the backbone splice location to the communications cabinet. Odd length cables and reel ends are acceptable for lateral cables provided they are pre-tested and free of defects and are of sufficient lengths to achieve continuous runs.

Contractor shall furnish and install fiber optic cable slack coils as noted on the plans. A minimum of three strain relief locations within the traffic signal cabinet, as noted on the plans.

All fiber optic cables shall include identification labels attached to the cable in each pull box, manhole and communications cabinet. The label shall be provided with information reading the next location the cable can be accessed, including cable strand count, location name or description, type of access (box, cabinet) approximate distance, and general direction. Example notes include "96F S ~450 FT TO SPLICE IN BOX @ SWC" or "432F N ~1200 FT TO BOX @ NWC DWY".

-7-
REVISION OF SECTION 614
FIBER OPTIC CABLE
(SINGLE MODE)

The Contractor shall furnish and install fiber optic cable slack coils as noted on the plans, unless otherwise directed by the Engineer.

Backbone and lateral buffer tubes and fiber strands shall be labeled on the splice tray prior to sealing of the closure or splice tray in the fiber optic termination panel. The Contractor shall ensure that all cable coils and splice closures are attached separately to the cable management hardware inside manholes in a manner which will allow for all splice closures to be removed separately for future maintenance purposes. In Pull Boxes, all cable coils shall be attached separately to the cable management hardware in a manner which allows for fiber optic cable to be removed separately.

The Contractor shall splice the lateral cable to pre-connectorized pigtails and install the connectors to the existing bulkheads within the existing termination panel at the traffic signal controller cabinet, as shown on the plans.

The Contractor shall submit a final documentation package. The final documentation package shall include the cable manufacturer's installation procedures, technical support documentation and material documentation. These documents shall match the original submittals provided to the Engineer.

The Contractor is referred to Revision of Section 105 New Construction Inventory for information specific to the as-built documentation that will be required for this project.

METHOD OF MEASUREMENT

Subsection 614.13 shall include the following:

Fiber Optic Cable shall be measured by the linear foot for both backbone and lateral cable and shall include all labor and materials required to install the cable to make a complete and operational system, including the following items:

- (a) All associated materials, including pull tape, tracer wire, patch cables, splice closures, trays, and ancillary materials, including labor to install.
- (b) Identification labels for backbone fiber and lateral fiber cables in each pull box, manhole, field cabinet, and network facility.
- (c) Fiber optic testing and documentation of results, as required in Revision of Section 614 Test Fiber Optic Cable.
- (d) Method statement and final documentation package.

BASIS OF PAYMENT

Subsection 614.14 shall include the following:

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Indoor/Outdoor Fiber Optic Cable (Single Mode) (24 Strands)	Linear Foot
Indoor/Outdoor Fiber Optic Cable (Single Mode) (144 Strands)	Linear Foot
Fiber Optic Cable (Single Mode) (96 Strands)	Linear Foot
Fiber Optic Cable (Single Mode) (432 Strands)	Linear Foot

12-strand fiber optic laterals will be paid for separately under Revision of Section 614 – 12 Port Pre-Terminated Patch Panel and Pigtail

Testing fiber optic cable shall be measured and paid for separately. See Revision of Section 614 – Test Fiber Optic Cable project special provision.

**REVISION OF SECTION 614
BUFFER TUBE FAN OUT
KIT**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

For this project, the Buffer Tube Fan Out Kit shall be furnished and installed at Littleton facilities where new fiber optic cables will be terminated, as shown on the Plans.

MATERIALS

Buffer Tube Fan Out Kits shall match the number of fiber strands in the lateral fiber optic cable being terminated. Buffer tube fan-out kits shall be compatible with the fiber optic cable being terminated and shall be color-coded to match the lateral fiber strand color. Fan out kit buffer tubes shall be 900 um. The buffer tube fan out kit fiber strand length shall be sufficient for routing and placement in the termination panel.

CONSTRUCTION REQUIREMENTS

The Contractor shall install fiber optic buffer tube fan out kits on the new fiber optic cables into City of Littleton facilities, as shown in the Plans. The Contractor shall install fanned out cables on the ends of the fiber cable strands. Buffer tubes for lateral fiber strands shall be neatly coiled and secured within the field termination panels. Taping or leaving the buffer tubes unmanaged shall not be allowed.

BASIS OF PAYMENT

Payment will be made under:

Pay Item

Buffer Tube Fan Out Kit

Pay Unit

Each

Payment will be full compensation for all labor, materials and equipment required to complete the work.

**REVISION OF SECTION 614
FIBER OPTIC TERMINATION
PANEL**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of furnishing and installing fiber optic termination panels for single mode fiber optic cables in City of Littleton facilities where new fiber optic cables are being terminated, as shown in the Plans.

MATERIALS

All termination panels shall be manufactured using aluminum and shall be finished with a powder coat finish. The termination panels shall accommodate lateral fiber optic cables as shown on the plans. All termination panels at field device locations shall be equipped with six port Straight Tip (ST) type bulkheads and be compliant with the 2010 Edition of Telcordia Technologies Generic Requirement (GR) GR-326 *Generic Requirements for Single Mode Optical Connectors and Jumper Assemblies*. The manufacturer shall perform acceptance testing for insertion loss and return loss with the test certification provided with each patch panel.

All termination panels shall have a labeling scheme that complies with details as shown on the plans.

All termination panels shall be compatible with the fiber optic cable being terminated.

24 port, 48 port, and 144 port termination panels for lateral fiber optic cables shall be provided to accommodate 24 ports, 48 ports, and 144 ports, respectively. Termination panels shall be compatible with a 19-inch equipment rack. The panels shall be provided with six port ST type bulkheads. Terminations within the patch panel shall be polished with an Ultra Physical Contact (UPC) finish. The panel shall be provided with covers for the remaining spaces. The termination panel shall have a slide out interior.

Bulkheads in all termination panels shall be metal. Plastic bulkheads will not be accepted.

CONSTRUCTION REQUIREMENTS

Termination panels shall be mounted in locations that allow for ease of access and shall not interfere with maintenance of the internal equipment. Termination panels shall be installed in 19-inch equipment racks.

Fiber terminations shall be as shown on the plans. The Contractor shall field terminate ST type bulkhead connectors on the ends of the lateral fiber cable strands and install them on the back side of the termination panel. The terminated connectors shall be nickel-plated with a ceramic ferrule and shall be polished with a UPC finish. Buffer tube fan out kits shall be paid for in accordance with the Revision of Section 614 – Buffer Tube Fan Out Kit.

All fiber terminations/splices for proposed patch panels shall be completed by the Contractor.

Instead of field terminating and polishing lateral fiber optic cables, the Contractor may use a single mode fiber pigtail that is factory terminated on 12 port ST type bulkhead and fusion splice the pigtail to the lateral fiber optic cable. If this method is used, the termination panel shall be sized and configured to accommodate splicing of the pigtail.

The Contractor shall use proper strain relief inside the termination panel for the fiber cable and fiber fan out strands per the manufacturer's recommendations. The use of tape to secure the individual fanned out strands to the bottom of the termination panel shall not be allowed. The Contractor shall allow enough slack in the terminated fiber to allow for opening and closing the termination panel without disturbing the terminated fiber.

All hardware shall be installed in accordance with manufacturer's recommendations. Method of Measurement

-2-

**REVISION OF SECTION 614
FIBER OPTIC TERMINATION
PANEL**

METHOD OF MEASUREMENT

Fiber Optic Termination Panels will be measured by the actual number of fiber optic termination panels installed and accepted and shall include all bulkheads, field terminations/splices for both proposed and existing termination panels, covers for empty bulkhead entries, labeling panels and all materials, hardware, labor and equipment necessary to complete the work.

BASIS OF PAYMENT

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Fiber Optic Termination Panel (24 Fiber)	Each
Fiber Optic Termination Panel (48 Fiber)	Each
Fiber Optic Termination Panel (144 Fiber)	Each

**REVISION OF SECTION 614
ETHERNET SWITCH
(INSTALL ONLY)**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of the installation of an Ethernet Switch in traffic signal controller cabinets as shown in the Plans. Ethernet switches will be furnished by the City and will be stored at the City of Littleton Public Works Street Maintenance facility located at 1800 W. Belleview Ave., Littleton, CO 80120. The Contractor shall notify the City Public Works a minimum of 48 hours prior to picking up the Ethernet switch.

MATERIALS

The Contractor shall install the Ethernet switch furnished by the City. The Contractor shall coordinate all testing and installation procedures with the City of Littleton's Traffic Analyst. The Contractor shall contact Tim Weaver at 303-795-3834 for all testing and installation requirements.

The Ethernet Switch shall be installed in accordance with the details shown in the Plans and in accordance with manufacturer's recommendations.

Each Ethernet switch SFP port shall be populated with single mode SFP transceiver(s) as required by the switch manufacturer. Optical attenuators shall be required if they are necessary to reduce optical signal power to a receive level specified for the SFP transceivers based on the transmission loss of the corresponding link. SFP transceivers and optical attenuators shall not be paid for separately, but shall be included in the cost of the Ethernet Switch (Install Only) item.

At Ethernet Switch locations the Contractor shall provide patch cables for the connection of the Ethernet switch to the fiber optic patch panel per the Revision of Section 614 Fiber Optic Pre-connectorized Cable. The cable shall be a duplex cable, in lengths sufficient to span from the switch to the patch panel with a maximum of two feet of slack. Connectors shall match both the switch SFP module and the proposed patch panels. This shall not be paid for separately, but shall be included in the cost of the Ethernet Switch (Install Only) item.

CONSTRUCTION REQUIREMENTS

If for any reason the switch or any associated device modules are defective or are damaged by the Contractor, the item shall be removed and replaced at no additional cost to the project.

All associated hardware and software not listed in this specification that is required for a complete installation and shall be considered subsidiary and shall be included as part of the work.

The Contractor shall ground the Ethernet Switch per manufacturer recommendations.

METHOD OF MEASUREMENT

Ethernet Switch (Install Only) shall be measured by the actual number of switches accepted and installed and shall include all labor and materials required to install the switch to make a complete and operational system, including cabling, connectors, and optics.

BASIS OF PAYMENT

Payment will be made under:

Pay Item

Ethernet Switch (Install Only)

Pay Unit

Each

**REVISION OF SECTION 614
12 PORT PRE-
TERMINATED PATCH
PANEL AND PIGTAIL**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of furnishing and installing factory terminated fiber distribution units between proposed splice points and field communications cabinets as indicated on the project plans.

MATERIALS

Pre-terminated patch panel and pigtails shall utilize single mode fiber that meets the requirements outlined in Revision of Section 614 – Fiber Optic Cable (Single Mode). They shall have a 12 strand fiber count, a loose-tube cable type, and be compatible with all other single mode fiber optic cables being utilized on the project. The cable tail shall have a minimum tensile strength of 50 pounds, and a maximum attenuation of 0.4 dB/km when measured at 1310nm. The cable tail shall be of sufficient length to be installed through existing or proposed conduit between the field communications cabinet and the fiber optic splice point, including coiling, as noted in the Plans.

The patch panel end of the unit shall be equipped with 12 Straight Tip (ST) type connectors configured in a total of six rows (or “steps”) with two connectors per row. Connectors shall have a typical insertion loss of no more than 0.2 dB per connector, with a maximum insertion loss of 0.4 dB. The connectors shall be tested for a minimum of 500 matings resulting in no more than 0.2 dB change in insertion loss. Patch panel dimensions shall not exceed 1.75 inches wide × 13.1 inches long × 1.75 inches deep. The patch panel shall be capable of being wall mounted or mounted to a standard equipment rack or DIN rails.

All components shall be rated for outdoor use and have an operating temperature of -40°F to 158°F (-40°C to +70°C).

CONSTRUCTION REQUIREMENTS

The patch panel end of the unit shall be installed in the field communications cabinet, and the fiber optic tail shall be pulled through existing or proposed conduit to the proposed splice point, as indicated on the Plans. The patch panel shall be mounted in the field communications cabinet in the orientation best suited for the space available in the cabinets and to prevent damage to cabling and connectors when the cabinet door is closed. All installation shall conform to the manufacturer’s assembly and mounting requirements.

METHOD OF MEASUREMENT

12 Port Pre-terminated Patch Panel and Pigtail will be measured by the actual number of units installed and accepted. This shall include the length of the fiber optic tail from splice point to communications cabinet including required coiling length, as well as all mounting hardware, and all other materials, hardware, labor, and equipment necessary to complete the work.

BASIS OF PAYMENT

Payment will be made under:

Pay Item	Pay Unit
12 Port Pre-terminated Patch Panel and Pigtail	Each

REVISION OF SECTION 614 FIBER OPTIC SPLICE CLOSURE

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This item includes installing fiber optic splice closures and performing splicing of both fiber optic backbone and fiber optic lateral cables at locations shown on the plans.

MATERIALS

The fiber optic splice closures shall be furnished and installed by the Contractor.

The splice closures shall be dome type and shall meet the following minimum requirements:

- (1) The closures shall seal, anchor and protect fiber optic cable splices.
- (2) The closures shall have a minimum of six total cable entries.
- (3) The closures shall be suitable for underground applications and shall be corrosion resistant, watertight and airtight.
- (4) The closure splice trays shall have a hinged design with an upright locking mechanism for all splice trays.
- (5) The closures shall have a sealing design that does not require glue, sealant, or new cable seals to re-enter the closure.
- (6) The closure shall be bonded inside and outside and have an external ground lug
- (7) The Contractor shall include all necessary accessories to complete splicing.
- (8) The Contractor shall include all mounting hardware.
- (9) The splice closure shall comply with Telcordia Generic Requirement (GR) GR-771.

The closures shall be sized to provide a capacity of twice the total number of strands for all cables entering the closure.

CONSTRUCTION REQUIREMENTS

The Contractor shall notify the Project Engineer of proposed daily splicing locations two business days prior to splicing and also the morning of proposed splicing. The Contractor shall contact the Project Engineer at least four hours prior to sealing the closure to allow inspection.

If the Project Engineer cannot be on site to inspect the open splice closure, a minimum of eight digital pictures shall be taken at varying angles of the interior of the splice closure showing all completed work as stated in this specification and shown on the Project Detail Sheet. The pictures shall include exposed fiber stands (both spliced and uncut) in all splice trays, fiber tray labeling and remaining buffer tubes showing appropriate coiling. One picture shall also include the complete re-assembly of all interior parts prior to final sealing. Once the closure and fiber coils are installed in the pull box, two pictures shall be taken showing the final installation of both the closure and the coiled fiber cable attached to the fiber management hardware. All pictures shall be organized per location and shall be submitted to the Project Engineer along with all final testing result documentation.

All splices shall be performed using the fusion splicing method. The fusion splicer shall be calibrated and certified at least once within the previous year from this project. The Contractor shall present all certification documentation to the Project Engineer prior to start of fiber splicing.

The optical fibers shall be fusion spliced and shall meet the requirements in the Revision of Section 614 – Test Fiber Optic Cable.

-2-
REVISION OF SECTION 614
FIBER OPTIC SPLICE
CLOSURE

The Contractor shall label each individual splice and buffer tube in all splice trays per the Project Detail Sheet included on the plans.

The Contractor shall cut and splice only those fiber strands shown to be spliced on the fiber splicing plan sheets. All unused buffer tubes and fiber strands shall remain uncut. After the fiber cable and proposed buffer tube is prepped for splicing, designated fiber strands in the buffer tube shall be cleaned in preparation for splicing. All uncut fiber strands shall be coiled in the tray. Remaining buffer tubes shall be neatly coiled, secured and stored in the storage area within the closure under the splice trays per the manufacturer's recommendations. Buffer tubes proposed for splicing shall be wrapped and secured to the splice tray with ties per the manufacturer's recommendations.

Bare fiber strands shall not be taped to the splice tray.

All fiber optic cables shall be secured and sealed at the closure entrances. All unused cable entries shall be plugged using an approved product from the manufacturer of the splice closure.

If the closure requires re-entry, it shall be conducted per the manufacturer's recommendation for re-entry and resealing. The Contractor shall use caution to prevent damage to the existing fiber strands, splices, and buffer tubes inside the splice closure. When sealing the closure for a second time, the Contractor shall follow all re-entry requirements of the manufacturer.

The Contractor shall ensure that the fiber optic splice closures and associated fiber cable coils fit adequately within the pull box splice locations shown on the plans, and shall securely mount the splice enclosure to the side of the pull box if shown on the project plans.

METHOD OF MEASUREMENT

Fiber Optic Splice Closure will be measured by the actual number of units installed and accepted. This shall include all materials, hardware, labor, and equipment necessary to complete the work.

BASIS OF PAYMENT

Payment will be made under:

Pay Item	Pay Unit
Splice Enclosure	Each

REVISION OF SECTION 614 FIBER OPTIC FUSION SPLICE

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 614.01 shall include the following:

This work consists of performing fiber optic fusion splices as shown in the plans for each location.

MATERIALS

Subsection 614.08 shall include the following:

The Contractor shall furnish and install all materials required to complete the proposed Fiber Splice(s) and Proposed Fiber Splice(s) (Special) work shown on the plans, including all required splice kits, connectors and pigtails, adapters, jumpers, pigtails, ancillary hardware, calibrated splicing equipment and labor to perform the required work at locations shown on the plans and as directed by the Engineer.

Approximate fiber optic fusion splicing quantities are summarized in the plans.

CONSTRUCTION REQUIREMENTS

Subsection 614.10 shall include the following:

The Contractor will not be required to confirm that actual splice configurations match the plans, but will be permitted, upon written approval from the Engineer, to re-enter existing project splice closures, at the Contractor's expense, to confirm information.

The Contractor shall provide a minimum of one (1) business day advance notice prior to re-entering any existing splice closures. In the case of splice closures that are not owned by the City of Littleton, the Contractor shall also provide a minimum of one (1) business day advance notice to the splice closure owner, prior to re-entering the splice closure. The Contractor shall provide the advance notice for re-entry into any project splice closure, regardless of when and by whom the splice closure was installed. If an advance notice period is also called for on the plans, the longer advance notice period shall apply, in case of discrepancy.

Fiber Optic Fusion Splices shall be conducted at cable end splice locations and mid-sheath splice locations shown on the plans, or as approved by the Engineer, except as noted herein.

All optical fiber splicing shall be performed using the fusion splicing technique, and according to the latest version of the manufacturer's cable installation procedures; industry accepted installation standards, codes, and practices; or as directed by the Engineer.

All optical fiber splicing shall be performed in accordance with these specifications and conforming to EIA/TIA standards.

A fusion splice machine shall be used to splice all optical fiber. All splicing equipment shall be cleaned and calibrated according to the manufacturer's recommendations prior to each splicing session at each location. Fiber optic strands exposed for splicing shall be cleaned of all gels and foreign materials with appropriate cleaning solvents or materials.

-2-

**REVISION OF SECTION 614
FIBER OPTIC FUSION
SPLICE**

All splices shall match fiber and buffer tube colors as shown in the plans. Where a fiber cable is to be accessed for lateral or drop signal insertion, only the buffer tube containing the fiber to be accessed shall be opened and only the actual fiber to be accessed shall be cut. If a fiber end is not intended for use, the fiber shall be cut to a length equal to that of the fiber to be used and neatly laid into the splice tray. Pre-severed main backbone fibers shall be spliced to provide continuity to by-passed strands. The backbone fiber optic cable strand not being utilized for a lateral connection shall not be severed in any splice enclosures.

Any fibers exposed during splicing shall be treated with a protective coating and placed in a protective sleeve or housing to protect the fiber from damage or contaminants.

All splices shall be arc fusion spliced, and the ends shall be cleaved with a precision cleaver to create perpendicular ends. Fiber preparation prior to splicing shall include cleaning, cleaving, stripping, and polishing.

The Contractor shall test all optical fiber strands for loss across the splice in accordance to "Revision of Section 614 Test Fiber Optic Cable

All splices shall be enclosed within a splice closure or a splice tray, as approved by the Engineer.

BASIS OF PAYMENT

Subsection 614.14 shall include the following:

The cost of all labor and materials required for fiber optic fusion splice(s) will not be paid for separately, but shall be included in the cost of the fiber optic cable being spliced. This shall include all labor and materials required to splice fiber optic cables, as shown on the plans and described in this specification, including adjustments to splice configurations described herein to maintain network connectivity.

REVISION OF SECTION 614 TEST FIBER OPTIC CABLE

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 614.01 shall include the following:

This work shall consist of testing both new cable and existing fiber optic cable, including bi-directional OTDR tests and optical power meter tests both before and after proposed fiber optic work, from terminated and bare ends, from field and building locations throughout City.

MATERIALS

Subsection 614.08 shall include the following:

The guidelines for fiber optic cable testing include:

Test jumpers and patch cords must be of the same fiber core size and connector type as the cable system.

The light source and OTDR must operate with the range of 1310 nm and 1550 nm for testing in accordance with TIA-526-7.

The power meter and the light source must be set to the same wavelength during testing.

The OTDR shall be calibrated within the past 24 months and in accordance with the requirements of TIA/EIA-455-226. The power meter shall be calibrated within the past 24 months and traceable to the National Institute of Standards and Technology (NIST).

The following items are required to perform fiber optic cable tests:

- (a) an OTDR;
- (b) a test reel, if necessary;
- (c) a light source at the appropriate wavelength;
- (d) Optical Power Measurement Equipment; and
- (e) Test Jumpers as specified below.
 - 1. CPR Test Jumper-1 and Test Jumper-2 shall be 1-5 meters long with connectors compatible with the light source and power meter and have the same fiber construction as the link segment being tested.

CONSTRUCTION REQUIREMENTS

Subsection 614.10 shall include the following:

- (a) *Contractor Access to Network Facilities*

The Contractor's personnel may be required to complete background checks for short term access into secure network facilities required to complete the fiber optic testing within City facilities.

- (b) *Optical Fiber Cable Testing with OTDR*

The Contractor shall perform an OTDR test of all fibers in all tubes on the reel prior to installation of the fiber. The test results shall be supplied to the Engineer prior to installation of the cable.

-2-

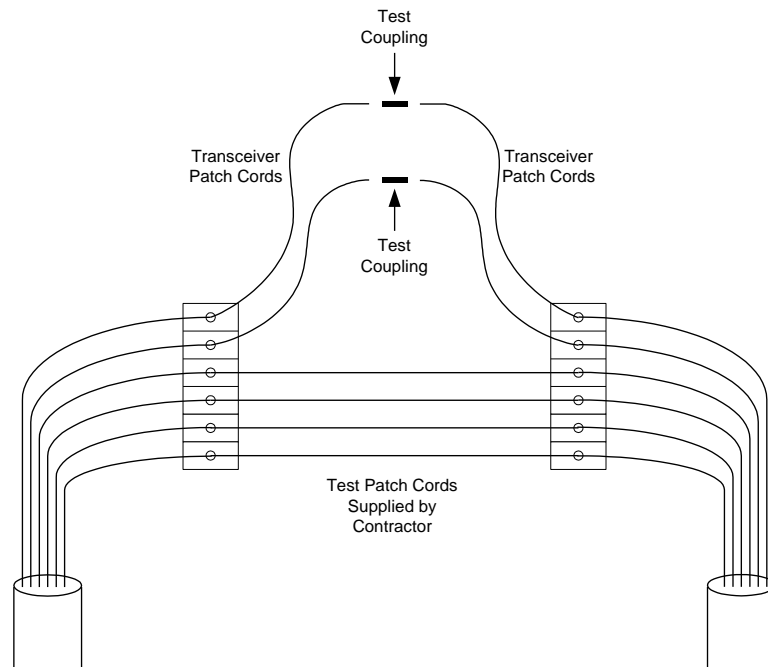
REVISION OF SECTION 614 **TEST FIBER OPTIC CABLE**

The Contractor shall test fiber optic cable prior to installation. Any cable damaged to any part of the end-to-end system, during construction and acceptance testing, shall be replaced at the Contractor's expense.

The Contractor shall perform OTDR fiber testing on all fibers in the completed end-to-end system. The Contractor shall also perform OTDR fiber testing for each existing end of the existing unused fiber strands. Testing shall consist of a bi-directional end-to-end OTDR trace performed per TIA -455-61. The system margin loss measurements shall be provided at 1310 and 1550nm.

If the Plans require installation of a fiber optic patch panel, the Contractor shall supply patch cords to patch all terminated fibers through the panel for all fiber testing. If patch cords are specified in the Plans for final equipment installation, these patch cords shall be connected using a test coupling for the end-to-end test.

If the City's existing dark fibers will be utilized on a project, the Contractor should perform OTDR fiber testing on these existing dark fibers prior to the commencement of any work to ensure that this infrastructure is not damaged and in good working order. If the Contractor opts not to perform the OTDR fiber testing on existing dark fibers prior to the initiation of any work, the Contractor shall be responsible for any dark fiber that is found to be damaged after final OTDR testing is performed and shall replace or repair the damaged dark fiber as approved by the Engineer.



-3-

**REVISION OF SECTION 614
TEST FIBER OPTIC CABLE**

OTDR readings will be used to ensure proper installation, to troubleshoot faults, and to diagnose any damage caused to the fibers. OTDR signature traces will be used for documentation and maintenance. For fibers that are identified in the Plans to be left non-terminated, an OTDR shall be used to test end-to-end attenuation.

Loss numbers for the installed link shall be calculated by taking the sum of the bi-directional measurements and dividing that sum by two.

The Contractor shall use an OTDR that is capable of storing traces electronically and shall save each final trace.

To ensure the traces identify the end points of the fiber under test and the fiber designation, the Contractor shall use a test reel, if required, to eliminate the “dead zone” at the start of the trace so that the start of the fiber under test can be identified on the trace. Indicate the length of the test reel for all test results.

If the fiber designation is not indicated on the trace itself, the Contractor shall provide a cross-reference table between the stored trace file name and the fiber designation.

In compliance with TIA-455-61 “Measurement of Fiber or Cable Attenuation Using an OTDR” the Contractor shall record the following information during the test procedure:

1. Names of personnel conducting the test.
2. Type of test equipment used (manufacturer, model, serial number, calibration date).
3. Date test is being performed.
4. Optical source wavelength and spectral width.
5. Fiber identification.
6. End point locations.
7. Launch conditions.
8. Method of calculation for the attenuation or attenuation coefficient.
9. Acceptable link attenuation.

(c) Optic Fiber Cable Testing with Optical Power Meter

The Contractor shall conduct an Optical Power Meter Test for each fiber installed and each fiber that is spliced.

Fiber optic cable segments shall be tested in one direction at both the 1310 nm and 1550 nm wavelength.

In compliance with TIA -526-7 “Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant,” the following information shall be recorded during the test procedure:

1. Names of personnel conducting the test.
2. Type of test equipment used (manufacturer, model, serial number, calibration date).
3. Date test is being performed.
4. Optical source wavelength and spectral width.
5. Fiber identification.

-4-

REVISION OF SECTION 614 TEST FIBER OPTIC CABLE

6. Reference power measurement (when not using a power meter with a Relative Power Measurement Mode).
7. Measured attenuation of the link segment.
8. Acceptable link attenuation.

(d) *Acceptable Attenuation Values*

Acceptable attenuation values shall be calculated for each fiber tested. These values represent the maximum acceptable test values for the Work.

SM Fiber. The general attenuation equation for any SM link segment is as follows:

- Acceptable Link Attn. = Cable Attn. + Connector Attn. + Splice Attn.
- 8.3 μ m Single-mode Attenuation Coefficients:
- Cable Attn.=Cable Length (km) x (0.35 dB/km@1310 nm or 0.25 dB/km@1550 nm)
- Connector Attn. (LC connectors) = 0.50 dB per mated pair, excludes transceiver connectors on Ethernet switch
- Splice Attn. (Fusion) = 0.30 dB per fusion splice

(e) *Test Procedures*

If not already provided with the construction documents and prior to the initiation of any fiber testing, the Contractor shall submit a fiber testing plan to the Engineer for approval prior to beginning any of the fiber work. The fiber testing plan must outline all fibers that will be tested by the Contractor.

All fiber testing shall be performed on all fibers in the completed end-to-end system, as identified in the project plans. All system connectors, adapters and jumpers shall be cleaned as per manufacturer's instructions before each measurement is taken.

The Contractor shall not begin fiber optic testing until all work is complete. The Engineer will require the Contractor to repeat tests at the Contractor's sole expense, if fiber optic testing is performed before the work is completed. The Contractor shall notify the Engineer three (3) working days prior to testing. The Engineer may observe testing at some or all locations.

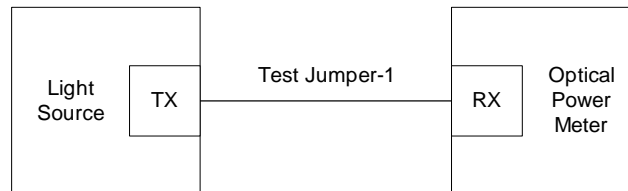
Testing shall be performed by qualified personnel that are competent for the task either through experience or certifications as approved by the Engineer prior to any testing activities. At least one of the technicians utilized by the Contractor for testing shall be certified by an accredited organization such as the Fiber Optic Association (FOA) or the Electronics Technician Association (ETA) and performs or provides oversight of the testing activities. Where the Contractor plans to utilize experienced personnel without formal certification from an approved accredited organization, a detail resume shall be provided for each individual outlining their planned involvement and submitted to the Engineer for review and approval prior to the individual's involvement in any testing activities.

The Optical Power Meter fiber test shall be conducted as follows:

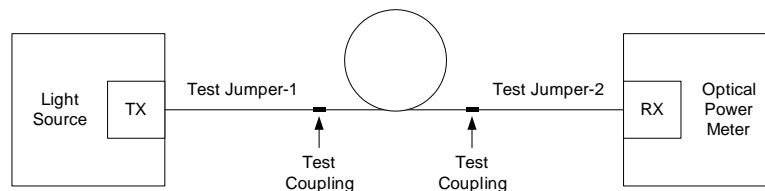
1. Clean the test jumper connectors and the test coupling per manufacturer's instructions.
2. Follow the test equipment manufacturer's initial adjustment instructions.
3. Connect Test Jumper-1 between the light source and the power meter. Avoid placing bends in the jumper that are less than 100 mm (4 inches) in diameter.

-5-

REVISION OF SECTION 614 **TEST FIBER OPTIC CABLE**



4. If the power meter has a Relative Power Measurement Mode, select it. If it does not, reduce the Reference Power Measurement (Pref). If the meter can display power levels in dBm, select this unit of measurement to simplify subsequent calculations.
5. Disconnect Test Jumper-1 from the power meter. Do NOT disconnect the test jumper from the light source.
6. Attach Test Jumper-1 to one end of the cable plant to be measured and Test Jumper-2 to the other end.



7. Record the Power Measurement (Psum). If the power meter is in Relative Power Measurement Mode, the meter reading represents the true value. If the meter does not have a Relative Power Measurement Mode, perform the following calculation:
 - A. $CPR (dB) = Psum - Pref$
 - B. If Psum and Pref are in watts:
 - C. $CPR (dB) = 10 \times \log_{10} [Psum/Pref]$
8. If Psum and Pref are in the same logarithmic units (dBm, dBu, etc.):

(f) *Test Acceptance*

The Contractor shall demonstrate that each Optical Power Test results in acceptable attenuation values.

The Contractor, solely at the Contractor's cost, shall remake any fusion splices that have test results exceeding acceptable attenuation values.

The Contractor, solely at the Contractor's cost, shall retest any fiber links that have been re-spliced.

The Contractor, solely at the Contractor's cost, shall bring any newly installed fiber optic link not meeting the requirements of this specification into compliance.

-6-

REVISION OF SECTION 614 TEST FIBER OPTIC CABLE

Where the Contractor is utilizing existing fiber optic cable links, the Contractor shall test the existing cable(s) that they are working with prior to and after the work is completed. The Contractor shall submit their test results to the Engineer to confirm the condition of the cable prior to the initiation of work on existing cables and call attention to any existing damage it found through this examination. Likewise, the Contractor shall submit their test results to the Engineer to verify the condition of the cable after completion of work on the existing cables to substantiate that it wasn't damaged by the Contractor's operations and is in good working order. Any existing cables that were in good working order prior to the initiation of the Contractor's work, but shown to be damaged after completion of the work, shall be repaired and/or replaced solely at the Contractor's cost at the discretion of the Engineer.

(g) Submittals

In addition to the requirements in Revision to Section 105 Contractor Submittals, the Contractor shall submit test results documentation as both a hard copy and electronic copy to the Engineer.

After each reel test, the Contractor shall submit one hard copy of the OTDR trace for every fiber on the reel. After installation, the Contractor shall submit one hard copy of the OTDR trace for every spliced fiber. Hard copy traces shall be organized and bound in logical order in an 8 ½" x 11" hard cover binder.

The Contractor shall submit, after approval of the hard copy traces, electronic copies of all traces and appropriate software to allow reading the traces. The Engineer will approve all OTDR results prior to completion of the project. The Contractor shall submit one copy of the complete contract Plans, including additional drawings issued as part of any change orders, with any deviations clearly marked in color. Deviations to be noted and shall include but not be limited to the following:

1. Fiber Splice location;
2. Fiber Splice configuration; and
3. Termination layout.

METHOD OF MEASUREMENT

Subsection 614.13 shall include the following:

Testing of fiber optic cable will be measured by all fiber optic testing, re-testing, including all labor, materials, and document submittals necessary to complete the work.

BASIS OF PAYMENT

Subsection 614.14 shall include the following:

Payment will be made under:

Pay Item	Pay Unit
Test Fiber Optic Cable	Lump Sum

**REVISION OF SECTION 614
FIBER OPTIC PRE-
CONNECTORIZED CABLE**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of the installation of single mode fiber optic pre-connectorized patch cables between the termination patch panel and the communications equipment optical ports in communication cabinets and network facilities.

MATERIALS

All fiber optic cables shall be suitable for outdoor conduit installation.

All fiber optic cable shall have compatible characteristics with other proposed and existing fiber optic cables. The single mode fiber shall meet or exceed the requirements of International Telecommunications Union – Telecommunications Standardization Sector - Recommendation G.652.D.

All cables shall be new and unused non-armored outdoor cable consisting of non-dispersion shifted, low water peak single-mode fiber strands free of surface imperfections and inclusions. Each single mode fiber strand shall consist of a doped silica core surrounded by a concentric silica cladding. The fiber shall be of matched clad design.

The measured attenuation of the connector (inclusive of coupler and mated test connector) shall not exceed an average of 0.3 decibel (dB) for all connectors provided. All connectors found in excess of 0.5 dB shall be rejected. Reflectance shall be less than -40 dB from 14°F to 140°F (-10°C to +60°C). The manufacturer shall have a program that periodically tests connectors to ensure that after 1000 re-matings, the attenuation will not change more than 0.2 dB.

The measured insertion loss shall be a maximum of 0.25 dB with a typical loss of 0.15 dB. Return loss shall be a maximum of -65 dB (Angle Physical Contact - APC) and -55 dB (Ultra Physical Contact -UPC) with a typical loss of -68 dB (APC) and -58 dB (UPC). The minimum cable bend radius shall be 15 times the outer diameter of the cable.

The connector shall be able to withstand an axial pull of 25 pounds with no physical damage to the connector and no permanent optical degradation more than 0.3 dB.

The pre-connectorized cables shall be provided with pre-connectorized connectors on both ends to match the termination patch panel bulkheads and communications equipment optical ports. Connectors shall be terminated by the manufacturer.

At network facilities, the Contractor shall provide pre-connectorized cables of sufficient length to span from the fiber termination patch panel bulkheads to the communications equipment optical port, with a maximum of two feet of slack cable. At communications cabinets, the Contractor shall provide pre-connectorized cables of sufficient length to span from the fiber termination patch panel bulkheads to the communications equipment optical port. This length shall be 4 feet maximum.

The connectors shall be nickel-plated with a ceramic ferrule and shall be polished to match the polish of the optical port that the connector will be plugged into.

-2-

**REVISION OF SECTION 614
FIBER OPTIC PRE-
CONNECTORIZED CABLE**

The bend insensitive pre-connectorized patch cable shall meet the following specifications:

Patch Cable Connectors

- EIA, TIA-55 (FOCIS)
- UL94 V-O
- GR-326, Issue 3 Specifications
- Fiber Cable - Telcordia GR-409

The cables shall contain the exact number of loose tube fibers and bulkhead connectors to connect from the termination patch panel to the communications equipment optical ports. If the optical equipment transmits (Tx) and receives (Rx) data with a single optic, the pre-connectorized cable shall contain a single optical fiber (simplex). When the optical device transmits and receives data with two or four optics, or a network Ethernet switch small form factor pluggable optic module, the pre-connectorized cable shall be provided with two optical fibers (duplex) per pair of transmit and receive optics.

CONSTRUCTION REQUIREMENTS

Pre-connectorized cables shall be installed from the termination panel bulkheads to the communications equipment optical ports.

The Contractor's Installation technician shall have a minimum certification in International Municipal Signal Association (IMSA) Fiber Optics for ITS, Traffic, Fire Alarm, and Communications Systems or equivalent or better fiber optics certification.

At network facilities, the pre-connectorized cables shall be installed in the cable management hardware attached to equipment racks. At communication cabinets and traffic signal cabinets, the Contractor shall neatly route pre-connectorized cables between the fiber termination patch panel bulkheads and the communications equipment optical port. Appropriate cable management shall be used.

Prior to installation, the Contractor shall clean all pre-connectorized cable bulkhead connectors with lint-free fiber wipes moistened with Isopropyl Alcohol 99 percent U.S.P. After cleaning with alcohol, the Contractor shall clean the bulkhead with an optical connector cleaner to ensure that all residues are removed.

The Contractor shall submit manufacturer testing reports for pre-connectorized cables as part of the as-built documentation. The Contractor shall note the installation location on the test report for future reference.

At network facilities, the contractor shall apply an identification label at each end of each pre-connectorized patch cable. The identification label shall include information indicating the patch panel number, device being connected and communications equipment optical port.

At all communications cabinets, the contractor shall apply an identification label at each end of each pre-connectorized patch cable. The identification label shall include the wavelength, the termination panel port and the data transmitting description (example: Tx or Rx).

Patch cable labeling shall be as shown on the Plans.

-3-

**REVISION OF SECTION 614
FIBER OPTIC PRE-
CONNECTORIZED CABLE**

METHOD OF MEASUREMENT

Fiber optic pre-connectorized cables and labeling will not be measured separately but will be considered subsidiary to the individual communications equipment items.

BASIS OF PAYMENT

Fiber optic pre-connectorized cables and labeling will not be paid for separately but will be considered subsidiary to the individual communications equipment items and shall include all labor, materials and equipment required to complete the work. Also included shall be all information labeling in network facilities and in field device communications cabinets

REVISION OF SECTION 614 GROUNDING AND BONDING

Section 614 of the Standard Specifications is hereby revised for this project as follows:

DESCRIPTION

This work consists of grounding and bonding requirements at project locations for all Intelligent Transportation System (ITS)-related structures, poles, service pedestals and cabinets. The work covered in this section consists of labor, materials, and services required for a functional and unobtrusive grounding system.

- (a) General. Provide comprehensive grounding and bonding for ITS-related equipment. The City of Littleton's target resistance to ground value is equal to or less than 10 Ω .
- (b) Applicable Documents. Work performed in this section shall comply with the most current edition of the following codes and/or standards:
 - 1. IEEE 81 – Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System
 - 2. IEEE C2 – National Electrical Safety Code
 - 3. NEMA GR 1 – Grounding Rod Electrodes and Grounding Rod Electrode Couplings
 - 4. NFPA 70 – National Electrical Code
 - 5. NFPA 70E – Standard for Electrical Safety in the Workplace
 - 6. NFPA 780 – Standard for the Installation of Lightning Protection Systems
 - 7. TIA-607 – Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
 - 8. UL 96 – Lightning Protection Components
 - 9. UL 96A – Installation Requirements for Lightning Protection Systems
 - 10. UL 467 – Grounding and Bonding Equipment
- (c) Identify to the Project Engineer any conflicts between the requirements of codes/standards development organizations and the plans and specifications for this project.
- (d) Submittals.
 - 1. Provide cut-sheets of each type of product proposed for approval by the Project Engineer prior to commencement of work.
 - 2. Provide a system plan, conductor routing, supports, connectors and ground rods along with connection, mounting and splicing details.
- (e) Components.
 - 1. Grounding electrodes (driven rods). Provide ground rods that meet or exceed the following requirements:
 - A. Preferred. Copper-clad steel ground rods (pointed) shall not be less than 0.625 inch diameter and a minimum of eight feet in length. It shall be UL certified and have a minimum plating thickness of 10 mil copper cladding.

-2-

REVISION OF SECTION 614 GROUNDING AND BONDING

- B. Other Alternatives. Other ground rod types, such as chemical ground electrodes, may be considered based on site soil chemistry, adjacent electrically bonded structures, or if the installation must occur in a corrosive area, but must be approved by the Project Engineer in writing.
- 2. Grounding Electrode Conductor. The grounding electrode conductor shall be solid or stranded copper with a minimum size of #6 AWG, unless otherwise specified. The Contractor shall size the grounding electrode conductor in accordance with Article 250.66 of the NEC. Bare and insulated grounding electrode conductors shall be permitted, as approved by the Project Engineer. Insulated grounding electrode conductors shall be Type THWN and conform to the requirements of Article 310 of the NEC. Insulated grounding electrode conductors shall utilize a green jacket color. The grounding electrode conductor run shall be installed in one continuous run without a splice or joint, except as permitted in accordance with Article 250.64(C) of the NEC.
 - A. For bonding between a cabinet frame and busbar, a braided ground strap shall be utilized. The braided ground strap shall consist of non-insulated tinned copper flat braid wire with a minimum width of 0.5 inches and a thickness of 0.07 inches (based on estimated #6 AWG equivalence).
- 3. Grounding Connectors. Grounding connectors shall be provided for attachment to grounding electrodes, ground bus and ground lugs. Grounding and bonding connections shall be made by means of a compression connector, a mechanical connector, or an exothermic weld. Mechanical and compression connectors shall have only one conductor installed unless designed or UL-listed for more conductors. Mechanical connections shall only be permitted when a compression or exothermic connection cannot be made.
- 4. Ground Bus. Provide copper bar stock grounding busbar as shown on plans. If the dimensions of the busbar are not shown on the plans, the minimum size shall be 0.25 inch thick by 2 inches high by 6 inches wide and positions for five lugs, unless otherwise specified by the Project Engineer. Hole patterns on the busbar shall accommodate two-hole lugs in accordance with TIA-607 and hole spacing should not be less than 0.75 inch. Busbar must be wall mountable and UL certified. Stand-off brackets shall also be included and brackets shall be manufactured from 300 series stainless steel with stainless steel bolts and lock washers.

CONSTRUCTION REQUIREMENTS

- (a) General. Install equipment, materials and devices in accordance with equipment manufacturer's written instructions and in compliance with applicable installation standards.
 - 1. Connections.
 - A. Provide exothermically welded connections below grade and in areas exposed to visible moisture.

-3-

**REVISION OF SECTION 614
GROUNDING AND
BONDING**

- B. Provide heavy duty bolted clamped connections, UL listed, above grade and in areas where safety to personnel and structures dictate.

2. Installation.

- A. Install one grounding electrode. Each grounding electrode shall be installed such that at least the entire length is in contact with the soil. Where a rock bottom is encountered, the grounding electrode installation shall conform to the requirements of Article 250.53(G) of the NEC. The grounding electrode system shall be installed within City of Littleton right-of-way.
- B. Leave top of grounding electrode exposed for testing and for verifying quantities.
- C. Measure the resistance of the installed grounding electrode with respect to the surrounding soil using an earth ground resistance tester.
- D. If the results exceed 10 Ω , install a second grounding electrode a minimum of one electrode length away from the first grounding electrode. The bonding jumper used to connect grounding electrodes shall be installed and sized in accordance with Article 250.53(C) of the NEC.
- E. Measure the resistance of the installed grounding electrode system with respect to the surrounding soil using an earth ground resistance tester.
- F. Record and report results to Project Engineer in writing. The target resistance to ground is equal to or less than 10 Ω , however after installing two grounding electrodes, a resistance to ground value equal to or less than 25 Ω will be accepted by the City of Littleton. The Contractor shall be responsible for confirming the resistance to ground requirements with the various manufacturers of the equipment it procures for this project. Where manufacturers have more stringent resistance to ground requirements for operational performance and warranties, the Contractor shall be required to adhere to the manufacturer's requirements for acceptance by the City of Littleton.
- G. In the absence of low resistance soil conditions, the Project Engineer, at his/her sole discretion, may allow the use of the following: bentonite to fill the ground rod hole; chemical electrodes; or ground enhancement material. The Contractor shall obtain written permission from the Project Engineer prior to using the previously mentioned materials.

-4-

**REVISION OF SECTION 614
GROUNDING AND
BONDING**

3. Surface Preparation

- A. Ground Bus. An abrasive pad shall be used to remove any dirt, grease, oil and oxidation from the ground bus. A thin coating of antioxidant compound shall be applied to the connection point on the ground bus. Using stainless steel hardware, the Contractor shall tighten and torque to the value specified for the hardware grade, material and size. Only one lug shall be installed per a two-hole mounting on a bonding surface. Lugs shall not overlap or use the same mounting holes on a bonding surface. Due to thermal cycling anticipated in the field environment, the lock washer shall be substituted with flat washers and a cupped spring washer (i.e., Belleville washer), with the cup against the head of the bolt.
- B. Other Surfaces. Clean the surface thoroughly where the grounding lug is to be connected. The grounding surface shall be clean of any paint, dirt, grease, oil, rust and other oxidation. A thin coating of antioxidant compound shall be applied to the connection point on the surface. Using stainless steel or silicon bronze hardware, the Contractor shall tighten and torque to the value specified for the hardware material and size. Lugs shall not overlap or use the same mounting holes on a bonding surface. The lock washer shall be substituted with flat washers and a cupped spring washer, with the cup against the head of the bolt.
- C. Ground Attachment to Structures and Poles. The grounding electrode conductor shall be connected to the ground stud on a structure or within a pole using stainless steel nuts and cupped spring washers. The connector type for the grounding electrode conductor shall be a full circle connector sized appropriately for the diameter of the ground stud and the wire gauge of the conductor.

Where a ground stud does not exist on a structure or within a pole, the Contractor shall install a tapped and threaded hole to accommodate the grounding electrode conductor and screw. The connector type for the grounding electrode conductor shall be a full circle connector sized appropriately for the diameter of the screw and the wire gauge of the conductor. Stainless steel screws and cupped spring washers shall be included.

- D. Grounding Connectors. The lug size, configuration and material for compression connectors shall be selected based on the grounding electrode conductor size and fastening conditions. The insulation shall be trimmed back so that the bared grounding electrode conductor is slightly longer than the barrel. After applying an antioxidant compound on the exposed grounding electrode conductor, insert the conductor so that it touches the end of the barrel as viewed through the inspection port. Ensure the grounding electrode conductor remains at the end of the barrel before making the first crimp nearest the tongue end and working toward the

-5-

**REVISION OF SECTION 614
GROUNDING AND
BONDING**

conductor with the remaining crimps. The lug manufacturer's instructions shall be followed for the number of crimps and their location on the barrel. For exothermic welds to the grounding electrode conductor, select the mold and weld metal applicable to the conductor size and lug configuration. Clean and dry (using a torch) the grounding electrode conductor and the mold. Insert the conductor and lug into the mold. Close the handle clamp, lock the mold and then insert the disk into the mold. Pour the weld metal into the mold and apply the starting material over the weld metal and on the lip of the mold. Close the cover and ignite using a flint igniter.

After the reaction is complete, wait a minimum of 15 seconds and then open the mold and remove the finished lug connection. Clean any slag from the finished lug connection.

- E. Grounding Connectors. The lug size, configuration and material for compression connectors shall be selected based on the grounding electrode conductor size and fastening conditions. The insulation shall be trimmed back so that the bared grounding electrode conductor is slightly longer than the barrel. After applying an antioxidant compound on the exposed grounding electrode conductor, insert the conductor so that it touches the end of the barrel as viewed through the inspection port. Ensure the grounding electrode conductor remains at the end of the barrel before making the first crimp nearest the tongue end and working toward the conductor with the remaining crimps. The lug manufacturer's instructions shall be followed for the number of crimps and their location on the barrel. For exothermic welds to the grounding electrode conductor, select the mold and weld metal applicable to the conductor size and lug configuration. Clean and dry (using a torch) the grounding electrode conductor and the mold. Insert the conductor and lug into the mold. Close the handle clamp, lock the mold and then insert the disk into the mold. Pour the weld metal into the mold and apply the starting material over the weld metal and on the lip of the mold. Close the cover and ignite using a flint igniter.

After the reaction is complete, wait a minimum of 15 seconds and then open the mold and remove the finished lug connection. Clean any slag from the finished lug connection.

4. Testing.

- A. Testing shall be performed prior to connecting to utility ground in an effort to eliminate ground loops.

-6-

**REVISION OF SECTION 614
GROUNDING AND
BONDING**

- B. When the grounding electrodes are installed, they shall be measured for their effectiveness using the three-point, fall of potential method per IEEE 81 to measure the resistance of the installed grounding electrode configuration with respect to the surrounding soil using an earth ground resistance tester. The final measurement must be performed in the presence of the Project Engineer or City of Littleton's designated representative. Provide documentation to the Project Engineer of ground grid measurement results for each ITS site location tied to a single grounding system.
- C. Contractor shall furnish its own earth ground resistance tester including stakes, clamps, cabling, transformers, and other required accessories needed to perform the testing. A copy of the earth ground resistance tester's NIST certification shall be provided to the Project Engineer as verification that the unit has been calibrated using standards and instruments traceable to international standards.

METHOD OF MEASUREMENT

Grounding and bonding will not be measured or paid for separately but will be considered subsidiary to the ITS field device, communications equipment, and cabinet items and shall include all labor, materials, equipment, testing and documentation required to complete the work.

**REVISION OF SECTION 626
MOBILIZATION**

Section 626 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 626.01 is hereby revised to include:

This item also includes demobilization of equipment and supplies from this project site.

BASIS OF PAYMENT

Subsection 626.02 is hereby deleted and replaced by the following:

Two payments will be made for the mobilization item. 50% of the amount bid for mobilization will be paid at the completion of mobilization. The remaining 50% of the amount bid for mobilization will be paid at the completion of the project when the equipment has been demobilized.

Payment will be made under:

Pay Item

Mobilization

Pay Unit

Lump Sum

**REVISION OF SECTION 630
CONSTRUCTION ZONE
TRAFFIC CONTROL**

Section 630 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

Subsection 630.01 shall include the following:

This work consists of furnishing Method for Handling Traffic (MHT), coordinating with affected owners and tenants, implementing construction zone traffic control, and otherwise.

CONSTRUCTION REQUIREMENTS

In subsection 630.10(a), delete the 1st paragraph and replace with the following:

The Contractor shall control traffic in accordance with the Traffic Control Plan (TCP). The Contractor shall develop a TCP in cooperation with the Engineer. To implement the TCP, the Contractor shall develop and submit a Method for Handling Traffic (MHT) for each different phase of construction which shows the Contractor's proposed construction phasing and proposed traffic control devices consistent with the TCP. If at any time the Contractor desires to change the MHT, it shall be considered a different phase requiring a new MHT. The Contractor shall submit each MHT to the Engineer a minimum of two weeks before starting that phase.

Subsection 630.10 shall include the following:

Approval of the proposed MHT(s) by the Engineer does not relieve the Contractor of liability specifically assigned to him under the Contract.

The Contractor shall notify the Engineer by Thursday at 3:00 PM which streets the Contractor intends to work on the following week. This notification shall be made for all phases of construction.

The Contractor is directed to review the following resources for the required components of the Traffic Control Plan (TCP) for this project:

- (a) The City's Traffic Control Plan (TCP) templates and
- (b) The Manual on Uniform Traffic Control Devices (MUTCD)

Subsection 630.10(a)(5) shall include the following:

The Contractor shall coordinate the Access Maintenance Plan with, and based on the requirements of, all affected owners and tenants. The Access Maintenance Plan shall include documentation of this coordination, including the approval signature of each affected owner or tenant. Should the Contractor be unable to obtain approval and signatures, documentation of the efforts made to obtain said approval and signatures must be submitted. All access shall be maintained on surfaces equal to or better than those existing at the time the access is first disturbed. For short periods of time only as allowed by the Engineer, access may be maintained on aggregate base course surfaces.

The Contractor shall maintain access to all roadways, side streets, walkways, alleyways, driveways, and hike/bike paths at all times unless otherwise approved by the Engineer.

Parking areas temporarily disturbed by construction activities shall be restored to a useable condition during non-working hours. Such temporary parking shall utilize an all-weather surface.

The Contractor shall prepare the MHT to reflect the Access Maintenance Plan by detailing all barricades, ramps, signs, and temporary means of access to address the needs of the property owners or tenants.

-2-

**REVISION OF SECTION 630
CONSTRUCTION ZONE
TRAFFIC CONTROL**

Prior to commencing any work which affects access to a property, the Access Maintenance Plan for that property must be submitted and approved by the Engineer.

Subsection 630.10(a)(6) shall include the following:

The Contractor shall maintain continuous access throughout the project for pedestrians, bicyclists, and disabled persons. When the existing access route is disturbed by construction, a temporary all-weather access shall be provided. All temporary access shall be a minimum of 5 feet wide and meet Americans with Disabilities Act (ADA) requirements. Acceptable all-weather surfacing shall be concrete or asphalt surface, or as approved by the Engineer. Delineation of pedestrian access through the work area shall be accomplished using temporary plastic fencing and appropriate signage.

When pedestrian crosswalks are temporarily closed at signalized intersections, the Contractor shall cover the pedestrian signal heads in accordance with section 630.19, cover pedestrian push buttons, and erect temporary regulatory signage prohibiting pedestrian crossings in accordance with the MUTCD.

Subsection 630.19 is added following subsection 630.18 as follows:

Temporary Masking and Adjusting Signals. Vehicular and pedestrian signal indications or portions thereof that conflict with the construction signing, markings, or Traffic Control Plan shall be completely covered by the Contractor so that none of the covered signal is visible to traffic. Overhead signal faces shall be temporarily reset as required to be positioned over the center of each left and through lane open to traffic, unless otherwise approved by the Engineer. Traffic signal faces shall be reset to their original or final location, as appropriate, at the completion of the MHT causing the need to reset.

Subsection 630.13 shall include the following:

The Contractor shall erect and maintain warning lights, signs, barricades, and sufficient safeguards around all excavations, embankments, and obstructions.

The Contractor shall install construction traffic control devices where they do not block or impede other existing traffic control devices or sidewalks for pedestrians, disabled persons, or bicyclists. The Contractor is restricted from storing any materials, construction traffic control devices, signs, etc. in any median area or park area.

Vertical cuts or fills greater than 1 inch resulting from construction operations adjacent to traffic lanes, or within the clear zone shall be temporarily sloped at a 6:1 or flatter slope, and delineated at 35 foot intervals immediately after removal operations to safeguard the traveling public.

Construction equipment used on this project shall meet the same minimum exhaust requirements as those specified by the manufacturer of the equipment.

The Contractor and subcontractors shall equip their construction vehicles with flashing amber lights. Equipment to be used at night shall also be equipped with flashing amber lights. Flashing amber lights on vehicles and equipment shall be visible from all directions.

Utilization of materials to be incorporated into the work may be permitted. However, any degradation or other contamination or destruction shall be corrected at the Contractor's expense prior to acceptance.

During non-construction periods (evenings, weekends, holidays, etc.) all work shall be adequately protected to ensure the safety of vehicular and pedestrian traffic, as detailed in the Contractor's MHTs. Excavations or holes shall be filled in or fenced when unattended.

-3-

**REVISION OF SECTION 630
CONSTRUCTION ZONE
TRAFFIC CONTROL**

Whenever the Contractor removes, obliterates, or overlays any pavement markings, they shall replace them on a daily basis prior to opening the affected areas to traffic. All temporary pavement markings shall fully comply with the Standard Specifications and Special Provisions.

The Contractor shall not have construction equipment or materials in the lanes open to traffic any time.

All personal vehicle and construction equipment parking is prohibited where it conflicts with safety, access, or the flow of traffic. Landscaped areas, public park areas, and roadway shoulders shall be kept clear of parking and storage of all personal and construction equipment except where approved by the Engineer.

The Contractor shall not place tack coat on any surface to be paved where traffic will be forced to travel upon fresh bituminous materials.

The Contractor shall make arrangements with the Regional Transportation District (RTD) at 1560 Broadway, Suite 700, Denver, CO 80202 two business days prior to blocking access to existing bus stops within the project limits. When temporary bus stops are required by RTD, RTD will establish the new bus stop(s), and the Contractor shall accommodate access by furnishing and installing all-weather surface and delineation to the new bus stop. All lane closures shall be subject to the approval of the Engineer by MHT. Request for each closure shall be made at least 24 hours in advance of the time the lane closure is to be implemented. Lane closures will not be allowed to remain unless being utilized in continuum for the intended purpose for which they were set up.

During non-working hours, the roadways shall be restored to a safe travel conditions for the free flow of traffic. Any maintenance required restoring the roadways to this condition, including the pavement patching and grading, shall be done prior to opening the areas to traffic or completing work for the day.

The Contractor shall clean the roadway of all construction debris before opening it to traffic.

All flagging stations used at night shall be illuminated with floodlights. Street, highway lights and "high mast lighting" may be used for flagging station illumination when approved by the Engineer. Floodlights shall be located and directed so as not to interfere with the sight of any motorists, and the cost is to be included in the work.

Prior to removal and resetting of any sign the Contractor shall prepare a sign inventory and submit to the Engineer as a Working Drawing. Any signs damaged due to the Contractor's operations shall be replaced in kind or repaired by the Contractor at no additional cost to the project.

The Contractor shall obtain the appropriate permits for work within the city right-of-way, consistent with Section 2.3 Construction Documents Related To Capital Improvements of the City's Roadway Design & Construction Standards.

Daily logs shall be completed by the Contractor for every day traffic control devices are present on the job. Each log must specify the MHT(s) in use and confirm the devices were inspected and adjusted as needed.

Subsection 630.20 is added following subsection 630.19 as follows:

Permitted Work Times. Work that interferes with traffic will only be permitted during the following hours:

- (a) The Contractor shall perform all the work on the roadway between the hours of 8:30 AM and 3:30 PM or as approved by the Engineer. Weekend and nighttime work will not be allowed without the prior written approval of the Engineer. During this time, only one lane can be closed on each approach.

-4-

**REVISION OF SECTION 630
CONSTRUCTION ZONE
TRAFFIC CONTROL**

- (b) The Contractor shall not work in a manner that directly or indirectly interferes with the flow of traffic between the hours of 5:30 AM and 8:30 AM Monday through Friday, between the hours of 3:30 PM to 6:30 PM Monday through Thursday, or after 2:00 PM on Fridays, unless otherwise authorized by the Engineer.
- (c) The Contractor shall not perform work on Holidays.
- (d) The Contractor shall not close lanes during special events.
- (e) The Contractor shall coordinate lane closures with adjacent projects.
- (f) The Contractor shall maintain business access(es) during business hours.
- (g) The Contractor shall coordinate all of the work on the roadway during any special event with the City of Littleton.
- (h) The Contractor shall adhere to the time restrictions detailed in the current edition of the CDOT Region 1 Lane Closure Strategy (available at www.codot.gov), for work that affects traffic on state highways or other roadways under the jurisdiction of CDOT, and discussed therein.

All costs incidental to temporary pavement markings for traffic control will not be paid for separately, but shall be included in the work.

All costs incidental to maintenance of access will not be paid for separately, but shall be included in the work.

All costs incidental to the foregoing requirements shall be included in the original contract prices for the project.

FORCE ACCOUNT ITEMS

This special provision contains the estimate for the force account item included in the Contract. The estimated amount marked with an asterisk will be added to the total bid to determine 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	Estimated Quantity	Amount
F/A Minor Contract Revisions	F.A.	\$30,000
F/A Fuel Cost Adjustment	F.A.	\$1,000
F/A Erosion Control	F.A.	\$5,000
F/A Environmental Health and Safety Management	F.A.	\$2,000

F/A Minor Contract Revisions – This item will cover the cost of unanticipated work that is determined to be necessary as work on the project progresses, which was not shown or described in the Contract plans and specifications. There will be no payment for this force account item unless written authorization is provided to the Contractor from the Engineer.

F/A Fuel Cost Adjustment – This work is described in the Standard Special Provision– Fuel Cost Adjustment to the contract to accommodate fluctuations in fuel prices.

F/A Erosion Control – This force account is to pay for any other erosion control items the TECS will need during the duration of this project. All items shall be pre-approved by the Project Engineer prior to installation or they will be at no cost to the project.

F/A Environmental Health & Safety Management – This item will cover the cost of sampling, testing, and disposal of contaminated water.

UTILITIES

The known utilities within the limits of this project are:

UTILITY	CONTACT/EMAIL	PHONE/FAX
Xcel Energy – Gas & Electric 10001 W. Hampden Lakewood, CO 80227	Scott Gomer scott.gomer@xcelenergy.com	(303) 716-2003
Century Link 5325 Zuni Street #728 Denver, CO 80221	Shelly Bergstrom shelly.bergstrom@lumen.com	(720) 501-5803 Office (303) 257-0027 Cell
Comcast 8490 North Umatilla Street Federal Heights, CO 80260	Jason Mollo jason_mollo@comcast.com Gregory Jaeger gregory_jaeger@comcast.com	(303) 241-1964
Zayo Bandwidth 4771 Walnut Street #100 Boulder, CO 80301	James Black jamesr.black@zayo.com	(719)-216-8508 Cell
Denver Water 1600 W 12 th Ave Denver, CO 80204	Paul Peloquin paul.peloquin@denverwater.org	(303) 628-6620 Office (720) 808-3618 Cell
CDOT ITS 425C Corporate Circle Golden, CO 80401	Jill Scott jill.scott@state.co.us	(303) 512-5805 Office (303) 512-5878 Fax
CDOT Region 1 Traffic Operations 18500 E. Colfax Avenue Aurora, CO 80011	Chris Vokurka christopher.vokurka@state.co.us	(303) 512-4058 Office (303) 947-9779 Cell
City of Centennial 13133 E. Arapahoe Road Centennial, CO 80112	Anna Bunce abunce@centennialco.gov	(303) 325-8036
Arapahoe County 5334 S. Prince St Littleton, CO 80120	Mark Harkleroad mharkleroad@arapahoe.gov	(303) 795-4848
City of Littleton – Utilities Department 2255 W. Berry Ave Littleton, CO 80120	Tim Weaver tweaver@littleton.gov	(303) 795-3834

The work described in these plans and specifications requires full cooperation between the Contractor and the utility owners in accordance with Subsection 105.11 in conducting their respective operations, to complete the utility work with minimum delay to the project.

-2-
UTILITIES

PART 1 CONTRACTOR SHALL PERFORM THE WORK LISTED BELOW:

Coordinate project construction with the performance by the utility owner of each utility work element listed in Part 2 below. Perform preparatory work specified in Part 2 for each utility work element. Provide an accurate construction schedule that includes all utility work elements to the owner of each impacted utility.

Provide each utility owner with weekly updates to the schedule. Conduct detailed utility coordination meetings prior to each construction phase to coordinate all requirements and schedules, and provide other necessary accommodations as directed by the Engineer. Notify each utility owner in writing, with a copy to the Engineer, prior to the time each utility work element is to be performed by the utility owner. Provide the notice with the number of days specified in Part 2 immediately prior to the time the utility work must be begun to meet the project schedule.

Provide traffic control, as directed by the Engineer, for any utility work by the utility owner expected to be coordinated with construction. However, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner.

Perform each utility work element for every utility owner listed here in Part 1. Notify each utility owner in advance of any work being done by the Contractor to its facility, so that the utility owner can coordinate its inspections for final acceptance of the work with the Engineer.

Project Limits – All Utility Owners

Prior to excavating, the Contractor shall positively locate all potential conflicts with existing underground utilities and proposed construction, as determined by the Contractor according to proposed methods and schedule of construction. The Contractor shall modify construction plans to avoid existing underground facilities as needed, and as approved by the Engineer. Please note that Colorado 811 marks only its members' facilities – Other facilities, such as ditches and drainage pipes may exist, and it is the Contractor's responsibility to investigate, locate and avoid such facilities.

NO UTILITY WORK EXPECTED.

PART 2 UTILITY OWNERS SHALL PERFORM THE WORK LISTED BELOW:

The City of Littleton Contractor shall provide traffic control for any utility work expected to be coordinated with construction, as directed by the City of Littleton Engineer. However, traffic control for utility work outside of typical project work hours shall be the responsibility of the utility owner. The utility owner shall prepare and submit to the City of Thornton a Method of Handling Traffic for utility work to be performed outside typical project work hours. The utility owner shall obtain approval of the Method of Handling traffic from the City of Littleton Engineer prior to beginning the utility work to be performed outside typical project work hours.

NO UTILITY WORK EXPECTED.

-3-
UTILITIES

GENERAL:

The Contractor shall comply with Article 1.5 of Title 9, CRS ("Excavation Requirements") when excavating or grading is planned in the area of underground utility facilities. The Contractor shall notify all affected utilities at least two (2) business days, not including the actual day of notice, prior to commencing such operations. The Contractor shall contact Colorado 811 at phone no. **811**, to have locations of registered lines marked by member companies. All other underground facilities shall be located by contacting the respective owner. Utility service laterals shall also be located prior to beginning excavation or grading.

When utilizing trenchless excavation methods, the contractor shall coordinate project construction with each affected utility owner, pursuant to 2 C.C.R. 601-18 Sections 4.3.1 and 4.3.11, to ensure the new utility installation will follow best practices and not damage existing utilities. New utility installations shall adhere to the separation and construction requirements set by each utility owner. A variance of these requirements can be issued in urban areas when deemed reasonably necessary. Any such variance shall be coordinated with the utility owner.

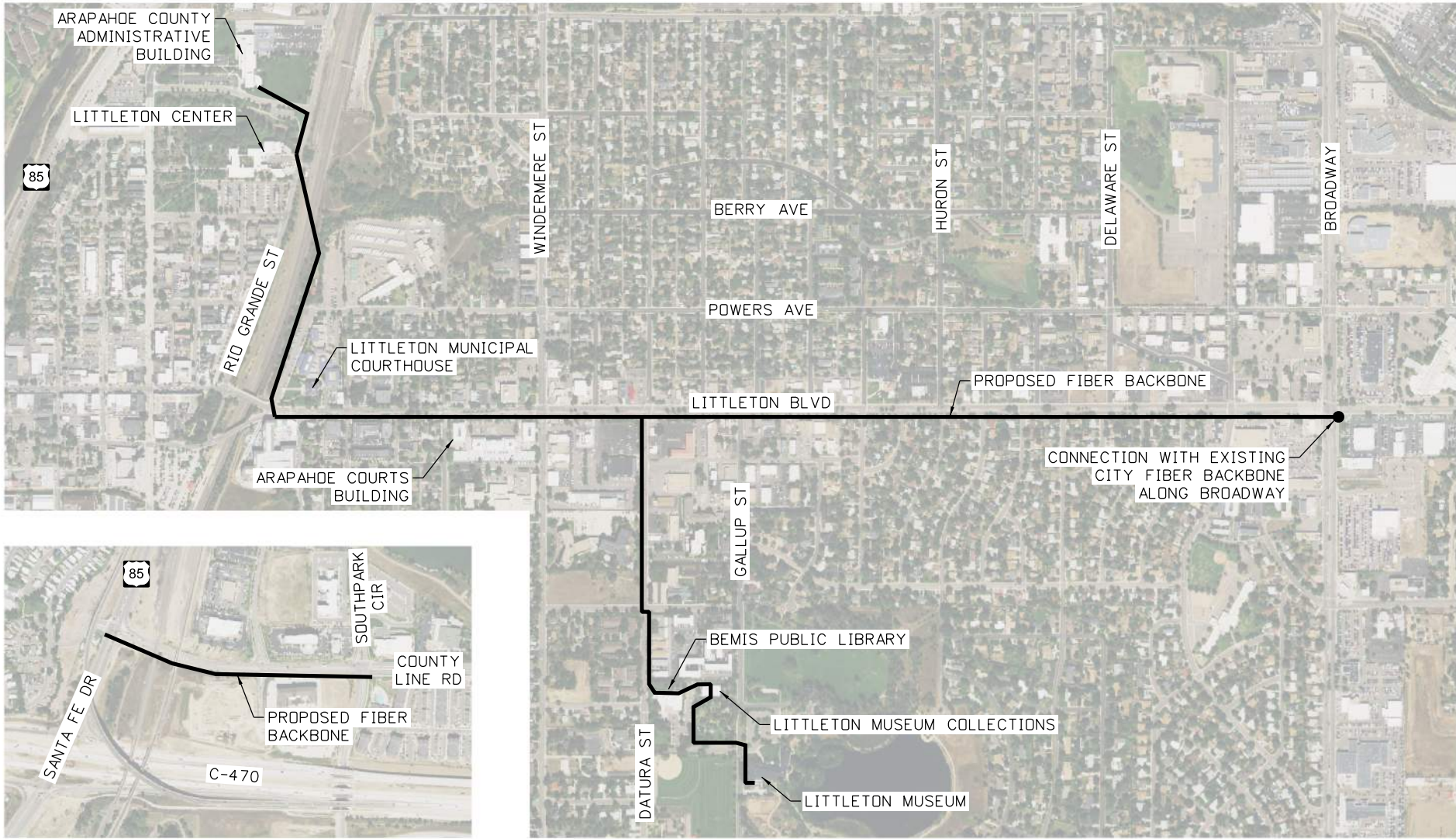
When the Contractor is working near or under high voltage distribution line, it shall be assumed the distribution line is energized and the Contractor shall not be closer than ten feet (10') in any direction from the energized conductors. If work will be within ten feet (10') of energized conductors, the Contractor shall call Xcel Energy's Builders Call Line Colorado ("BCLCO") 1-800-628-2121 a minimum of thirty (30) days in advance to arrange for an outage. An outage will be arranged if it is determined to be necessary. The outage will be a day-by-day situation. Typically, there is a fee charged when an electrical outage is required. However, this fee shall be waived for this project since the electric facilities are in public right-of-way. Xcel shall not charge a fee for this work.

The location of utility facilities as shown on the plan and profile sheets, and herein described, were obtained from the best available information.

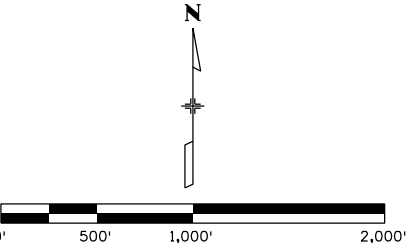
All costs incidental to the foregoing requirements will not be paid for separately but shall be included in the work.

CITY OF LITTLETON
PUBLIC WORKS
STATE OF COLORADO

WEST LITTLETON BLVD COMMUNICATIONS UPGRADE
LITTLETON PROJECT NO. 21-37



SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	STANDARDS PLANS LIST
3-4	GENERAL NOTES
5-6	SUMMARY OF APPROXIMATE QUANTITIES
7-12	STORMWATER MANAGEMENT PLAN
13	CONSTRUCTION TRAFFIC CONTROL
14	CONSTRUCTION NOTES, LEGEND & TABULATION
15	ITS KEY MAP
16-26	ITS PLANS
27	NETWORK DIAGRAM
28-33	SPLICING DIAGRAMS
34-40	ITS DETAILS
41-57	SUBSURFACE UTILITY ENGINEERING PLANS



PROJECT LOCATION MAP

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Print Date: 2/10/2025

File Name: 200420_Littleton Blvd-TITLE SHEET.dgn

Horiz. Scale: 1:1000 Vert. Scale: N/A

1675 LARIMER ST, STE 400 PH: 303-339-0440
DENVER, COLORADO 80202 FAX: 303-325-7743

Sheet Revisions		
Date:	Comments	Init.

CITY OF LITTLETON
2255 WEST BERRY AVENUE
LITTLETON, CO 80120
PHONE: 303-795-3700

As Constructed	Contract Information		Project No./Code
	Contractor:		
	No Revisions:	Resident Engineer: name	21-37
	Revised:	Project Engineer: name	
Void:	PROJECT STARTED: / /	ACCEPTED: / /	Sheet Number 1
	Comments:		

PLAN NUMBER		M STANDARD TITLE		PAGE NUMBER		PLAN NUMBER		M STANDARD TITLE		PAGE NUMBER		PLAN NUMBER		S STANDARD TITLE		PAGE NUMBER	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-100-1	STANDARD SYMBOLS (3 SHEETS).....		1-3		<div><div></div><div></div><div></div><div></div><div></div></div>	M-606-1	MIDWEST GUARDRAIL SYSTEM TYPE 3 W-BEAM..... 31 INCHES (19 SHEETS) <i>(REVISED ON MARCH 5, 2020)</i>		79-97		<div><div></div><div></div><div></div><div></div><div></div></div>	S-612-1	DELINEATOR INSTALLATIONS (8 SHEETS)		171-178 <i>(REVISED ON APRIL 30, 2024)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-100-2	ACRONYMS AND ABBREVIATIONS (4 SHEETS).....		4-7		<div><div></div><div></div><div></div><div></div><div></div></div>	M-606-13	GUARDRAIL TYPE 7 F-SHAPE BARRIER (4 SHEETS).....		98-101		<div><div></div><div></div><div></div><div></div><div></div></div>	S-613-1	ROADWAY LIGHTING (6 SHEETS)		179-186 <i>(REVISED ON SEPTEMBER 30, 2020)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-203-1	APPROACH ROADS.....		8		<div><div></div><div></div><div></div><div></div><div></div></div>	M-606-14	PRECAST TYPE 7 CONCRETE BARRIER (4 SHEETS).....		102-104 <i>(REVISED ON FEBRUARY 9, 2023)</i>		<div><div></div><div></div><div></div><div></div><div></div></div>	S-613-2	ALTERNATIVE ROADWAY LIGHTING (4 SHEETS) <i>(NEW, ISSUED ON SEPTEMBER 30, 2020)</i>			
<div><div></div><div></div><div></div><div></div><div></div></div>	M-203-2	DITCH TYPES		9		<div><div></div><div></div><div></div><div></div><div></div></div>	M-606-15	GUARDRAIL TYPE 9 SINGLE SLOPE BARRIER		105-115 <i>(REVISED ON FEBRUARY 17, 2023)</i>		<div><div></div><div></div><div></div><div></div><div></div></div>	S-613-3	PULL BOX DETAIL (2 SHEETS) <i>(NEW, ISSUED ON APRIL 4, 2024)</i>			
<div><div></div><div></div><div></div><div></div><div></div></div>	M-203-11	SUPERELEVATION CROWNED AND..... DIVIDED HIGHWAYS (3 SHEETS)		10-12		<div><div></div><div></div><div></div><div></div><div></div></div>	M-607-1	WIRE FENCES AND GATES (3 SHEETS).....		116-118		<div><div></div><div></div><div></div><div></div><div></div></div>	S-613-4	TRAFFIC SIGNAL ONE-LINE DIAGRAMS (6 SHEETS) <i>(NEW, ISSUED ON JUNE 15, 2023)</i>		<i>(REVISED ON MARCH 1, 2024)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-203-12	SUPERELEVATION STREETS (2 SHEETS).....		13-14		<div><div></div><div></div><div></div><div></div><div></div></div>	M-607-2	CHAIN LINK FENCE (3 SHEETS).....		119-121		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-1	GROUND SIGN PLACEMENT (2 SHEETS).....		187-188	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-206-1	EXCAVATION AND BACKFILL FOR STRUCTURES		15-16 (2 SHEETS)		<div><div></div><div></div><div></div><div></div><div></div></div>	M-607-3	BARRIER FENCE.....		122		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-2	CLASS I SIGNS ...		<i>(REVISED ON MARCH 1, 2024)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-206-2	EXCAVATION AND BACKFILL FOR BRIDGES (2 SHEETS)....		17-18		<div><div></div><div></div><div></div><div></div><div></div></div>	M-607-4	DEER FENCE, GATES, AND GAME RAMPS (7 SHEETS).....		123-127 <i>(REVISED ON JULY 13, 2020)</i>		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-3	CLASS II SIGNS ...		<i>(REVISED ON MARCH 1, 2024)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-208-1	TEMPORARY EROSION CONTROL (11 SHEETS)		19-29 <i>(REVISED ON MAY 16, 2024)</i>		<div><div></div><div></div><div></div><div></div><div></div></div>	M-607-10	PICKET SNOW FENCE		128		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-4	CLASS III SIGNS (3 SHEETS) ...		<i>(REVISED ON MARCH 1, 2024)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-210-1	MAILBOX SUPPORTS (2 SHEETS)		30-31		<div><div></div><div></div><div></div><div></div><div></div></div>	M-607-15	ROAD CLOSURE GATE (9 SHEETS).....		129-137		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-5	BREAK-AWAY SIGN SUPPORT DETAILS		194-195 FOR CLASS III SIGNS (2 SHEETS)	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-214-1	NURSERY STOCK DETAILS		32		<div><div></div><div></div><div></div><div></div><div></div></div>	M-608-1	CURB RAMPS (10 SHEETS).....		138-147		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-6	CONCRETE FOOTINGS AND SIGN ISLANDS.....		196-197 FOR CLASS III SIGNS (2 SHEETS)	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-216-1	SOIL RETENTION COVERING (2 SHEETS)		33-34		<div><div></div><div></div><div></div><div></div><div></div></div>	M-609-1	CURBS, GUTTERS, AND SIDEWALKS (4 SHEETS).....		148-151		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-8	TUBULAR STEEL SIGN SUPPORT DETAILS (7 SHEETS).....		198-204 <i>(REVISED ON MARCH 1, 2024)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-400-1	SAFETYEDGE FOR PAVEMENT <i>(NEW, ISSUED ON DECEMBER 12, 2024)</i>				<div><div></div><div></div><div></div><div></div><div></div></div>	M-611-1	CATTLE GUARD (2 SHEETS).....		152-153		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-9	PEDESTRIAN PUSH BUTTON POST ASSEMBLY (2 SHEETS).....		205-206 <i>(SUPERSEDED ON JANUARY 23, 2020 BY S-614-45)</i>	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-412-1	CONCRETE PAVEMENT JOINTS (9 SHEETS)		35-39 <i>(REVISED ON JANUARY 31, 2022)</i>		<div><div></div><div></div><div></div><div></div><div></div></div>	M-611-2	DEER GUARD (2 SHEETS).....		154-155		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-10	MARKER ASSEMBLY INSTALLATIONS		207	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-412-2	CONCRETE PAVEMENT CRACK REPAIR (6 SHEETS) <i>(REVISED ON SEPTEMBER 6, 2022)</i>				<div><div></div><div></div><div></div><div></div><div></div></div>	M-614-1	RUMBLE STRIPS (3 SHEETS).....		156-158		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-11	MILEPOST SIGN DETAIL FOR HIGH SNOW AREAS		208	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-510-1	STRUCTURAL PLATE PIPE H-20 LOADING.....		40		<div><div></div><div></div><div></div><div></div><div></div></div>	M-614-2	SAND BARREL ARRAYS (2 SHEETS).....		159-160		<div><div></div><div></div><div></div><div></div><div></div></div>	S-614-12	STRUCTURE NUMBER INSTALLATION (2 SHEETS).....		209-210	
<div><div></div><div></div><div></div><div></div><div></div></div>	M-601-1	SINGLE CONCRETE BOX CULVERT (CAST-IN-PLACE).....															

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GENERAL NOTES:


1. THIS PROJECT CONSISTS OF FIBER OPTIC CABLE INSTALLATION, SPLICING, AND TERMINATING; CONDUIT AND PULL BOX INSTALLATION; AND OTHER RELATED IMPROVEMENTS ALONG RIO GRANDE STREET AND COURT PLACE BETWEEN CRESTLINE AVENUE AND LITTLETON BOULEVARD, ALONG LITTLETON BOULEVARD BETWEEN COURT PLACE AND BROADWAY, ON DATURA STREET AND GALLUP STREET BETWEEN LITTLETON BOULEVARD AND LAKE AVENUE, AND ON COUNTY LINE ROAD BETWEEN SANTA FE DRIVE AND SOUTHPARK CIRCLE. REFER TO THE PROJECT SPECIAL PROVISIONS FOR MORE INFORMATION. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF LITTLETON'S STANDARDS, MANUALS, AND SPECIFICATIONS, THE COLORADO DEPARTMENT OF TRANSPORTATION'S (CDOT) "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2023 EDITION", CDOT'S "M & S STANDARD PLANS, 2019 EDITION", THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, 2009 EDITION", AND THE "NATIONAL ELECTRIC CODE (NEC)."
2. THE BID QUANTITIES OF THE PROJECT ARE THE RESULT OF A QUANTITY TAKEOFF BY THE ENGINEER. THE CONTRACTOR SHALL, HOWEVER, SATISFY HIMSELF AS TO THE ACCURACY OF ALL QUANTITIES AND BRING ANY DISCREPANCIES TO THE ATTENTION OF THE PROJECT ENGINEER, IN WRITING, AT THE EARLIEST OPPORTUNITY. ANY REQUIRED ITEM NOT SHOWN IN THE SUMMARY OF QUANTITIES SHALL BE CONSIDERED INCIDENTAL TO THE INSTALLATION OF THE FIBER NETWORK AND WILL NOT BE PAID FOR SEPARATELY.
3. RIGHT-OF-WAY SHOWN ON THE PLANS IS BASED ON INFORMATION AVAILABLE AT TIME OF PRINT. THE INFORMATION IS PROVIDED TO THE CONTRACTOR TO IDENTIFY CONSTRUCTION CONSTRAINTS. PRIOR TO WORKING IN THE AREA, THE CONTRACTOR SHALL FIELD VERIFY THE APPARENT AVAILABLE RIGHT-OF-WAY (AS IDENTIFIED BY FENCES, MONUMENTS, BUILDINGS, MAINTAINED PRIVATE PROPERTY, ETC.) TO VERIFY CONSTRUCTION CONSTRAINTS. ALL CONSTRUCTION SHALL BE WITHIN CITY OF LITTLETON RIGHT-OF-WAY OR EASEMENTS.
4. PROPOSED CONDUIT ROUTING SHOWN ON THE PLANS IS DIAGRAMMATIC IN INTENT. CONTRACTOR SHALL MODIFY ROUTING AS NECESSARY TO AVOID EXISTING AND PROPOSED OBSTRUCTIONS.
5. ANY CURB AND GUTTER, ASPHALT PAVEMENT, CONCRETE PAVEMENT OR SIDEWALK, FACILITIES, OR LANDSCAPING WHICH IS TO REMAIN AND IS DAMAGED AS A RESULT OF THE CONTRACTOR'S OPERATION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
6. WHERE IT IS REQUIRED TO CUT EXISTING PAVEMENT, THE CUTTING SHALL BE DONE TO A NEAT WORK LINE TO THE DESIRED DEPTH WITH A PAVEMENT CUTTING SAW OR OTHER METHOD AS APPROVED BY THE ENGINEER. THIS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
7. ALL WORK INSIDE TRAFFIC SIGNAL CABINETS SHALL BE PERFORMED BY AN INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION (IMSA) LEVEL II TRAFFIC SIGNAL TECHNICIAN. A COPY OF ALL RELEVANT LICENSES AND CERTIFICATIONS SHALL BE GIVEN TO THE PROJECT ENGINEER BEFORE WORK STARTS.
8. THE CONTRACTOR MUST SUBMIT TO THE PROJECT ENGINEER CUT SHEETS AND/OR MATERIAL DESCRIPTIONS OF ALL MATERIALS PRIOR TO PURCHASE FOR APPROVAL BY THE CITY OF LITTLETON. IN ADDITION, COPIES OF ALL MANUFACTURER'S RECOMMENDED INSTALLATION INSTRUCTIONS AND PROCEDURES FOR MATERIALS SHALL BE PROVIDED TO THE CITY PRIOR TO THE START OF THE WORK.
9. UPON COMPLETION OF THE WORK ,THE CONTRACTOR SHALL SUBMIT RECORD DRAWINGS, "AS-CONSTRUCTED" PLANS TO THE CITY OF LITTLETON SHOWING THE ACTUAL LOCATION OF CONDUIT, PULL BOXES, AND OTHER SIGNIFICANT WORK ITEMS AT NO ADDITIONAL COST TO THE PROJECT. "AS-CONSTRUCTED" PLANS SHALL BE THE CONSTRUCTION PLAN SET WITH CHANGES MARKED IN RED INK. THIS WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE PROJECT. DOCUMENTS IN THE FORM OF PRINTS SHALL BE SUBMITTED AT THE TIME THE SYSTEM ACCEPTANCE TESTS BEGIN.
10. THIS PROJECT INCLUDES PULLING COMMUNICATION CABLES THROUGH EXISTING CONDUIT. CONTRACTOR SHALL NOT DAMAGE ANY EXISTING CABLES IN THE EXISTING CONDUIT. CONTRACTOR SHALL NOTIFY THE APPROPRIATE AGENCY STAFF OF ANY DAMAGED, OR UNUSABLE, SEGMENTS OF EXISTING CONDUIT.
11. ALL RANGE POINTS, TIES, BENCHMARKS, OR SURVEY CONTROL POINTS WHICH MAY BE ENCOUNTERED DURING CONSTRUCTION MUST BE SURVEYED PRIOR TO DISTURBING. THIS WILL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE WORK. ANY POINT DAMAGED SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
12. ALL STAGING AREAS SHALL BE SUBMITTED TO THE PROJECT ENGINEER FOR APPROVAL.
13. THE CONTRACTOR SHALL NOT CLOSE OR OBSTRUCT BUSINESS OR RESIDENTIAL DRIVEWAYS UNLESS APPROVED IN WRITING BY THE PROJECT ENGINEER.
14. NO CONSTRUCTION VEHICLES SHALL BE IN THE TRAVELED WAY AT ANY TIME WITHOUT APPROPRIATE CONSTRUCTION TRAFFIC CONTROL.
15. IN ADDITION TO THE ITEMS TABULATED THROUGHOUT THE PLAN SET, IT IS ESTIMATED THAT THE FOLLOWING ITEMS WILL BE REQUIRED FOR THIS PROJECT:

ITEM NUMBER	DESCRIPTION	UNIT	QUANTITY
626-00000	MOBILIZATION	LS	1

ENVIRONMENTAL NOTES

16. THERE SHALL BE NO STOCKPILING OR SIDE CASTING OF WASTE MATERIAL INCLUDING BUT NOT LIMITED TO PAINT CHIPS, ASPHALT, OR CONCRETE ADJACENT TO ANY DRAINAGE WAYS (INCLUDING DRY DRAINAGE WAYS).
17. DISPOSAL OF EXCESS MATERIAL OFF-SITE OR THE IMPORTING OF MATERIALS ON-SITE, REGARDLESS OF PROPERTY OWNERSHIP, MUST BE DONE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.
18. NO GROUNDWATER SHALL BE ALLOWED TO RUN OFF TO ANY STORM SEWER, DITCH, OR WATERS OF THE STATE. WATER SHALL BE CONTAINED, REMOVED FROM THE SITE, OR DISPOSED IN ACCORDANCE WITH LOCAL, STATE, OR FEDERAL REGULATIONS.
19. CONTROL MEASURES WILL BE IMPLEMENTED BEFORE, DURING, AND FOLLOWING CONSTRUCTION TO PREVENT DEBRIS OR CONSTRUCTION MATERIALS FROM ENTERING INTO EXISTING WATERWAY AND WETLAND AREAS. STRUCTURAL AND/OR NON-STRUCTURAL EROSION AND SEDIMENT CONTROL DEVICES WILL BE USED TO PREVENT THE MOVEMENT OF DRILLING FLUIDS, MUDS, CONCRETE, PETROLEUM PRODUCTS, AND SEDIMENT FROM EXPOSED AREAS INTO SURROUNDING DRAINAGES AND WETLAND AREAS TO PROTECT AQUATIC RESOURCES WITHIN AND ADJACENT TO THE PROJECT AREA. ALL TEMPORARY CONTROL MEASURES SHALL BE REMOVED FROM THE SITE UPON SUBMITTING THE INACTIVATION NOTICE.
20. THE CONTRACTOR SHALL KEEP ALL ENVIRONMENTALLY SENSITIVE AREAS, SUCH AS WATERWAYS, DITCHES, PRAIRIE DOG COLONIES, WETLANDS, DRAINAGE AREAS, AND OPEN SPACE, FREE AND CLEAR OF DEBRIS, MATERIALS, EQUIPMENT, AND VEHICLES. NO PARKING, STAGING, OR WORK SHALL BE ALLOWED IN ANY SUCH AREAS. THE CONTRACTOR SHALL REMOVE IN A TIMELY MANNER, ALL SEDIMENT, MUD, DEBRIS, OR OTHER POTENTIAL POLLUTANTS WHICH MAY BE DISCHARGED TO, OR ACCUMULATE IN, THE FLOW LINES AND PUBLIC RIGHTS-OF-WAY AS A RESULT OF CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT.
21. THE CONTRACTOR SHALL REPLACE ANY DAMAGED LANDSCAPE, INCLUDING BUT NOT LIMITED TO, TOPSOIL, GRASS, IRRIGATION SYSTEM COMPONENTS, TREES, SHRUBS, GROUND COVERS AND MULCH, TO ITS ORIGINAL CONDITION. SOD SHALL MATCH EXISTING. IN AREAS NOT SODDED, SEEDING (NATIVE), MULCHING (WEED FREE), AND MULCH TACKIFIER SHALL BE USED. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER'S LANDSCAPE MAINTENANCE PERSONNEL AT LEAST FIVE (5) WORKING DAYS IN ADVANCE OF STARTING WORK IN THE AREA. WITH PROPER AND TIMELY NOTIFICATION, THE OWNER'S LANDSCAPE MAINTENANCE PERSONNEL SHALL MARK AND IDENTIFY THE IRRIGATION SYSTEM COMPONENTS. THIS IS IN NO WAY ALL INCLUSIVE OF ALL UTILITIES OR ALL OF THE IRRIGATION SYSTEM. NO LANDSCAPE SHALL BE WITHOUT WATERING SERVICES DURING THE GROWING SEASON. IF THE IRRIGATION SERVICE IS INTERRUPTED FOR MORE THAN THREE DAYS, THE CONTRACTOR SHALL BE LIABLE TO HAND/TRUCK WATER AND POSSIBLY ALL PLANT REPLACEMENT IN THE AFFECTED LANDSCAPE. LANDSCAPE RESTORATION SHALL BE CONSIDERED COMPLETE WHEN THE LANDSCAPE AND IRRIGATION SYSTEM IS RESTORED TO ITS ORIGINAL CONDITION AND APPROVED BY THE MAINTAINING PERSONNEL. THE OWNER'S LANDSCAPE MAINTENANCE PERSONNEL, PRIOR TO BURIAL, SHALL INSPECT ALL REPAIR WORK TO ANY IRRIGATION COMPONENTS, AND PROVIDE ACCEPTANCE OF SAID WORK. WORK SHALL BE PAID FOR AS BID ITEM 212 – LANDSCAPE RESTORATION, UNLESS DAMAGE WAS DUE TO CONTRACTOR NEGLIGENCE.
22. WORKERS SHALL BE ALERT DURING EXCAVATIONS FOR ANY VISUAL OR OLFATORY SIGNS OF CONTAMINATION. IF SOIL AND/OR GROUNDWATER CONTAMINATION IS ENCOUNTERED, WORK WILL STOP IMMEDIATELY AND THE PROCEDURES OUTLINED IN CDOT SPECIFICATION 250 SHALL BE FOLLOWED.
23. THE CONTRACTOR SHALL NOT PARK OR STAGE WITHIN ANY ADJACENT PARKS, RECREATION AREAS, OR OPEN SPACE, NOR SHALL CONSTRUCTION ACTIVITIES INTERFERE WITH ANY RECREATIONAL ACTIVITIES HAPPENING NEARBY. ALL SIDEWALKS, TRAILS, PARKS, CROSSWALKS, SCHOOLS, AND MULTI-USE PATHS SHALL REMAIN OPEN AND ACCESSIBLE TO USERS AT ALL TIMES UNLESS OTHERWISE APPROVED BY THE ENGINEER.
24. STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITIES SHALL NOT CAUSE, HAVE THE REASONABLE POTENTIAL TO CAUSE, OR MEASURABLY CONTRIBUTE TO AN EXCEEDANCE OF ANY WATER QUALITY STANDARD.
25. CONSTRUCTION SHALL BE PHASED IN A MANNER TO LIMIT EARTH DISTURBING ACTIVITIES (I.E. THE ENTIRE PROJECT SITE SHOULD NOT BE DISTURBED IF CONSTRUCTION WILL ONLY BE OCCURRING IN ONE PARTICULAR SECTION).
26. ALL DRILLING FLUID SHALL BE CONTAINED AND NOT ALLOWED TO DISCHARGE INTO WETLANDS OR WATERWAYS. THE CONTRACTOR SHALL MONITOR FOR SURFACE RELEASES OF DRILLING FLUID AND STOP DRILLING OPERATIONS IF A SUDDEN OR UNEXPECTED LOSS OF DRILLING FLUID RETURNS IS OBSERVED UNTIL THE LOCATION OF ANY SURFACE RELEASE CAN BE IDENTIFIED. DISCHARGES OF DRILLING FLUID TO WETLANDS OR WATERWAYS SHALL BE REPORTED TO THE PROJECT ENGINEER IMMEDIATELY.
27. WHEN THE CONTRACTOR'S OPERATIONS ENCOUNTER ARCHAEOLOGICAL OR PALEONTOLOGICAL DISCOVERIES, ALL AFFECTED OPERATIONS SHALL CEASE AND THE CONTRACTOR SHALL NOTIFY THE ENGINEER. SEE SUBSECTION 107.23 OF THE CDOT STANDARD SPECIFICATIONS FOR ADDITIONAL INFORMATION.
28. BEST MANAGEMENT PRACTICES WILL BE ADHERED TO PREVENT THE SPREAD OF NOXIOUS WEEDS.

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As Constructed	GENERAL NOTES			Project No./Code
No Revisions:				21-37
Revised:	Designer: B. WALDMAN	Structure Numbers		
	Detailer: D. MURIE			
Void:	Sheet Subset: G-NOTES	Subset Sheets: 1 of 2		Sheet Number 3

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ENVIRONMENTAL NOTES (CONTINUED)

29. IN THE UNLIKELY EVENT THAT ASBESTOS CONTAINING MATERIAL (ACM) IS ENCOUNTERED, INCLUDING WITH BURIED UTILITIES, WORKERS MUST FOLLOW CDOT SPECIFICATION 250.07 – REGULATED ASBESTOS CONTAMINATED SOILS (RACS) MANAGEMENT AND CDOT REGULATED ASBESTOS-CONTAMINATED SOIL MANAGEMENT STANDARD OPERATING PROCEDURE. ADDITIONALLY, DEPENDING ON THE TYPE OF ACM, THIS MATERIAL MUST ALSO BE ABATED IN ACORDANCE WITH EITHER SECTION 5.5 OF THE SOLID WASTE REGULATIONS, OR REGULATION NO. 8 OF THE AIR QUALITY CONTROL COMMISSION REGULATIONS. WORKERS ON THIS PROJECT MUST FOLLOW CDOT SPECIFICATION 250 – ENVIRONMENTAL HEALTH AND SAFETY MANAGEMENT.

FIBER OPTIC NOTES

30. PULL BOX LOCATIONS ARE APPROXIMATE AND ARE SHOWN FOR INFORMATION PURPOSES ONLY. REFER TO THE PROJECT SPECIAL PROVISIONS FOR ADDITIONAL REQUIREMENTS.
31. ALL CONDUIT SHALL BE SCHEDULE 80 HDPE. BORED CONDUIT MAY ONLY BE USED WITHIN THE LIMITS OF THE SUBSURFACE UTILITY PLANS, AND SHALL BE AT A MINIMUM DEPTH OF 48 INCHES. ALL TRENCHED CONDUIT SHALL BE AT A MINIMUM DEPTH OF 48 INCHES.
32. AWG #12 SOLID CORE TRACER WIRE AND MULE TAPE SHALL BE INSTALLED BY THE CONTRACTOR AS SPECIFIED IN THE CONTRACT DOCUMENTS.
33. IF CONCRETE SIDEWALK IS REMOVED TO FACILITATE THE PLACEMENT OF CONDUIT OR PULL BOXES, THE ENTIRE SECTION FROM SCORELINE TO SCORELINE SHALL BE REMOVED AND REPLACED. CONCRETE SIDEWALK SHALL BE REPLACED TO MATCH EXISTING SIDEWALK DEPTH AND ELEVATION. REMOVED CONCRETE SHALL BE DISPOSED OF AT A LOCATION APPROVED BY THE PROJECT ENGINEER. IF POTHOLING IN A CONCRETE SIDEWALK, THE CONTRACTOR MAY BE ALLOWED TO PATCH THE SIDEWALK; HOWEVER, THIS WOULD BE AT THE DISCRETION OF THE PROJECT ENGINEER. NO PULL BOXES MAY BE PLACED IN THE SIDEWALK UNLESS APPROVED BY THE CITY ENGINEER. IT IS ESTIMATED THAT 20 SY OF SIDEWALK REMOVAL AND REPLACEMENT WILL BE REQUIRED FOR THIS PROJECT.
34. ALL EXCAVATIONS LEFT UNATTENDED SHALL BE FENCED WITH ORANGE SAFETY FENCE AND METAL POSTS DRIVEN INTO THE GROUND ON A MAXIMUM OF 10' CENTERS.
35. ALL FIBER WORK SHALL BE PER THE MANUFACTURER'S INSTRUCTION AND RECOMMENDATIONS. THIS SHALL INCLUDE ALL SPLICING, TERMINATION, FIBER OPTIC CLOSURE MANAGEMENT AND ALL OTHER MATERIALS PROVIDED.
36. THE CONTRACTOR SHALL ENSURE THAT THE MINIMUM BEND RADII OF THE FIBER OPTIC CABLES, PER THE CABLE MANUFACTURER'S SPECIFICATIONS ARE NOT VIOLATED AT ANY POINT DURING TRANSPORT, STORAGE, AND INSTALLATION OF THE FIBER OPTIC CABLE.
37. A MINIMUM FIFTY (50) FEET OF PROPOSED FIBER OPTIC CABLE SHALL BE COILED AT ALL PULL BOXES, ONE HUNDRED (100) FEET AT ALL MANHOLES, AND TEN (10) FEET AT ALL GROUND MOUNTED CABINETS. AT SPLICE POINT LOCATIONS SHOWN ON THE PLANS (EXISTING, PROPOSED, OR FUTURE), ONE HUNDRED (100) FEET OF CABLE SHALL BE COILED INSIDE THE PULL BOX OR MANHOLE.
38. ALL FIBER OPTIC CABLES INSTALLED BY THE CONTRACTOR SHALL BE LABELED AS SPECIFIED IN THE CONTRACT DOCUMENTS AND AS DIRECTED BY THE ENGINEER.
39. AT LOCATIONS THROUGHOUT THIS PROJECT EXISTING LITTLETON 2" CONDUIT HAS BEEN STUBBED UP NEAR MCI PULL BOXES. CONTRACTOR TO IDENTIFY THESE CONDUITS AND SWEEP THEM INTO THE PROPOSED PULL BOXES AS IDENTIFIED IN THE PLANS. IF POSSIBLE, CONTRACTOR SHALL UTILIZE THE EXISTING CONDUIT THE ENTIRE DISTANCE INTO THE PULL BOX. IF NECESSARY, CONTRACTOR MAY COUPLE NEW CONDUIT TO THE END OF EXISTING CONDUIT TO REACH THE PROPOSED PULL BOX LOCATION. 10 LF OF 2-INCH ELECTRICAL CONDUIT (PLASTIC) HAS BEEN INCLUDED IN THE QUANTITIES FOR THIS WORK AT EACH STUBBED UP CONDUIT LOCATION. MCI CONDUIT AND PULL BOXES SHALL NOT BE DISTURBED DURING THIS WORK.
40. THE CONTRACTOR SHALL SPLICE THE FIBER OPTIC CABLE ONLY AT APPROVED SPLICE LOCATIONS AS SHOWN ON THE PLANS. ALL BACKBONE FIBER OPTIC CABLE SHALL RUN CONTINUOUSLY AND UNSPLICED FROM END TO END WITH NO INTERMEDIATE REEL-TO-REEL SPLICES, UNLESS APPROVED BY THE PROJECT ENGINEER. IF THE PROJECT ENGINEER APPROVES REEL-TO-REEL SPLICES, THE COST OF THE SPLICING WORK SHALL BE INCLUDED IN BID ITEM 614 – FIBER OPTIC CABLE (SINGLE MODE). MID-SHEATH SPLICES SHALL BE PERFORMED AT LATERAL LOCATIONS AND ONLY FIBERS BEING SPLICED SHALL BE CUT.
41. IT IS ESTIMATED THAT 304 FIBER OPTIC FUSION SPLICES WILL BE REQUIRED FOR THIS PROJECT, WHICH INCLUDES 24 ADDITIONAL UNALLOCATED SPLICES NOT SHOWN ON THE SPLICING DIAGRAMS FOR OTHER ADDITIONAL SPLICING WORK AS DIRECTED BY THE ENGINEER. THE COST OF SPLICING WORK SHALL BE INCLUDED IN BID ITEM 614 – FIBER OPTIC CABLE (SINGLE MODE)

42. FOR NETWORK RELATED EQUIPMENT INSTALLATIONS, THE CONTRACTOR SHALL:
- A. SECURE TERMINATION PANELS, ETHERNET SWITCHES AND ASSOCIATED ELECTRICAL WIRING AND EQUIPMENT CABLING IN A WORKMANLIKE MANNER THAT DOES NOT INTERFERE WITH THE EQUIPMENT AND FUTURE MAINTENANCE ON THE CABINET.
 - B. INSTALL FIBER OPTIC CABLES IN A LOCATION WHICH WILL NOT DAMAGE CABLE OR PATCH CABLES AND NOT BE DISTURBED BY FUTURE ROUTINE MAINTENANCE. STRAIN RELIEF AND CABLE LABEL SHALL BE INSTALLED.
 - C. PRE-CONNECTORIZED FIBER PATCH CABLE SHALL BE LABELED WITH CORRESPONDING TRANSMIT (TX), RECEIVE (RX) WAVELENGTHS, TERMINATION PANEL PORT ASSIGNMENT AND DATA DIRECTION FROM DEVICE LOCATIONS AS PART OF THE REQUIRED LABELING.
43. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY TESTING HARDWARE EQUIPMENT FOR THIS PROJECT. THIS SHALL INCLUDE BUT NOT BE LIMITED TO AN OPTICAL POWER METER AND OPTICAL TIME DOMAIN REFLECTOMETER (OTDR) ALONG WITH ANY OTHER FIBER OPTIC EQUIPMENT THAT MAY BE REQUIRED.
44. THE CONTRACTOR SHALL BI-DIRECTIONALLY TEST ALL FIBERS AT EACH CABLE END. FIBER SPLICES SHALL BE FUSION SPLICED AND SHALL NOT ADD MORE THAN 0.1 dB LOSS TO ANY INDIVIDUAL FIBER RUN. FIBER CABLES SHALL BE FURNISHED WITH SLACK AS SPECIFIED ON THE PLANS. FIBER TESTING CANNOT COMMENCE UNTIL ALL FIBER WORK FOR THAT SEGMENT IS COMPLETE. FIBER TESTING WORK SHALL BE INCLUDED IN THE COST OF BID ITEM 614 – TEST FIBER OPTIC CABLE.
45. FIBER ACCEPTANCE TEST RESULTS SHALL BE PROVIDED IN PAPER AND ELECTRONIC FORMATS UPON COMPLETION. THE CONTRACTOR SHALL PROVIDE ANY SOFTWARE NECESSARY TO VIEW ELECTRONIC TEST RESULTS. THIS SHALL BE INCLUDED IN THE COST OF BID ITEM 614 – TEST FIBER OPTIC CABLE.


UTILITY NOTES

46. UTILITIES ARE DEPICTED ON THESE PLANS IN ACCORDANCE WITH THEIR ACHIEVED "QUALITY LEVEL" AS DEFINED IN THE AMERICAN SOCIETY OF CIVIL ENGINEERS DOCUMENTATION ASCE 38 "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA." RELIANCE UPON THESE DATA FOR RISK MANAGEMENT PURPOSES DURING BIDDING DOES NOT RELIEVE THE EXCAVATOR OR UTILITY OWNER FROM FOLLOWING ALL APPLICABLE UTILITY DAMAGE PREVENTION STATUTES, POLICIES, AND/OR PROCEDURES DURING EXCAVATION.
47. THE CONTRACTOR'S ATTENTION IS DIRECTED TO SUBSECTION 105.11 OF THE STANDARD SPECIFICATIONS CONCERNING UTILITIES AND THE UTILITY SPECIFICATION FOR THIS PROJECT. THE PHYSICAL FEATURES WITHIN THE LIMITS OF THE PROJECT HAVE BEEN SHOWN BASED ON THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL VERIFY AND BE RESPONSIBLE FOR ALL FEATURES, INCLUDING ALL UNDERGROUND AND ABOVE GROUND UTILITIES, PRIOR TO BEGINNING ANY WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FILED LOCATING AND VERIFYING ALL UTILITY INFORMATION. FOR UTILITY CONSTRUCTION COORDINATION, THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER FOR COLORADO AT 811.
48. POTHOLING WILL BE REQUIRED ON THIS PROJECT AND WILL BE PAID FOR SEPARATELY AS ITEM 203-01597 POTHOLING. IT IS ESTIMATED THAT 100 HOURS OF POTHOLING WILL BE REQUIRED FOR THIS PROJECT. THE CONTRACTOR SHALL LOCATE AND POTHOLE ALL POTENTIAL CONFLICTS WITH EXISTING BURIED UTILITY FACILITIES WITHIN THE PROPOSED CONSTRUCTION LIMITS, AS SHOWN BY FIELD LOCATION MARKINGS. IF A CONFLICT EXISTS, MODIFY PROPOSED CONSTRUCTION PLANS TO AVOID ALL EXISTING BURIED UTILITY FACILITIES. POTHOLING IN CONCRETE SHALL BE AT THE DIRECTION OF THE PROJECT ENGINEER.
49. THE CONTRACTOR SHALL COMPLY WITH ARTICLE 1.5 OF TITLE 9, CRS ("EXCAVATION REQUIREMENTS") WHEN EXCAVATING OR GRADING IS PLANNED IN THE AREA OF UNDERGROUND UTILITY FACILITIES. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITIES AT LEAST TWO (2) BUSINESS DAYS, NOT INCLUDING THE ACTUAL DAY OF NOTICE, PRIOR TO COMMENCING SUCH OPERATIONS. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT PHONE NO. 811 OR 1-800-922-1987 TO HAVE LOCATIONS OF UNCC REGISTERED LINES MARKED BY MEMBER COMPANIES. ALL OTHER UNDERGROUND FACILITIES SHALL BE LOCATED BY CONTACTING THE RESPECTIVE OWNER. UTILITY SERVICE LATERALS SHALL BE LOCATED PRIOR TO BEGINNING EXCAVATION OR GRADING.
50. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING AND COORDINATING WITH THE APPROPRIATE UTILITY REPRESENTATIVES TO BE ONSITE DURING POTHOLING. THE CONTRACTOR SHALL REFER TO THE UTILITY PLANS AND/OR SPECIFICATION FOR ADDITIONAL REQUIREMENTS.

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									Detailer: D. MURIE	Numbers			
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INDEX			CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	ITS PLAN		GENERAL		PROJECT TOTALS	
BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.
			202-00055	REMOVAL OF FIBER OPTIC CABLE	LF	5,390				5,390	
			202-00200	REMOVAL OF SIDEWALK	SY			20		20	
			203-01597	POTHOLING	HOURL			100		100	
			208-00002	EROSION LOG TYPE 1 (12 INCH)	LF			600		600	
			208-00035	AGGREGATE BAG	LF			120		120	
			208-00045	CONCRETE WASHOUT STRUCTURE	EACH			1		1	
			208-00051	STORM DRAIN INLET PROTECTION (TYPE I)	LF			30		30	
			208-00052	STORM DRAIN INLET PROTECTION (TYPE II)	LF			30		30	
			208-00103	REMOVAL AND DISPOSAL OF SEDIMENT (LABOR)	HOURL			20		20	
			208-00105	REMOVAL AND DISPOSAL OF SEDIMENT (EQUIPMENT)	HOURL			20		20	
			208-00106	SWEEPING (SEDIMENT REMOVAL)	HOURL			20		20	
			212-00032	SOIL CONDITIONING	ACRE			0.1		0.1	
			212-00700	ORGANIC FERTILIZER	LB			30		30	
			212-00701	COMPOST (MECHANICALLY APPLIED)	CY			7		7	
			212-00704	MYCORRHIZAE	LB			6		6	
			212-00708	SEEDING (NATIVE) BROADCAST	ACRE			0.1		0.1	
			212-01200	LANDSCAPE RESTORATION	LS			1		1	
			213-00003	MULCHING (WEED FREE)	ACRE			0.1		0.1	
			213-00061	MULCH TACKIFIER	LB			10		10	
			216-00101	SOIL RETENTION BLANKET (STRAW-COCONUT) (PHOTODEGRADABLE CLASS 1)	SY			100		100	
			607-11525	FENCE (PLASTIC)	LF			100		100	
			608-00006	CONCRETE SIDEWALK (6 INCH)	SY			20		20	
			612-00260	LOCATION MARKER (FIBER OPTIC) (DOME)	EACH	18				18	
			613-00206	2 INCH ELECTRICAL CONDUIT (BORED)	LF	16,860				16,860	
			613-01200	2 INCH ELECTRICAL CONDUIT (PLASTIC)	LF	340				340	
			613-07023	PULL BOX (24"X36"X24")	EACH	13				13	
			613-07040	PULL BOX (30"X48"X24")	EACH	5				5	
			613-07195	PROOF CONDUIT	LF	7,380				7,380	
			614-87015	BUFFER TUBE FAN OUT KIT	EACH	6				6	
			614-87024	FIBER OPTIC TERMINATION PANEL (24 FIBER)	EACH	2				2	
			614-87144	FIBER OPTIC TERMINATION PANEL (144 FIBER)	EACH	1				1	
			614-87350	TEST FIBER OPTIC CABLE	LS			1		1	
			614-87496	FIBER OPTIC CABLE (SINGLE MODE) (96 STRANDS)	LF	2270				2,270	

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	Detailer: D. MURIE	Numbers		
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INDEX			CONTRACT ITEM NO.	CONTRACT ITEM	UNIT	ITS PLAN		GENERAL		PROJECT TOTALS	
BOOK	PAGE	SHEET				PLAN	AS CONST.	PLAN	AS CONST.	PLAN	AS CONST.
			614	FIBER OPTIC TERMINATION PANEL (48 FIBER)	EACH	2				2	
			614	ETHERNET SWITCH (INSTALL ONLY)	EACH	5				5	
			614	12 PORT PRE-TERMINATED PATCH PANEL AND PIGTAIL	EACH	5				5	
			614	SPLICE ENCLOSURE	EACH	7				7	
			614	INDOOR/OUTDOOR FIBER OPTIC CABLE (SINGLE MODE) (24 STRANDS)	LF	4,595				4,595	
			614	INDOOR/OUTDOOR FIBER OPTIC CABLE (SINGLE MODE) (144 STRANDS)	LF	665				665	
			614	FIBER OPTIC CABLE (SINGLE MODE) (432 STRANDS)	LF	10,380				10,380	
			626-00000	MOBILIZATION	LS			1		1	
			630-00000	FLAGGING	HOUR			20		20	
			630-00007	TRAFFIC CONTROL INSPECTION	DAY			44		44	
			630-00012	TRAFFIC CONTROL MANAGEMENT	DAY			110		110	
			630-80341	CONSTRUCTION TRAFFIC SIGN (PANEL SIZE A)	EACH			56		56	
			630-80342	CONSTRUCTION TRAFFIC SIGN (PANEL SIZE B)	EACH			16		16	
			630-80350	VERTICAL PANEL	EACH			30		30	
			630-80358	ADVANCE WARNING FLASHING OR SEQUENCING ARROW PANEL (C TYPE)	EACH			2		2	
			630-80363	DRUM CHANNELIZING DEVICE (WITH LIGHT) (FLASHING)	EACH			50		50	
			630-80380	TRAFFIC CONE	EACH			150		150	
			630-85020	MOBILE ATTENUATOR	EACH			2		2	
				FORCE ACCOUNT =====							
			700-70010	F/A MINOR CONTRACT REVISIONS	FA			1		1	
			700-70016	F/A FUEL COST ADJUSTMENT	FA			1		1	
			700-70380	F/A EROSION CONTROL	FA			1		1	
			700-70589	F/A ENVIRONMENTAL HEALTH & SAFETY MANAGEMENT	FA			1		1	

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CITY OF LITTLETON
2255 WEST BERRY AVENUE
LITTLETON, CO 80120
PHONE: 303-795-3700

As Constructed	SUMMARY OF APPROXIMATE QUANTITIES		Project No./Code
No Revisions:			21-37
Revised:	Designer: B. WALDMAN	Structure Numbers	
Void:	Detailer: D. MURIE		
	Sheet Subset: SAQ	Subset Sheets: 2 of 2	Sheet Number 6

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1. SITE DESCRIPTION

The Contractor shall comply with all CDOT contractual requirements. The SWMP Administrator for Construction shall update to reflect current project site conditions.

- A. PROJECT SITE LOCATION: Work is being performed on Rio Grande Street and Court Place between Crestline Ave and Littleton Blvd, along Littleton Blvd between Court Place and Broadway, on Datura Street between Littleton Boulevard and Lake Avenue, and on County Line Road between Santa Fe Drive and Southpark Circle.
- B. PROJECT SITE DESCRIPTION: This project will install fiber optic cable from the Littleton Center to various traffic signals and City facilities on or near Littleton Boulevard and County Line Road. Much of the proposed fiber will be installed through existing conduits, but new conduit will be installed in some locations using open trenching and directional boring. The project will also install pull boxes along the fiber optic alignment, and communications equipment in traffic signal cabinets and facilities.
- C. PROPOSED SEQUENCING FOR MAJOR CONSTRUCTION ACTIVITIES: Conduit installation, pull box installation, communications equipment installation, fiber optic cable pulling and splicing.
- D. ACRES OF DISTURBANCE:

1. Total area of construction site (LOC): N/A

2. Total area of proposed disturbance (LDA): 0.5 acres

3. Total area of seeding: 0.1 acres
- E. EXISTING SOIL DATA: Soils within the limits of the project are approximately 26% sandy loam with low erodibility, 7% Bresser loam with moderate erodibility, and 66% Nunn loam with high erodibility.
Data Source(s): USDA Web Soil Survey
- F. EXISTING VEGETATION, INCLUDING PERCENT OF VEGETATIVE COVER: During design, the SWMP Administrator for Design in consultation with the Engineer will determine if the SWMP Administrator for Design or the SWMP Administrator for Construction will conduct the Vegetation Transects. If the site is disturbed, an Adequate Reference Site(s) may be utilized, refer to the permit.

Pre-Construction Date of survey: _____ Percent Existing Vegetative Cover: _____
Description of existing vegetation: _____
Method for determining percent vegetative cover: _____

Include a map or table showing transect locations, photos documenting pre-Construction vegetative cover, and methodology used to determine existing vegetative cover to SWMP tab 17:

Post-Construction Date of survey: _____ Percent Vegetative Cover: _____
Description of vegetation: _____
The method used to determine pre-construction percent cover shall be used to determine post construction percent cover.

Include map or table showing transect locations, photos documenting post-Construction vegetative cover, and methodology used to determine existing vegetative cover to SWMP tab 17:

2. STORMWATER MANAGEMENT CONTROLS FOR FIRST CONSTRUCTION ACTIVITIES

THE CONTRACTOR SHALL PERFORM THE FOLLOWING:

- A. POTENTIAL POLLUTANT SOURCES

1. Refer to Potential Pollutant Sources in SWMP Section 4A. Evaluate, identify and describe all potential sources of pollutants at the site in accordance with subsection 107.25 and place any Control Measures required to contain potential pollutants.
- B. OFFSITE DRAINAGE (RUN ON WATER)

1. Place Control Measures to address run-on water in accordance with subsection 208.03.

C. CONSTRUCTION DEWATERING:

1. Obtain a CDPs Dewatering Permit from CDPHE if conditions of their Low Risk Guidance for Discharges of Uncontaminated Groundwater to Land are not met; see subsections 107.02 and 107.25.

Refer to CDPHE Low Risk Discharge Guidance Document of Uncontaminated Groundwater to Land. <https://www.colorado.gov/pacific/sites/default/files/WQ%20LOW%20RISK%20GW.pdf>

D. VEHICLE TRACKING CONTROL

1. Control Measures shall be implemented in accordance with subsection 208.04.

E. PERIMETER CONTROL

1. Perimeter control shall be established as the first item on the SWMP to prevent the potential for pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters.
2. Perimeter control may consist of berms, silt fence, erosion logs, existing landforms, or other Control Measures as approved.

3. QUALIFIED STORMWATER MANAGERS:

A. SWMP ADMINISTRATOR FOR DESIGN: CDOT Certified Individual responsible for developing SWMP Plan Sheets and SWMP Site Maps during the design phase.

Name/Title	Contact Information	Certification #
Elliott Heckler / Engineer	Phone: (303) 339-0440 Email: elliott.heckler@consoreng.com	ADC4F7E7

B. SWMP ADMINISTRATOR FOR CONSTRUCTION: (As defined in Subsection 208) The Contractor shall designate a SWMP Administrator for Construction. The SWMP Administrator for Construction shall become the operator for the SWMP and assume responsibility for all design changes to the SWMP implementation and maintenance in accordance to 208.03, the SWMP shall remain the property of CDOT. The SWMP Administrator for Construction shall be responsible for implementing, maintaining and revising SWMP, including the title and contact information. The activities and responsibilities of the SWMP Administrator for Construction shall address all aspects of the project's SWMP. (Update the information below for each new SWMP Administrator for Construction) (Copy of TECS Certification must also be included in the SWMP.)

Name/Title	Contact Information (phone & email)	TECS Certification #	Start Date	Engineer Approval


C. PERMANENT STABILIZATION SUBJECT MATTER EXPERT: This qualified individual will be either a Regional Environmental Staff member, or an Independent Contractor Controller (Independent Assurance Program). This expert is a project team leader responsible for ensuring project adherence to requirements of the 207 and 212 Project Special Provisions as follows, and will be available for questions regarding permanent stabilization requirements.

1. Review the Topsoil Management Plan and the Permanent Stabilization Site Maps.
2. Attend the Environmental Pre-construction Conference.
3. Coordinate the Site Pre-vegetation Conference.
4. Review and recommend approval of products.
5. Review and recommend approval of the Quantities Verification Prerequisite.
6. Attend the Substantial Landscape Completion Walkthrough.
7. Attend the Final Landscape Completion Walkthrough.

Name/Title	Contact Information

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Sheet Revisions		
Date:	Comments	Init.



CITY OF LITTLETON

2255 WEST BERRY AVENUE

LITTLETON, CO 80120

PHONE: 303-795-3700

As Constructed		STORMWATER MANAGEMENT PLAN			Project No./Code
No Revisions:					21-37
Revised:		Designer: B. WALDMAN	Structure Numbers		
		Detailer: D. MURIE			
Void:		Sheet Subset: SWMP	Subset Sheets: 1 of 6		Sheet Number 7

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4. DURING CONSTRUCTION

The SWMP should be considered a "living document" that is continuously reviewed and modified. During construction, the following items shall be added, updated, or amended as needed by the Contractor in accordance with Section 208.

- A. MATERIALS HANDLING AND SPILL PREVENTION: prior to construction commencing the Contractor shall submit a Spill Prevention, Control and Countermeasure Plan, see subsection 208.06. Materials handling shall be in accordance with subsection 208.06.
- B. OTHER CDPS PERMITS: List applicable CDPS permits associated with the permitted site and activities.
- C. STOCKPILE MANAGEMENT: shall be done in accordance with subsections 107.25 and 208.07
- D. CONCRETE WASHOUT: Concrete wash out water or waste from field laboratories and paving equipment shall be contained in accordance with subsection 208.05.
- E. SAW CUTTING: shall be done in accordance with subsections 107.25, 208.04, 208.05
- F. STREET SWEEPING: shall be done in accordance with subsection 208.04

5. CONTROL MEASURE MAINTENANCE

- A. Maintenance shall be in accordance with subsection 208.04 (f).

6. INTERIM AND PERMANENT STABILIZATION

The Contractor shall comply with all interim stabilization and permanent stabilization requirements in accordance with subsection 208.04(e).

A. SEEDING PLAN

The following seed mix(es) and rates are for broadcast seeding method as shown on the Permanent Stabilization Site Maps shall be used:

COMMON NAME	BOTANICAL NAME	LBS. PLS PER ACRE
Ephraim Crested Wheatgrass	Agropyron cristatum	6.0
Sheep Fescur	Festuca ovina	5.0
Perennial Rye	Lolium perenne	4.0
Chewings Fescue	Festuca rubra susp. commutate	3.0
Milkweed	Ascleplas spp.	3.0
TOTAL		21.0

- B. SEEDING APPLICATION: The following seeding methods shall be used for all areas which are not surfaced and as shown on the Permanent Stabilization Site Maps. Soil compaction shall be minimized for areas where permanent stabilization will be achieved through vegetative cover.

SEEDING METHOD (subsection 212.05)	ACRE
Seeding (Native) Broadcast, CDOT Pay Item 212-00708	0.1
TOTAL	0.1

The Contractor shall provide the location of where seed is stored and access to stored seed locations to the Engineer. Seed stored by the Contractor for longer than 30 days will be rejected.

C. MULCHING APPLICATION: Apply a minimum of 2 tons of certified weed free hay or 2 1/2 tons of certified weed free straw per acre and in accordance with Section 213, and mechanically crimp it into the soil in combination with an organic mulch tackifier.

- 1. Prior to winter shutdown or the summer seeding window closure: Uncompleted slopes shall be mulched with 2 tons of mulching (weed free) per acre, mechanically crimped into the topsoil in combination with an organic mulch tackifier in accordance with subsections 208 and 213.

D. SPECIAL REQUIREMENTS:

- 1. Soil amendments, seedbed preparation, and permanent stabilization mulching shall be accomplished within four working days of placing the topsoil on the de-compacted civil subgrades. If placed topsoil is not mulched with permanent stabilization mulch within four working days, the Contractor shall complete interim stabilization methods in accordance with subsection 208.04(e) at no additional cost to the Department.
- 2. Permanent stabilization mulching shall be accomplished within 24 hours of hydraulic application of native seed.
- 3. The Contractor shall submit a proposed Permanent Stabilization Phasing Plan to the Engineer for approval showing how the SWMP Permanent Stabilization Plans will be implemented to minimize damage to seeded areas.

E. SOIL AMENDMENT REQUIREMENTS: Minimum amendment material requirements for all disturbances to receive seeding (native).

0.1 Total Acres of Seeding (Native) Broadcast					
Seeding (Native) Broadcast Pay Item	Pay Item	Description	Amount/Acre	Units	Total For This Method
	212-00700	Organic Fertilizer	300	Pounds	30
	212-00701	Compost (Mechanically Applied)	65	CY	7
	212-00704	Mycorrhizae	60	Pounds	6

F. SOIL RETENTION COVERING: On slopes and ditches requiring a blanket or turf reinforcement mat (trm), the blanket/trm shall be placed in lieu of mulch and mulch tackifier and placed after seeding (native). See SWMP Site Map for blanket/trm locations.

G. PERMANENT STABILIZATION APPLICATION UNDER STRUCTURES: Under structures shade patterns should be considered and the use of Median Cover Material (Stone) or other stabilized options with an approved Project Special Provision should be used. See SWMP Site Map for locations.

H. RESEEDING OPERATIONS/CORRECTIVE STABILIZATION:

Prior to partial acceptance.

- 1. All seeded areas shall be reviewed by the SWMP Administrator for Construction and or Engineer for bare soils caused by surface or wind erosion. Bare areas caused by surface or gully erosion, blown away mulch, etc. shall be re-graded, seeded, and have the designated mulching applied as necessary, at no additional cost to the project.

7. PRIOR TO PROJECT FINAL ACCEPTANCE

- A. When directed by the Engineer, removal and disposal of temporary control measures shall be included in the cost of work.
- B. At the end of the project, all ditch checks shall consist of either temporary erosion logs (or equivalent) or permanent riprap.
- C. Refer to Specification 208.10 for Items to be completed prior to requesting partial acceptance of water quality work.

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File Name: 200420_Littleton Blvd-SWMP.dgn			Date:	Comments	Init.		No Revisions:					21-37	
Horiz. Scale: N/A							Revised:	Designer: B. WALDMAN	Structure		Sheet Number 8		
Vert. Scale: N/A								Detailer: D. MURIE	Numbers				
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8. NARRATIVES:

Control Measure Matrices During Construction:

1. Control measure narratives have been included for the CDOT Standard Specifications and Standard Plan M-208 and M-216 along with any non-standard control measures approved during the design process. If a Non-Standard Control Measure not included in the SWMP is proposed and approved by the Engineer the SWMP Administrator for Construction shall do the following: Place an "X" in the column for non-standard and complete a Non-Standard Control Measure Specification and Narrative covering the what, when, where and why the control measure is being used shall be add to the SWMP. The appropriate "X" shall also be added to the implementation phase(s).
2. The SWMP Administrator for Construction shall place an "X" in the column In Use On Site when the control measure has been installed.
3. A "B" in the Initial Activities Column indicates that the control measure shall be installed **before** construction activity starts. Locations and quantities will be discussed during the Environmental Pre-Construction Conference with the Regional Water Pollution Control Manager.

STRUCTURAL Control Measures that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:

APPLICATION, CONTROL MEASURE	NARRATIVE	M- 208 STANDARD or "X" for NON- STANDARD	IN USE ON SITE	CONTROL MEASURE IMPLEMENTATION PHASE		
				INITIAL ACTIVITIES	INTERIM ACTIVITIES	PERMANENT STABILIZATION
PROTECTION OF EXISTING WETLANDS Fence (plastic) and erosion logs	Fence (plastic) shall be placed in combination with erosion logs to prevent encroachment of construction traffic and sediment into state waters prior to start of construction disturbances. Fence (plastic) shall be placed adjacent to the wetlands; erosion logs shall be placed between the plastic fence and disturbance area. Logs shall be placed to direct flows away from or filter water running into wetlands from disturbance areas.					
PROTECTION OF EXISTING TREES/LANDSCAPING Fence (plastic)	Fence (plastic) shall be used in areas indicated in the plans to prevent encroachment of construction traffic and sediment for the protection of mature trees and/or existing landscaping prior to start of construction disturbances.			B	X	
CHECK DAM/DITCH CHECK Erosion log, silt berm, silt dike, rock check dam	Placed in ditches immediately upon completion of ditch grading to reduce velocity of runoff in ditch. For existing ditches, place prior to start of construction disturbances.	M-208				
Storm Drain Inlet Protection In Paved Roadways (Type 1, 2 and 3 as shown on M-208-1, sheet 5 of 11)	Manufactured storm drain inlet protection placed prior to construction disturbances as detailed in M-208-1, to protect existing inlets or immediately upon completion of new inlets to prevent sediment from entering the inlet throughout construction.	M-208		B	X	
Storm Drain Inlet Protection In Native Seed Areas (M-604 Standard Inlets Type C and D)	Erosion logs or aggregate bags placed around inlet grate to prevent sediment from entering inlet. Place prior to construction disturbances to protect existing inlets or immediately upon completion of new inlets.	M-208				
CULVERT INLET/OUTLET PROTECTION Erosion logs, aggregate bags	Placed at mouth of culvert inlets and over top of culvert at inlet and outlet where disturbance may be occurring adjacent to pipe to prevent sediment laden water from entering pipe or drainage. Place prior to start of construction disturbances.	M-208				
TYPE C, TYPE D AND TYPE 13 PROTECTION Erosion logs, aggregate bags, erosion bales	Placed around inlet grate or slope and ditch paving to prevent sediment from entering inlet. Place prior to start of construction disturbances.	M-208				
STOCKPILE PROTECTION Temporary berm, erosion logs, aggregate bags*	Placed within specified distance, in accordance with subsection 208.06, from toe to contain sediment around stockpile. *Aggregate bags are easily moved and replaced for access during the work day. Place prior to start of stockpile, increase control as stockpile increases size.	M-208			X	
TOE OF FILL PROTECTION Erosion logs, temporary berm, silt fence, topsoil windrow*	Place prior to slope/embankment work to capture sediment and protect and delineate undisturbed areas. *Can be used to stockpile topsoil for salvage.	M-208				
PERIMETER CONTROL Erosion logs, silt fence, temporary berm, topsoil windrow*	Placed prior to construction commencing to address potential run-on water from off site, and to divert around disturbed area. *Can be used to stockpile topsoil for salvage.	M-208		B	X	
SEDIMENT CONTROL/ SLOPE CONTROL Silt fence, erosion logs	Placed on the contour of a slope to contain and slow down construction runoff. Place prior to start of construction disturbances.	M-208		B	X	
TEMPORARY SEDIMENT TRAP	Used to capture sediment laden runoff from disturbed areas < 5 acres during construction. Place prior to start of construction disturbances. Outlets that withdraw water from or near the surface may be installed when discharging from basins and impoundments.	M-208				
EMBANKMENT PROTECTION OR TEMPORARY SLOPE DRAIN	Placed as a conduit or chute to drain runoff down slope and to prevent erosion of slope.	M-208				
OUTLET PROTECTION Riprap, or approved other	Material placed as energy dissipater to prevent erosion at outlet structure.	M-601-12				
CONCRETE WASHOUT In-ground or fabricated	Construction control, used for waste management of concrete and concrete equipment cleaning. Place prior to start of concrete activities.	M-208		B	X	
VEHICLE TRACKING PAD	Source control, placed to prevent tracking of sediment from disturbed area to offsite surface. Place prior to start of construction disturbances.	M-208				

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File Name: 200420_Littleton Blvd-SWMP.dgn	
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CITY OF LITTLETON
2255 WEST BERRY AVENUE
LITTLETON, CO 80120
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As Constructed		STORMWATER MANAGEMENT PLAN		Project No./Code
No Revisions:				21-37
Revised:		Designer: B. WALDMAN	Structure Numbers	
		Detailer: D. MURIE		
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DGN MODEL: Sheet 04
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Engineered SEDIMENT BASIN	Constructed early in project, prior to storm sewer/ditches and in accordance with 208.05(p) to capture storm flow. Outlet structure and/or outfall shall be modified for temporary sediment control using an approved non-standard detail. Outlets that withdraw water from or near the surface shall be installed when discharging from basins and impoundments, unless infeasible					
DEWATERING (Contractor is responsible for obtaining a permit from Colorado Department of Health and Environment.)	Shall be done in such a manner to prevent potential pollutants from entering state waters.					
TEMPORARY STREAM CROSSING	Constructed over stream or drainage to prevent discharge of pollutants from construction equipment into water.					
CLEAN WATER DIVERSION	Placed to divert clean surface or ground water around disturbance area to prevent it from mixing with construction runoff.					
OTHER						

NON-STRUCTURAL Control Measures that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:
Erosion control devices are used to limit the amount of soil loss on site. Sediment control devices are designed to capture sediment on the project site.

APPLICATION, CONTROL MEASURE	NARRATIVE	M- STANDARD or "For NON- STANDARD	IN USE ON SITE	CONTROL MEASURE IMPLEMENTATION PHASE		
				INITIAL ACTIVITY	INTERIM ACTIVITIES	PERMANENT STABILIZATION
VEGETATIVE BUFFER STRIP Fence (plastic)	Finishing component for filtering sediment-laden runoff from disturbance area. Area within CDOT ROW or temporary easement to be identified on SWMP prior to construction starting.			X	X	X
GRADING APPLICATIONS (LANDFORM)	Existing or created landforms may be used as a control measure if they prevent sediment from entering or leaving the disturbance area. If a landform directs flow of water to a concentrated outfall point, the outfall point shall be protected to prevent erosion. Area to be identified on SWMP prior to construction starting.	M-208				
TOPSOIL MANAGEMENT STOCKPILE/SALVAGE Windrow or stockpile	Prior to any site disturbance work commencing, existing topsoil shall be scraped to a depth four inches or as specified, and placed in stockpiles or windrows. Upon completion of final grading, topsoil shall be evenly distributed over embankment to a depth of four inches or as specified.	M-208				
SURFACE ROUGHENING / GRADING TECHNIQUES	Temporary stabilization of disturbance and to minimize wind and erosion.					
SEEDING (TEMPORARY)	Temporary stabilization used for over wintering of disturbance or used to control erosion for areas scheduled for future construction.					
BONDED FIBER MATRIX or MULCHING (HYDRAULIC)	Not to be used in areas of concentrated flows, i.e. ditch lines. To be for either Interim or Permanent Stabilization placed as a surface cover for erosion control. May be used as surface cover when work is temporarily halted and as approved by the Engineer for stockpiles.					
Straw or Hay MULCH/MULCH TACKIFIER	Interim or Permanent Stabilization placed as a surface cover for erosion control and or seeding establishment. To be installed as Interim Stabilization as a surface cover when work is temporarily halted and as approved by the Engineer				X	X
SPRAY-ON MULCH BLANKET (Not to be used in areas of concentrated flows, i.e. ditch lines.)	Interim or Permanent Stabilization placed as a surface cover for erosion control and or seeding establishment. To be installed as temporary surface cover when work is temporarily halted and as approved by the Engineer					
SEEDING PERMANENT (NATIVE)	Permanent Stabilization of disturbance and to reduce runoff and control erosion on disturbed areas.					X
SOIL RETENTION BLANKET (SRB)	Permanent Stabilization of disturbance and to reduce runoff and control erosion on disturbed areas.	M-216			X	X
TURF REINFORCEMENT MAT (TRM)	Permanent Stabilization of disturbance and to reduce runoff and control erosion on disturbed areas. Placed in channels or on slopes for erosion control, channel liner and seeding establishment.	M-216				
Sweeping	Source control, used to remove sediment tracked onto paved surfaces and to prevent sediment from entering drainage system. Sweep daily and at the end of the construction shift as needed. Kick brooms shall not be permitted.			X	X	X
OTHER						

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No Revisions:					21-37
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		Detailer: D. MURIE			
Void:		Sheet Subset: SWMP	Subset Sheets: 4 of 6		Sheet Number 10

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9. TABULATION OF STORMWATER QUANTITIES

A. Control Measure sediment removal and disposal shall be paid for as: 208 Removal and Disposal of Sediment (Equipment) and 208 Removal and Disposal of Sediment (Labor). All other control measure maintenance shall be included in the cost of the control measure.

Pay Item	Description	Pay Unit	Initial Const	Interim Const.	Permanent Stabilization	*Total Quantity
208-00002	Erosion Log Type 1 (12 inch)	LF	600			600
208-00035	Aggregate Bag	LF	120			120
208-00045	Concrete Washout Structure	Each		1		1
208-00051	Storm Drain Inlet Protection (Type I)	LF	30			30
208-00052	Storm Drain Inlet Protection (Type II)	LF	30			30
208-00103	Removal and Disposal of Sediment (Labor)	Hour		20		20
208-00105	Removal and Disposal of Sediment (Equipment)	Hour		20		20
208-00106	Sweeping (Sediment Removal)	Hour		20		20
212-00032	Soil Conditioning	Acre			0.1	0.1
212-00700	Organic Fertilizer	Pounds			30	30
212-00701	Compost (Mechanically Applied)	CY			7	7
212-00704	Mycorrhizae	Pounds			6	6
212-00708	Seeding (Native) Broadcast	Acre			0.1	0.1
212-01200	Landscape Restoration	LS			1	1
213-00003	Mulching (Weed Free)	Acre			0.1	0.1
213-00061	Mulch Tackifier	LB			10	10
216-00101	Soil Retention Blanket (Straw/Coconut) (Photodegradable Class 1)	SY		100		100
607-11525	Fence (Plastic)	LF	100			100
700-70380	F/A Erosion Control	FA		1		1

*It is anticipated that additional control measures and control measure quantities not shown on the SWMP Site Maps shall be required on the project for unforeseen conditions and replacement of items that are beyond their useful service life, see subsections 208.03 and 208.04. **Quantities for all control measures shown above are estimated, and have been increased for unforeseen conditions and normal control measure life expectancy.** Quantities shall be adjusted according to the conditions encountered in the field as directed and approved by the Engineer. Payment shall be for the actual work completed and material used.

** F/A refers to CDOT's Force Account Pay Items.

10. BIOLOGICAL IMPACTS and DEWATERING

A. ENVIRONMENTAL IMPACTS:

- 1. Wetland Impacts: NO
- 2. Stream Impacts: NO
- 3. Threatened and Endangered Species: N/A


B. DEWATERING: (Not covered under the CDPHE guidance document *Low Risk Discharge Guidance Discharges of Uncontaminated Groundwater to Land*):

<https://www.colorado.gov/pacific/sites/default/files/WQ%20LOW%20RISK%20GW.pdf>

- 1. Dewatering: Refer to other environmental permits in accordance with subsection 107.02 and the permits contained in Tab 16 of the SWMP.
- 2. If groundwater does not meet water quality standards for receiving water a separate CDPs Dewatering Permit shall be obtained by the Contractor from CDPHE in accordance with subsections 107.02 and 107.25.

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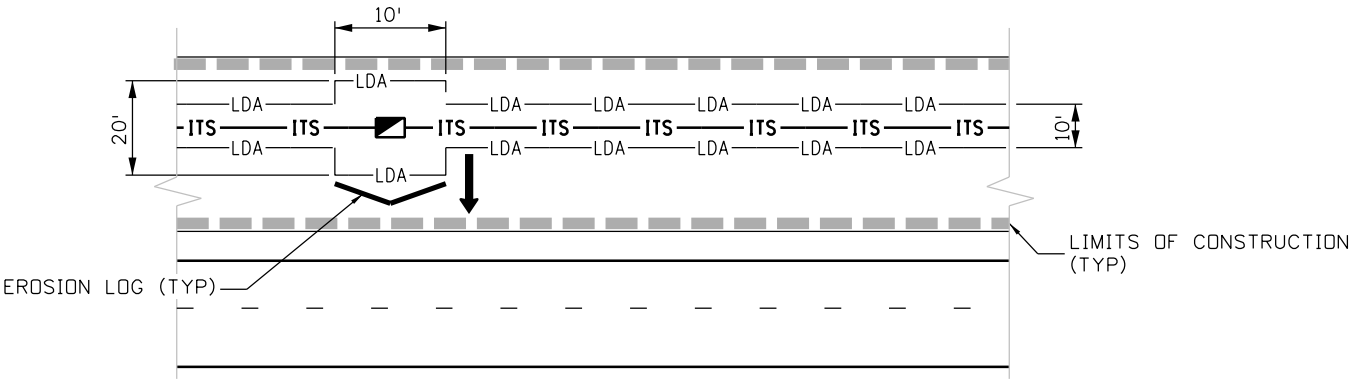
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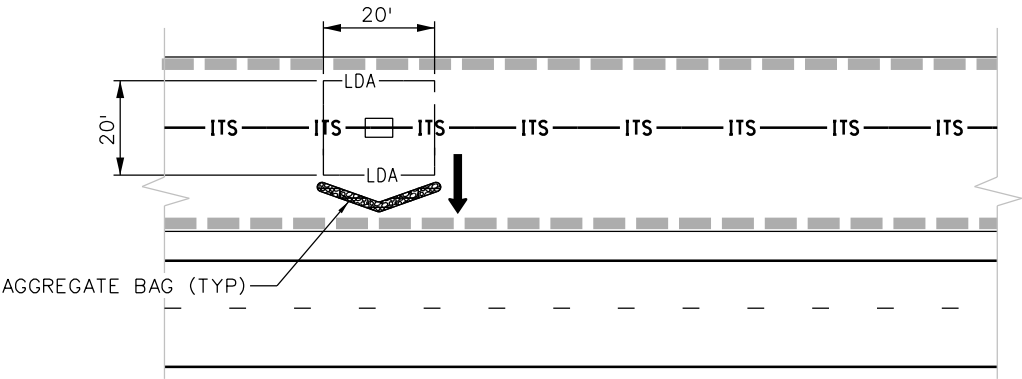
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2255 WEST BERRY AVENUE
LITTLETON, CO 80120
PHONE: 303-795-3700

As Constructed		STORMWATER MANAGEMENT PLAN		Project No./Code
No Revisions:				21-37
Revised:		Designer: B. WALDMAN	Structure Numbers	
		Detailer: D. MURIE		
Void:		Sheet Subset: SWMP	Subset Sheets: 5 of 6	Sheet Number 11

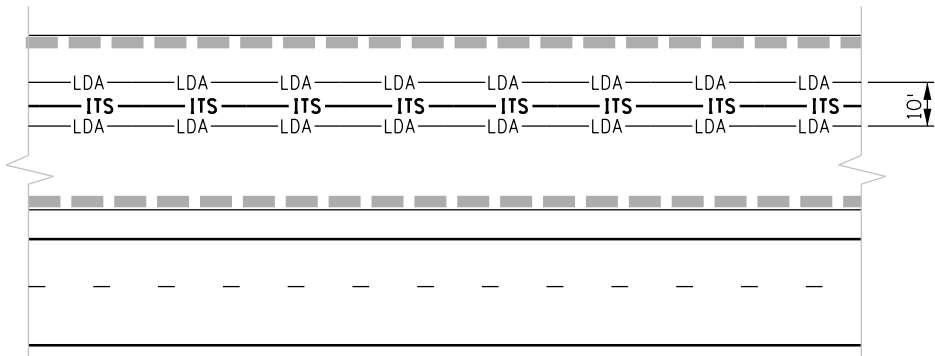
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TYPICAL PULL BOX EROSION CONTROL



TYPICAL BORE PIT EROSION CONTROL



TYPICAL CONDUIT TRENCH EROSION CONTROL

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As Constructed		STORMWATER MANAGEMENT PLAN TYPICALS		Project No./Code
No Revisions:				21-37
Revised:		Designer: B. WALDMAN	Structure Numbers	
Void:		Detailer: D. MURIE		
		Sheet Subset: SWMP	Subset Sheets: 6 of 6	Sheet Number 12

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TABULATION OF TRAFFIC ENGINEERING ITEMS			
ITEM NUMBER	ITEM DESCRIPTION	UNIT	QUANTITY
630-00000	Flagging	HOURL	20
630-00007	Traffic Control Inspection	DAY	44
630-00012	Traffic Control Management	DAY	110
630-80341	Construction Traffic Sign (Panel Size A)	EACH	56
630-80342	Construction Traffic Sign (Panel Size B)	EACH	16
630-80350	Vertical Panel	EACH	30
630-80358	Advance Warning Flashing or Sequencing Arrow Panel(C Type)	EACH	2
630-80363	Drum Channelizing Device (With Light) (Flashing)	EACH	50
630-80380	Traffic Cone	EACH	150
630-85020	Mobile Attenuator	EACH	2

NOTES:

1. QUANTITIES LISTED IN THE TABULATION OF TEMPORARY TRAFFIC CONTROL ITEMS ARE SUMMARIZED BASED ON CONSTRUCTION WORK USING TYPICAL TRAFFIC CONTROLS SHOWN IN CASE NUMBERS 18 AND 19 OF THE CDOT M&S STANDARD PLAN S-630-1.
2. LITTLETON SHALL PAY FOR UP TO TWO (2) TEMPORARY TRAFFIC CONTROL LOCATIONS CONCURRENTLY AS SHOWN IN THE TABULATION OF TRAFFIC CONTROL ITEMS LISTED ABOVE. THE CONTRACTOR MAY CHOOSE TO WORK OR MAINTAIN DEVICES AT ADDITIONAL LOCATIONS AT THE CONTRACTOR'S EXPENSE.
3. ONLY ONE DAY OF TCI/TCM SHALL BE PAID ON ANY SINGLE DAY AND THEREFORE INCLUDES WORK AT ALL SITES. MULTIPLE TCI/TCM DAYS SHALL NOT BE PAID ON ANY SINGLE DAY WITHOUT APPROVAL FROM THE PROJECT ENGINEER.
4. ADDITIONAL ITEMS NEEDED TO PERFORM NIGHT WORK, IF ANY, SHALL NOT BE PAID FOR SEPARATELY AND SHALL BE INCLUDED IN THE COST OF THE WORK.
5. ANY EXISTING SIGN THAT CONFLICTS WITH TEMPORARY SIGNS SHALL BE MASKED OR REMOVED. THE COST OF MASKING EXISTING SIGNS SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
6. THE CONTRACTOR SHALL MOVE ALL CONSTRUCTION TRAFFIC CONTROL DEVICES OUTSIDE OF THE CLEAR ZONE, OR REMOVE THEM ENTIRELY AT THE END OF EACH WORK DAY. NO DEVICES WILL BE ALLOWED TO REMAIN OVERNIGHT INSIDE OF THE CLEAR ZONE WITHOUT THE PROJECT ENGINEER'S APPROVAL.

SCHEDULE OF CONSTRUCTION TRAFFIC CONTROL DEVICES					
SIGNS					
SIGN CODE	LEGEND	DIMENSIONS	ITEM 630- CONSTRUCTION TRAFFIC SIGN PANEL		
			EACH		
			A	B	C
G20-10	XYZ/CONSTRUCTION/THANKS YOU/XXX-XXX-XXXX	48" x 48"		8	
G20-11	CONSTRUCTION INFORMATION SIGN	48" x 48"		8	
R2-10	BEGIN / DOUBLE / FINES / ZONE	24" x 30"	8		
R2-11	END / DOUBLE / FINES / ZONE	24" x 30"	8		
R9-9	SIDEWALK CLOSED	24" x 12"	4		
R9-11	SIDEWALK CLOSED AHEAD CROSS HERE	24" x 18"	4		
W20-1	ROAD WORK AHEAD	36" x 36"	8		
W20-4	ONE LANE / ROAD / XX FT	36" x 36"	8		
W20-5(R)	RIGHT LANE/CLOSED/AHEAD	36" x 36"	4		
W20-7	FLAGGER	36" x 36"	8		
W4-2(R)	RIGHT LANE ENDS	36" x 36"	4		
SIGN TOTALS			56	16	

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CONSTRUCTION NOTES

- 1

EXISTING LITTLETON PULL BOX
- 2

EXISTING GROUND MOUNTED TRAFFIC SIGNAL CABINET
- 3

EXISTING CONDUIT
- 4

EXISTING ARAPAHOE COUNTY MANHOLE
- 5

2-INCH ELECTRICAL CONDUIT (BORED)
- 6

(2) 2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 7

PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 8

PROPOSED PULL BOX (24"X36"X24")
- 9

PROPOSED PULL BOX (30"X48"X24")
- 10

EXISTING ARAPAHOE COUNTY PULL BOX
- 11

(2) 2-INCH ELECTRICAL CONDUIT (BORED)
- 12

2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 13

FIBER OPTIC TERMINATION PANEL (144 FIBER)
- 14

FIBER OPTIC TERMINATION PANEL (48 FIBER)
- 15

FIBER OPTIC TERMINATION PANEL (24 FIBER)
- 16

BUFFER TUBE FAN OUT KIT
- 17

NOT USED
- 18

EXISTING ARAPHADE COUNTY CONDUIT
- 19

EXISTING CDDT CONDUIT
- 20

PROPOSED SPLICE POINT (SEE SPLICE DIAGRAM)
- 21

SWEEP EXISTING STUBBED UP CONDUIT(S) INTO EXISTING PULL BOX
- 22

EXISTING MCI PULL BOX
- 23

SWEEP EXISTING STUBBED UP CONDUIT(S) INTO PROPOSED PULL BOX
- 24

PROPOSED EDGE ETHERNET SWITCH (INSTALL ONLY)
- 25

INSTALL PRE-TERMINATED PATCH PANEL (12 PORT)
- 26

EXISTING CDDT SPLICE POINT
- 27

EXISTING CDDT TRAFFIC SIGNAL CABINET
- 28

EXISTING CDDT PULL BOX

WIRING NOTES

- 1

EXISTING CDDT 144 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 2

EXISTING CDDT 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 3

EXISTING LITTLETON 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 4

INSTALL INDOOR/OUTDOOR 144 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 5

INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 6

INSTALL 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 7

EXISTING LITTLETON 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 8

INSTALL INDOOR/OUTDOOR 24 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 9

REMOVE EXISTING FIBER OPTIC CABLE
- 10

PROOF CONDUIT
- 11

INSTALL 96 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)

LEGEND

- EXISTING CABINET
- EXISTING MANHOLE
- EXISTING PULL BOX (SIZE VARIES)
- PROPOSED PULL BOX (SIZE VARIES)
- EXISTING CONDUIT W/ NEW FIBER
- EXISTING CONDUIT W/ EXISTING FIBER
- PROPOSED CONDUIT W/ NEW FIBER

ITS PLANS TABULATION

ITEM NO.	DESCRIPTION	UNIT	ITS PLAN											TOTALS
			1	2	3	4	5	6	7	8	9	10	11	
202-00055	REMOVAL OF FIBER OPTIC CABLE	LF	1125	1605						800	1860			5390
612-00260	LOCATION MARKER (FIBER OPTIC) (DOME)	EACH		1	3	3	2	3	2	2		1	1	18
613-00206	2 INCH ELECTRICAL CONDUIT (BORED)	LF		970	2900	3700	2900	2910	2040	1440				16860
613-01200	2 INCH ELECTRICAL CONDUIT (PLASTIC)	LF			90	20			50			80	100	340
613-07023	PULL BOX (24"X36"X24")	EACH		1	1	2	2	3	1	2		1		13
613-07040	PULL BOX (30"X48"X24")	EACH			2	1			1				1	5
613-07195	PROOF CONDUIT	LF	1135	1605						800	1860	1315	665	7380
614-87015	BUFFER TUBE FAN OUT KIT	EACH		1							5			6
614-87024	FIBER OPTIC TERMINATION PANEL (24 FIBER)	EACH		1							1			2
614-87144	FIBER OPTIC TERMINATION PANEL (144 FIBER)	EACH	1											1
614-87496	FIBER OPTIC CABLE (SINGLE MODE) (96 STRANDS)	LF										1615	655	2270
614	FIBER OPTIC TERMINATION PANEL (48 FIBER)	EACH									2			2
614	ETHERNET SWITCH (INSTALL ONLY)	EACH			2	1			1				1	5
614	12 PORT PRE-TERMINATED PATCH PANEL AND PIGTAIL	EACH			2	1			1				1	5
614	SPLICE ENCLOSURE	EACH	1	1	2	1			1				1	7
614	INDOOR/OUTDOOR FIBER OPTIC CABLE (SINGLE MODE) (24 STRANDS)	LF		560		355				1670	2010			4595
614	INDOOR/OUTDOOR FIBER OPTIC CABLE (SINGLE MODE) (144 STRANDS)	LF	665											665
614	FIBER OPTIC CABLE (SINGLE MODE) (432 STRANDS)	LF	770	1880	1700	1605	1550	1605	1270					10380

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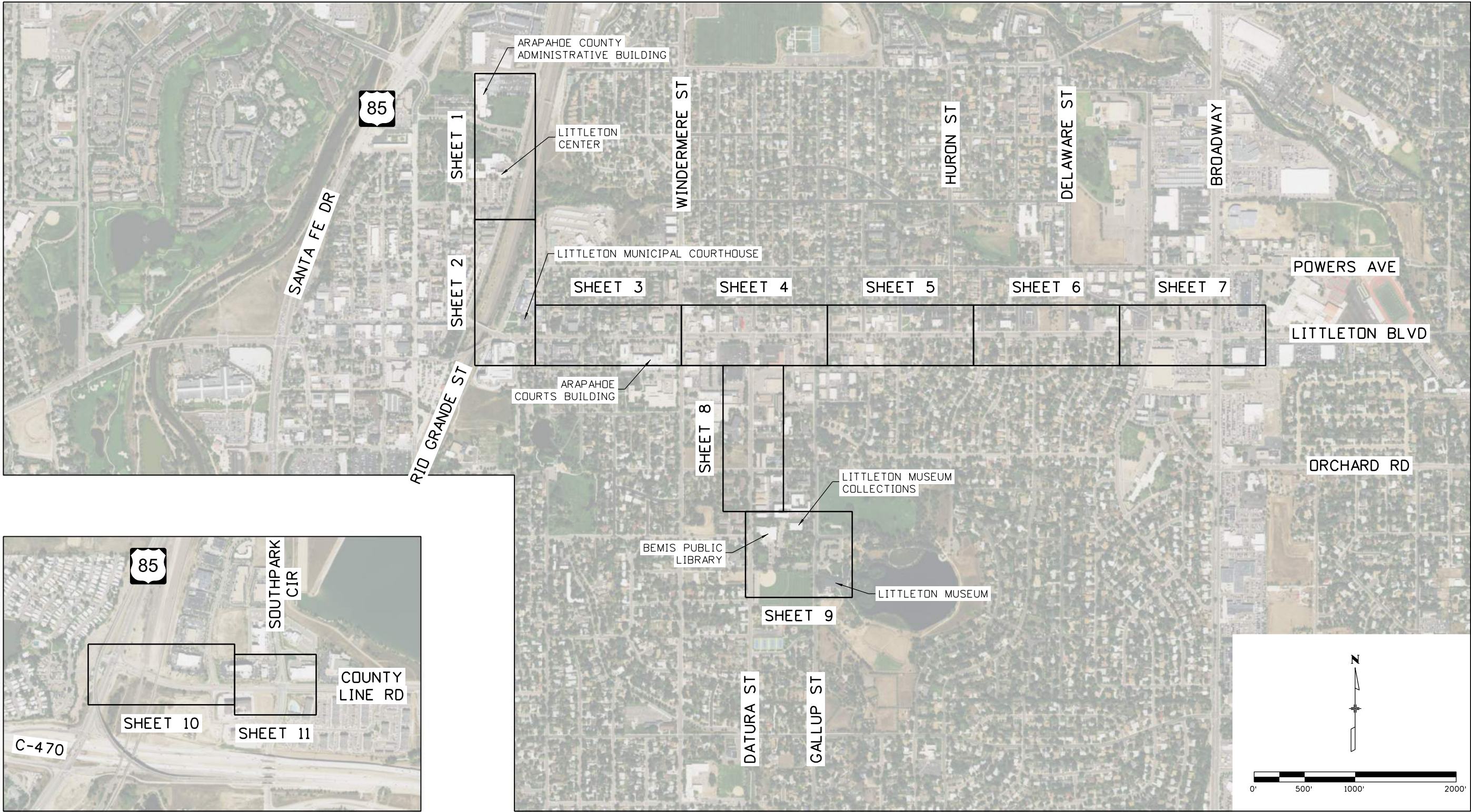
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PHONE: 303-795-3700


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No Revisions:					21-37	
Revised:		Designer: B. WALDMAN	Structure Numbers			
		Detailer: D. MURIE				
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Page 142 of 185

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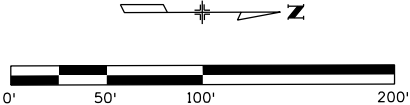
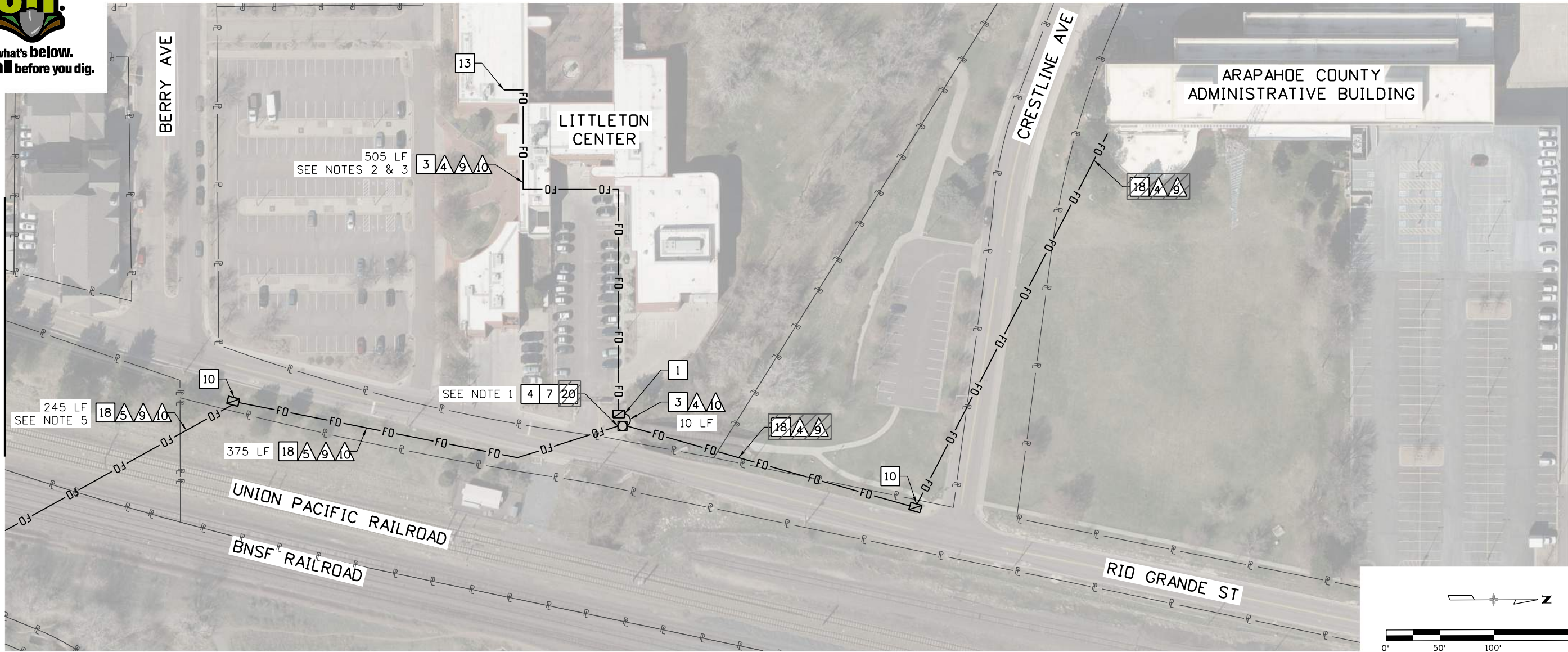
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21-37
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CONSTRUCTION NOTES

- 1 EXISTING LITTLETON PULL BOX
- 3 EXISTING CONDUIT
- 4 EXISTING ARAPAHOE COUNTY MANHOLE
- 7 PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 10 EXISTING ARAPAHOE COUNTY PULL BOX
- 13 FIBER OPTIC TERMINATION PANEL (144 FIBER)
- 18 EXISTING ARAPHADE COUNTY CONDUIT
- 20 PROPOSED SPLICE POINT (SEE SPLICE DIAGRAM)

WIRING NOTES

- 4 INSTALL INDOOR/OUTDOOR 144 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 5 INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 9 REMOVE EXISTING FIBER OPTIC CABLE
- 10 PROOF CONDUIT

LEGEND

WORK TO BE COMPLETED BY OTHERS

NOTES

- CONTRACTOR TO SPLICE NEW 432 STRAND FIBER BACKBONE TO THE NEW 144 STRAND FIBER OPTIC CABLE ENTERING LITTLETON CENTER AT THIS MANHOLE. AN ADDITIONAL 144 STRAND FIBER OPTIC CABLE BETWEEN THIS MANHOLE AND THE ARAPAHOE COUNTY ADMINISTRATIVE BUILDING WILL BE INSTALLED BY OTHERS AT A LATER DATE, AND WILL ALSO BE SPLICED TO THE LITTLETON FIBER OPTIC CABLES AT THIS MANHOLE. REFER TO SPLICING DIAGRAMS FOR MORE INFORMATION.
- THE EXISTING 144 STRAND FIBER OPTIC CABLE ENTERING THE LITTLETON CENTER SHALL BE REPLACED WITH A NEW 144 STRAND FIBER OPTIC CABLE. THE NEW CABLE SHALL FOLLOW THE SAME CONDUIT PATH AS THE EXISTING CABLE, AND SHALL TERMINATE IN THE IT EQUIPMENT ROOM ON THE SECOND FLOOR OF THE FACILITY. PRIOR TO INSTALLATION, THE CONTRACTOR SHALL FIELD VERIFY, CONFIRM CONTINUITY, PROOF THE EXISTING PROPOSED PATHWAY INTO THE BUILDING, AND CONFIRM THE CABLE LENGTH NOTED IN THE PLANS. THE CONTRACTOR SHALL SUBMIT A METHOD OF CABLE INSTALLATION TO THE CITY FOR REVIEW AND APPROVAL BY THE PROJECT ENGINEER. INSTALLATION SHALL NOT OCCUR UNTIL THE CONTRACTOR'S PROPOSED INSTALLATION METHOD HAS BEEN APPROVED BY THE CITY.
- ALL WORK IN THE LITTLETON CENTER SHALL BE COORDINATED WITH SCOTT ROGERS AT (720) 281-5273 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THE WORK.
- ALL WORK IMPACTING ARAPAHOE COUNTY INFRASTRUCTURE SHALL BE COORDINATED WITH MARK HARKLERDAD AT (303) 795-4848 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THE WORK.
- THE FIBER OPTIC CABLE RUNNING BENEATH THE RAILROAD TRACKS SHALL BE INSTALLED FROM EAST TO WEST. CONTRACTOR SHALL PHASE WORK TO ENSURE THE INSTALLATION CAN OCCUR IN THIS DIRECTION. ADDITIONAL REEL-TO-REEL SPLICES TO MEET THIS REQUIREMENT SHALL NOT BE ALLOWED UNLESS APPROVED BY THE PROJECT ENGINEER PRIOR TO STARTING FIBER OPTIC INSTALLATION.

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2255 WEST BERRY AVENUE
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PHONE: 303-795-3700

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LITTLETON BLVD
ITS PLANS

Designer:	B. WALDMAN	Structure	
Detailer:	D. MURIE	Numbers	
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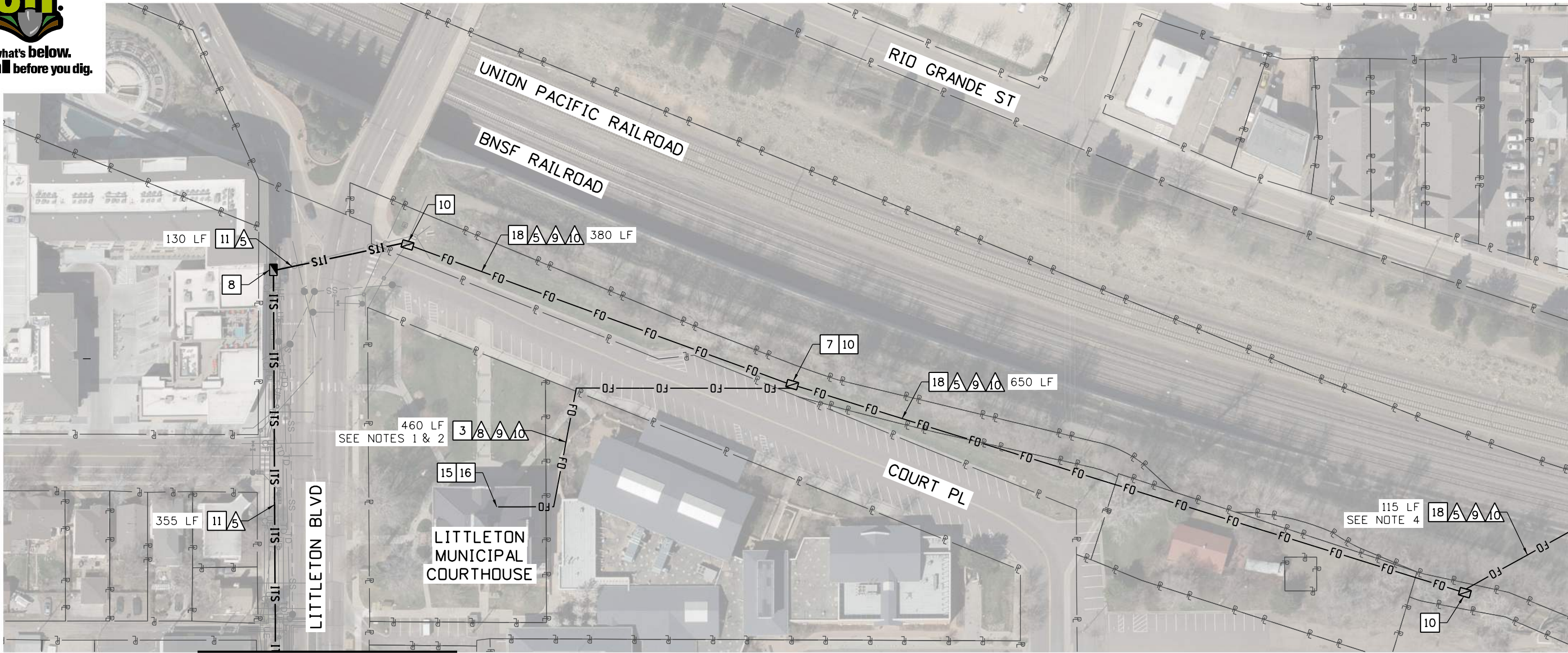
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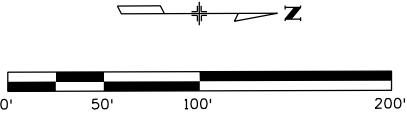
- 3 EXISTING CONDUIT
- 7 PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 8 PROPOSED PULL BOX (24"X36"X24")
- 10 EXISTING ARAPAHOE COUNTY PULL BOX
- 11 (2) 2-INCH ELECTRICAL CONDUIT (BORED)
- 15 FIBER OPTIC TERMINATION PANEL (24 FIBER)
- 16 BUFFER TUBE FAN OUT KIT
- 18 EXISTING ARAPHADE COUNTY CONDUIT

WIRING NOTES

- 5 INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 8 INSTALL INDOOR/OUTDOOR 24 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 9 REMOVE EXISTING FIBER OPTIC CABLE
- 10 PROOF CONDUIT

NOTES

- CONTRACTOR SHALL INSTALL PROPOSED LATERAL INTO THE LITTLETON MUNICIPAL COURTHOUSE BUILDING THROUGH EXISTING CONDUIT AND PATHWAYS OF THE EXISTING CABLE. PRIOR TO INSTALLATION, THE CONTRACTOR SHALL FIELD VERIFY, CONFIRM CONTINUITY, PROOF THE EXISTING PROPOSED PATHWAY INTO THE BUILDING, AND CONFIRM THE CABLE LENGTH NOTED IN THE PLANS. THE CONTRACTOR SHALL SUBMIT A METHOD OF CABLE INSTALLATION TO THE CITY FOR REVIEW AND APPROVAL BY THE PROJECT ENGINEER. INSTALLATION SHALL NOT OCCUR UNTIL THE CONTRACTOR'S PROPOSED INSTALLATION METHOD HAS BEEN APPROVED BY THE CITY.
- ALL WORK AT THE LITTLETON MUNICIPAL COURTHOUSE SHALL BE COORDINATED WITH SCOTT ROGERS AT (720) 281-5273 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THE WORK.
- ALL WORK IMPACTING ARAPAHOE COUNTY INFRASTRUCTURE SHALL BE COORDINATED WITH MARK HARKLERDAD AT (303) 795-4848 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THE WORK.
- THE FIBER OPTIC CABLE RUNNING BENEATH THE RAILROAD TRACKS SHALL BE INSTALLED FROM EAST TO WEST. CONTRACTOR SHALL PHASE WORK TO ENSURE THE INSTALLATION CAN OCCUR IN THIS DIRECTION. ADDITIONAL REEL-TO-REEL SPLICES TO MEET THIS REQUIREMENT SHALL NOT BE ALLOWED UNLESS APPROVED BY THE PROJECT ENGINEER PRIOR TO STARTING FIBER OPTIC INSTALLATION.



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LITTLETON BLVD
ITS PLANS

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Detailer: D. MURIE

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21-37

Sheet Number 17

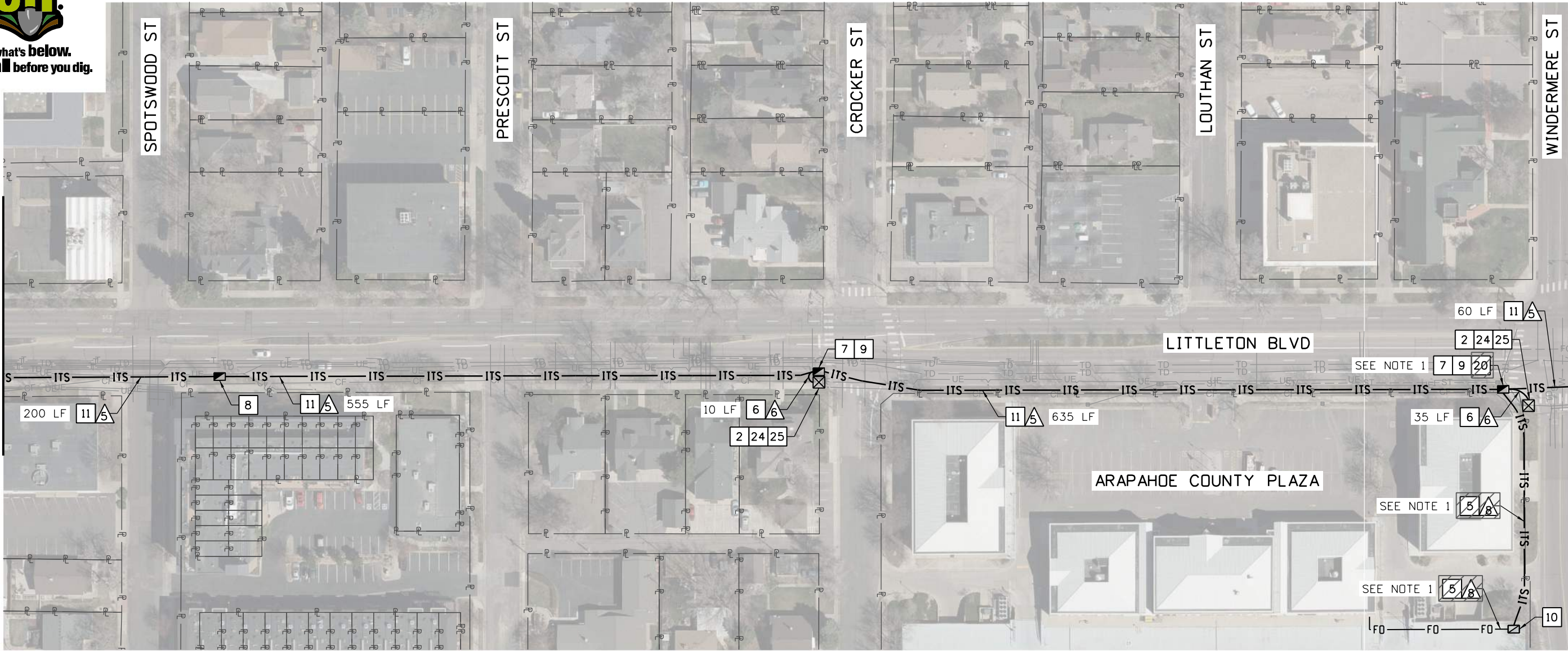
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CONSTRUCTION NOTES

- 2 EXISTING GROUND MOUNTED TRAFFIC SIGNAL CABINET
- 5 2-INCH ELECTRICAL CONDUIT (BORED)
- 6 (2) 2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 7 PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 8 PROPOSED PULL BOX (24"X36"X24")
- 9 PROPOSED PULL BOX (30"X48"X24")
- 10 EXISTING ARAPAHOE COUNTY PULL BOX
- 11 (2) 2-INCH ELECTRICAL CONDUIT (BORED)
- 20 PROPOSED SPLICE POINT (SEE SPLICE DIAGRAM)
- 24 PROPOSED EDGE ETHERNET SWITCH (INSTALL ONLY)
- 25 INSTALL PRE-TERMINATED PATCH PANEL (12 PORT)

WIRING NOTES

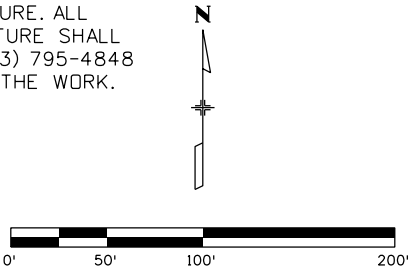
- 5 INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 6 INSTALL 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 8 INSTALL INDOOR/OUTDOOR 24 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)

NOTES

1. WORK TO ESTABLISH CONNECTIVITY TO ARAPAHOE COUNTY PLAZA TO BE COMPLETED BY OTHERS AFTER THE NEW FIBER BACKBONE ON LITTLETON BLVD HAS BEEN INSTALLED. THE LOCATION OF ARAPAHOE COUNTY INFRASTRUCTURE ON THIS SHEET IS APPROXIMATE AND SHALL BE VERIFIED WITH THE COUNTY PRIOR TO ACCESSING THIS INFRASTRUCTURE. ALL WORK IMPACTING ARAPAHOE COUNTY INFRASTRUCTURE SHALL BE COORDINATED WITH MARK HARKLEROD AT (303) 795-4848 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THE WORK.

LEGEND

WORK TO BE COMPLETED BY OTHERS



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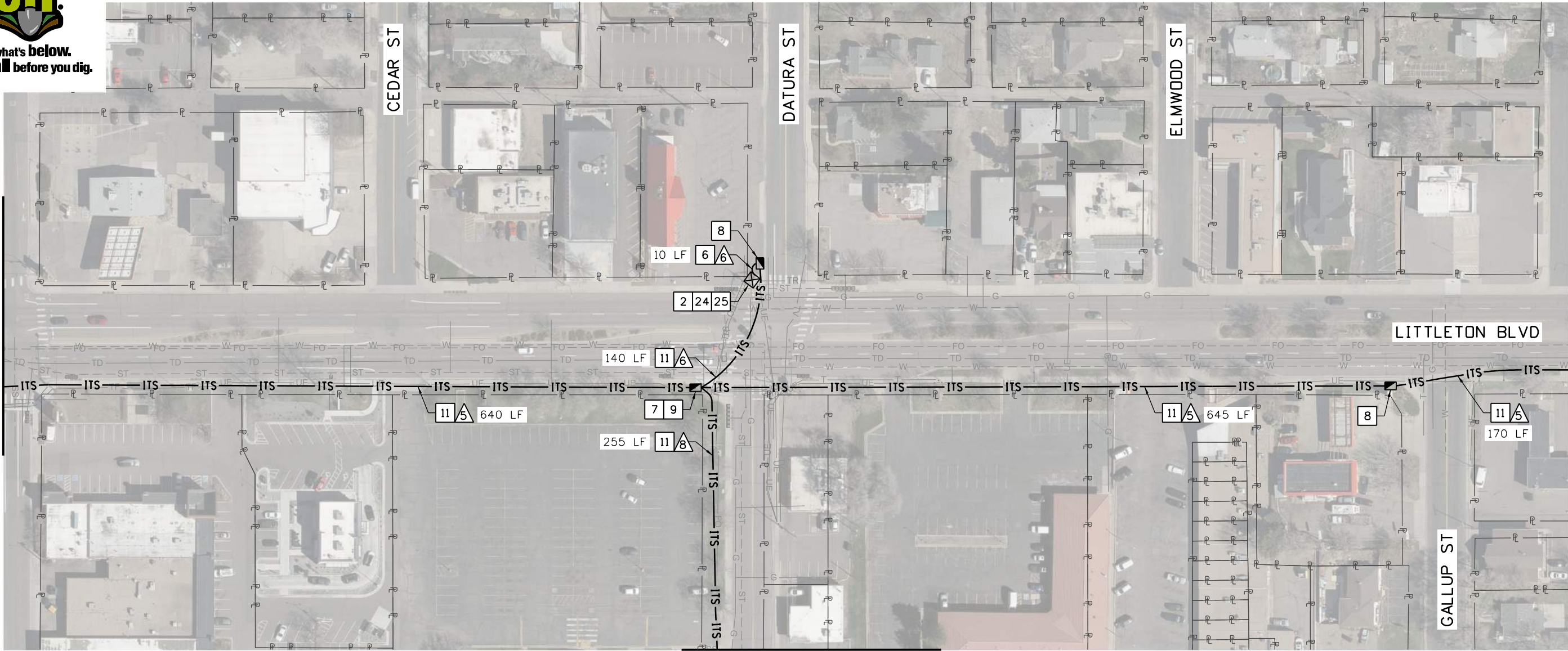
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No Revisions:		Designer: B. WALDMAN		21-37
Revised:		Detailer: D. MURIE		
Void:		Sheet Subset: ITS		Sheet Number 18
		Structure Numbers		
		Subset Sheets: 3 of 11		

DGN MODEL: 3-Littleton Spotswood - Louthan
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MATCH LINE SUBSET SHEET 5

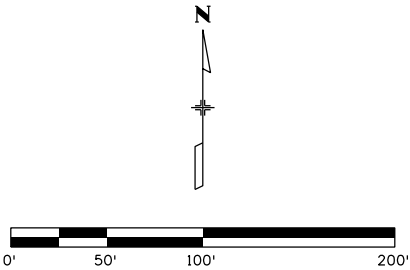
MATCH LINE SUBSET SHEET 8

CONSTRUCTION NOTES

- 2 EXISTING GROUND MOUNTED TRAFFIC SIGNAL CABINET
- 6 (2) 2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 7 PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 8 PROPOSED PULL BOX (24"X36"X24")
- 9 PROPOSED PULL BOX (30"X48"X24")
- 11 (2) 2-INCH ELECTRICAL CONDUIT (BORED)
- 24 PROPOSED EDGE ETHERNET SWITCH (INSTALL ONLY)
- 25 INSTALL PRE-TERMINATED PATCH PANEL (12 PORT)

WIRING NOTES

- 5 INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 6 INSTALL 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 8 INSTALL INDOOR/OUTDOOR 24 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)



DGN MODEL: 4-Littleton Windermere - Gallup

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File Name: 200420 Littleton Fiber ITS_Plans.dgn
Horiz. Scale: 1:100 Vert. Scale: As Noted

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Sheet Revisions

Date:	Comments	Init.



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No Revisions:

Revised:

Void:

LITTLETON BLVD
ITS PLANS

Designer: B. WALDMAN

Detailer: D. MURIE

Sheet Subset: ITS

Structure

Numbers

Subset Sheets: 4 of 11

Project No./Code

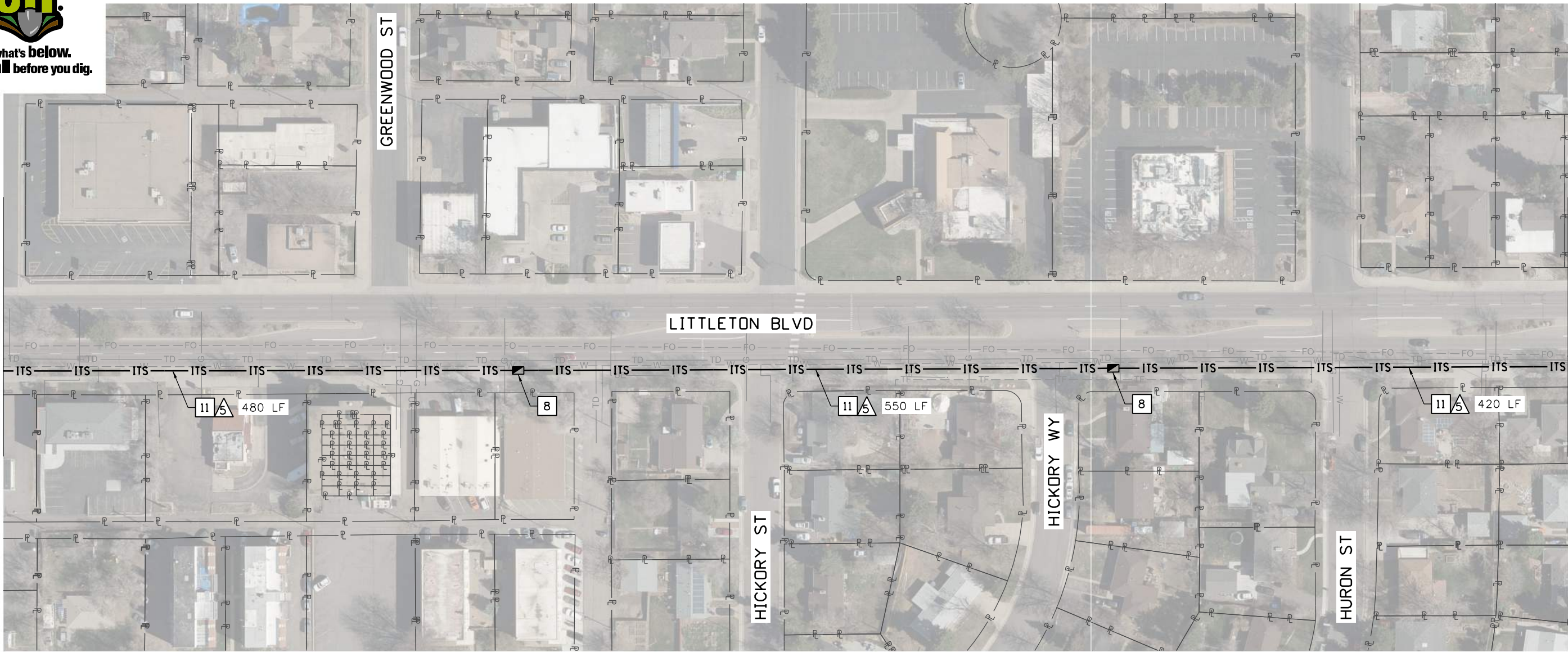
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Sheet Number 19

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MATCH LINE SUBSET SHEET 4



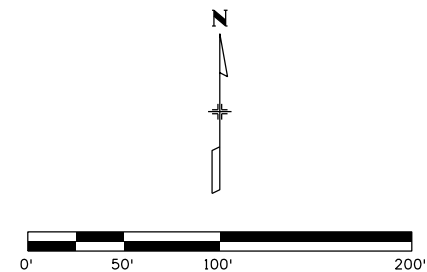
MATCH LINE SUBSET SHEET 6

CONSTRUCTION NOTES

- 8 PROPOSED PULL BOX (24"X36"X24")
- 11 (2) 2-INCH ELECTRICAL CONDUIT (BORED)

WIRING NOTES

- △ INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)



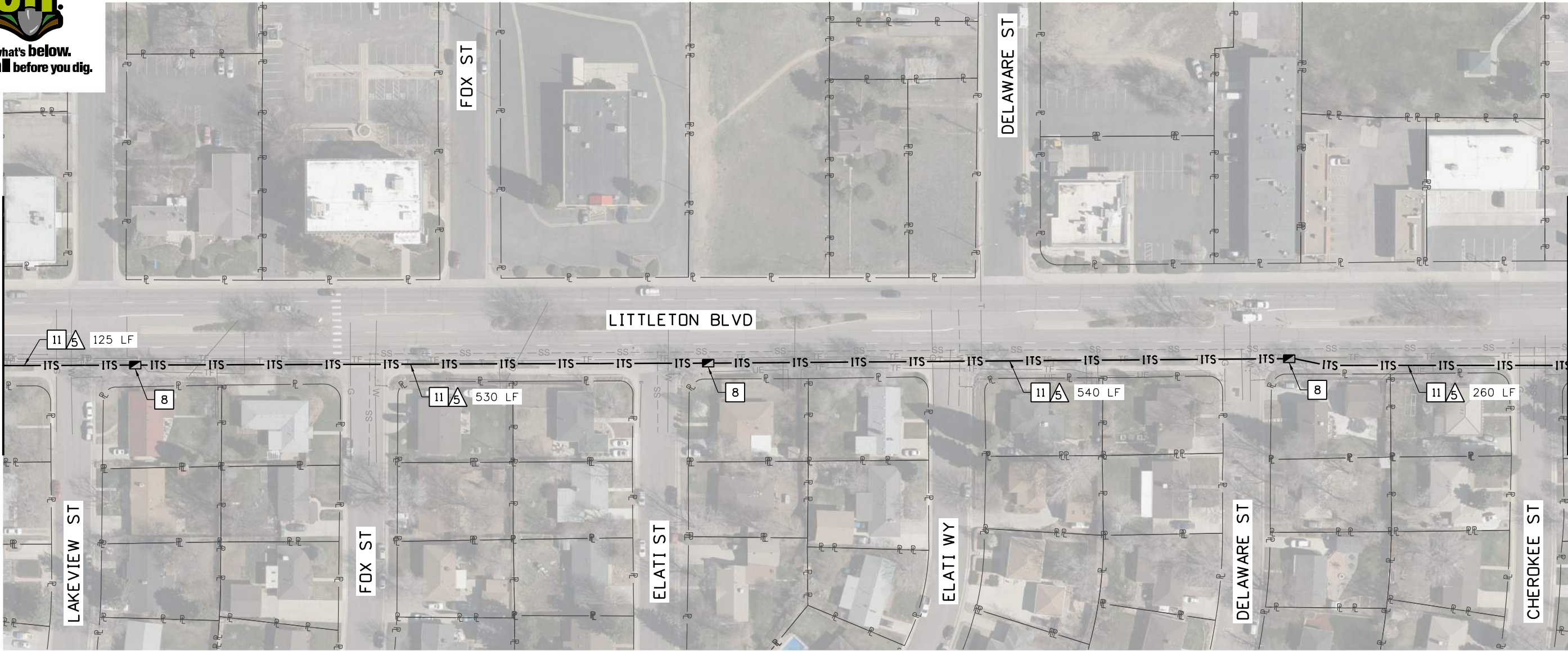
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							Sheet Subset: ITS		Subset Sheets: 5 of 11	Sheet Number 20			

Contract ID 3208

DGN MODEL: 6-Littleton Lakeview - Delaware
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MATCH LINE SUBSET SHEET 5



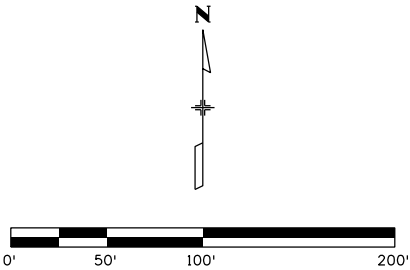
MATCH LINE SUBSET SHEET 7

CONSTRUCTION NOTES

- 8 PROPOSED PULL BOX (24"X36"X24")
- 11 (2) 2-INCH ELECTRICAL CONDUIT (BORED)

WIRING NOTES

- △ INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)



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**LITTLETON BLVD
ITS PLANS**

Designer: B. WALDMAN
Detailer: D. MURIE

Structure
Numbers

Sheet Subset: ITS

Subset Sheets: 6 of 11

Project No./Code

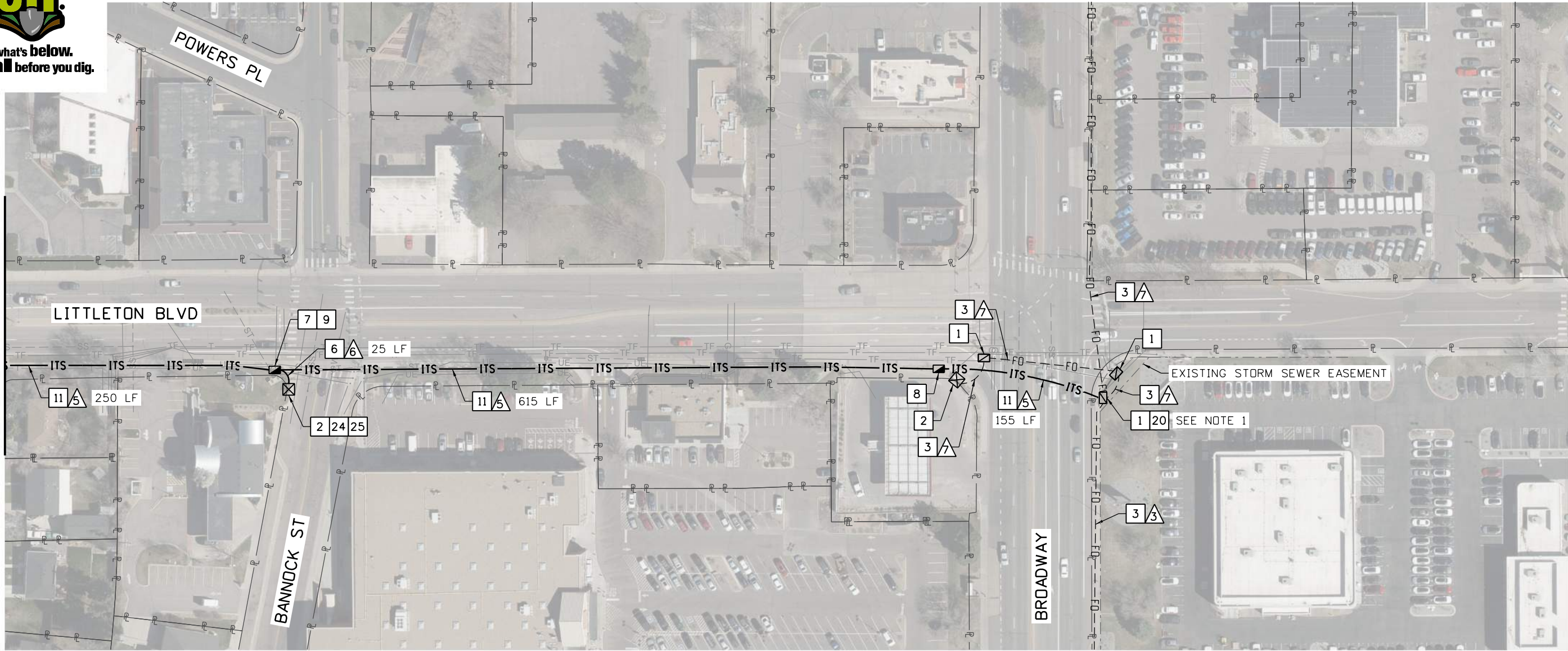
21-37

Sheet Number 21



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CONSTRUCTION NOTES

- 1

EXISTING LITTLETON PULL BOX
- 2

EXISTING GROUND MOUNTED TRAFFIC SIGNAL CABINET
- 3

EXISTING CONDUIT
- 6

(2) 2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 7

PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 8

PROPOSED PULL BOX (24"X36"X24")
- 9

PROPOSED PULL BOX (30"X48"X24")
- 11

(2) 2-INCH ELECTRICAL CONDUIT (BORED)
- 20

PROPOSED SPLICE POINT (SEE SPLICE DIAGRAM)
- 24

PROPOSED EDGE ETHERNET SWITCH (INSTALL ONLY)
- 25

INSTALL PRE-TERMINATED PATCH PANEL (12 PORT)

WIRING NOTES

- △

EXISTING LITTLETON 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- △

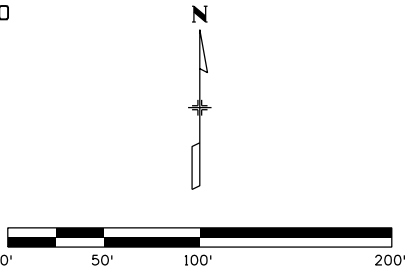
INSTALL 432 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- △

INSTALL 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- △

EXISTING LITTLETON 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)

NOTES

1. A PULL BOX AND SPLICE CLOSURE WERE INSTALLED AT THE SOUTHEAST CORNER OF BROADWAY & LITTLETON BLVD AS PART OF THE SOUTH BROADWAY FIBER UPGRADE PROJECT. CONTRACTOR TO PULL LITTLETON BLVD BACKBONE TO THIS PULL BOX AND SPLICE TO THE BROADWAY BACKBONE USING THE PREVIOUSLY INSTALLED SPLICE ENCLOSURE. REFER TO SPLICING DIAGRAMS FOR PROPOSED FIBER ASSIGNMENTS.



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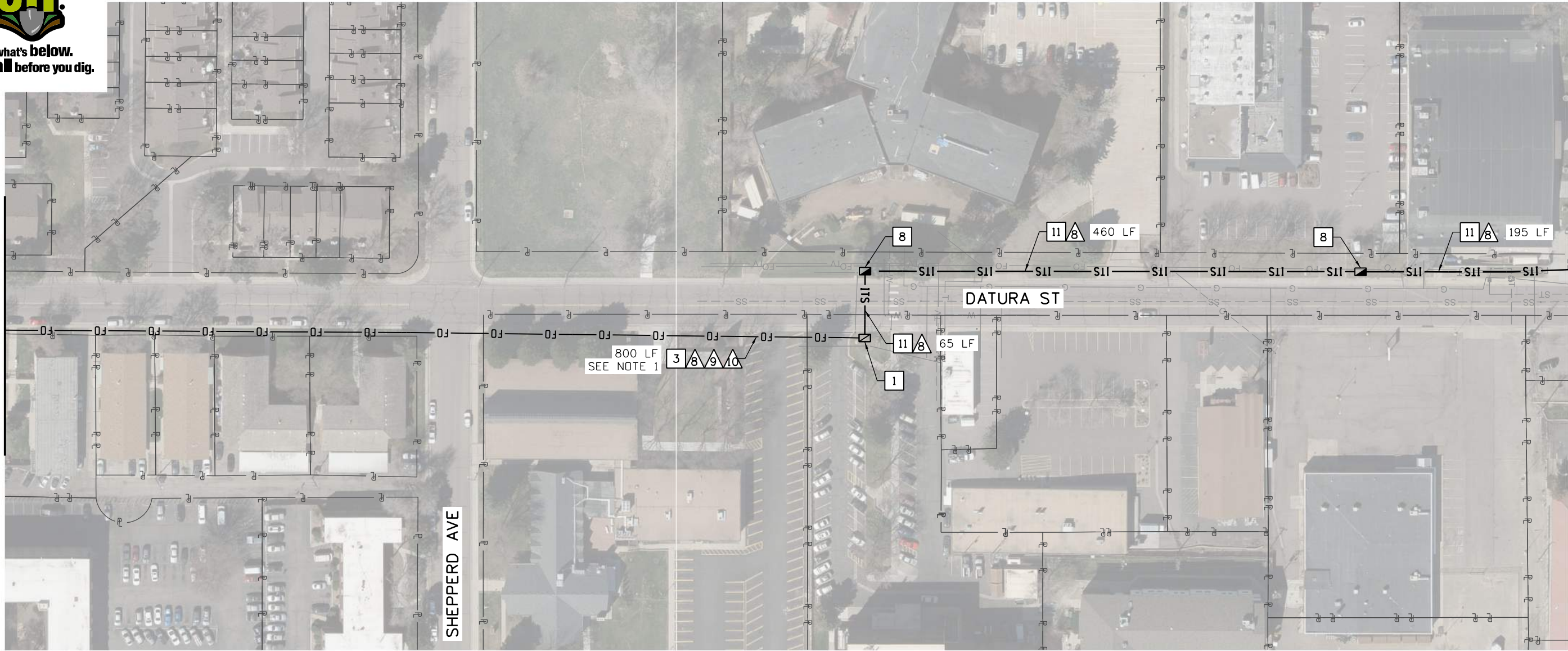
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Revised:		Designer: B. WALDMAN	Structure Numbers		
Void:		Detailer: D. MURIE			
		Sheet Subset: ITS	Subset Sheets: 7 of 11		Sheet Number 22

DGN MODEL: 7-Littleton and Broadway
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MATCH LINE SUBSET SHEET 4

CONSTRUCTION NOTES

- 1 EXISTING LITTLETON PULL BOX
- 3 EXISTING CONDUIT
- 8 PROPOSED PULL BOX (24"X36"X24")
- 11 (2) 2-INCH ELECTRICAL CONDUIT (BORED)

WIRING NOTES

- 8 INSTALL INDOOR/OUTDOOR 24 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 9 REMOVE EXISTING FIBER OPTIC CABLE
- 10 PROOF CONDUIT

NOTES

1. CONTRACTOR TO INSTALL NEW FIBER OPTIC CABLE IN EXISTING CONDUIT THAT CONTAINS AN EXISTING FIBER OPTIC CABLE. THE EXISTING FIBER OPTIC CABLE SHALL BE PROTECTED IN PLACE UNTIL THE NEW FIBER OPTIC CABLE HAS BEEN INSTALLED AND CONNECTIVITY HAS BEEN ESTABLISHED TO ALL LITTLETON FACILITIES INCLUDED ON THIS PROJECT. CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DAMAGED OR UNUSABLE SEGMENTS OF EXISTING CONDUIT IMMEDIATELY UPON IDENTIFICATION. THE CONTRACTOR SHALL CONTACT SCOTT ROGERS AT (720) 281-5273 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THIS WORK.



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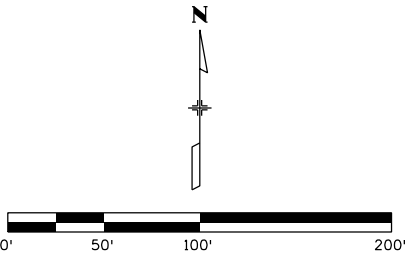
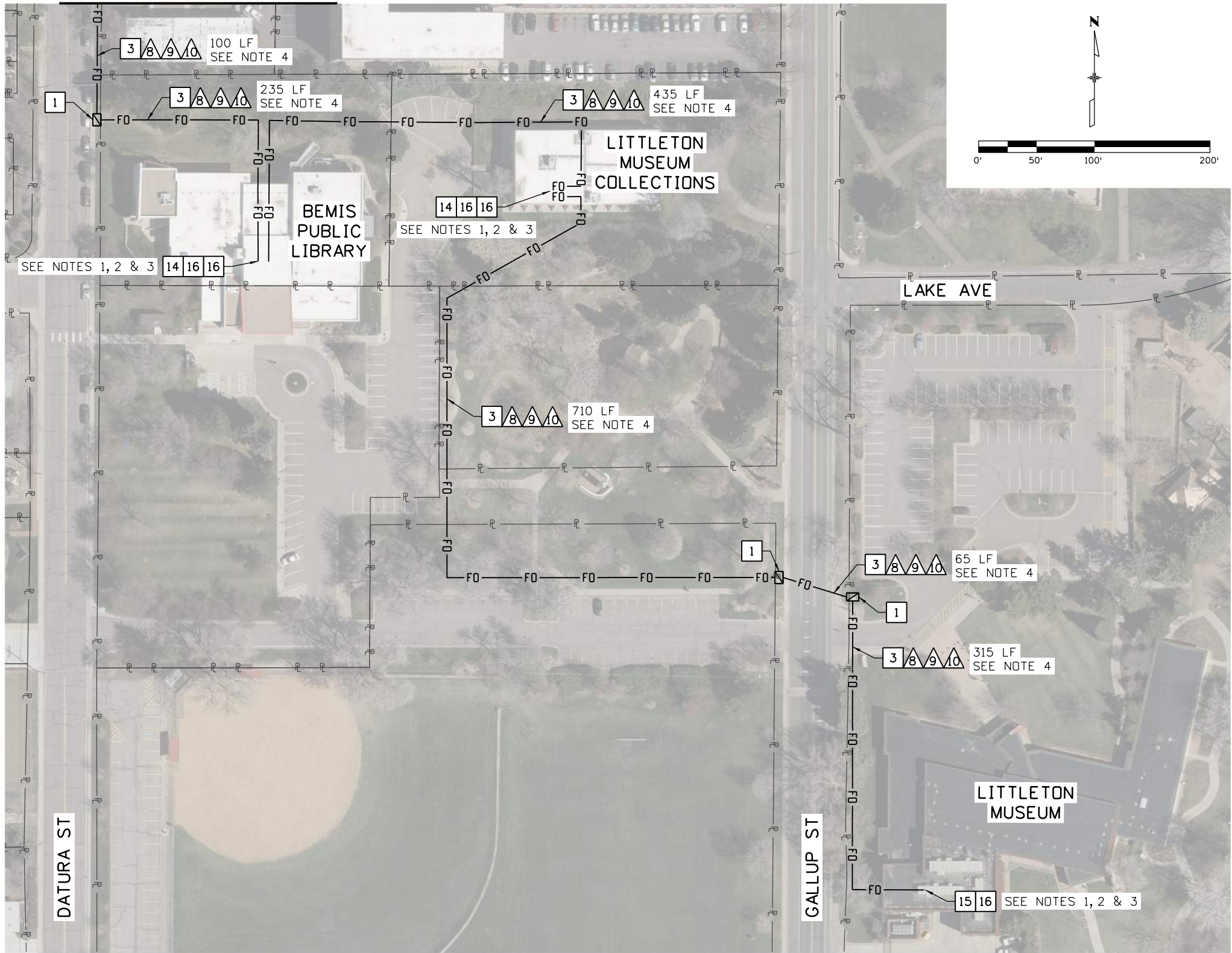


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Revised:		Detailer: D. MURIE			
Void:		Sheet Subset: ITS	Subset Sheets: 8 of 11		Sheet Number 23



MATCH LINE SUBSET SHEET 8



CONSTRUCTION NOTES

- 1 EXISTING LITTLETON PULL BOX
- 3 EXISTING CONDUIT
- 14 FIBER OPTIC TERMINATION PANEL (48 FIBER)
- 15 FIBER OPTIC TERMINATION PANEL (24 FIBER)
- 16 BUFFER TUBE FAN OUT KIT


WIRING NOTES

- 8 INSTALL INDOOR/OUTDOOR 24 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 9 REMOVE EXISTING FIBER OPTIC CABLE
- 10 PROOF CONDUIT

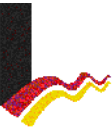
NOTES

- CONTRACTOR TO INSTALL SEPARATE FIBER OPTIC CABLES BETWEEN EACH BUILDING AS SHOWN ON THIS SHEET. THIS WILL RESULT IN TWO CABLES BEING TERMINATED IN THE BEMIS PUBLIC LIBRARY AND LITTLETON MUSEUM COLLECTIONS BUILDINGS. CONTRACTOR SHALL PATCH THE TWO PROPOSED CABLES TOGETHER TO ALLOW A CONTINUOUS CIRCUIT TO EACH OF THE DOWNSTREAM BUILDINGS. REFER TO THE SPLICING DIAGRAMS FOR FIBER ASSIGNMENTS AND PATCH CABLE CONFIGURATIONS.
- PRIOR TO INSTALLATION OF NEW FIBER OPTIC CABLES INTO CITY FACILITIES, THE CONTRACTOR SHALL FIELD VERIFY, CONFIRM CONTINUITY, PROOF THE EXISTING PROPOSED PATHWAY INTO THE BUILDING, AND CONFIRM THE CABLE LENGTH NOTED ON THE PLANS. THE CONTRACTOR SHALL SUBMIT A METHOD OF CABLE INSTALLATION TO THE CITY FOR REVIEW AND APPROVAL BY THE PROJECT ENGINEER. INSTALLATION SHALL NOT OCCUR UNTIL THE CONTRACTOR'S PROPOSED INSTALLATION METHOD HAS BEEN APPROVED BY THE CITY.
- ALL WORK AT THE BEMIS PUBLIC LIBRARY, THE LITTLETON MUSEUM COLLECTIONS BUILDING, AND THE LITTLETON MUSEUM SHALL BE COORDINATED WITH SCOTT ROGERS AT (720) 281-5273 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THE WORK.
- CONTRACTOR TO INSTALL NEW FIBER OPTIC CABLE IN EXISTING CONDUIT THAT CONTAINS AN EXISTING FIBER OPTIC CABLE. THE EXISTING FIBER OPTIC CABLE SHALL BE PROTECTED IN PLACE UNTIL THE NEW FIBER OPTIC CABLE HAS BEEN INSTALLED AND CONNECTIVITY HAS BEEN ESTABLISHED TO ALL LITTLETON FACILITIES INCLUDED ON THIS PROJECT. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DAMAGED OR UNUSABLE SEGMENTS OF EXISTING CONDUIT IMMEDIATELY UPON IDENTIFICATION. THE CONTRACTOR SHALL CONTACT SCOTT ROGERS AT (720) 281-5273 A MINIMUM OF ONE WEEK PRIOR TO PERFORMING THIS WORK.

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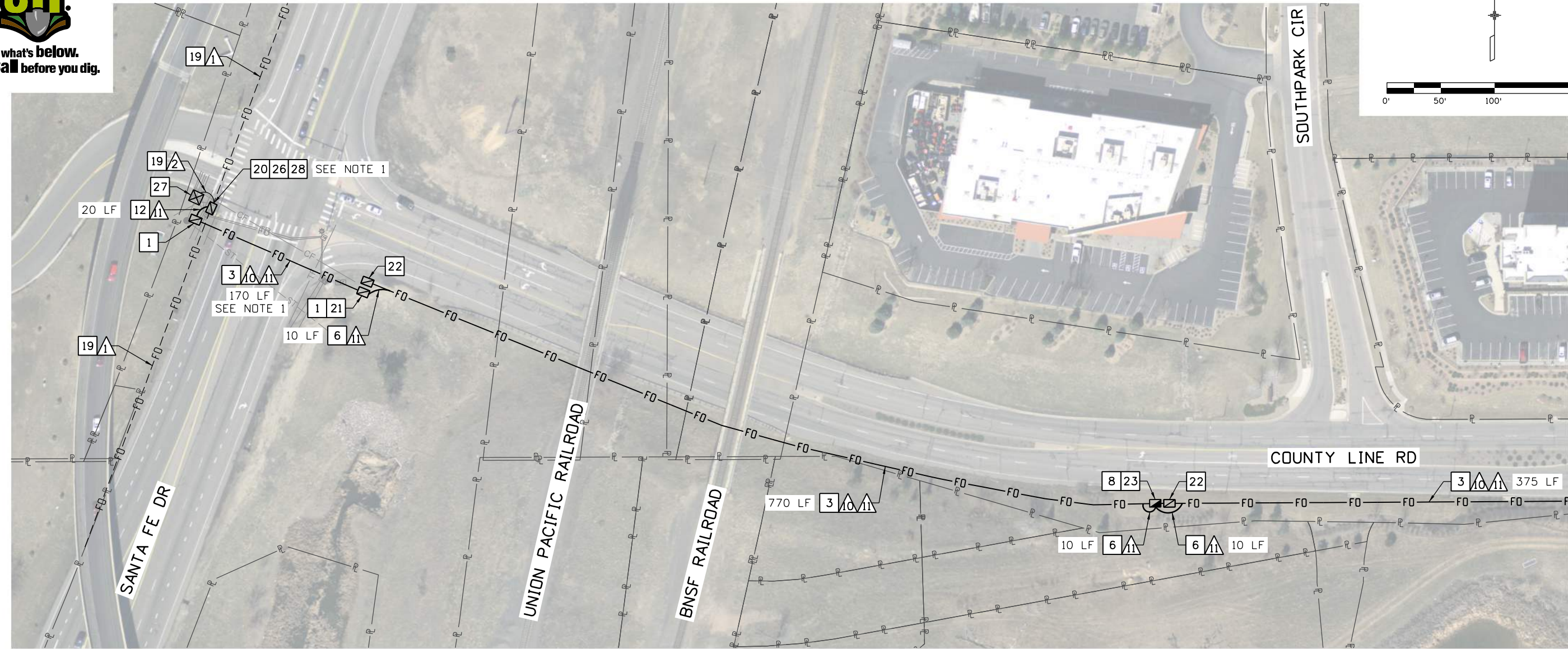


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No Revisions:		Designer: B. WALDMAN		21-37
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CONSTRUCTION NOTES

- 1

EXISTING LITTLETON PULL BOX
- 3

EXISTING CONDUIT
- 6

(2) 2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 8

PROPOSED PULL BOX (24"X36"X24")
- 12

2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 19

EXISTING CDOT CONDUIT
- 20

PROPOSED SPLICE POINT (SEE SPLICE DIAGRAM)
- 21

SWEEP EXISTING STUBBED UP CONDUIT(S) INTO EXISTING PULL BOX
- 22

EXISTING MCI PULL BOX
- 23

SWEEP EXISTING STUBBED UP CONDUIT(S) INTO PROPOSED PULL BOX
- 26

EXISTING CDOT SPLICE POINT
- 27

EXISTING CDOT TRAFFIC SIGNAL CABINET
- 28

EXISTING CDOT PULL BOX

WIRING NOTES

- 1

EXISTING CDOT 144 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)
- 2

EXISTING CDOT 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 10

PROOF CONDUIT
- 11

INSTALL 96 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)

NOTES

1. DEDICATED CONDUIT AND PULL BOXES FOR THE LITTLETON FIBER OPTIC BACKBONE WERE INSTALLED AT THE INTERSECTION OF COUNTY LINE RD & SANTA FE DR DURING A RECENT SIGNAL UPGRADE PROJECT. CONTRACTOR TO PULL NEW FIBER OPTIC CABLE INTO THE EXISTING FIBER PULL BOX ON SOUTHEAST CORNER AND USE EXISTING CONDUIT TO REACH THE EXISTING PULL BOX ON THE SOUTHWEST CORNER. NEW CONDUIT SHALL BE INSTALLED BETWEEN THE EXISTING PULL BOX ON THE SOUTHWEST CORNER AND THE EXISTING CDOT SPLICE POINT FOR INSTALLATION OF THE NEW BACKBONE. PRIOR TO STARTING WORK IN THIS AREA, THE CONTRACTOR SHALL CONFIRM THE LOCATIONS OF THE EXISTING LITTLETON AND CDOT INFRASTRUCTURE AND ALERT THE PROJECT ENGINEER IMMEDIATELY OF ANY DISCREPANCIES. THE CONTRACTOR SHALL CONTACT JILL SCOTT WITH CDOT ITS GROUP AT (303) 512-5805 A MINIMUM OF TWO WEEKS PRIOR TO PERFORMING SPLICING OR ANY OTHER WORK THAT WILL IMPACT CDOT INFRASTRUCTURE

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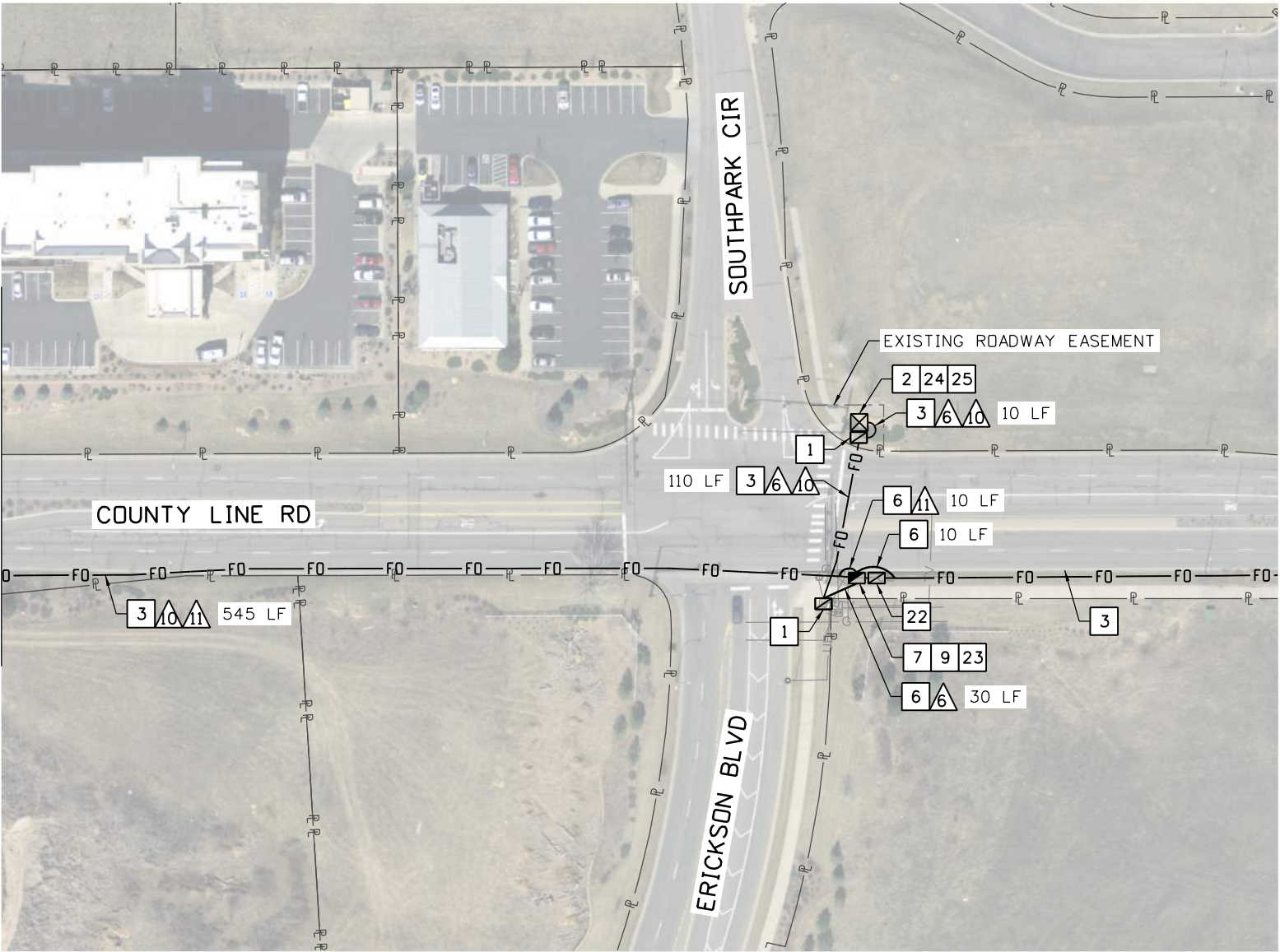
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PHONE: 303-795-3700

As Constructed		COUNTY LINE RD ITS PLANS		Project No./Code
No Revisions:		Designer: B. WALDMAN		21-37
Revised:		Detailer: D. MURIE		
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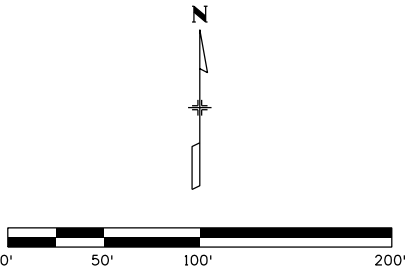
CONSTRUCTION NOTES

- 1 EXISTING LITTLETON PULL BOX
- 2 EXISTING GROUND MOUNTED TRAFFIC SIGNAL CABINET
- 3 EXISTING CONDUIT
- 6 (2) 2-INCH ELECTRICAL CONDUIT (PLASTIC)
- 7 PROPOSED SPLICE POINT WITH NEW SPLICE ENCLOSURE (SEE SPLICE DIAGRAM)
- 9 PROPOSED PULL BOX (30"X48"X24")
- 22 EXISTING MCI PULL BOX
- 23 SWEEP EXISTING STUBBED UP CONDUIT(S) INTO PROPOSED PULL BOX

- 24 PROPOSED EDGE ETHERNET SWITCH (INSTALL ONLY)
- 25 INSTALL PRE-TERMINATED PATCH PANEL (12 PORT)

WIRING NOTES

- 6 INSTALL 12 STRAND FIBER OPTIC LATERAL CABLE (SINGLE MODE)
- 10 PROOF CONDUIT
- 11 INSTALL 96 STRAND FIBER OPTIC BACKBONE CABLE (SINGLE MODE)



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Date:	Comments	Init.

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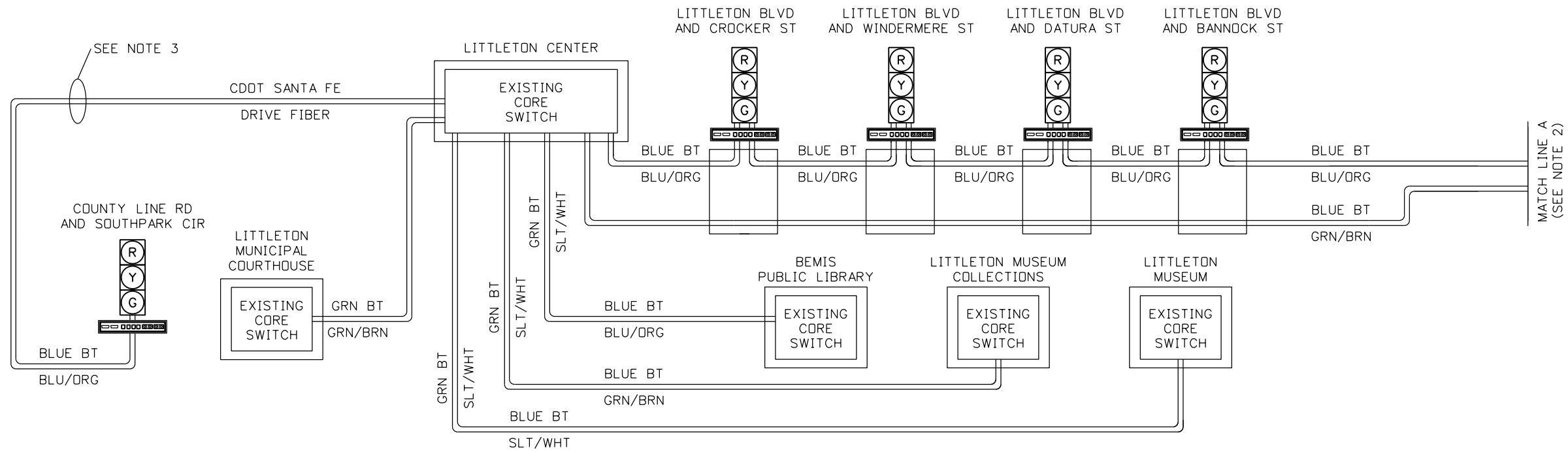
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LITTLETON, CO 80120

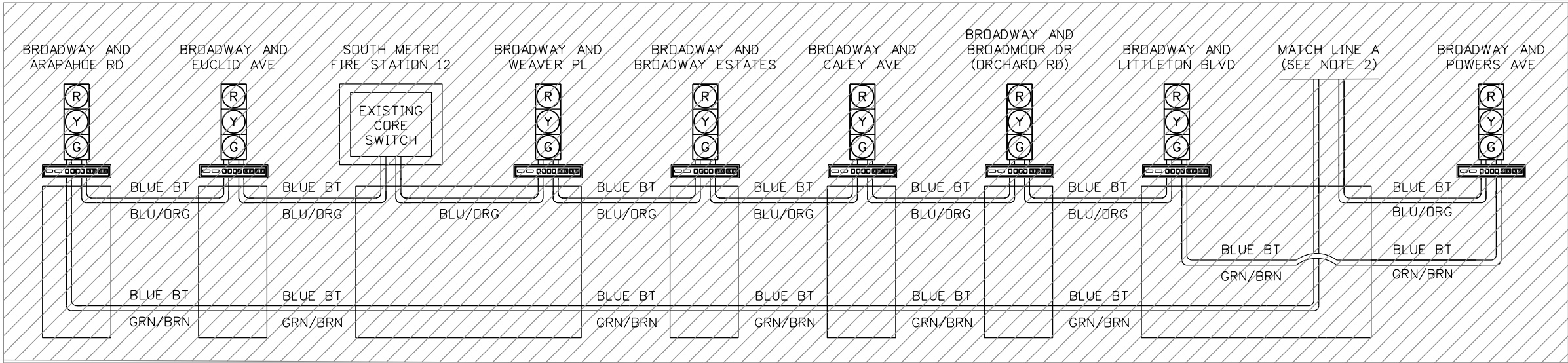
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No Revisions:		Designer: B. WALDMAN		21-37
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Void:		Sheet Subset: ITS	Subset Sheets: 11 of 11	Sheet Number 26

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ABBREVIATIONS	
APPROX	APPROXIMATELY
AVE	AVENUE
BLK	BLACK
BLU	BLUE
BLVD	BOULEVARD
BRN	BROWN
BT	BUFFER TUBE
CIR	CIRCLE
DR	DRIVE
EX	EXISTING
GRN	GREEN
LF	LINEAR FEET
NE	NORTHEAST
NW	NORTHWEST
ORG	ORANGE
PB	PULL BOX
PL	PLACE
PR	PROPOSED
RD	ROAD
SE	SOUTHEAST
SLT	SLATE
ST	STREET
SW	SOUTHWEST
YEL	YELLOW
VLT	VIOLET
WHT	WHITE



NOTES:

1. THE CONTRACTOR SHALL PROCURE OPTICS FOR INSTALLATION BETWEEN SWITCHES BASED ON THE SWITCH MANUFACTURER'S REQUIREMENTS.

2. A 432 STRAND FIBER OPTIC BACKBONE WAS INSTALLED ALONG BROADWAY DURING THE SOUTH BROADWAY COMMUNICATIONS UPGRADE PROJECT. THE LITTLETON BLVD COMMUNICATIONS UPGRADE PROJECT WILL ESTABLISH A CONNECTION BETWEEN THIS EXISTING FIBER OPTIC CABLE AND THE LITTLETON CENTER.
3. COMMUNICATIONS SIGNAL FOR COUNTY LINE RD & SOUTHPARK CIR TRAFFIC SIGNAL TO BE BACKHAULED VIA CDDT'S EXISTING BACKBONE ON SANTA FE DRIVE.

BLUE BUFFER TUBE (BACKBONE)
FIBERS 1 (BLUE), 2 (ORANGE), 3 (GREEN), AND 4 (BROWN)

LEGEND

FIBER STRAND

CITY OF LITTLETON TRAFFIC SIGNAL LOCATION

PULL BOX SPLICE POINT

PROPOSED EDGE SWITCH

EXISTING EDGE SWITCH

FOR INFORMATION ONLY (COMPLETED DURING A PREVIOUS PACKAGE)

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No Revisions:		Designer: B. WALDMAN	Structure Numbers	21-37
Revised:		Detailer: D. MURIE		
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LEGEND

1

2

3

4

5

6

7

8

9

10

11

12

BLUE

ORANGE

GREEN

BROWN

SLATE

WHITE

RED

BLACK

YELLOW

VIOLET

ROSE

AQUA

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→

UNUSED FIBER

PROPOSED FIBER SPLICE

FIBER NOT LANDED

PROPOSED PATCH CABLE

COL

EX

PR

CITY OF LITTLETON

EXISTING

PROPOSED

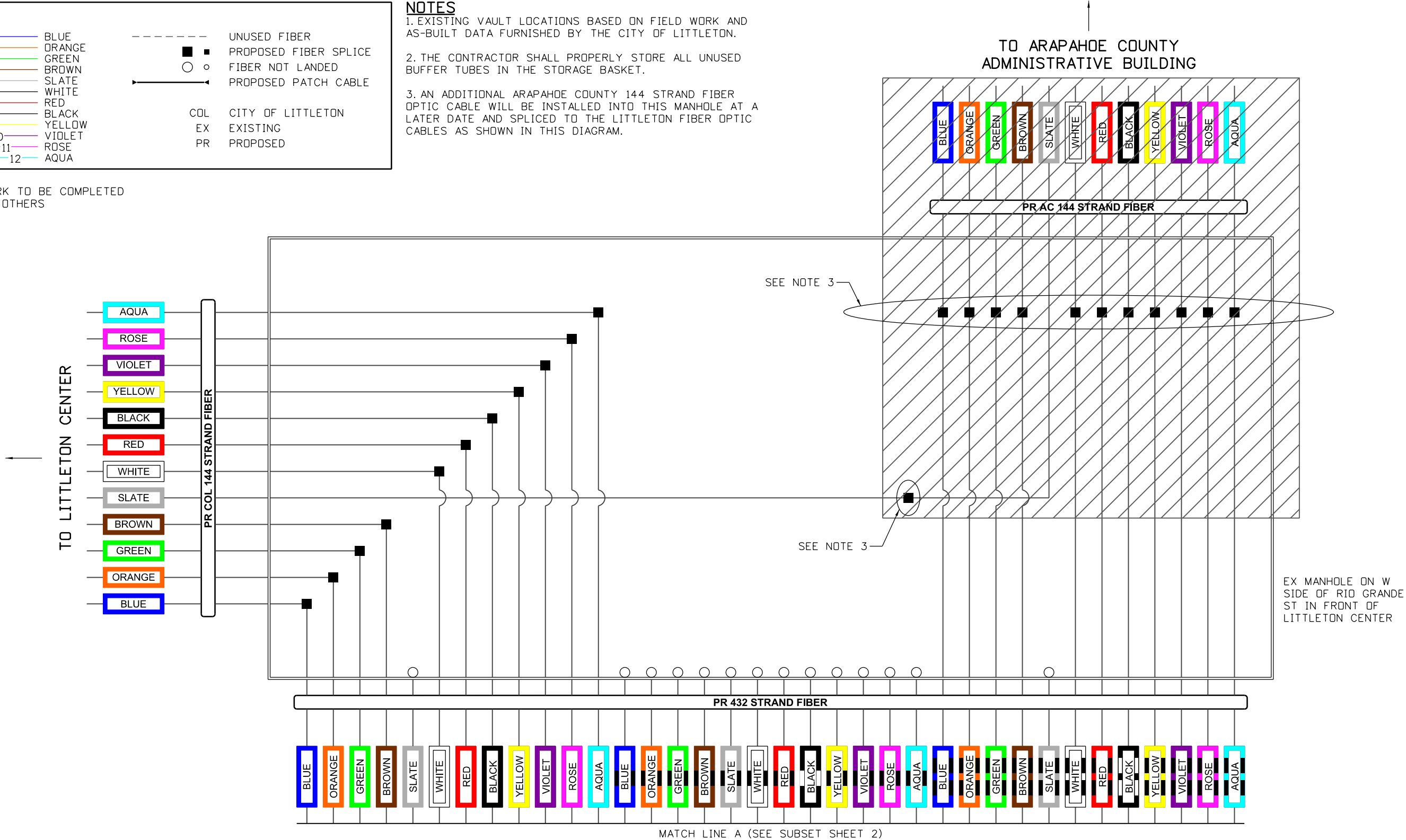
NOTES

1. EXISTING VAULT LOCATIONS BASED ON FIELD WORK AND AS-BUILT DATA FURNISHED BY THE CITY OF LITTLETON.

2. THE CONTRACTOR SHALL PROPERLY STORE ALL UNUSED BUFFER TUBES IN THE STORAGE BASKET.

3. AN ADDITIONAL ARAPAHOE COUNTY 144 STRAND FIBER OPTIC CABLE WILL BE INSTALLED INTO THIS MANHOLE AT A LATER DATE AND SPLICED TO THE LITTLETON FIBER OPTIC CABLES AS SHOWN IN THIS DIAGRAM.


 WORK TO BE COMPLETED BY OTHERS



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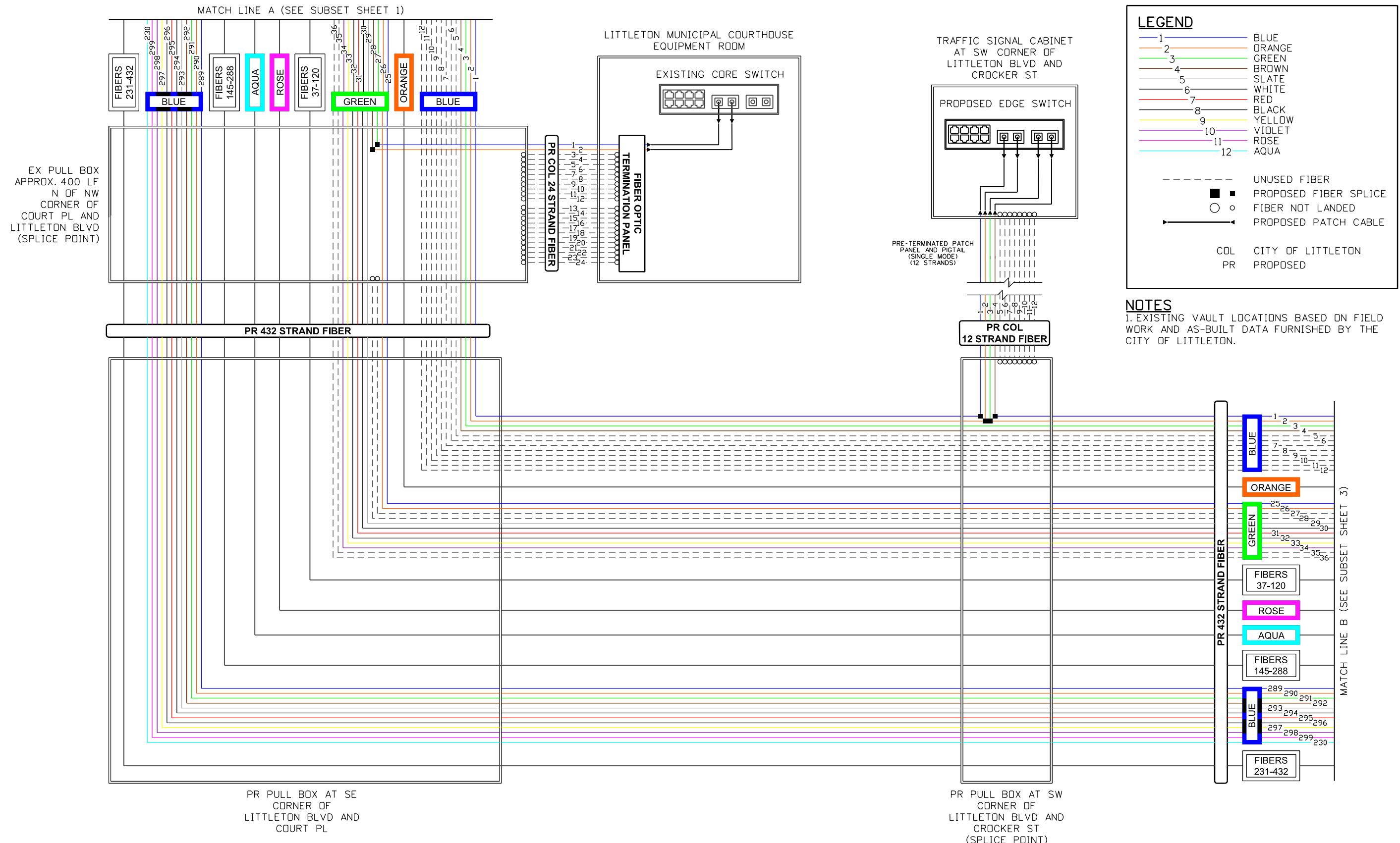
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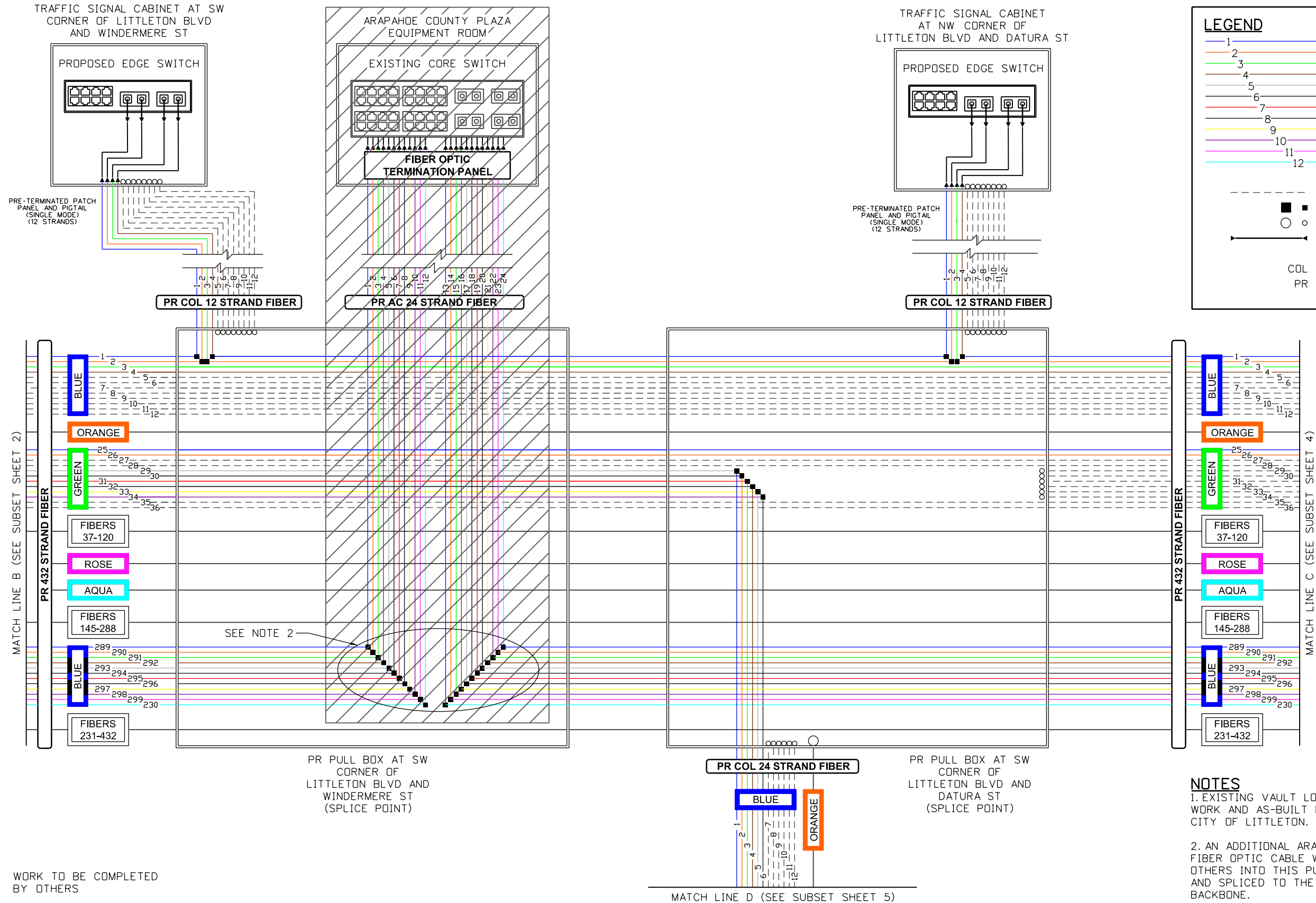
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No Revisions:		Designer: B. WALDMAN		21-37
Revised:		Detailer: D. MURIE		
Void:		Sheet Subset: SPLICE		
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Horiz. Scale: N/A							Revised:		Designer: B. WALDMAN	Structure Numbers			
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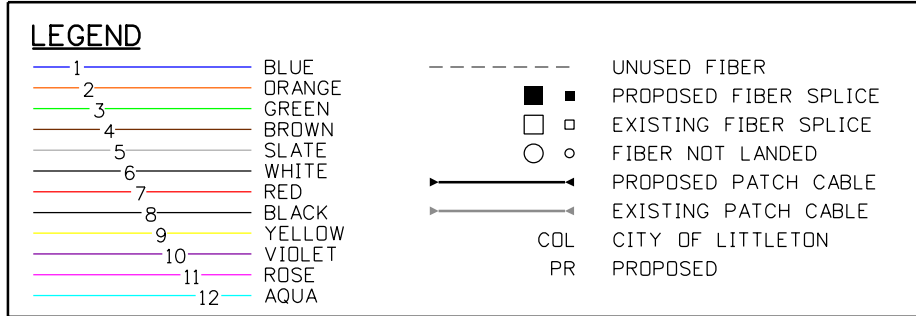
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Date:	Comments	Init.



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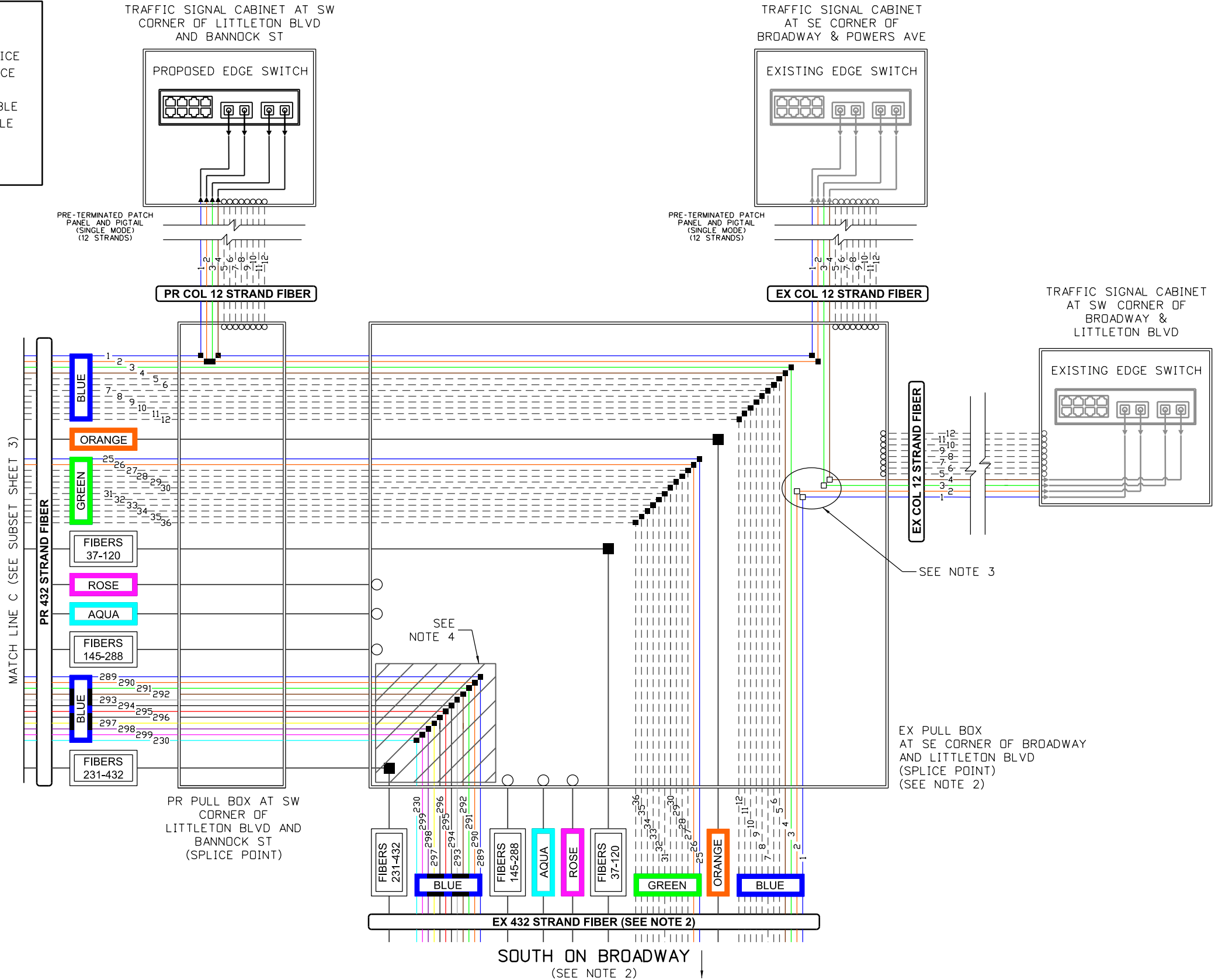
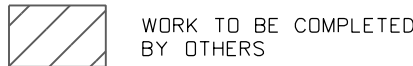
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No Revisions:		Designer: B. WALDMAN	Structure Numbers	21-37
Revised:		Detailer: D. MURIE		
Void:		Sheet Subset: SPLICE	Subset Sheets: 3 of 6	Sheet Number 30

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NOTES

1. EXISTING VAULT LOCATIONS BASED ON FIELD WORK AND AS-BUILT DATA FURNISHED BY THE CITY OF LITTLETON.
2. FIBER OPTIC BACKBONE ON BROADWAY AND FIBER PULL BOX AT SE CORNER OF BROADWAY & LITTLETON BLVD WERE INSTALLED DURING THE SOUTH BROADWAY COMMUNICATIONS UPGRADE PROJECT. CONTRACTOR SHALL UTILIZE THE EXISTING SPLICE ENCLOSURE AT THIS LOCATION TO PERFORM THE ADDITIONAL SPLICES PROPOSED ON THIS PROJECT.
3. SPLICES CONNECTING THE BROADWAY & LITTLETON BLVD AND BROADWAY & POWERS AVE INTERSECTIONS TO THE BROADWAY FIBER BACKBONE CABLE WERE COMPLETED DURING THE SOUTH BROADWAY COMMUNICATIONS UPGRADE PROJECT. THESE SPLICES SHALL BE PROTECTED IN PLACE.
4. SPLICES OF ARAPAHOE COUNTY'S BACKBONE FIBERS 289-432 WILL BE COMPLETED BY OTHERS AT A LATER DATE.



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**LITTLETON BLVD
SPLICING DIAGRAMS**

Designer: B. WALDMAN

Detailer: D. MURIE

Sheet Subset: SPLICE

Structure
Numbers

Subset Sheets: 4 of 6

Project No./Code

21-37

Sheet Number **31**

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LEGEND

1

2

3

4

5

6

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8

9

10

11

12

BLUE

ORANGE

GREEN

BROWN

SLATE

WHITE

RED

BLACK

YELLOW

VIOLET

ROSE

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UNUSED FIBER

PROPOSED FIBER SPLICE

FIBER NOT LANDED

PROPOSED PATCH CABLE

COL

PR

CITY OF LITTLETON

PROPOSED

NOTES
1. EXISTING VAULT LOCATIONS BASED ON FIELD WORK AND AS-BUILT DATA FURNISHED BY THE CITY OF LITTLETON.
2. CONTRACTOR TO PATCH FIBERS OF PROPOSED CABLES TOGETHER AS SHOWN ON THESE PLANS TO ALLOW CONNECTIVITY TO DOWNSTREAM BUILDINGS.

The diagram illustrates fiber splicing plans for three locations: Bemis Public Library Equipment Room, Littleton Museum Collections Equipment Room, and Littleton Museum Equipment Room. Each location features an 'EXISTING CORE SWITCH' connected to a 'PR FIBER OPTIC TERMINATION PANEL' via 'PATCH CABLES (SEE NOTE 2)'. The termination panels are connected to 'PR COL 24 STRAND FIBER' bundles. The bundles are color-coded: BLUE (1-12) and ORANGE (1-12). A 'MATCH LINE D (SEE SUBSET SHEET 3)' is shown on the left, indicating the connection to the previous sheet. The fiber bundles are shown entering the termination panels and connecting to the existing core switches. The diagram also shows the fiber bundles entering the equipment rooms and connecting to the termination panels.

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No Revisions:				21-37
Revised:		Designer: B. WALDMAN	Structure Numbers	
Void:		Detailer: D. MURIE		
		Sheet Subset: SPLICE	Subset Sheets: 5 of 6	Sheet Number 32

Contract ID 3208Page 160 of 185

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LEGEND

1

2

3

4

5

6

7

8

9

10

11

12

BLUE

ORANGE

GREEN

BROWN

SLATE

WHITE

RED

BLACK

YELLOW

VIOLET

ROSE

AQUA

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COL

PR

UNUSED FIBER

PROPOSED FIBER SPLICE

EXISTING FIBER SPLICE

FIBER NOT LANDED

PROPOSED PATCH CABLE

EXISTING PATCH CABLE

CITY OF LITTLETON

PROPOSED

NOTES

1. EXISTING VAULT LOCATIONS BASED ON FIELD WORK AND AS-BUILT DATA FURNISHED BY THE CITY OF LITTLETON.

2. CONTRACTOR TO SPLICE PROPOSED LITTLETON FIBER BACKBONE TO EXISTING CDOT BACKBONE AT THE EXISTING CDOT PULL BOX. EXISTING FIBER OPTIC SPLICES SHALL BE PROTECTED IN PLACE, AND CONTRACTOR SHALL PERFORM ALL PROPOSED SPLICING AT THIS LOCATION WITHOUT DISTURBING THE EXISTING SPLICES. CONTRACTOR SHALL CONTACT JILL SCOTT WITH CDOT ITS GROUP (303) 512-5808 A MINIMUM OF TWO WEEKS PRIOR TO PERFORMING THIS WORK.

The diagram illustrates a fiber splicing project. At the top, 'NORTH ON SANTA FE DR (TO LITTLETON CENTER)' is indicated. Below it, 'EX CDOT 144 STRAND FIBER' is shown with a bundle of 144 fibers, including a 'BLUE' strand. This connects to an 'EX CDOT PULL BOX AT SW CORNER OF SANTA FE DR AND COUNTY LINE RD (SPLICE POINT)'. Inside the pull box, fibers are numbered 1 through 12. A 'SEE NOTE 2' callout points to a specific splice. The pull box connects to 'PR COL 96 STRAND FIBER' and 'PR COL 12 STRAND FIBER'. The 96-strand fiber has color-coded sections: BLUE, ORANGE, GREEN, BROWN, SLATE, WHITE, RED, and BLACK. The 12-strand fiber is also color-coded. These connect to a 'PR PULL BOX AT SE CORNER OF SOUTHPARK CIR AND COUNTY LINE RD (SPLICE POINT)'. Finally, the fibers connect to a 'TRAFFIC SIGNAL CABINET AT NE CORNER OF SOUTHPARK CIR AND COUNTY LINE RD', which contains a 'PROPOSED EDGE SWITCH' and a 'PRE-TERMINATED PATCH PANEL AND PIGTAIL (SINGLE MODE) (12 STRANDS)'.

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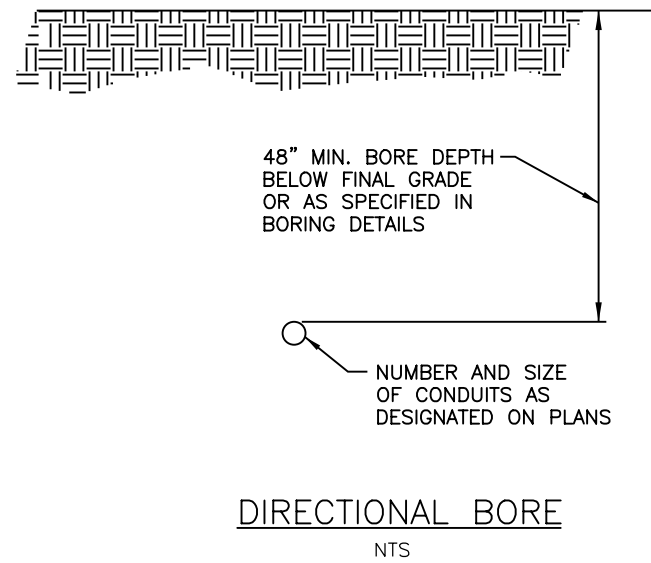
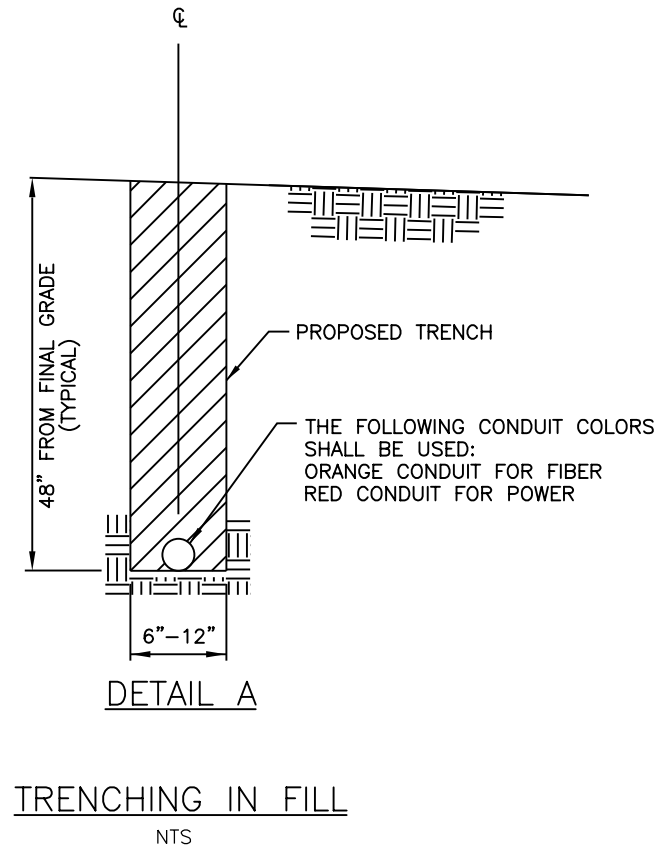
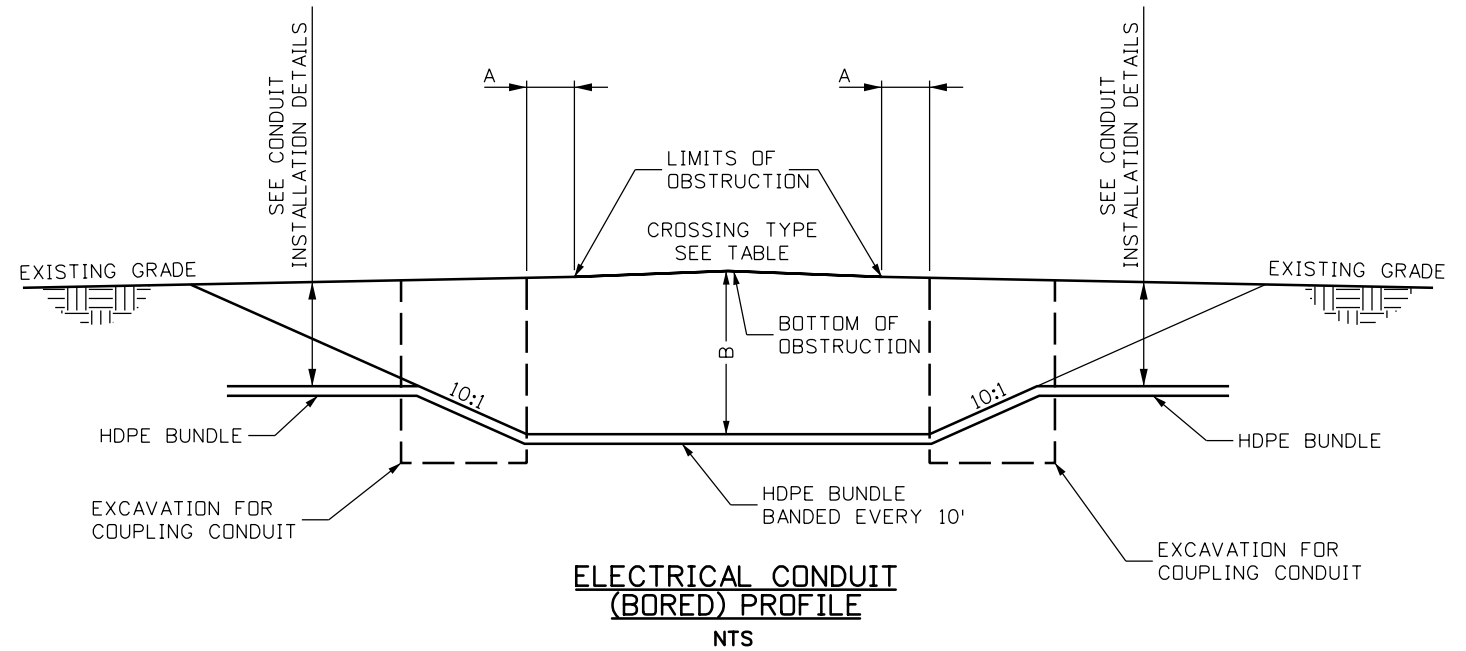
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As Constructed		COUNTY LINE RD SPLICING DIAGRAMS		Project No./Code
No Revisions:		Designer: B. WALDMAN		21-37
Revised:		Detailer: D. MURIE	Structure Numbers	
Void:		Sheet Subset: SPLICE	Subset Sheets: 6 of 6	Sheet Number 33

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NOTES:

1. CONTRACTOR SHALL CONFORM TO THE APPLICABLE AGENCY REQUIREMENTS AND SPECIFICATION FOR BORE CROSSINGS.
2. EXCAVATIONS AND DISTURBANCE LIMITS REQUIRE SEEDING AND MULCHING OR LANDSCAPE RESTORATION.
3. CONTRACTOR SHALL BACKFILL AND REGRADE SITE TO MATCH EXISTING CONDITIONS.
4. CONTRACTOR MUST REPAIR ANY DAMAGE TO PAVEMENT CAUSED BY ERRANT BORING AT THEIR COST.
5. TRENCHES SHALL BE FILLED IN BY THE END OF THE WORK DAY. CONTRACTOR SHALL USE A BMP ON THE DOWNSTREAM SIDE OF ANY REMAINING SPOILS TO PREVENT THE TRANSPORT OF THE SEDIMENT DURING A RAIN EVENT.



CROSSING TYPE	A	B
CULVERT	5' MIN	48" MIN
DRIVEWAY	5' MIN	48" MIN
DITCH	15' MIN	48" MIN
CROSS ROAD	15' MIN	48" MIN
FREEWAY	15' MIN	48" MIN
PRAIRIE DOGS	15' MIN	84" MIN
TREE	20' MIN	84" MIN
WATERWAY	50' MIN	48" MIN
WETLAND	50' MIN	48" MIN

Print Date: 11/15/2024
File Name: 200420_DET01_Conduit Installation.dgn
Horiz. Scale: NTS Vert. Scale: As Noted

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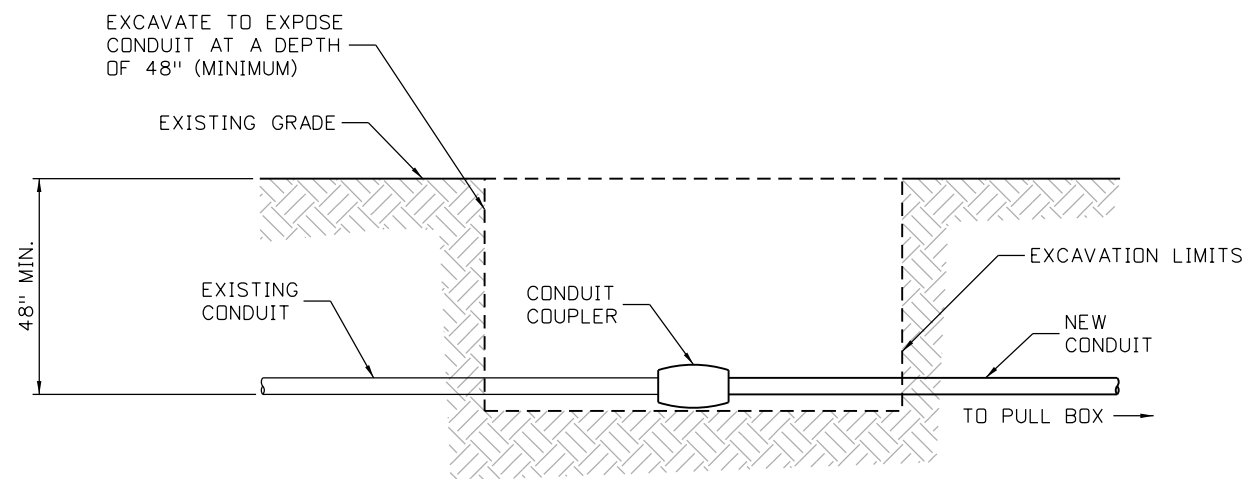
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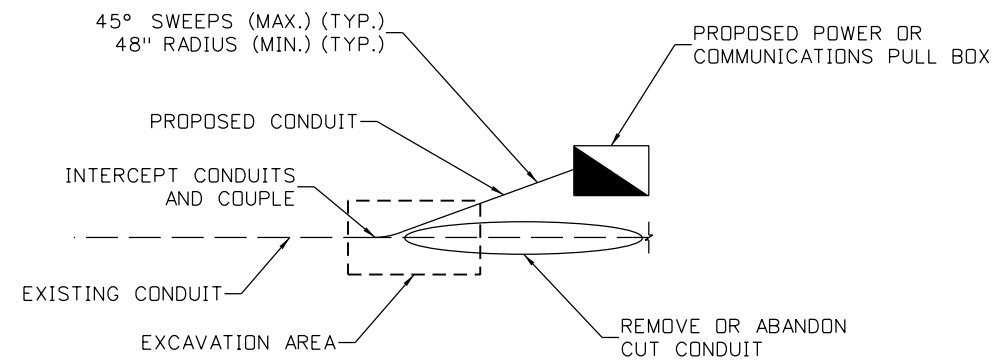
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As Constructed		CONDUIT INSTALLATION ITS DETAIL		Project No./Code
No Revisions:		Designer: B. WALDMAN		21-37
Revised:		Detailer: D. MURIE		
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		Structure Numbers		
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CONDUIT EXCAVATION AND COUPLING DETAIL



PROPOSED PULL BOX
CONDUIT COUPLING DETAIL

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File Name: 200420_DET02_Conduit Coupling Detail.dgn	
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Void:

CONDUIT COUPLING ITS DETAIL			
Designer:	B. WALDMAN	Structure Numbers	
Detailer:	D. MURIE		
Sheet Subset:	DETAILS	Subset Sheets:	2 of 7

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21-37
Sheet Number 35

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- DIRECTION OF FIBER OPTIC CABLE RUN (BACKBONE AND LATERAL CABLES)
- DEVICE ATTACHED (LATERAL CABLE)
- FOOTAGE MEASUREMENT AT PULL BOX OR MANHOLE (TMS) LOCATION (BACKBONE AND LATERAL CABLES)
- FIBER MANUFACTURER SERIAL NUMBER (BACKBONE AND LATERAL CABLES)
- NUMBER OF FIBERS IN CABLE (BACKBONE AND LATERAL CABLES)
- DATE OF INSTALLATION (BACKBONE AND LATERAL CABLES)

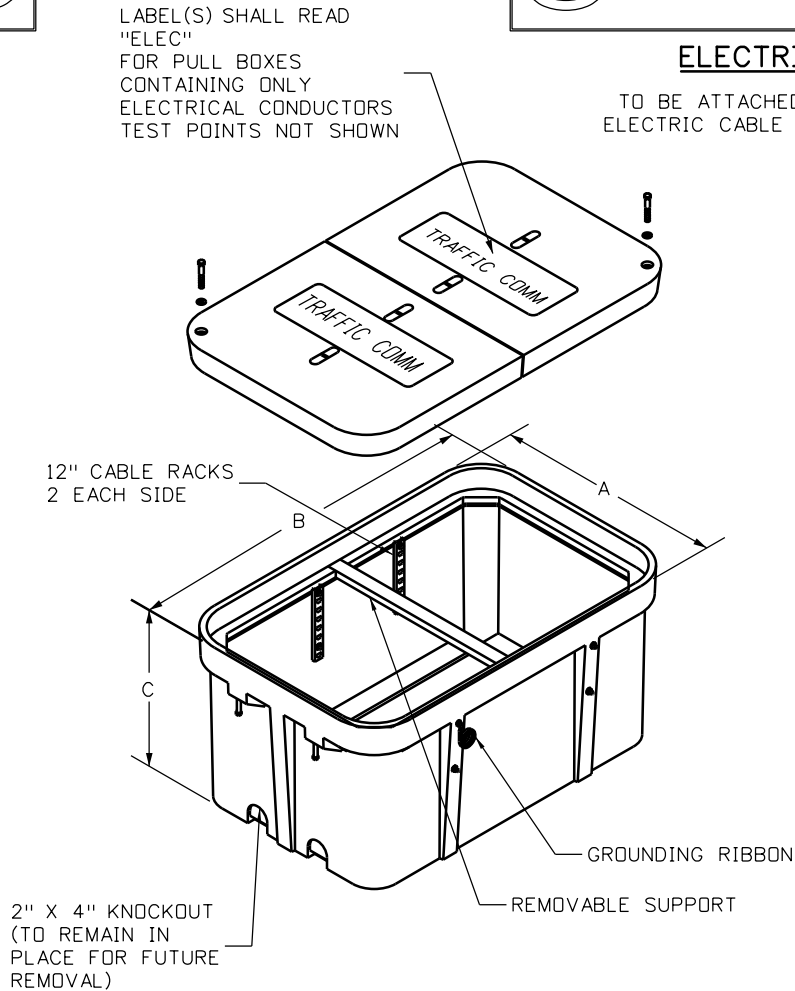
COMMUNICATIONS CABLE LABEL

TO BE ATTACHED BY PLASTIC TIE TO EACH COMMUNICATIONS CABLE LOCATED IN ALL PULL BOXES AND MANHOLES (TMS)

- FED FROM: DESCRIPTION OF SERVICE LOCATION / __LF __ (DIRECTION) / THROUGH __PULL BOXES
- FEEDS: DESCRIPTION OF ITS CABINET / __LF __ (DIRECTION) / THROUGH __PULL BOXES
- NUMBER OF CONDUCTORS AND SIZE (e.g. 3C#6)

ELECTRIC CABLE LABEL

TO BE ATTACHED BY PLASTIC TIE TO EACH ELECTRIC CABLE LOCATED IN ALL PULL BOXES



ITS PULL BOX

ITS PULL BOX TYPE	DIMENSIONS (INCHES)			KNOCKOUT MOUSE HOLE TYPE	COILED TRACER WIRE (FEET)
	A	B	C		
24" X 36" X 24"	24	36	24	4	6
30" X 48" X 24"	30	48	24	4	6

PULL BOX NOTES:

1. CONDUITS DEPICTED ON THIS TYPICAL DETAIL ARE REPRESENTATIVE ONLY. NUMBER OF CONDUITS INSTALLED AND CONDUIT SIZE SHALL BE AS TABULATED AND SHOWN ON THE PLANS.
2. DESIGNATION FOR THE INSTALLATION OF ELECTRICAL WIRING AND FIBER OPTIC CABLE IN THE BACKBONE CONDUIT SYSTEM IS DESCRIBED IN THE PROJECT SPECIFICATIONS.
3. CONDUIT CENTERLINE SHALL BE ALIGNED WITHIN THE PULL BOX TO FACILITATE FIBER OPTIC CABLE PULLING.
4. CONDUIT PLUGS SHALL BE INSTALLED IN ALL CONDUITS, BOTH WITH AND WITHOUT WIRE OR CABLE AND SHALL BE INCLUDED IN THE COST OF ELECTRICAL CONDUIT ITEM.
5. WEATHERPROOF TAGS SHALL BE INSTALLED ON ALL COMMUNICATIONS AND ELECTRIC CABLES AND SHALL BE INCLUDED IN THE COST OF ELECTRICAL CONDUIT ITEM.
6. TRACER WIRE AND PULL TAPE SHALL BE INCLUDED IN THE COST OF ELECTRICAL CONDUIT ITEM FOR BOTH BACKBONE AND LATERAL CONDUIT RUNS.
 - IF INSTALLATION INCLUDES MULTIPLE RUNS OF CONDUIT, PULL TAPE SHALL BE INSTALLED IN EACH INDIVIDUAL CONDUIT, TRACER WIRE SHALL BE INSTALLED IN THE CONDUIT CONTAINING FIBER OPTIC CABLE.
 - IF INSTALLATION INCLUDES ONLY ONE RUN OF CONDUIT, PULL TAPE AND TRACER WIRE SHALL BE INSTALLED IN SAME CONDUIT AS FIBER CABLE.
7. ALL PULL BOX TYPES SHALL BE PAID FOR UNDER THE CORRESPONDING PULL BOX ITEM, AND SHALL BE SIZED AS TABULATED AND SHOWN IN THE PLANS.
8. PULL BOXES SHALL HAVE A CONCRETE APRON SLOPED AWAY FROM PULL BOX OPENING. THE COST OF THE CONCRETE APRON SHALL BE PAID FOR AS PART OF PULL BOX ITEM.
9. FIBER OPTIC CABLE COILS WITHIN PULL BOXES SHALL BE TIED TO EACH CABLE RACK. PLASTIC WIRE TIES SHALL NOT BE ALLOWED. CAUTION SHALL BE TAKEN TO COIL THE FIBER CABLE PER MANUFACTURER'S RECOMMENDATIONS.
10. WORK TO INSTALL PULL BOX SHALL INCLUDE BUT NOT BE LIMITED TO SAW CUTTING OF CONCRETE SIDEWALKS, REMOVAL OF PAVEMENT, CONCRETE, EARTHWORK, ALL LANDSCAPE RESTORATION. ALL MATERIAL SHALL BE CONTAINED BY AN APPROVED BMP AND NOT ALLOWED TO RUN OFF SITE.
11. PULL BOX TYPES AS DEPICTED ON THIS PROJECT DETAIL SHALL NOT BE INSTALLED IN THE ASPHALT OR CONCRETE SHOULDER OF THE ROADWAY.
12. ALL PULL BOXES AND COVERS LOCATED IN AREAS WITH NON-DELIBERATE VEHICULAR TRAFFIC MUST COMPLY WITH ALL TEST PROVISIONS OF LATEST EDITION OF THE ANSI/SCTE 77 "SPECIFICATION FOR UNDERGROUND ENCLOSURE INTEGRITY" AND MUST MEET THE TIER 22 APPLICATION. MARKING SHOWING THE TIER 22 RATING MUST BE LABELED OR STENCILED ON THE INSIDE AND OUTSIDE OF THE BOX AND ON THE UNDERSIDE OF THE COVER.
13. COVER MUST BE SECURED TO PULL BOX USING 3/8-7 LAG THREAD HEX HEAD BOLTS.
14. A COMPLIANCE LETTER FROM THE MANUFACTURER OF THE PULL BOXES SHALL BE SUBMITTED ALONG WITH MATERIAL SUBMITTALS. THE COMPLIANCE LETTER SHALL INDICATE THAT THE PULL BOX MANUFACTURER HAS MET OR EXCEEDED ALL TEST PROVISIONS OF THE LATEST EDITION OF THE ANSI/SCTE 77 & ALL OF CDOT REQUIREMENTS LISTED IN PLAN DETAILS.
15. THE DEEP RECESS OF THE POLYMER CONCRETE PULL BOX SHALL BE CLEANED WITH AN ALCOHOL-BASED CLEANER PRIOR TO APPLYING LABELS.

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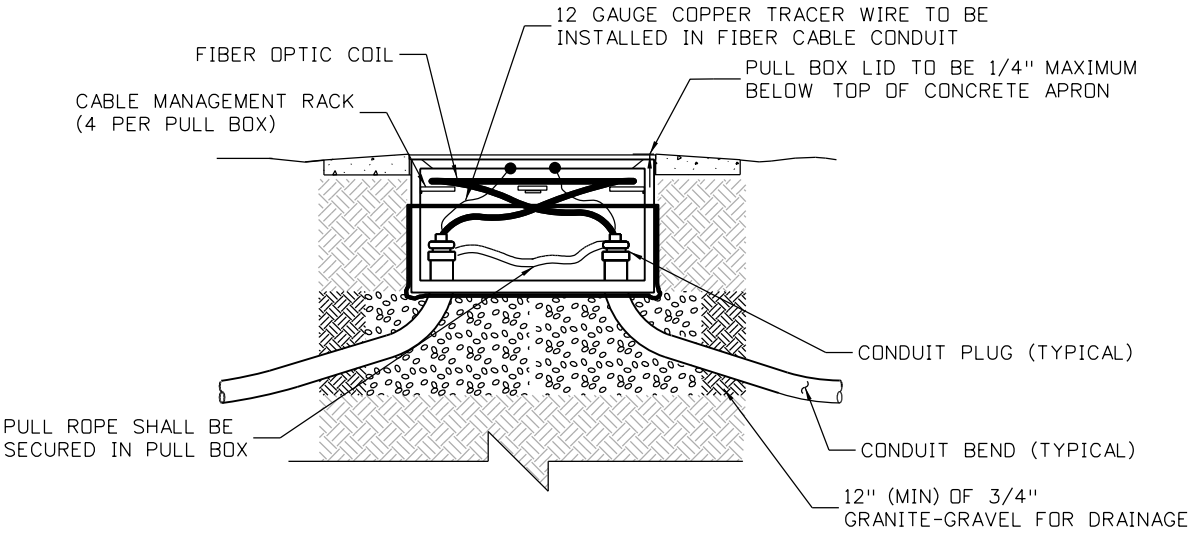
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As Constructed	PULL BOX (1 OF 2) ITS DETAIL			Project No./Code
No Revisions:				21-37
Revised:	Designer: B. WALDMAN	Structure Numbers		
	Detailer: D. MURIE			
Void:	Sheet Subset: DETAILS	Subset Sheets: 3 of 7		Sheet Number 36

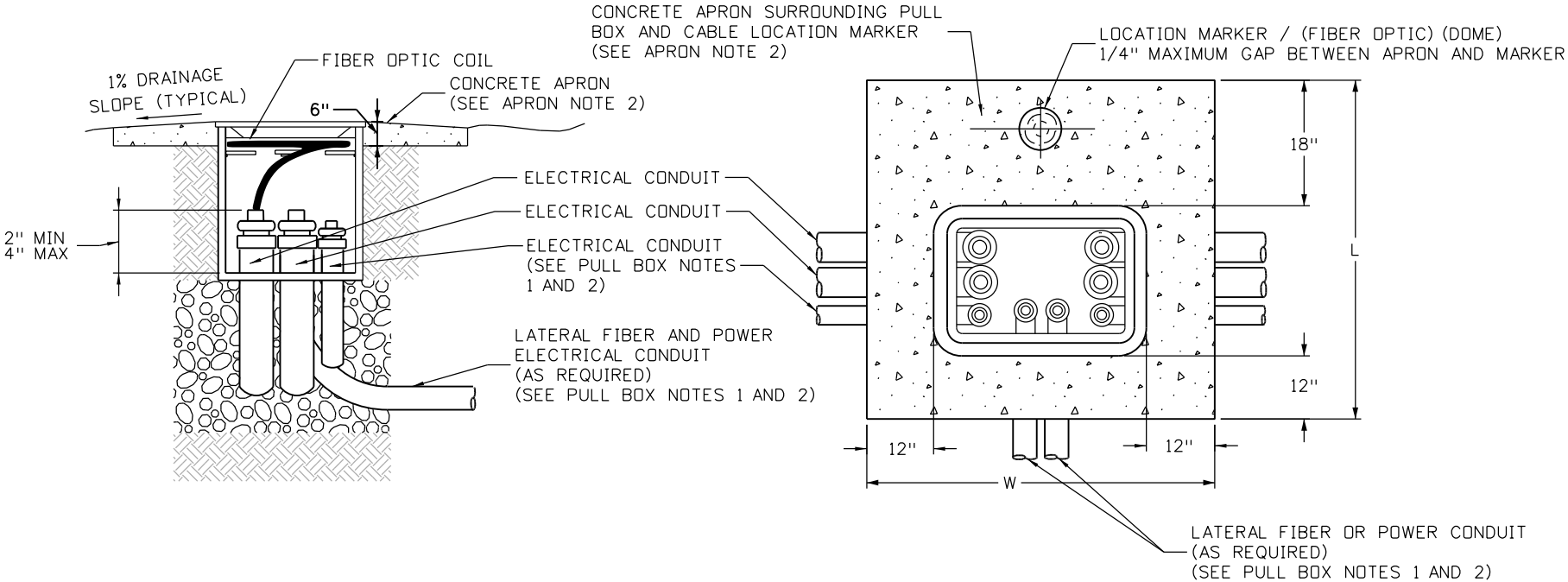
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ITS PULL BOX TYPE	CONCRETE APRON DIMENSIONS (INCHES) (SEE APRON NOTE 1)	
	W	L
24" X 36" X 24"	60	54
30" X 48" X 24"	72	60

- APRON NOTES:
- APRON DIMENSIONS MAY VARY BASED ON PULL BOX WALL THICKNESS.
 - WITH APPROVAL FROM ENGINEER, A SKID-RESISTANT PRECAST CONCRETE OR POLYMER CONCRETE APRON OF SIMILAR DIMENSIONS MAY BE USED. GROUND SHALL BE COMPACTED PER MANUFACTURER RECOMMENDATIONS.



- CONDUIT BEND NOTES:
- RADIUS MUST NOT BE LESS THAN 48" FOR CONDUIT CONTAINING FIBER
 - SWEEP MUST NOT BE GREATER THAN 45 DEGREES
 - DURING CABLE INSTALLATION, CONTRACTOR SHALL ENSURE NO DAMAGE TO CABLE OCCURS DUE TO FRICTION BETWEEN CONDUIT AND CABLE JACKET. THIS MAY REQUIRE INSTALLING TEMPORARY PVC SWEEPS ON HDPE CONDUIT ENDS.



ITS PULL BOX INSTALLATION

Print Date: 11/15/2024
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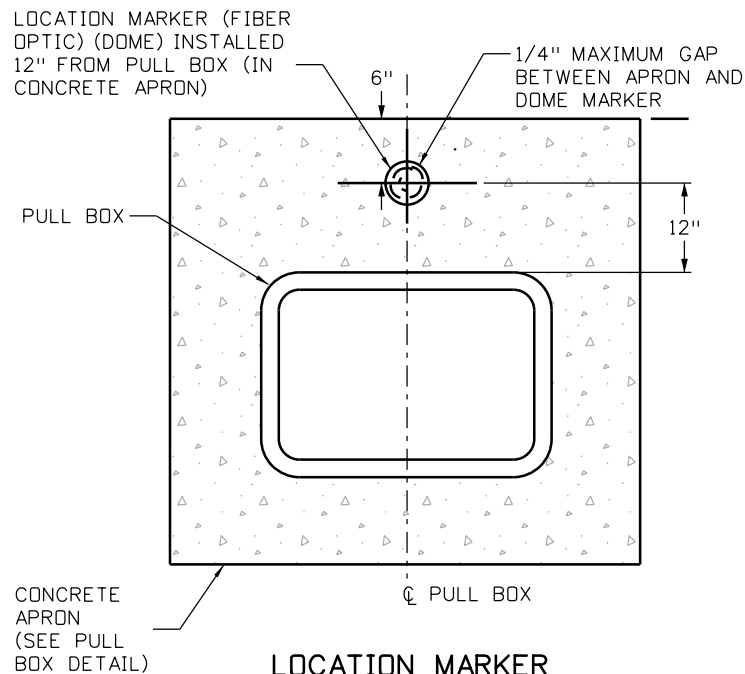
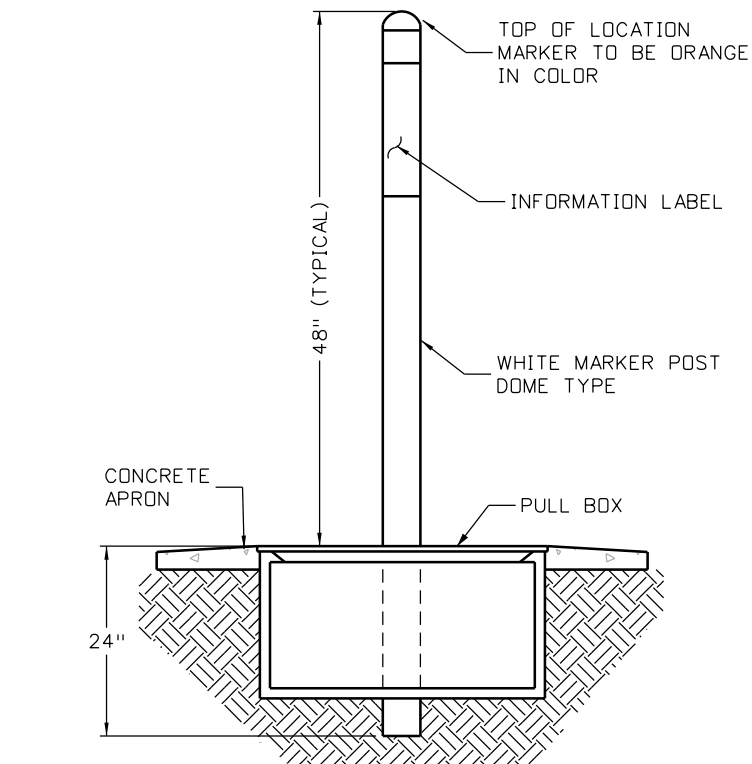
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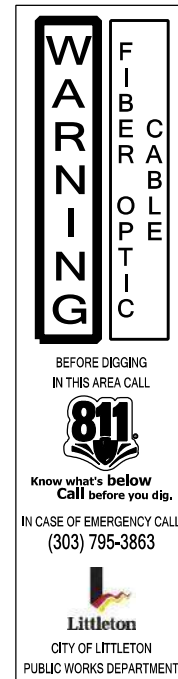
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As Constructed		PULL BOX (2 OF 2) ITS DETAIL		Project No./Code
No Revisions:		Designer: B. WALDMAN		21-37
Revised:		Detailer: D. MURIE	Structure Numbers	
Void:		Sheet Subset: DETAILS	Subset Sheets: 4 of 7	Sheet Number 37

DGN MODEL: CDDT Default
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LOCATION MARKER
(FIBER OPTIC) (DOME)
AT PULL BOXES
3" x 6' DOME TYPE POST




LOCATION MARKER INFORMATION LABELING


BLACK LETTERING ON ORANGE
BACKGROUND LOCATION
MARKER (FIBER OPTIC) (DOME)

LOCATION MARKER INSTALLATION NOTES:

1. AREA AROUND LOCATION MARKER INSTALLATION SHALL BE RETURNED TO EXISTING GRADE AND CONDITION. THIS WORK SHALL NOT BE PAID FOR SEPARATELY, BUT BE INCLUDED IN THE COST OF LOCATION MARKER ITEM.
2. LOCATION MARKER (FIBER OPTIC) (DOME) SHALL BE INSTALLED AT EACH PULL BOX ALONG BOTH THE BACKBONE AND LATERAL FIBER OPTIC CABLE RUNS THROUGHOUT THE PROJECT.
3. CONCRETE FOOTING SUPPORT FOR LOCATION MARKER (FIBER OPTIC) (DOME) AT PULL BOX LOCATIONS SHALL BE INCLUDED IN THE COST OF EACH PULL BOX SHOWN IN THE PROJECT.
4. THE CONTRACTOR SHALL PROVIDE THE PROJECT ENGINEER AN AS-BUILT DRAWING SHOWING THE INSTALLED LOCATIONS OF ALL MARKERS.
5. LOCATION MARKERS SHALL HAVE INFORMATION LABELS ATTACHED WITH ADHESIVE TO WITHSTAND HEAT AND COLD
6. WITH APPROVAL FROM ENGINEER A SKID RESISTANT, PRECAST CONCRETE OR POLYMER CONCRETE FOOTING SUPPORT OF SIMILAR DIMENSIONS MAY BE USED. GROUND SHALL BE COMPACTED PER MANUFACTURER RECOMMENDATIONS.

Print Date: 11/15/2024
File Name: 200420_DET05_Location Marker.dgn
Horiz. Scale: NTS Vert. Scale: As Noted
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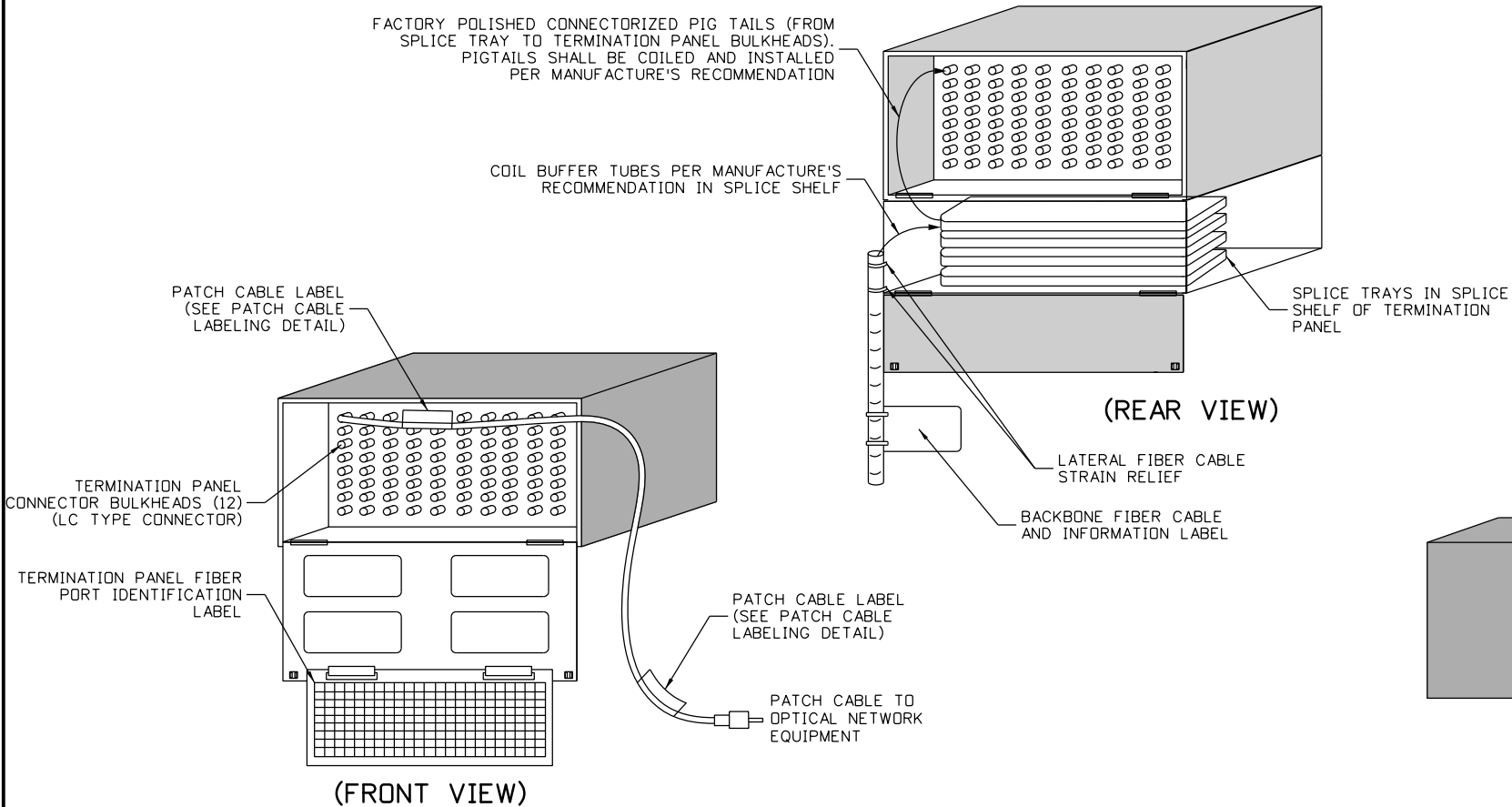
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Date:	Comments	Init.



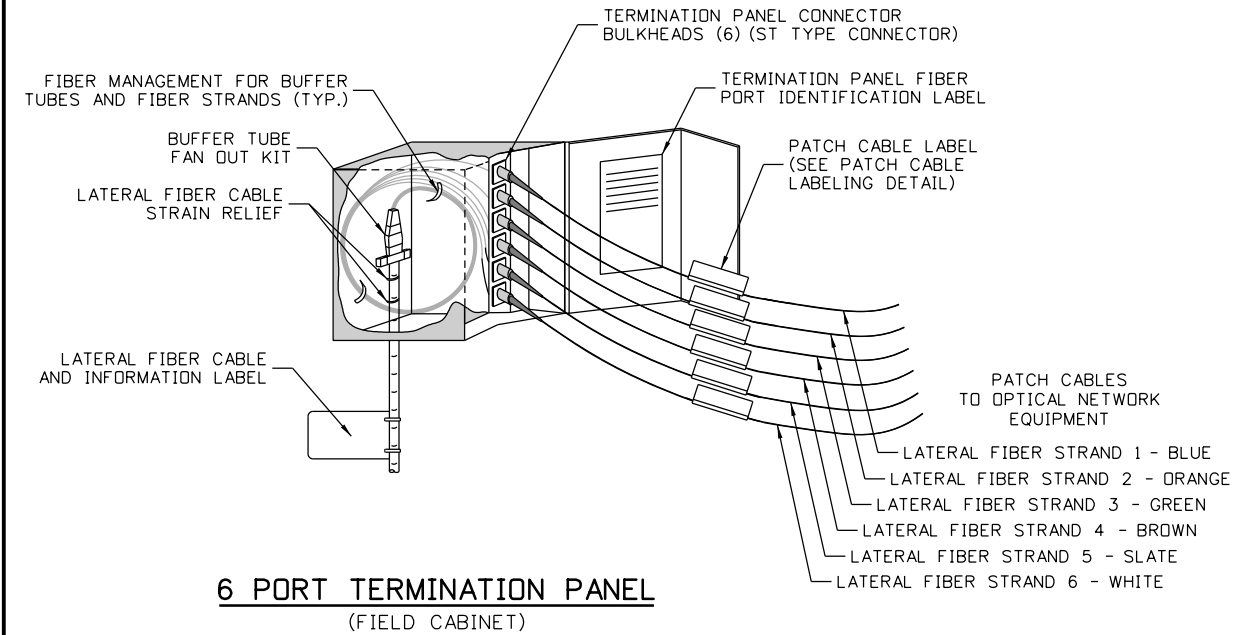
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As Constructed	LOCATION MARKERS ITS DETAIL			Project No./Code
No Revisions:				21-37
Revised:	Designer: B. WALDMAN	Structure Numbers		
	Detailer: D. MURIE			
Void:	Sheet Subset: DETAILS	Subset Sheets: 5 of 7		Sheet Number 38

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96 PORT OR LARGER TERMINATION PANEL
(TRAFFIC MANAGEMENT SYSTEM BUILDING)



NOTES:

1. WHEN A BACKBONE FIBER OPTIC CABLE IS BEING TERMINATED IN A NETWORK BUILDING TERMINATION PANEL, BUFFER TUBES SHALL BE SPLICED IN SPLICE TRAYS TO FACTORY POLISHED CONNECTORIZED PIG TAILS. NETWORK BUILDING TERMINATION PANEL SHALL HAVE A SPLICE SHELF WITH ADEQUATE STORAGE FOR BUFFER TUBE COILS AND SPLICE TRAYS.
2. THE CONTRACTOR SHALL PROVIDE SUFFICIENT FIBER OPTIC STRAND SLACK IN TERMINATION PANELS SO THE CONNECTOR BULKHEADS CAN BE REMOVED 6-8 INCHES FROM THE FRONT SIDE OF THE TERMINATION PANEL FOR FUTURE SERVICE AND MAINTENANCE.
3. PATCH CABLES USED TO CONNECT FROM A TERMINATION PANEL TO OPTICAL NETWORK EQUIPMENT IN A TRAFFIC MANAGEMENT SYSTEM BUILDING OR A FIELD CABINET SHALL HAVE AN INFORMATION LABEL ATTACHED TO BOTH ENDS.

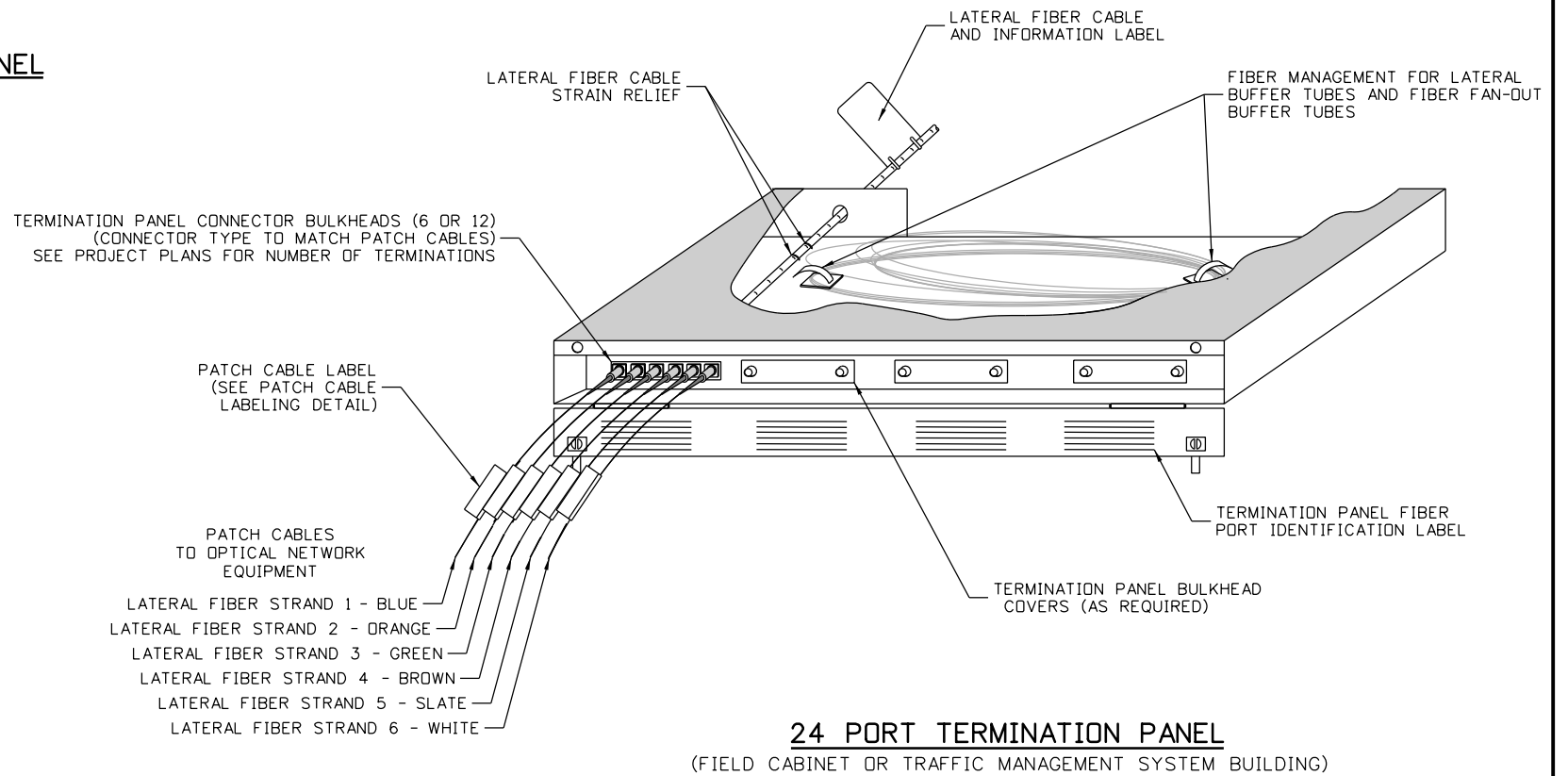
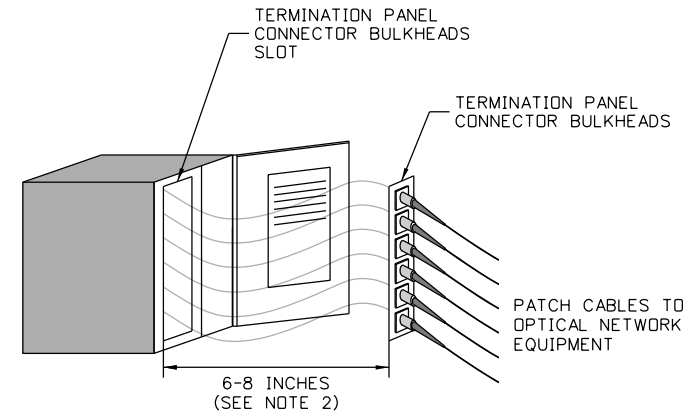
PATCH CABLE LABELING DETAIL

THE FOLLOWING INFORMATION SHALL BE SUPPLIED ON LABEL:

- TERMINATION PANEL PORT
- OPTICAL NETWORK EQUIPMENT PORT
- OPTICAL WAVELENGTH
- LOCATION AND DEVICES
- DATA DIRECTION AND NETWORK NODE BUILDING

EXAMPLE LABEL:

TERMINATION PANEL PORT 1-2
CIENA 3930 PORT 9
1450NM
I-25 MM71 - NB VMS AND CCTV
NB - 29TH STREET NODE



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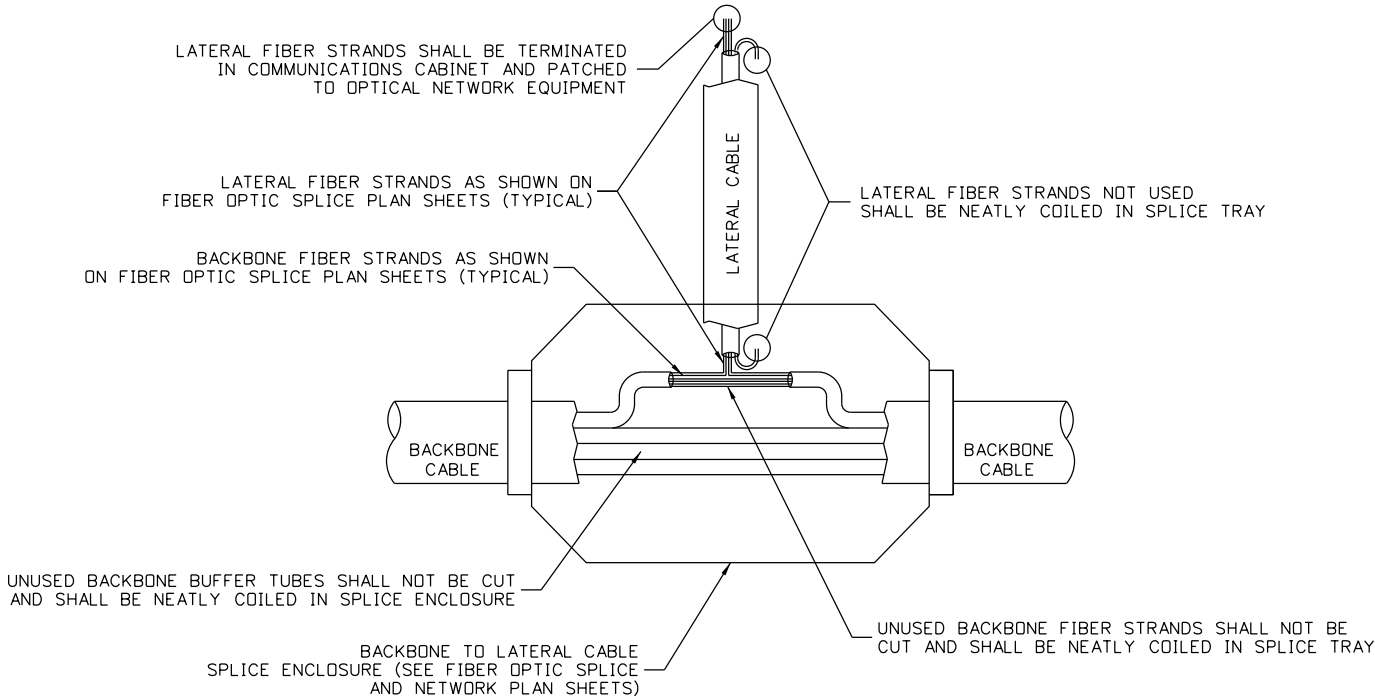
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As Constructed	TERMINATION PANEL ITS DETAIL			Project No./Code
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Revised:	Designer: B. WALDMAN	Structure Numbers		
Void:	Detailer: D. MURIE	Subset Sheets: 6 of 7		
	Sheet Subset: DETAILS			Sheet Number 39

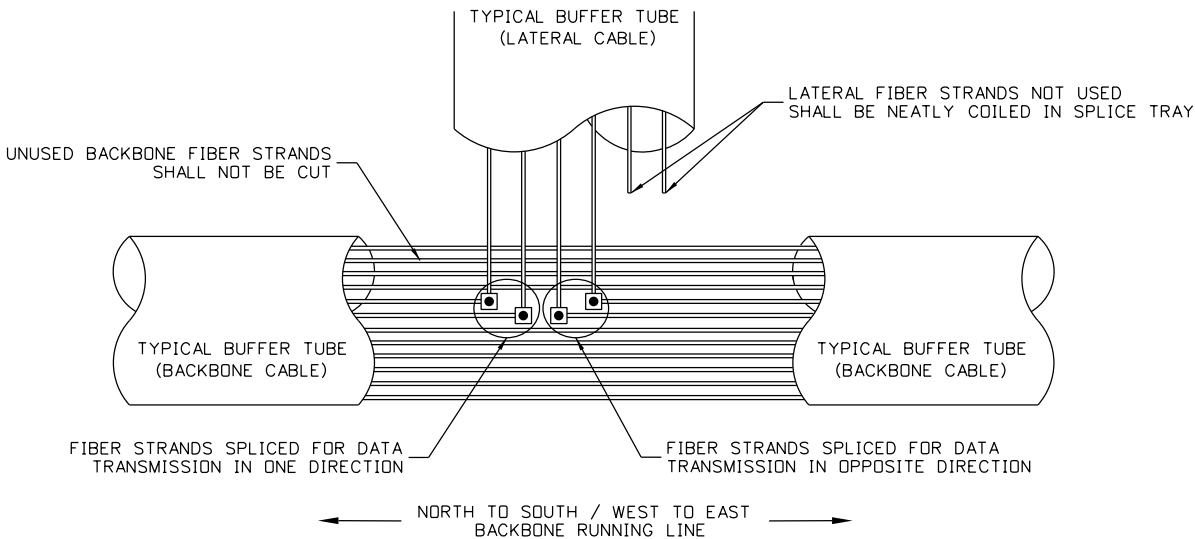
NOTES:

1. WHERE NOTED IN THE PLANS, FIBER OPTIC CABLE SHALL BE SPLICED IN THE MANNER SHOWN. ADDITIONAL SPLICING WILL NOT BE ALLOWED UNLESS APPROVED BY THE PROJECT ENGINEER. IN NO CASE SHALL SPLICING CAUSE THE TOTAL OPTICAL SIGNAL TO EXCEED THE POWER BUDGET SPECIFIED BY THE NETWORK EQUIPMENT SPECIFICATION AND PROJECT SPECIFICATION.
2. FIBER OPTIC CABLE SPLICES SHALL BE PLACED AND SEALED IN A WEATHERPROOF FIBER OPTIC SPLICE CLOSURE.
3. ONLY THE FIBER OPTIC BUFFER TUBES AND FIBER OPTIC STRANDS PROPOSED FOR SPLICING SHALL BE CUT AND ACCESSED FROM FIBER OPTIC CABLE. ALL OTHER FIBER OPTIC BUFFER TUBES SHALL REMAIN UNCUT AND SHALL BE NEATLY COILED IN SPLICE CLOSURE. ALL BARE FIBER STRANDS FROM THE PROPOSED FIBER OPTIC BUFFER TUBE SHALL BE NEATLY COILED IN THE SPLICE TRAY.
4. THE CONTRACTOR SHALL VERIFY DATA DIRECTIONS AT EACH SPLICE LOCATION AS IT PERTAINS TO THE OPERATION OF THE OPTICAL NETWORK EQUIPMENT PRIOR TO SPLICING.
5. THE FUSION SPLICING METHOD SHALL BE THE ONLY ACCEPTABLE METHOD FOR SPLICING FIBER OPTIC STRANDS. AFTER THE FUSION SPLICING OF THE BACKBONE TO LATERAL CABLES ARE COMPLETE THEY SHALL BE PROTECTED BY FIBER OPTIC HEAT-SHRINKING SLEEVES AND INSERTED INTO THE SPLICE CHIPS SECURED TO THE SPLICE TRAY.
6. THE CONTRACTOR SHALL LABEL SPLICE TRAY IN THE BACKBONE TO LATERAL CABLE SPLICE CLOSURE WITH THE FOLLOWING INFORMATION:
 - BACKBONE BUFFER TUBE AND DIRECTION
 - LATERAL BUFFER TUBE AND DIRECTION
 - FOR SPLICES, LABEL BOTH THE BACKBONE FIBER STRANDS AND THE LATERAL FIBER STRANDS



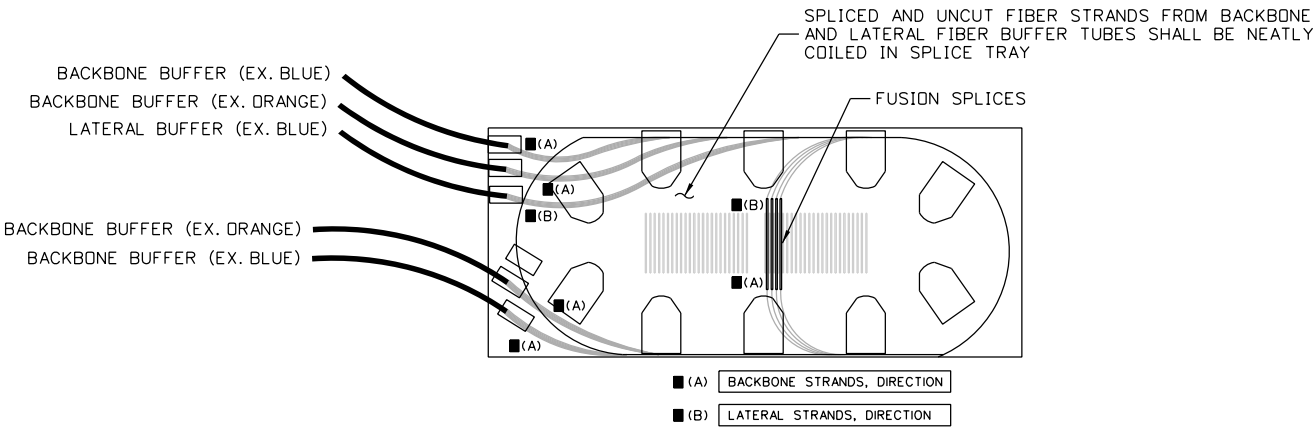
BACKBONE TO LATERAL CABLE SPLICING DETAIL

SCHEMATIC DETAIL ONLY




SPLICING DATA DIRECTION DETAIL

BUS NETWORK TOPOLOGY (DROP AND REPEAT/DAISY CHAIN)



BACKBONE TO LATERAL SPLICE TRAY LABELING DETAIL

DGN MODEL: Model david.murie 4:56:22 PM \\den-fier01.consor.local\den-files\server3\Network\Projects\p200420 - Littleton Fiber Design\TD 4 Littleton Fiber Design\TD 4 Cable Splice Non-CWDM.dgn

Print Date: 11/15/2024		
File Name: 200420_DET07_FD Cable Splice Non-CWDM.dgn		
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No Revisions:				21-37
Revised:	Designer: B. WALDMAN	Structure Numbers		
Void:	Detailer: D. MURIE			
	Sheet Subset: DETAILS	Subset Sheets: 7 of 7		Sheet Number 40

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A DIVISION OF USIC

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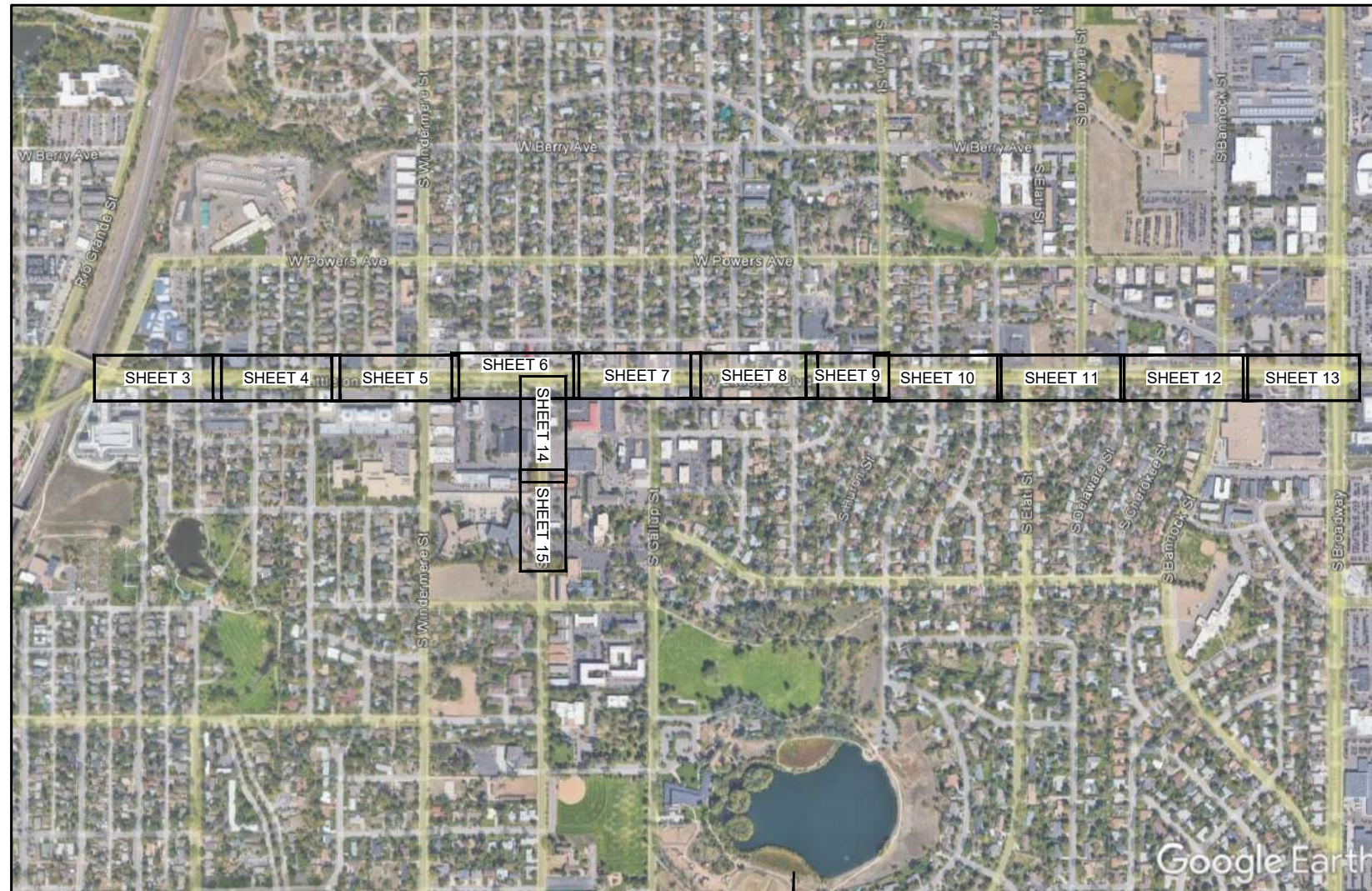


Project Information

WEST LITTLETON BLVD COMM UPGRADE
W LITTLETON BLVD
LITTLETON, CO

Start Date	2/7/25
Work Order#	----
Drawn By:	CRG

SHEET #	1
SHEET TITLE	COVER PAGE



VICINITY MAP
SCALE: N.T.S.



VICINITY MAP
SCALE: N.T.S.



1	COVER PAGE
2	LEGEND
3-16	UTILITY PLAN
17	EXISTING UTILITY QUALITY LEVEL DEFINITIONS

CLIENT SHALL SAVE AND HOLD HARMLESS USIC, INC., ITS OFFICERS, AGENTS, AND EMPLOYEES AGAINST ALL LIABILITY INCLUDING DAMAGES, FINES, PENALTIES, DAMAGE TO PROPERTY OR INJURY OR DEATH OF ANY PERSON OR PERSONS ARISING OUT OF OR IN ANY WAY CONNECTED WITH, OR RESULTING FROM THE WORK TO BE PERFORMED HEREUNDER, INCLUDING BUT NOT LIMITED TO SUCH LIABILITY ARISING OUT OF, OR IN ANY WAY CONNECTED WITH, OR RESULTING FROM THE ACTS, NON-ACTS, NEGLIGENCE OR ALLEGED NEGLIGENCE OF USIC, INC., ITS OFFICERS, AGENTS, AND EMPLOYEES IN CONNECTION WITH THE WORK, HEREUNDER PROVIDED, HOWEVER THAT LIABILITY ARISING OUT OF THE SOLE AND EXCLUSIVE ACTS OF NEGLIGENCE OF USIC, INC., ITS OFFICERS, AGENTS, AND EMPLOYEES SHALL BE THE RESPONSIBILITY OF USIC, INC., SAID INDEMNIFICATION SHALL BE INCLUSIVE OF ALL COSTS AND ATTORNEYS' FEES AND/OR ANY JUDGMENT OR SETTLEMENT, RESULTING FROM EITHER CLAIM OR LITIGATION PURSUED AGAINST USIC, INC., ARISING OUT OF THIS AGREEMENT.

	PROPOSED BORE PATH
	PROPOSED TRENCH
	RIGHT OF WAY
	NATURAL GAS LINE, (BY XCEL U.N.O.) (QUALITY LEVEL B)
	NATURAL GAS LINE, (BY XCEL U.N.O.) (QUALITY LEVEL C OR D)
	PETROLEUM PIPELINE (QUALITY LEVEL B)
	PETROLEUM PIPELINE (QUALITY LEVEL C OR D)
	UNDERGROUND ELECTRIC LINE (BY XCEL U.N.O.) (QUALITY LEVEL B)
	UNDERGROUND ELECTRIC LINE (BY XCEL U.N.O.) (QUALITY LEVEL C OR D)
	OVERHEAD ELECTRIC LINE (BY XCEL U.N.O.) (QUALITY LEVEL B)
	TELEPHONE LINE (BY CENTURYLINK U.N.O.) (QUALITY LEVEL B)
	TELEPHONE LINE (BY CENTURYLINK U.N.O.) (QUALITY LEVEL C OR D)
	TELEPHONE FIBER LINE (BY CENTURYLINK U.N.O.) (QUALITY LEVEL B)
	TELEPHONE FIBER LINE (BY CENTURYLINK U.N.O.) (QUALITY LEVEL C OR D)
	TELEPHONE DUCT (BY CENTURYLINK U.N.O.) (QUALITY LEVEL B)
	TELEPHONE DUCT (BY CENTURYLINK U.N.O.) (QUALITY LEVEL C OR D)
	CABLE TV FIBER LINE (BY COMCAST U.N.O.) (QUALITY LEVEL B)
	CABLE TV FIBER LINE(BY COMCAST U.N.O.) (QUALITY LEVEL C OR D)
	CABLE TV LINE (BY COMCAST U.N.O.) (QUALITY LEVEL B)
	CABLE TV LINE (BY COMCAST U.N.O.). (QUALITY LEVEL C OR D)
	FIBER OPTIC LINE (QUALITY LEVEL B)
	FIBER OPTIC LINE (QUALITY LEVEL C OR D)
	TRAFFIC ELECTRIC LINE (BY CDOT, U.N.O.) (QUALITY LEVEL B)
	TRAFFIC ELECTRIC LINE (BY CDOT, U.N.O.) (QUALITY LEVEL C OR D)
	WATER LINE (CITY OF DENVER, U.N.O.) (QUALITY LEVEL B)
	WATER LINE (CITY OF DENVER, U.N.O.) (QUALITY LEVEL C OR D)
	SANITARY SEWER LINE (CITY OF DENVER, U.N.O.) (QUALITY LEVEL B)
	SANITARY SEWER LINE (CITY OF DENVER, U.N.O.) (QUALITY LEVEL C OR D)
	STORM SEWER LINE (CITY OF DENVER, U.N.O.) (QUALITY LEVEL B)
	STORM SEWER LINE (CITY OF DENVER, U.N.O.) (QUALITY LEVEL C OR D)
	IRRIGATION LINE (QUALITY LEVEL B)
	IRRIGATION LINE (QUALITY LEVEL C OR D)
	MISCELLANEOUS CONDUIT (QUALITY LEVEL B)
	FENCE LINE (QUALITY LEVEL B)

LEGEND:

	ELECTRIC MANHOLE
	ELECTRIC VAULT
	ELECTRIC PEDESTAL
	ELECTRIC HANDHOLE
	ELECTRIC TRANSFORMER
	ELECTRIC SWITCH CABINET
	GAS VALVE
	RISER POLE
	STREET LIGHT
	UTILITY POLE
	TELEPHONE MANHOLE
	TELEPHONE HANDHOLE
	TELEPHONE PEDESTAL
	TELEPHONE CROSS-BOX
	CATV HANDHOLE
	CATV PEDESTAL

	FIBER OPTIC MANHOLE
	FIBER OPTIC HANDHOLE
	TRAFFIC HANDHOLE
	TRAFFIC PEDESTAL
	TRAFFIC LIGHT
	FIRE HYDRANT
	WATER VALVE
	WATER METER
	WATER VENT
	WATER MANHOLE
	SANITARY SEWER MANHOLE
	STORM SEWER MANHOLE
	STORM SEWER INLET
	BORE PIT
	END OF MAIN

ABBREVIATIONS:

EOP	EDGE OF PAVEMENT
F/L	FLOW LINE
BOC	BACK OF CURB
BOW	BACK OF WALK
S/L	STREET LIGHT
F/O	FIBER OPTIC
MW	MILL WRAP
AL	ALUMINUM
CU	COPPER
CLN	CENTURYLINK LOCAL NETWORK
H2O	WATER
MH	MANHOLE
SS	SANITARY SEWER
STM	STORM SEWER
TELE	TELEPHONE
EOM	END OF MAIN
TYP	TYPICAL
U.N.O.	UNLESS NOTED OTHERWISE
RE:	REFER TO



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WEST LITTLETON BLVD COMM UPGRADE
W LITTLETON BLVD
LITTLETON, CO

Start Date	2/7/25
Work Order#	----
Drawn By:	CRG

SHEET TITLE	LEGEND
-------------	--------

SHEET #	2
---------	---

KEYED NOTES

- 1 30" WATER
- 2 8" WATER
- 3 12" WATER
- 4 24" STORM SEWER
- 5 8" SANITARY SEWER
- 6 6" NATURAL GAS
- 7 4" NATURAL GAS
- 8 NEW TRAFFIC HANDHOLE



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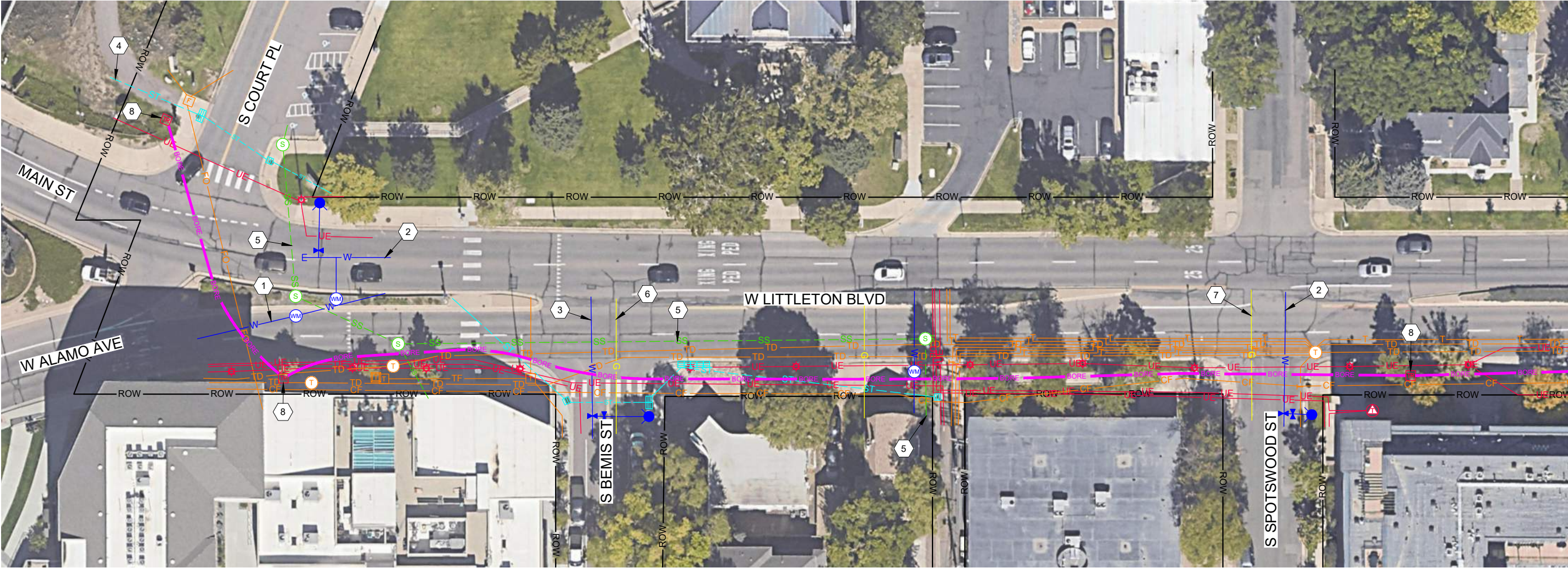
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Work Order#
Drawn By: CRG

SHEET TITLE

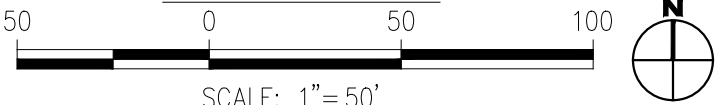
UTILITY
PLAN

SHEET #

3



UTILITY PLAN



SCALE: 1"=50'
Page 171 of 185

KEYED NOTES

- 1 6" WATER
- 2 21" STORM SEWER
- 3 18" STORM SEWER
- 4 8" SANITARY SEWER
- 5 4" PLASTIC NATURAL GAS
- 6 NEW TRAFFIC HANDHOLE
- 7 EXISTING LITTLETON FIBER MANHOLE



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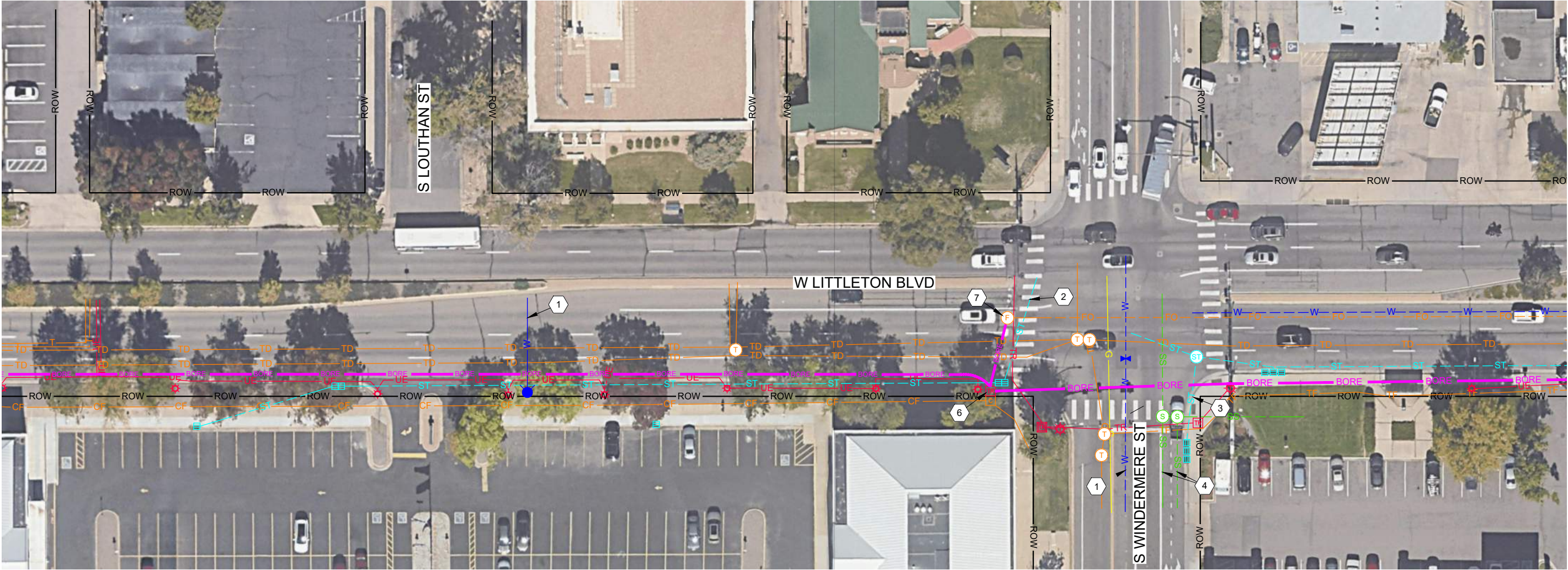
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Project Information

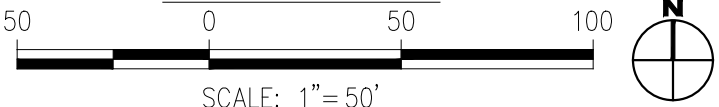
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Start Date 2/7/25
Work Order#
Drawn By: CRG

SHEET TITLE	UTILITY PLAN
SHEET #	5



UTILITY PLAN



SCALE: 1"=50'
Page 173 of 185

KEYED NOTES

- 1 30" WATER
- 2 16" WATER
- 3 24" STORM SEWER
- 4 5" NATURAL GAS
- 5 2" NATURAL GAS
- 6 NEW TRAFFIC HANDHOLE
- 7 6" WATER
- 8 8" WATER
- 9 48" STORM SEWER
- 10 NATURAL GAS (UNKNOWN SIZE OR MATERIAL)



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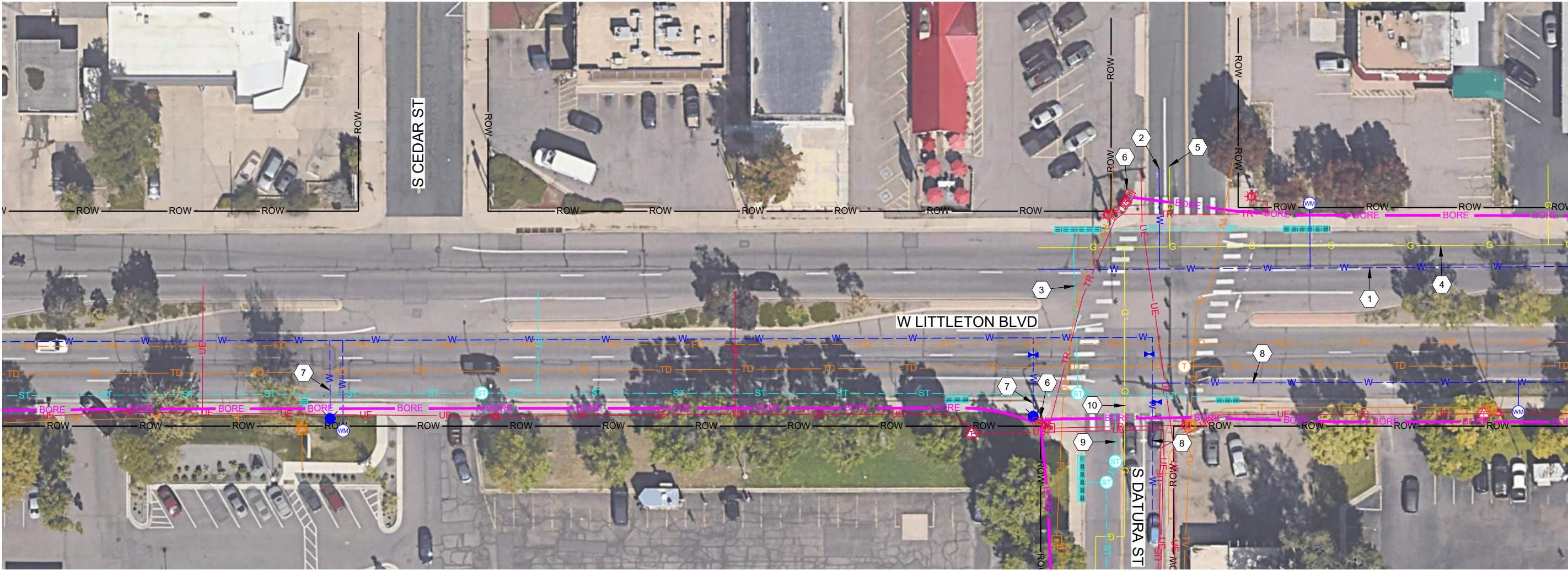
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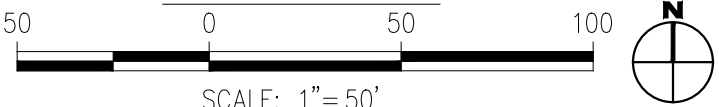
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LITTLETON, CO

Start Date 2/7/25
Work Order#
Drawn By: CRG

SHEET TITLE
UTILITY PLAN
SHEET #
6



UTILITY PLAN



SCALE: 1"=50'
Page 174 of 185

KEYED NOTES

- 1 30" WATER
- 2 5" NATURAL GAS
- 3 NEW TRAFFIC HANDHOLE
- 4 EXISTING LITTLETON FIBER MANHOLE
- 5 6" WATER
- 6 12" WATER
- 7 4" STEEL NATURAL GAS



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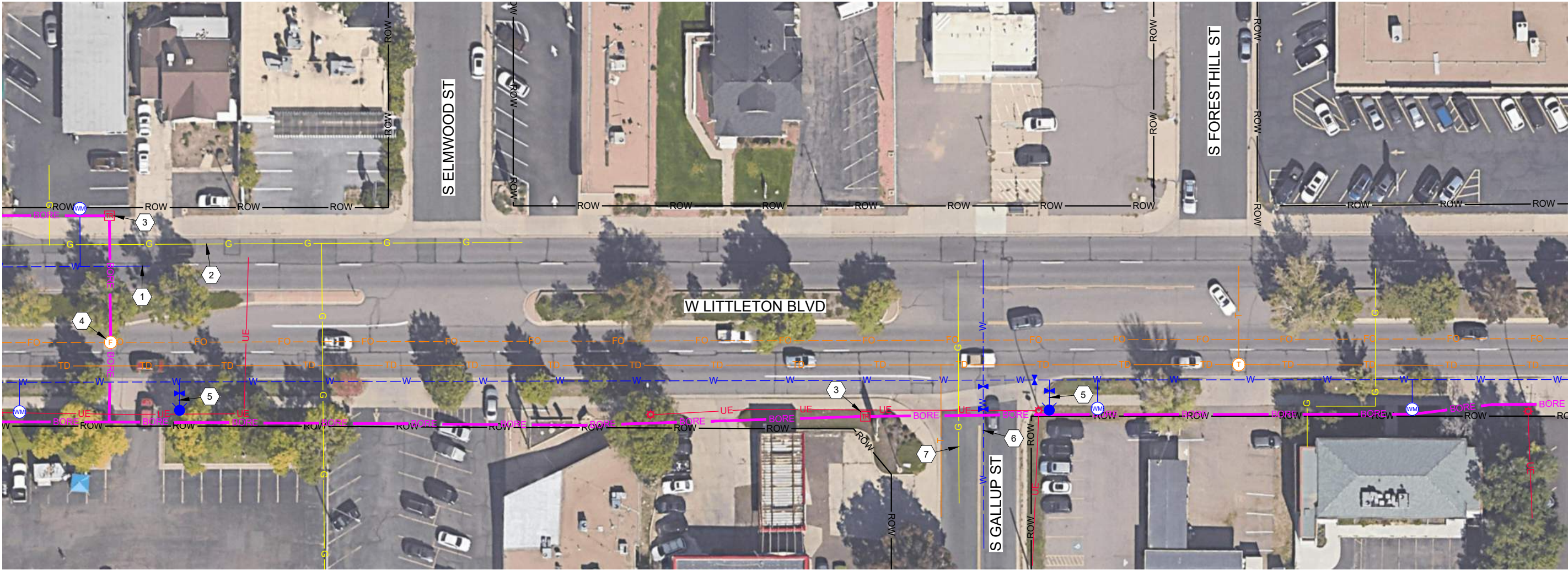
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Work Order#
Drawn By: CRG

SHEET TITLE

UTILITY
PLAN

SHEET #

7



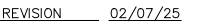
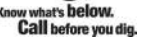
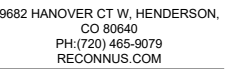
UTILITY PLAN



SCALE: 1"=50'
Page 175 of 185



1	EXISTING LITTLETON FIBER MANHOLE
2	NEW TRAFFIC HANDHOLE
3	WATER (SIZE UNKNOWN)
4	6" WATER
5	2" STEEL NATURAL GAS

[illegible]

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Start Date 2/7/25

Work Order# ----

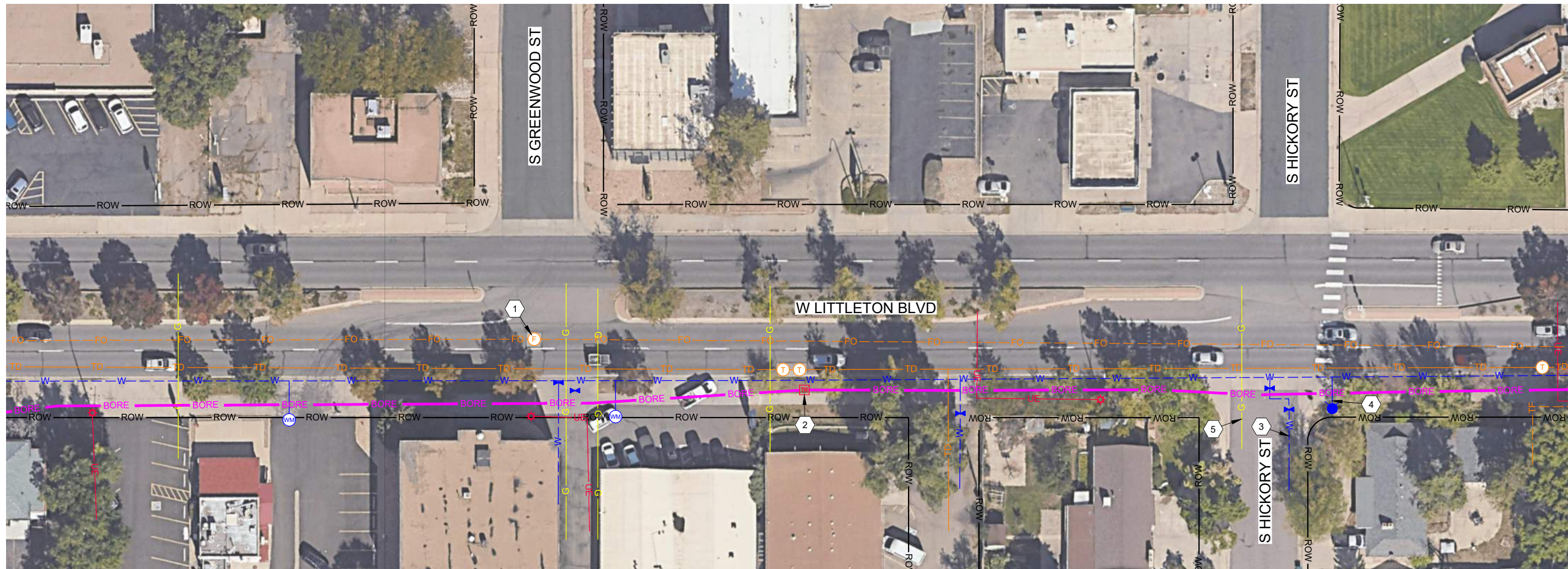
Drawn By: CRG

SHEET TITLE |

UTILITY PLAN

SHEET #

8



SCALE: 1"=50'

Contract ID 3208

KEYED NOTES

- 1 8" WATER
- 2 2" NATURAL GAS
- 3 NEW TRAFFIC HANDHOLE
- 4 EXISTING LITTLETON FIBER MANHOLE
- 5 WATER (SIZE UNKNOWN)
- 6 6" WATER



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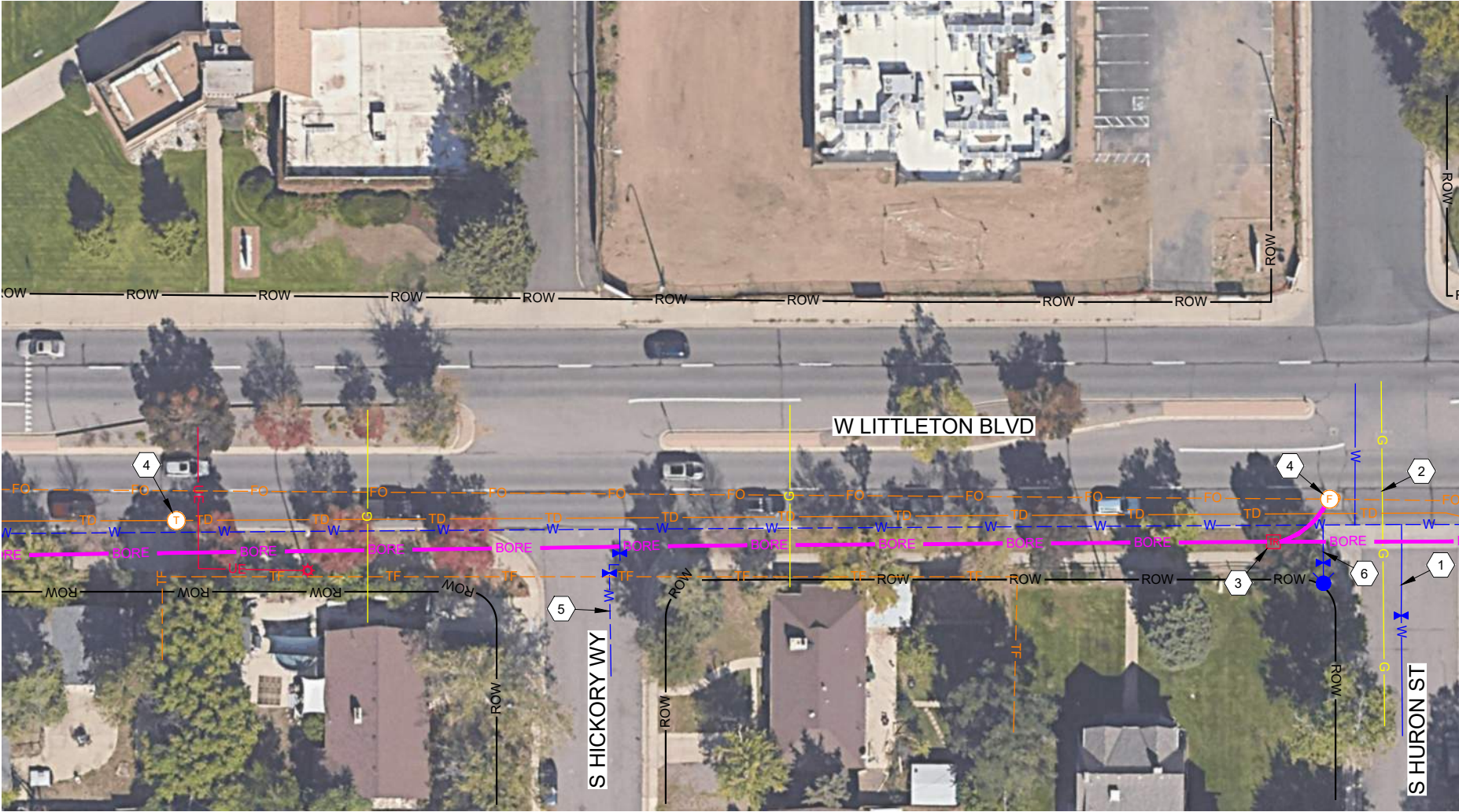
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Work Order# ---
Drawn By: CRG

SHEET TITLE

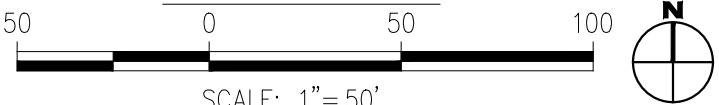
UTILITY
PLAN

SHEET #

9



UTILITY PLAN



SCALE: 1"=50'
Page 177 of 185

KEYED NOTES

- 1 8" WATER
- 2 8" SANITARY SEWER
- 3 2" NATURAL GAS
- 4 NEW TRAFFIC HANDHOLE
- 5 EXISTING LITTLETON FIBER MANHOLE
- 6 6" WATER



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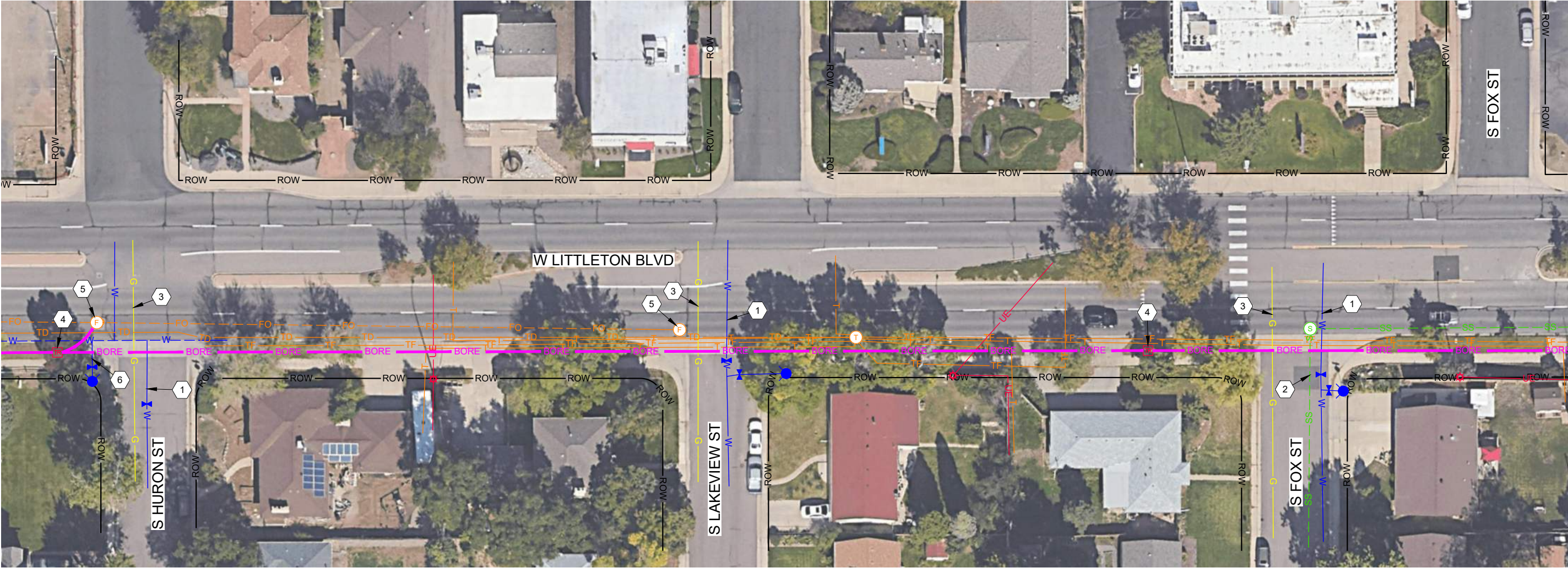
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Work Order#
Drawn By: CRG

SHEET TITLE

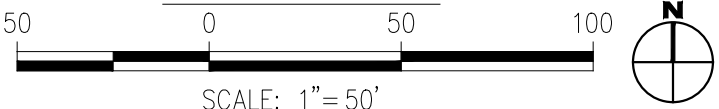
UTILITY
PLAN

SHEET #

10



UTILITY PLAN



SCALE: 1"=50'
Page 178 of 185

KEYED NOTES

- 1 8" WATER
- 2 8" SANITARY SEWER
- 3 2" NATURAL GAS
- 4 NEW TRAFFIC HANDHOLE
- 5 EMPTY FIBER MANHOLE



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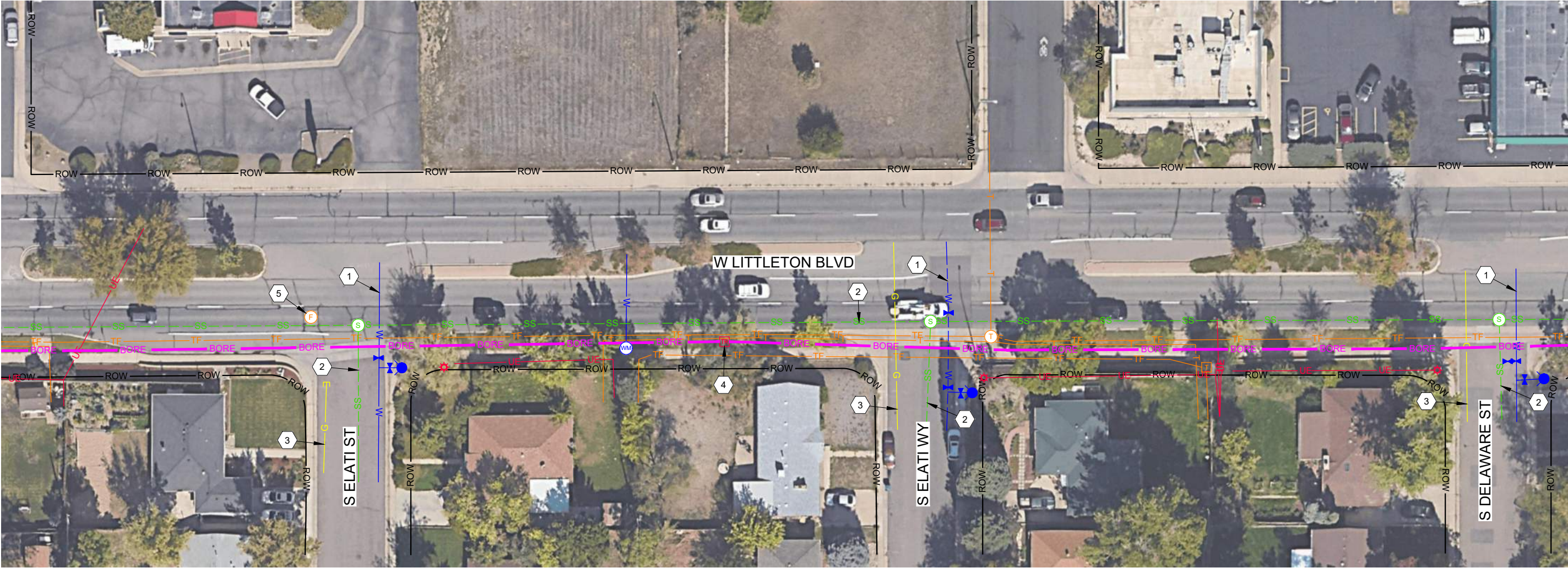
ISSUE /DATE	

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WEST LITTLETON BLVD COMM UPGRADE
W LITTLETON BLVD
LITTLETON, CO

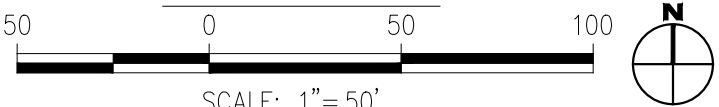
Start Date 2/7/25
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SHEET TITLE
UTILITY PLAN

SHEET #
11



UTILITY PLAN



SCALE: 1"=50'
Page 179 of 185

KEYED NOTES

- 1 8" WATER
- 2 8" SANITARY SEWER
- 3 24" STORM SEWER
- 4 48" STORM SEWER
- 5 2" NATURAL GAS
- 6 NEW TRAFFIC HANDHOLE
- 7 EMPTY FIBER MANHOLE



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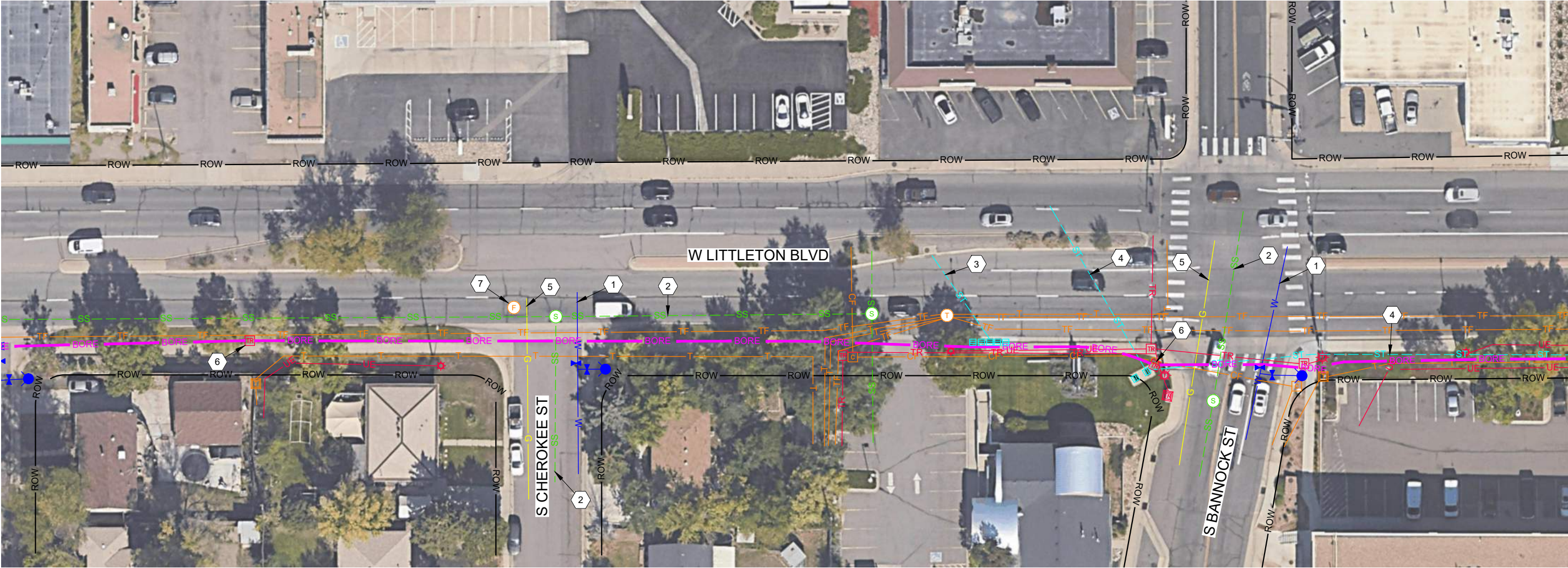
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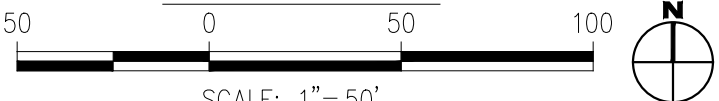
Start Date 2/7/25
Work Order#
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SHEET TITLE
UTILITY PLAN

SHEET #
12



UTILITY PLAN



SCALE: 1"=50'
Page 180 of 185

KEYED NOTES

- 1 16" WATER
- 2 8" SANITARY SEWER
- 3 24" STORM SEWER
- 4 12" STORM SEWER
- 5 8" NATURAL GAS
- 6 4" NATURAL GAS
- 7 NEW TRAFFIC HANDHOLE
- 8 EXISTING TRAFFIC HANDHOLE



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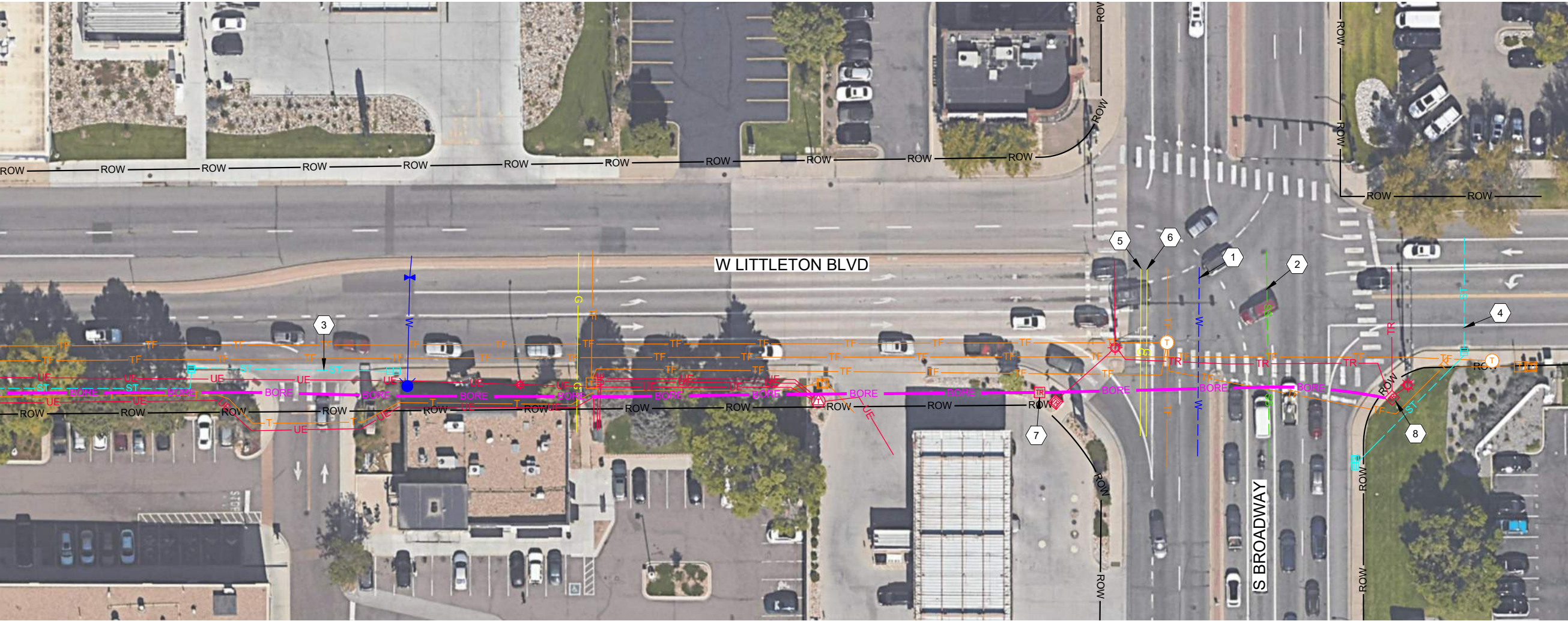
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Work Order#
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SHEET TITLE

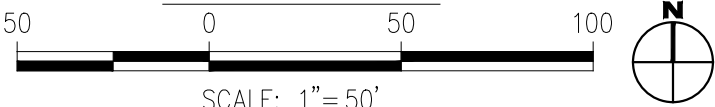
UTILITY
PLAN

SHEET #

13



UTILITY PLAN



SCALE: 1"=50'
Page 181 of 185

KEYED NOTES

- 1 NEW TRAFFIC HANDHOLE
- 2 MCI FIBER
- 3 NATURAL GAS (UNKNOWN SIZE OR MATERIAL)
- 4 10" SANITARY SEWER
- 5 21" STORM SEWER



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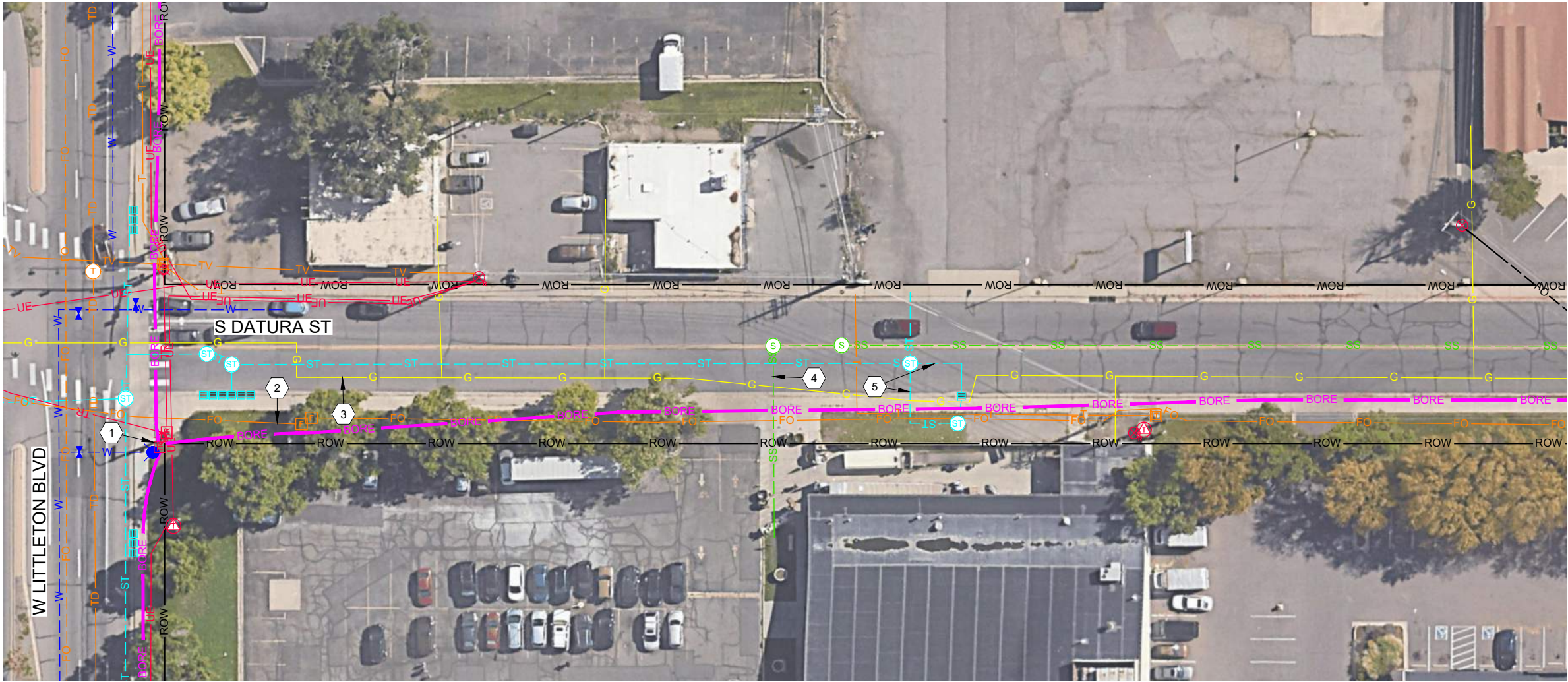
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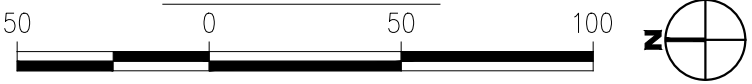
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SHEET TITLE	UTILITY PLAN
SHEET #	14



UTILITY PLAN



SCALE: 1"= 50'
Page 182 of 185

KEYED NOTES

- 1 CITY OF LITTLETON FIBER (AERIAL)
- 2 CITY OF LITTLETON FIBER
- 3 ZAYO FIBER HANDHOLE (ZAYO IN THE AREA)
- 4 8" SANITARY SEWER
- 5 8" WATER



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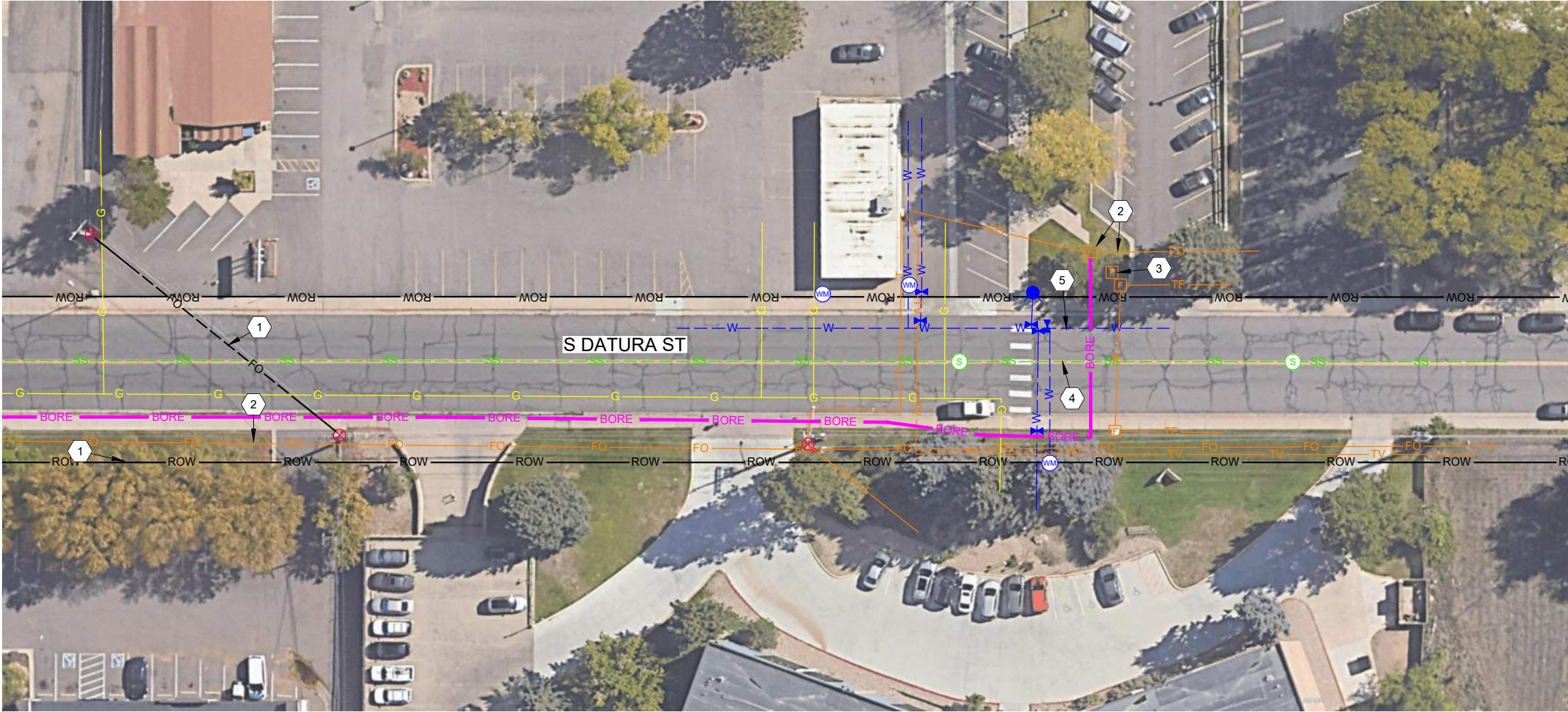
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SHEET TITLE

UTILITY
PLAN

SHEET #

15



UTILITY PLAN



SCALE: 1"=50'
Page 183 of 185



KEYED NOTES

- 1 16" WATER
- 2 30" STORM SEWER
- 3 36" STORM SEWER
- 4 4" NATURAL GAS
- 5 EMPTY MCI HANDHOLE
- 6 NEW TRAFFIC HANDHOLE
- 7 ABANDONED FUSION BOND NATURAL GAS IN THE AREA
- 8 EMPTY MCI CONDUIT (NO TRACER WIRE)
- 9 MCI FIBER



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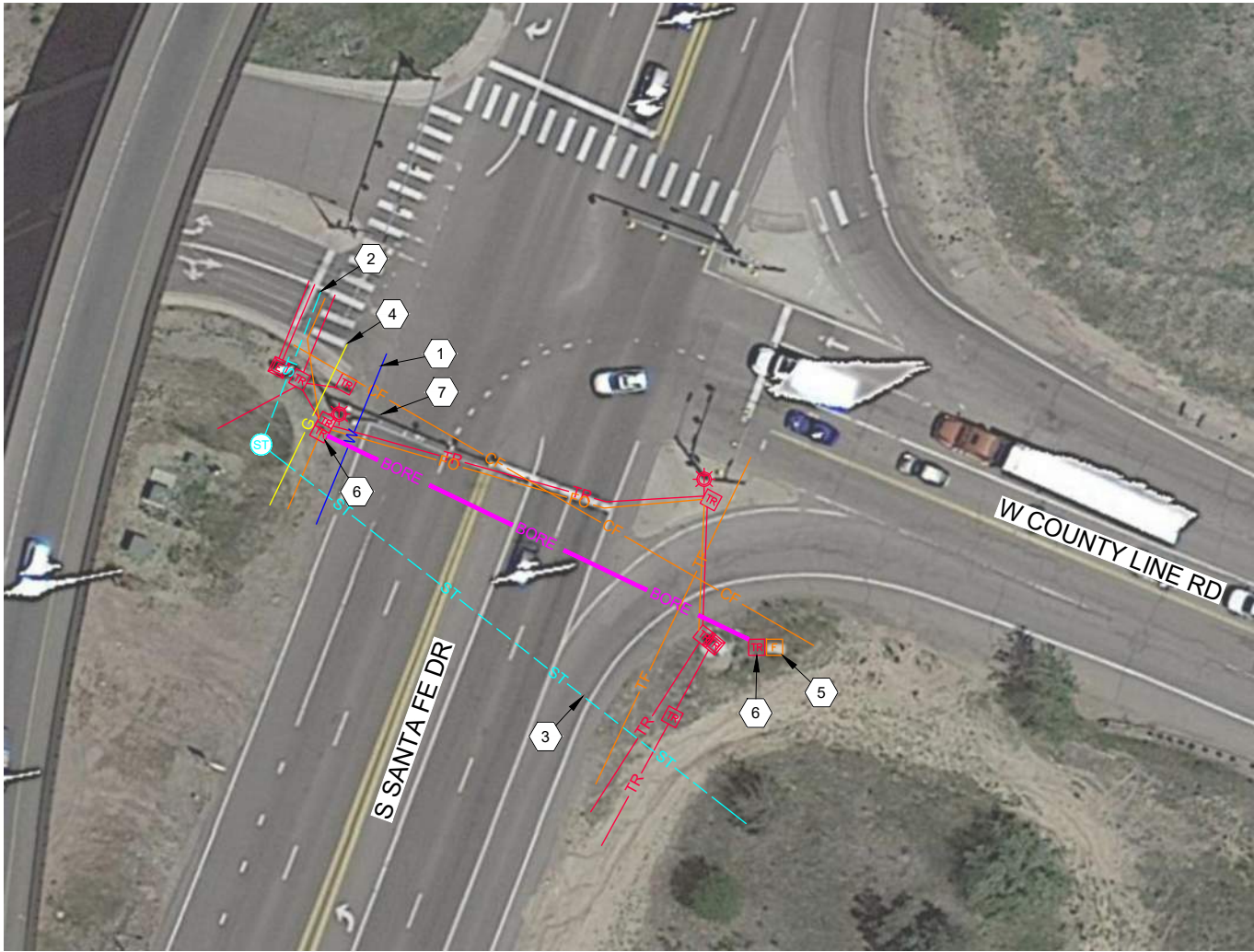
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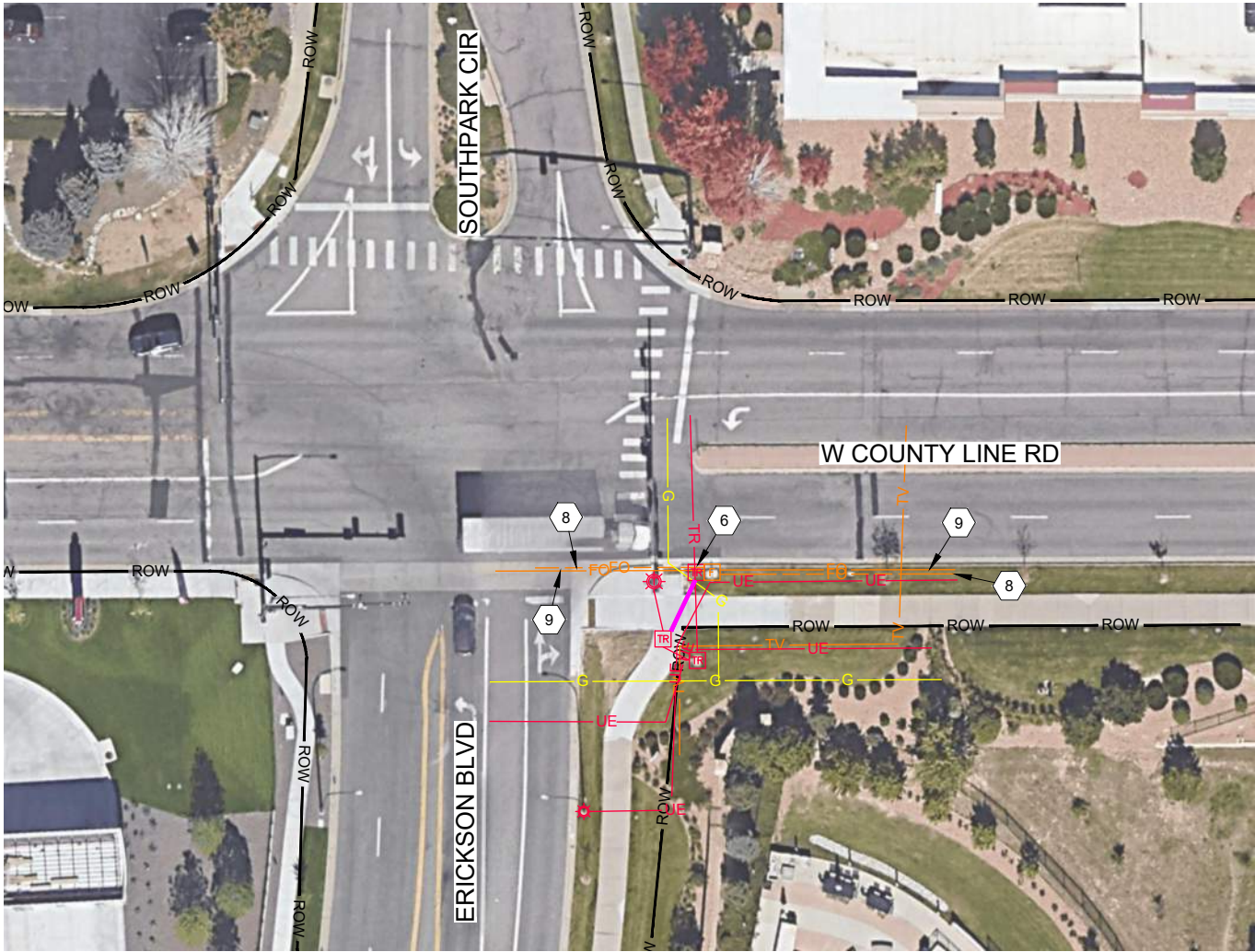
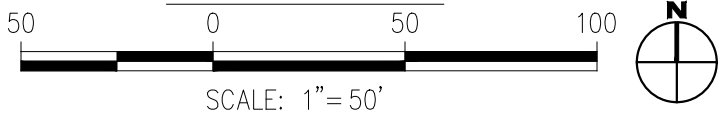
Start Date 2/7/25
Work Order#
Drawn By: CRG

SHEET TITLE
UTILITY PLAN

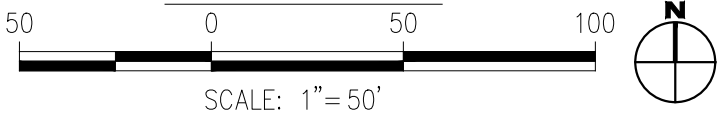
SHEET #
16



UTILITY PLAN



UTILITY PLAN



ASCE-38 EXISTING UTILITY QUALITY LEVEL DEFINITIONS



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Work Order#
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EXISTING UTILITY
QUALITY LEVEL
DEFINITIONS

SHEET #

17

Quality Level D ("QL D") information comes solely from existing utility records. It may provide an overall "feel" for the congestion of utilities, but it is often highly limited in terms of comprehensiveness and accuracy. Its usefulness may be limited to early design stage (project planning and route selection) activities or to projects with minimal planned excavations.

Quality Level C ("QL C") involves surveying visible above-ground utility facilities, such as manholes, valve boxes, posts, etc., and correlating this information with existing utility records (i.e., QL D data). When using this information, it is not unusual to find underground utilities that have been either omitted or erroneously plotted. QL C information may not, however, eliminate all inaccuracies; nor will it reveal an unrecorded line that has no surface features. Therefore, its usefulness may be limited to preliminary design reviews or to projects with minimal anticipated conflicts.

Quality Level B ("QL B") involves the use of surface geophysical techniques to determine the existence and horizontal position of underground utilities. This activity is called "designating". It further correlates utility records and surface topographical information, and may also help reveal unrecorded lines. Two-dimensional mapping information is obtained. This information may be sufficient to accomplish preliminary engineering goals, by helping the designer to determine where to place storm drainage systems, footers, foundations, and other design features in order to avoid conflicts with existing utilities. Slight adjustments in the design may produce substantial cost savings by eliminating utility relocations.

Quality Level A ("QL A ") involves the use of nondestructive digging equipment at discrete, critical points to determine the precise horizontal and vertical position of underground utilities, as well as the type, size, condition, material, and other characteristics. This activity is called "locating." It is the highest quality level presently available. This information, when combined with other surveyed and mapped information, allows the designer to infer plan and profile information, for use in making final design decisions. By knowing exactly where a utility is positioned in three dimensions, the designer can accurately determine the extent of a utility conflict, or can often make small adjustments in elevations or horizontal locations and avoid the need to relocate utilities. Additional information such as utility material, condition, size, soil contamination, and paving thickness also assists the designer and utility owner in their decisions. QL A information (in the form of test hole logs), when included in the project bid documents, may yield more favorable bids due to reduced contractor uncertainty about subsurface conditions.