

SPECIFICATIONS
AND
CONTRACT DOCUMENTS
FOR

**NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.9**

**CITY OF GALLUP, NEW MEXICO
Gallup Joint Utilities**

**FUNDED BY THE WATER TRUST BOARD THROUGH NEW MEXICO
FINANCE AUTHORITY, WPF #4338
AND
U.S. BUREAU OF RECLAMATION COOPERATIVE
AGREEMENT NO. R11AC40002**

Formal Bid No. 1903

Mayor: Jackie McKinney

CITY COUNCIL

Fran Palochak Linda Garcia
Alan Landavazo Yogash Kumar

January, 2019

Prepared By:

**DePAULI ENGINEERING AND SURVEYING, LLC
307 SOUTH 4th STREET
GALLUP, NM 87301**

Set No. _____



A handwritten signature in blue ink, appearing to read "Kurt A. Spolar", written over the bottom portion of the professional engineer seal.

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ADVERTISEMENT FOR BIDS

CITY OF GALLUP, NEW MEXICO

**NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.9**

**FUNDED BY THE WATER TRUST BOARD THROUGH
NEW MEXICO FINANCE AUTHORITY, WPF #4338 AND
U.S. BUREAU OF RECLAMATION COOPERATIVE
AGREEMENT NO. R11AC40002**

Formal Bid No. 1903

Notice is hereby given that the City of Gallup, New Mexico will receive sealed proposals for construction of NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.9 until the hour of 2:00 P.M., February 26, 2019 at the office of the Procurement Manager at City Hall, 110 West Aztec Avenue, Gallup, New Mexico. Bids will be opened, read and tabulated at that time. No bids will be received or considered if received after the time stated above.

The project consists of installing approximately 18,350 linear feet of 24" CL350 ductile iron waterline, 950 linear feet of 24" glass reinforced waterline, 3,260 linear feet of 16" CL 350 ductile iron waterline, 260 linear feet of 16" AWWA C905 CL235 DR18 PVC waterline, 250 linear foot jack and bore crossing of U.S. Highway 491 with a 16" carrier pipe in a 26" steel casing and a 95 linear foot jack bore installation on a through a steep slope with a 16" carrier pipe in a 26" steel casing. and tie-ins to existing waterline lines. Work will also include air release stations, valves, fittings, specials, trenching, backfilling, and compaction. Asphalt, gravel road surfacing and fencing removal and replacement will be required.

This project is located north of Gallup, New Mexico. The 24" waterline begins at the intersection of Morello Ave and Kachina Street, runs north along Kachina Street to Coal Basin Road, continues north along a projection of the west boundary of the Gamerco Townsite and ends just south of the Gamerco Reservoirs. The 16" waterline runs east west from 9th Street, across U.S. Highway 491 to the 24" waterline. Access to the undeveloped area is from south and north sides of the of the 24" waterline.

Plans, Specifications and Bidding Documents may be examined at the City of Gallup Water, and Wastewater Administrative Office located at 230 S. Second Street Gallup, New Mexico. You can also find more information on the project at www.gallupnm.gov/bids.

A Pre-Bid viewing for all plan holders to be held February 12, 2019 at 10:00 A.M. Attendees to assemble at DePauli Engineering at 307 S. 4th Street prior to leaving in caravan form to the sites.

Plans, Specifications and Bidding Documents may be obtained from Albuquerque Reprographics Inc., 4716 McLeod Rd. NE, Albuquerque, NM, 87109, (505) 884-0862, upon deposit of \$400.00, made payable to DePauli Engineering & Surveying, LLC, all of which will be refunded upon return of the documents within ten (10) days after bid opening.

/s/ Jackie McKinney

Mayor

Date

January 25, 2019

BIDDING REQUIREMENTS INFORMATION FOR BIDDERS

1. **LOCATION AND CHARACTER OF WORK:** The project consists of installing approximately 18,350 linear feet of 24" CL350 ductile iron waterline, 950 linear feet of 24" glass reinforced waterline, 3,260 linear feet of 16" CL 350 ductile iron waterline, 260 linear feet of 16" AWWA C905 CL235 DR18 PVC waterline, 250 linear foot jack and bore crossing of U.S. Highway 491 with a 16" carrier pipe in a 26" steel casing and a 95 linear foot jack bore installation on a through a steep slope with a 16" carrier pipe in a 26" steel casing. and tie-ins to existing waterline lines. Work will also include air release stations, valves, fittings, specials, trenching, backfilling, and compaction. Asphalt, gravel road surfacing and fencing removal and replacement will be required.

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2. **SUBMISSION OF PROPOSALS:** Formal bids must be submitted in a sealed envelope and shall not be opened and considered if they are not received by the purchasing department prior to the time specified for the bid opening. All sealed bids must be submitted on the documents original forms, or reasonable facsimile, furnished by the City of Gallup. All proposals must be signed by a responsible and authorized person for the bidding firm. Failure to do so may result in disqualification of their respective bid. Note that fax or electronically transmitted bids are not accepted by the City of Gallup as formal bids. Bids submitted after the bid opening date and time will not be considered and will be returned unopened. Bids will be opened in the purchasing department conference room.

Bids will be accepted until 2:00 pm local time on February 26, 2019 at the City of Gallup Purchasing Office; 110 West Aztec (87301); P.O. Box 1270; Gallup, New Mexico 87305.

Bidder shall utilize the formal bid number on their return mailing envelope or package. If sent by overnight method (Fed-Express, UPS Next Day Air etc.) Please note the formal bid number on carriers receipt. Failure to do so will not constitute a liability on the City if the bid is misplaced or lost.

3. **COPIES OF PLANS, SPECIFICATIONS, AND BIDDING DOCUMENTS:** Plans, Specifications and Bidding Documents may be viewed at the office of

DePauli Engineering and Surveying, LLC. 307 South 4th Street, Gallup, NM 87301, and The City of Gallup Water, and Wastewater Administrative Office at 230 South Second Street, Gallup, NM 87301. Plans, Specifications and Bidding Documents may be obtained from Albuquerque Reprographics, Inc., 4716 McLeod Rd, NE, Albuquerque, NM 87109, (505) 884-0862, upon deposit of \$400.00, made payable to DePauli Engineering & Surveying, LLC, all of which will be refunded upon return of the documents within ten (10) days after bid opening.

4. **INFORMATION:** If clarification is needed on any part of the Instructions to Bidders, contact the City of Gallup Purchasing Office: Frances Rodriguez; 505-863-1334. Questions regarding the plans specifications and scope of work should be directed to DePauli Engineering & Surveying, LLC at (505) 863-5440. Questions submitted less than 5 working days prior to bid opening, or after February 19, 2019 may not be addressed.
5. **SPECIFICATIONS:** Specifications, as included in this bid and the plans, are intended to indicate the requirements of the City of Gallup and give an accurate description of minimum standards acceptable. All items equal or equivalent to these requirements and standards will be considered, except where otherwise noted. All materials used and incorporated into this project shall be new unless otherwise agreed upon.
6. **PREFERENCES:** The City has no preference for any brand of equipment, kind of material or type of process and will consider all proposals for use of other materials or equipment, if they are, in fact, equal to that specified. The City will be the sole judge as to whether materials, equipment or process offered is, in fact, equal to that specified.
7. **EXAMINATION OF PROPOSED WORK:** Bidders must satisfy themselves, by personal investigation by any means they deem necessary or desirable, as to location of and conditions affecting proposed work and resulting costs thereof.
8. **PROJECT ERRORS:** Bidders will promptly notify the City of Gallup of any ambiguity, inconsistency or error they may discover upon examination of the project documents or the site and local conditions.
9. **TIME OF COMPLETION:** The Bidder must agree to commence work on a date to be specified in a written "Notice to Proceed" issued by the Engineer and to fully complete the project within one hundred eighty (180) calendar days thereafter, including weather delays.
10. **BIDDERS QUALIFICATIONS:** Bids will be considered only from firms who can provide evidence that they have established a satisfactory record of performance and integrity to insure they can execute the requirements as stated herein. The

City may make such investigation it deems necessary to determine the ability of the bidder to perform the work. Any determination as to competency shall be made by appropriate City staff.

Any proposal which is incomplete, irregular, or accompanied by an insufficient bond may be rejected. The City of Gallup also reserves the right to reject the proposal of a bidder who has previously failed to perform properly, including inferior materials, workmanship, or attempts to use substandard equipment, excessive inspection caused to the project to insure good workmanship, or poor construction methods, or failure to complete on time a contract of similar nature, or the proposal of a bidder who is not in a position to perform the work governed by the contract.

11. **BID GUARANTY:** A bid bond shall be submitted with the bid and made payable to the Owner in the amount of five percent (5%) of the bid sum. Security shall be by a certified or cashier's check, or a bid bond prepared on a form acceptable to the Owner, issued by a surety licensed to do business in the state where the project is located. The Owner will retain these securities until a contract has been entered into. The bidder shall file the surety bonds and enter into a contract for the work within 15 days after notice of award of contract. Should the low bidder refuse to enter into a contract, the Owner will retain his security as liquidated damages, not as a penalty. If the lowest bidder fails to enter into a contract, then the next lowest bidder will be considered as the lowest bidder.
12. **BONDS:** Within fifteen (15) days from award of contract, the Contractor shall furnish to the Owner, the Surety Bonds as hereinafter described. The Bonds shall be executed substantially in the forms as contained herein and shall be referenced or an attachment made to make the Contract Documents a part thereof. All provisions of the Bond shall be complete and in full accordance with statutory requirements. The Bonds shall be executed by the proper sureties through a company licensed and qualified to operate in the State and approved by the Owner. The Bonds shall be signed by an agent resident in the State, and the date of the Bonds shall be the date of execution of the contract. If any time during the continuance of the contract, the surety on the Contractor's bonds becomes irresponsible, the Owner shall have the right to require additional and sufficient sureties which the Contractor shall furnish to the satisfaction of the Owner within ten (10) days after notice to do so. In default thereof, the contract may be suspended with all payments or money due the Contractor withheld and the contract completed as hereinafter provided.

The Contractor shall furnish a Performance Bond and a Payment Bond each in 100% of the contract amount. The Performance Bond shall also provide for a 1 year guarantee for materials and workmanship once Contractor is considered substantially complete.

Additional Bonds and Insurance: Prior to Delivery of the executed agreement by Owner to Contractor, Owner may require Contractor to furnish such other bonds and such additional insurance, in such form and with such sureties or insurers, as Owner may require. If such other bonds or such other insurances are specified by written instructions given prior to opening of bid, the premiums shall be paid by the Contractor; if subsequent thereto, they shall be paid by the Owner.

13. **PUBLIC WORKS:** This solicitation is for a City of Gallup project and subject to the Public Works Statutes of the State of New Mexico (13-4-1 to 13-4-43 NMSA 1978); Construction Industries Licensing act (60-13-1 et seq. NMSA 1978); CID rules and regulations; applicable federal, state and local statutes and laws; and the City of Gallup Ordinances.
14. **WARRANTY:** All labor and work done by the Contractor shall be warranted for a period of **one year**.
15. **BUSINESS LICENSE:** Bidders are advised that they must have or obtain a current City of Gallup Business License for the type of material or services required under this contract before work commences or a purchase order issued.
16. **DESCRIPTION OF BID ITEMS AND BASIS OF PAYMENT:** A description of the work included in each bid item together with method of measurement and payment for items is contained in the Special Conditions.
17. **FORM COMPLETION:** All forms submitted must be typewritten or written legibly in ink. Any alterations to the bid amounts by erasures or by interlineations shall be initialed by the signer of the bid form.
18. **SUBCONTRACTORS:** Contractor shall not employ any subcontractor or other person or organization (including those who are to furnish the principal items of material or equipment), whether initially or as a substitute, against whom Owner may have reasonable objection. A subcontractor or other person or organization identified in writing to Owner by Contractor prior to the notice of award and not objected to in writing by Owner prior to the notice of award will be deemed acceptable to Owner. Acceptance of any subcontractor, other person, or organization by Owner shall not constitute a waiver of any right of Owner to reject defective work or work not in conformance with the contract documents. If Owner, after due investigation, has reasonable objection to any subcontractor, other person or organization proposed by Contractor after the notice of award, Contractor shall submit an acceptable substitute and the contract price shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate change order shall be issued. Contractor shall not be required to employ any subcontractor, other person or organization against whom he has reasonable objection. Contractor shall not without the consent of Owner make any substitution for any subcontractor, other person or organization who has been

accepted by Owner. Contractor shall issue a Non-Taxable Transaction Certificate (NTTC) to all Subcontractors.

19. LIST OF SUBCONTRACTORS: The bidder shall list the subcontractors he proposes to use for all trades or items. If awarded the contract, the bidder shall use the firm listed. Changes or substitutions to this list must be approved by the Engineer. A list of subcontractors for this project must accompany the bid proposal submittal.

SUBCONTRACTORS: The listing threshold for subcontractors for this project is \$28,421.00 and must be attached to the bid in compliance with 13-4-32 thru 13-4-43 NMSA 1978. The name and the city or county where each subcontractor is located shall also be listed. There shall be only one subcontractor listed for each classification. The general contractor shall not list himself as the subcontractor unless he represents that he is licensed and can perform such work satisfactorily. If subcontractors change according to bid options/additive alternatives accepted then list the subcontractors and the bid lots where they are to be used. The Owner reserves the right to disqualify subcontractors and suppliers in accordance with the conditions of the contract. Subcontracted work exceeding \$125,000.00 must be bonded separately by the subcontractor.

The Contractor agrees that he is fully responsible to the Owner for the acts and omissions of his subcontractors and or persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

The Contractor may be required to establish the reliability and responsibility of the proposed subcontractors or of any manufacturer to furnish and perform the work in accordance with the contract documents and completion schedule, and may also be required to require performance and payment bonds of some or all subcontractors in conformance with Sec. 13-4-37 NMSA 1978.

Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the Owner. No officer, agent or employee of the Owner, including the Engineer, shall have any power or authority to bind the Owner or incur any obligation in its behalf to any subcontractor, material supplier, or other person in any manner whatsoever.

20. MINIMUM WAGE RATES: There shall be no discrimination because of race, creed, color, sex, national origin or political affiliation in the employment of persons qualified by training and experience for work carried out under this contract.

A minimum wage schedule is bound in the documents and shall apply to all labor used in constructing the project. Each employee engaged in constructing the

project shall be paid a wage not less than the minimum specified in the Minimum Wage Rate Schedule published by the New Mexico Department of Work Force Solutions and made a part of these contract documents. Compliance with minimum wage rates shall apply equally to all Contractors and subcontractors engaged on the project. The Contractor shall post at appropriate places on the job site, copies of the Minimum Wage Schedule made a part of the Contract Documents.

It shall be the responsibility of the Contractor to furnish certified copies of payrolls to the Engineer (biweekly) and the New Mexico Department of Work Force Solutions when requested, or an interested party such as Contractors, contracting agencies, labor organizations and Contractor associations to ensure compliance with the New Mexico Public Work Minimum Wage Act.

Bidders are advised that all tiers of Contractors (including subcontractors) bidding more than \$60,000 on a public works contract must be registered with the Labor and Industrial Division of the State of New Mexico Department of Work Force Solutions prior to submitting a bid per NMSA 13-4-13.1. A labor enforcement fund form is available at www.dws.state.nm.us/

21. **LICENSES, LEGAL RESTRICTIONS, PERMITS AND REGULATIONS:** The Contractor shall have a license issued by the Construction Industries Division (CID) of the New Mexico Regulation and Licensing Department. The licenses shall be properly classified for the work to be performed under this contract and be in active status. All subcontractors shall also meet these criteria.

Additionally, the Contractor shall at his own expense, procure all necessary licenses and permits of a temporary nature and shall give due and adequate notices to those in control of all properties which may be affected by this operation. Permits, licenses and easements for permanent structures or permanent changes in existing facilities, shall be provided by the Owner unless otherwise specified. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the work as drawn or specified.

22. **ROYALTIES AND PATENTS:** It is agreed that all royalties for patents or patent infringement claims, whether such patents are for processes or devices, that might be involved in the construction or use of the work, shall be included in the contract amount and the Contractor shall satisfy all demands that may be made at any time for such, be liable for any damages or claims for patent infringements; and, at his own expense, defend any and all suits or proceedings that may be instituted any time against the Purchaser for infringement or alleged infringement of any patent or patents involved in the work and in case of an award of damages, the said Contractor shall pay such award. Final payment to the Contractor by the Owner will not be made while any such suits or claims remain unsettled.

23. TAXES: The Contractor and he alone, shall be liable for the cost of taxes and shall protect the Owner against liability by reason of municipal, state or federal laws or regulations. Contracts solicited by competitive sealed bids shall require that the bid amount exclude the applicable state gross receipts taxes or applicable local option tax, but that the Owner shall be required to pay the applicable tax including any increase in the applicable tax becoming effective after the date the contract is entered into. The applicable gross receipt tax or applicable local option tax shall be shown as a separate amount on each billing or request for payment made under the contract. Contractor shall issue a Non-Taxable Transaction Certificate (NTTC) to all Subcontractors.
24. COLLUSION: Collusion among bidders or an interest in more than one bid under a different name or firm shall be cause for rejection of bid(s).
25. COMMENCEMENT AND COMPLETION: The Contractor shall commence work on the date specified in the Owner's written notice to proceed and shall complete the work in its entirety within the time specified in the Contract Documents.
26. TIME REQUIRED FOR CONSIDERATION OF BID: Time will be required for tabulation of bids and consideration of the proposals by the Owner. Therefore, the Owner shall have one hundred twenty (120) days in which to make an award of contract.
27. UNIT PRICE DISCREPANCIES: Typographical errors, errors in extending unit prices, arithmetic errors or errors clearly evident on the face of the bid document may be corrected in accordance with the procurement ordinance and procurement regulations. Discrepancies involving the incorrect extension of unit prices shall be resolved in favor of unit prices.
28. REQUIRED PROVISIONS DEEMED INCLUDED: Each and every provision of law and clause required by law to be included in this contract shall be deemed to be included herein and the contract shall be read and enforced as though it were included herein. If through mistake or otherwise any such provision is not included or is not correctly included then upon the application of either party, the contract shall forthwith be physically amended to make such inclusion or correction.

The City of Gallup does not discriminate on the basis of race, color, national origin, sex, religion, age or disability in the employment or the provision of services. Contractors shall be in compliance with with all Federal, State and Local Laws and Ordinances regarding employment practices and the A.D.A. requirements.

29. **AWARD OF CONTRACT:** The award, if made shall be made to the lowest responsible bidder based on the total of all lots (excluding taxes). That is the most advantageous to the public. Bidder must submit bids for all items – or their bid will be found non responsive.

The City reserves the right to reject any or all bids. Bids may be rejected for the following, among other reasons:

- Bids containing any irregularities.
- Unbalanced value of any items.
- Reason for believing collusion exists among the bidders.
- The bidder being interested in any litigation against the city.
- The bidder being in arrears on or having defaulted on a previous contract; or within the past three years been formally debarred in the State of New Mexico or any other jurisdiction; or whose license has been suspended or revoked by the appropriate licensing authority.
- Lack of responsibility as may be revealed by a financial statement, experience and equipment, questionnaires, etc.
- Uncompleted work which in the judgment of the city will prevent or hinder the prompt completion of additional work if awarded.

The City of Gallup reserves the right to reject any or all bids in whole or in part, to cancel the bid, to waive technicalities and to accept the proposal it deems to be in the best interest of The City.

30. **AMENDMENTS:** If any questions or responses require revision to the solicitation as originally published, such revisions will be by formal written amendment only and issued to plan holders of record. If the solicitation includes a contact person for technical information, offerors are cautioned that any oral or written representations made by this or any person that appear to change materially any portion of the solicitation shall not be relied upon unless subsequently ratified by a written amendment to this solicitation issued by the purchasing office. For a determination as to whether any representation made requires that an amendment be issued, contact the purchasing office.
31. **PROTESTS:** Any bidder or offeror who is aggrieved in connection with a solicitation or award of contract may protest to the central purchasing office. The protest must be submitted in writing within seven (7) days after knowledge of the facts or occurrences giving rise there to.
32. **PROCUREMENT CODE VIOLATIONS:** The procurement code imposes civil and criminal penalties for its violation. In addition, the New Mexico criminal statutes impose felony penalties for illegal bribes, gratuities, and kick-backs.

33. GOVERNING LAW: The bid, terms and conditions, and the contract documents shall be governed by the laws of the state of New Mexico, and in accordance with 57-28A-1 NMSA 1978. .
34. CODE COMPLIANCE: Complete installation must meet federal, state, and local laws, codes and regulations.
35. EXTENDED PAYMENT PROVISION: This construction contract specifically provides for a payment later than twenty-one days after submission of an undisputed request for payment. Owner will make payment within forty-five days after submission of an undisputed request for payment.
36. NMDOT WORK PERMITS: Contractor shall obtain insurance in the amount of \$1,000,000, per occurrence, naming the NMDOT as insured prior to obtaining a Work Permit for works within Highway Right-of-Way.
37. BUY AMERICAN PROVISIONS: Not Required.
38. PREFERENCES: Resident NM Contractor's Preference & NM Veterans Contractor Preference do not apply.
39. LABOR ENFORCEMENT FUND: (Detailed information on following page)

LABOR ENFORCEMENT FUND

(STRICTLY ENFORCED)

13-4-13.1 Public works contracts; registration of contractors and subcontractors.

- A. Except as otherwise provided in this subsection, in order to submit a bid valued at more than sixty thousand dollars (\$60,000) in order to respond to a request for proposals or to be considered for award of any portion of a public works project greater than sixty thousand dollars (\$60,000) for a public works project that is subject to the Public Works Minimum Wage Act [13-4-10 NMSA 1978], the contractor, serving as a prime contractor or not, shall be registered with the labor and industrial division of the labor department. Bidding documents issued or released by a state agency or political subdivision of the state shall include a clear notification that each contractor, prime contractor or subcontractor is required to be registered pursuant to this subsection. The provisions of this section do not apply to vocational classes in public schools or public post-secondary educational institutions.
- B. The state or any political subdivision of the state shall not accept a bid on a public works project subject to the Public Works Minimum Wage Act from a prime contractor that does not provide proof or required registration for itself.
- C. Contractors and subcontractors may register with the division on a form provided by the division and in accordance with labor department rules. The division shall charge an annual registration fee of two hundred dollars (\$200). The division shall issue to the applicant a certificate of registration within fifteen days after receiving from the applicant the completed registration form and the registration fee.
- D. Registration fees collected by the division shall be deposited in the labor enforcement fund.

13-4-14.1 Labor enforcement fund; creation; use.

The "labor enforcement fund" is created in the state treasury. The fund shall consist of contractor and subcontractor registration fees collected by the labor and industrial division of the labor department and all investment and interest income from the fund. The fund shall be administered by the division and money in the fund is appropriated to the division for administration and enforcement of the Public Works Minimum Wage Act [13-4-10 NMSA 1978]. Money in the fund shall not revert to the general fund at the end of a fiscal year.

13-4-14.2 Registration cancellation, revocation, suspension; injunctive relief.

The director of the labor and industrial division of the labor department may:

- A. cancel, revoke or suspend with conditions, including probation, the registration of any party required to be registered pursuant to the Public Works Minimum Wage Act [13-4-10 NMSA 1978] for failure to comply with the registration provisions or for good cause, subject to appeal pursuant to Section 13-4-15 NMSA 1978; and
- B. seek injunctive relief in district court for failure to comply with the registration provisions of the Public Works Minimum Wage Act.

**U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO.
R11AC40002 CONTRACTUAL CONDITIONS:**

Funding for this procurement is from the Water Trust Board through the New Mexico Finance Authority, WTB #334 and U.S. Bureau of Reclamation Cooperative Agreement No. R11AC40002. The following Federal Contract provisions are incorporated by reference and made a part of the contract documents.

- Compliance with Executive Order 11246 (dated 9-24-1965), "Equal Employment Opportunity"; as amended by Executive Order 11375 (dated 10-13-1967) and as supplemented in Department of Labor regulations (41 CFR Chapter 60)

Equal Employment Opportunity – All contracts shall contain a provision requiring compliance with E.O. 11246, "Equal Employment Opportunity," as amended by E.O. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and as supplemented by regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

- Compliance with Copeland "Anti-Kickback Act (18 U.S.C. 874) as supplemented in Department of Labor Regulations (29 CFR Part 3)

Copeland "Anti-Kickback" Act (18 U.S.C. 874 and 40 U.S.C. 276c) – All contracts and sub-grants in excess of \$2000 for construction or repair awarded by recipients and sub-recipients shall include a provision for compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented by Department of Labor Regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or Part by Loans or Grants from the United States"). The Act provides that each contractor or sub-recipient shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled. The recipient shall report all suspected or reported violations to the Federal awarding agency.

- Compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330) as supplemented by Department of Labor regulations (29 CFR Part 5) Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333) – Where applicable, all contracts awarded by recipients in excess of \$2000 for construction contracts and in excess of \$2500 for other contracts that involve the employment of mechanics or laborers shall include a provision for compliance with Sections 102 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333), as supplemented by Department of Labor regulations (29 CFR part 5). Under Section 102 of the Act, each contractor shall be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours.

Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than 1 ½ times the basic rate of pay for all hours worked in excess of 40 hours in the work week. Section 107 of the Act is applicable to construction work and provides that no laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

- All rights to inventions and materials generated under this contract are subject to regulations issued by the Office of Federal Procurement Policy and the sponsor of the Federal Grant under which the contract is executed.

Rights to Inventions Made Under a Contract or Agreement – Contracts or agreements for the performance of experimental, developmental, or research work shall provide for the rights of the Federal Government and the recipient in any resulting invention in accordance with 37 CFR part 401, “Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements,” and any implementing regulations issued by the awarding agency.

- Contractor shall maintain an acceptable cost accounting system. Contractor agrees to maintain all books, records and reports required under this contract for not less than three years after final payment is made. Contractor agrees to provide access to the Sponsor, the Office of Federal Procurement Policy and the Comptroller General of the United States or their duly authorized representatives’ access to any books, documents, papers and records of the Contractor which are directly pertinent to the specific contract for purposes of making audit, examination excerpts and transcriptions. Retention of all required records for three years after grantees or sub-grantees make final payments and all pending matters are closed.
- Compliance with all applicable standards, orders, or requirements issued under Section 306 of the Clean Air Act (42 U.S.C. 1857(h), Section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protections Agency regulations (40 C.F.R. Part 15.)
- Mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Publication L. 94-163, 89 Stat. 871)
- Debarment and Suspension (E.O.s 12549 and 12689) – No contract shall be made to parties listed on the General Services Administration’s List of Parties Excluded from Federal Procurement or Non-Procurement Programs in accordance with

E.O.s 12549 and 12689, "Debarment and Suspension." This list contains the names of parties debarred, suspended, or otherwise excluded by agencies, and contractors declared ineligible under statutory or regulatory authority other than E.O. 12549. Contractors with awards that exceed the small purchase threshold shall provide the required certification regarding its exclusion status that of its principal employees.

Contracting with Small & Minority Firms, Women's Business Enterprise & Labor Surplus Area Firms

Per the Bureau of Reclamation and City of Gallup Cooperative Agreement R11AC40002, Item Number 3 Procurement Standards, letter (e):

(e) Contracting with small and minority firms, women's business enterprise and labor surplus area firms. (1) The grantee and subgrantee will take all necessary affirmative steps to assure that minority firms, women's business enterprises, and labor surplus area firms are used when possible.

(2) Affirmative steps shall include:

(i) Placing qualified small and minority businesses and women's business enterprises on solicitation lists;

(ii) Assuring that small and minority businesses, and women's business enterprises are solicited whenever they are potential sources;

(iii) Dividing total requirements, when economically feasible, into smaller tasks or quantities to permit maximum participation by small and minority business, and women's business enterprises;

(iv) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority business, and women's business enterprises;

(v) Using the services and assistance of the Small Business Administration, and the Minority Business Development Agency of the Department of Commerce; and

(vi) Requiring the prime contractor, if subcontracts are to be let, to take the affirmative steps listed in paragraphs (e)(2) (i) through (v) of this section.

Note: The purpose is to ensure that these entities are aware of the opportunities to Subcontract. There are no minority firms, women's business enterprise or DBE goals or percentages that need to be met.

BID PROPOSAL
NAVAJO GALLUP WATER SUPPLY PROJECT REACH 27.9
FUNDED BY THE WATER TRUST BOARD THROUGH NEW MEXICO
FINANCE AUTHORITY WFP #4338 AND U.S. BUREAU OF
RECLAMATION OF COOPERATIVE AGREEMENT NO. R11AC40002
FORMAL BID NO. 1903

All:

The undersigned Bidder, in compliance with your invitation for bids for NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.9 having examined the Plans, Specifications and related documents, sites and conditions of the proposed work and being fully advised as to the materials, supplies, equipment and labor required for the construction of the project, and the time and method of payment for work performed, hereby proposes to furnish all labor, materials and supplies, and to construct the project in accordance with terms of the contract documents, within the time set forth herein, for the prices stated below. The prices are to cover all expenses incurred in completing the work under contract.

The Bidder agrees to commence work under this contract on or before the date specified in a written "Notice to Proceed" issued by the Owner or his representatives and to fully complete the project within one hundred eighty (180) consecutive calendar days thereafter, including weather delays. The Bidder also agrees to meet other scheduling requirements of these contract documents.

REACH 27.9

LOT 1 - 24" WATERLINE CONSTRUCTION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For 24" Cl. 350 DIP waterline with granular bedding and rock free native backfill complete in place for the Unit Price per Linear Foot of:	14700 LF	\$ _____	\$ _____
2	For 24" Cl. 350 DIP waterline with granular bedding and granular backfill complete in place for the Unit Price per Linear Foot of:	3680 LF	\$ _____	\$ _____
3	For 24" Cl. 250 AWWA C950 GRP restrained waterline and restrained fittings as called for with granular bedding and granular backfill complete in place for the Unit Price per Linear Foot of:	950 LF	\$ _____	\$ _____
4	For 24" resilient wedge AWWA horizontal gate valve with valve boxes and bypass valve assembly complete in place for the Unit Price per Each of:	9 EA	\$ _____	\$ _____
5	For 12" resilient wedge AWWA vertical gate valves with valve box for flush or other locations complete in place for the Unit Price per Each of:	9 EA	\$ _____	\$ _____
6	For Type 2A air release station (2" air valve size) including vault, piping, and fittings complete in place for the Unit Price per Each of:	13 EA	\$ _____	\$ _____
7	For GRP Type 2 air release station (2" air valve size) including vault, piping, and fittings complete in place for the Unit Price per Each of:	1 EA	\$ _____	\$ _____

REACH 27.9

LOT 1 - 24" WATERLINE CONSTRUCTION - CONTINUED

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
8	For vertical 24" DIP 1 1/4" ells as conditions require during construction complete in place for the Unit Price per Each of:	2 EA	\$ _____	\$ _____
9	For 24"x12" flushing apparatus (not including valve) as detailed for the Unit Price per Each of:	9 EA	\$ _____	\$ _____
10	For Tie-in 'A' to existing 24" waterline including fittings and sleeves but not valves complete in place for the Lump Sum Price of:	LS	\$ _____	\$ _____
11	For Tie-in 'B' to existing 24" waterline including fittings and sleeves but not valves complete in place for the Lump Sum Price of:	LS	\$ _____	\$ _____
12	For installation of a fire hydrant assembly including 6" gate valve, 10' of 6" DIP waterline, fire hydrant, and appurtenances complete in place the the Unit Price per Each of:	1 EA	\$ _____	\$ _____
13	For high pressure water service meter including 6" gate valve, 5' of 6" DIP waterline, 10' of 3/4" Type K copper line, 3/4" tapped 6" cap, fittings, valves, specials, connection to customer service lines, and appurtenances as required complete in place for the Unit Price per Each of:	3 EA	\$ _____	\$ _____
14	For the installation 3/4" Type K copper service line from main line to meter can as required complete in place for Unit Price per Linear Foot of:	75 LF	\$ _____	\$ _____
15	For the installation of City supplied pressure reducing valve in the existing Kachina PRV station piping, complete and in place for the Lump Sum Price of:	LS	\$ _____	\$ _____
16	For Type A waterline rock excavation and disposal for the Unit Price per Cubic Yard of:	1500 CY	\$ _____	\$ _____
17	For Type B waterline rock excavation and disposal for the Unit Price per Cubic of:	5000 CY	\$ _____	\$ _____
18	For the grade control structure at Sta 92+00 as detailed complete in place for the Lump Sum Price of:	LS	\$ _____	\$ _____

REACH 27.9

LOT 1 - 24" WATERLINE CONSTRUCTION - CONTINUED

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
19	For the grade control structure at Sta 121+60 as detailed complete in place for the Lump Sum Price of:	LS	\$_____	\$_____
20	For wire enclosed rip-rap as detailed complete in place for the Unit Price per Square Yard of:	60 SY	\$_____	\$_____
21	For removal of existing asphalt paved road section and construction of 20' Typical Gravel Road as detailed complete in place for the Unit Price per Linear Foot of:	2010 LF	\$_____	\$_____
22	For trench patch, 6" PMBP (2 lifts) and 6" base course complete in place for the Unit Price per Square Yard of:	2500 SY	\$_____	\$_____
23	For 4" thick gravel surfacing to replace existing that is lost during construction for the Unit Price per Square Yard of:	200 SY	\$_____	\$_____
24	For archeological fencing including corner and pull posts complete in place for the Unit Price per Linear Foot of:	1680 LF	\$_____	\$_____
25	For traffic control implementation for the Lump Sum Price of:	LS	\$_____	\$_____
26	For materials testing by independent testing lab (soil, concrete, base course, etc.). This amount to be used for totaling bid. Actual amount to be based on approved invoice:	Allowance	\$20,000.00	\$20,000.00
27	For furnishing a hydraulic valve operator and two (2) "T" handle operators, as specified, to the City for the Lump Sum Price of:	LS	\$_____	\$_____
28	For down time caused by unexpected encounters with historical, archaeological, or environmental items for the Unit Price per Hour of:	30 HRS	\$_____	\$_____

Lot 1 Subtotal: \$_____

REACH 27.9

LOT 2 - 16" WATERLINE CONSTRUCTION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For 16" CI, 350 DIP waterline with granular bedding and rock free native backfill complete in place for the Unit Price per Linear Foot of:	2625 LF	\$ _____	\$ _____
2	For 16" CI, 350 DIP waterline with granular bedding and granular backfill complete in place for the Unit Price per Linear Foot of:	675 LF	\$ _____	\$ _____
3	For 16" AWWA C905 DR18 PVC with bell and gasket joints with granular bedding and rock free backfill complete in place for the Unit Price per Linear Foot of:	260 LF	\$ _____	\$ _____
4	For 250 linear foot jack and bore crossing of U.S. Highway 491 with a 16" carrier pipe in a 26" steel casing, Sta. 29+10 to Sta. 30+25, complete and in place for the Lump Sum Price of:	LS	\$ _____	\$ _____
5	For 65 linear foot jack and bore crossing steep slope with a 16" carrier pipe in a 26" steel casing, Sta. 26+60 to Sta. 27+25, complete and in place for the Lump Sum Price of:	LS	\$ _____	\$ _____
6	For 16" resilient wedge AWWA vertical gate valve with valve box complete in place for the Unit Price per Each of:	4 EA	\$ _____	\$ _____
7	For 12" resilient wedge AWWA vertical gate valves with valve box for flush or other locations complete in place for the Unit Price per Each of:	4 EA	\$ _____	\$ _____
8	For Type 2 air release station (2" air valve size) including vault, piping, and fittings complete in place for the Unit Price per Each of:	4 EA	\$ _____	\$ _____
9	For vertical 16" DIP 1 1/4" ells as conditions require during construction complete in place for the Unit Price per Each of:	2 EA	\$ _____	\$ _____
10	For 16" x 12" flushing apparatus (not including valve) as detailed for the Unit Price per Each of:	4 EA	\$ _____	\$ _____
11	For Tie-in 'C' to existing 16" line including fittings and sleeves but not valves complete for the Lump Sum Price of:	LS	\$ _____	\$ _____
12	For installation of a fire hydrant assembly including 6" gate valve, 10' of 6" DIP waterline, fire hydrant, and appurtenances complete in place the the Unit Price per Each of:	1 EA	\$ _____	\$ _____

REACH 27.9

LOT 2 - 16" WATERLINE CONSTRUCTION -CONTINUED

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
13	For high pressure water service meter including 6" gate valve, 5' of 6" DIP waterline, 10' of 3/4" Type K copper line, 3/4" tapped 6" cap, fittings, valves, specials, connection to customer service lines, and appurtenances as required complete in place for the Unit Price per Each of:	3 EA	\$_____	\$_____
14	For the installation 3/4" Type K copper service line from main line to meter can as required complete in place for Unit Price per Linear Foot of:	30 LF	\$_____	\$_____
15	For Type A waterline rock excavation and disposal for the Unit Price per Cubic Yard:	120 CY	\$_____	\$_____
16	For Type B waterline rock excavation and disposal for the Unit Price per Cubic Yard:	1000 CY	\$_____	\$_____
17	For the grade control structure at Sta 6+40 as detailed complete in place for the Lump Sum Price of:	LS	\$_____	\$_____
18	For the grade control structure at Sta 8+75 as detailed complete in place for the Lump Sum Price of:	LS	\$_____	\$_____
19	For the grade control structure at Sta 11+25 as detailed complete in place for the Lump Sum Price of:	LS	\$_____	\$_____
20	For 4" thick gravel surfacing to replace existing that is lost during construction for the Unit Price per Square Yard of:	700 SY	\$_____	\$_____
21	For installation of 6' high, 12' wide, double panel chain link gate including posts, frame, fabric, hardware, concrete, and appurtenances as detailed complete and in place for the Unit Price	2 EA	\$_____	\$_____
22	For traffic control implementation for the Lump Sum Price of:	LS	\$_____	\$_____
23	For materials testing by independent testing lab (soil, concrete, base course, etc.). This amount to be used for totaling bid. Actual amount to be based on approved invoice:	Allowance	\$20,000.00	\$20,000.00
24	For furnishing wire fencing material and seed mix to the City for the Lump Sum Price of:	LS	\$_____	\$_____
25	For down time caused by unexpected encounters with historical, archaeological or environmental items for the Unit Price per Hour of:	30 HRS	\$_____	\$_____

Lot 2 Subtotal: \$_____

REACH 27.9 LOTS 1 SUBTOTAL: \$ _____
REACH 27.9 LOTS 2 SUBTOTAL: \$ _____

REACH 27.9 LOTS 1-2 SUBTOTAL: \$ _____
TAX @ 8.3125%: \$ _____

TOTAL ESTIMATED CONSTRUCTION AMOUNT: \$ _____

The undersigned Bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The undersigned Bidder agrees to enter into a contract for completion of the project within fifteen (15) days from the date of acceptance of this proposal. Upon receipt of written notice of acceptance of his bid, Bidder will execute the formal contract documents attached within fifteen (15) days & deliver the Surety Bond as required. The Bid Bond attached hereto is to become the property of the Owner in the event the Contract and Bond are not executed within the time set forth, as liquidated damages for the delay and expense incurred by the Owner.

RECEIPT OF THE FOLLOWING ADDENDA
NO'S IS HEREBY ACKNOWLEDGED:

Addendum No. 1: _____ Date: _____

Addendum No. 2: _____ Date: _____

Addendum No. 3: _____ Date: _____

Bidders Checklist of Submittal Documents

- Bidder's Qualification Statement (2 Pages)
- Subcontractor's Listing (1 Page, attach additional pages if needed)
- Price Proposal Forms
- Bid Bond (5%) (2 Pages)
- Acknowledge Receipt of Amendments (If any)
- Notice of Extended Payment Provision
- Current I.R.S. Form W-9

Company Name: _____

RESPECTFULLY SUBMITTED:

Signature: _____

Printed Name: _____

Title _____

Business Address: _____

City _____ State _____ Zip _____

e-mail address _____

FEIN Number _____

CONTRACTOR'S LICENSE NO. & CLASSIFICATION

NEW MEXICO DEPARTMENT OF WORKFORCE SOLUTIONS NO.

BIDDERS QUALIFICATION STATEMENT

PROJECT TITLE: Gallup Rural Navajo Water Supply Project – Reach 27.9, Formal Bid No 1903
SUBMITTED BY: _____
(Print or Type Name of Bidder)
ADDRESS: _____

The undersigned certifies the truth and correctness of all statements and of all answers to questions made hereinafter:

1. How many years has your organization been in business under its present name?

2. If a corporation, answer the following:
 - a. Date of Incorporation: _____
 - b. State of Incorporation: _____
3. If individual or partnership, answer the following:
 - a. Date of Organization: _____
4. If other than corporation or partnership, describe organization and name principals:
5. Has any construction contract to which you have been a party been terminated by the owner; have you ever terminated work on a project prior to its completion for any reason; has any surety which issued a performance bond on your behalf ever completed the work in its own name or financed such completion on your behalf; has any surety expended any monies in connection with the contract for which they furnished a bond on your behalf? If the answer to any portion of this question is "yes", please furnish details of all such occurrences including name of owner, architect or engineer, and surety, and name and date of project:
6. Has any officer or partner of your organization ever been an officer or partner of another organization that had any construction contract terminated by the owner; terminated work on a project prior to its completion for any reason; had any surety which issued a performance bond complete the work in its own name or financed such completion; or had any surety expend any monies in connection with a contract for which they furnished a bond? If the answer to any portion of this question is "yes", please furnish details of all such occurrences, including name of owner, architect or engineer, and surety, and name and date of project.
7. List projects, contract amount, percent complete and scheduled completion of the construction projects your organization has in process on this date:
 - a. List the projects competed by your firm within the past 3 years, with the final cost of the project, and project contact information:
 - b. List your construction experience in projects similar to this project:

8. List name and construction experience of the principals in your organization, including officers:
9. List the states and categories of construction in which you organization is legally qualified to do business:
10. List name, address, and telephone number of an individual who represents each of the following and who may be contacted for a financial reference:
- a. A surety: _____

- b. A bank: _____
CREDIT AVAILABLE: \$ _____
- c. A major material supplier: _____

Dated this _____ day of _____ 20 _____

Bidder: _____
(Print or Type Name of Bidder)

By: _____

Title: _____

Seal of Corporation

CITY OF GALLUP
SUBCONTRACTOR LISTING
NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.9
FUNDED BY THE WATER TRUST BOARD THROUGH NEW MEXICO FINANCE AUTHORITY, WPF #4338 AND
U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002
Formal Bid No. 1903

The Subcontractor Listing Threshold For This Project Is \$28,421.00 And Attached To The Bid In Compliance With 13-4-32 Thru 13-4-43 NMSA 1978, Together With The City Or County Location Of Their Place Of Business Listed. The Following Subcontractors Will Work On The Construction Of The Project If My Proposal Is Accepted. List only one entry for each category of work as defined by Contractor.

Bidder Represents That He Is Licensed And Qualified To Perform 100% Of The Category Of Work For Which No Subcontractor Is Listed. D.W.S. Registration Number Required If Amount Of Work Exceeds \$60,000.

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

Company Name: _____
Address: _____
City/County: _____ State: _____
Work to be Performed: _____
Amount (\$): _____
License No.: _____
DWS Registration No. _____
FEIN #: _____

-No Contractor whose Proposal is accepted shall permit any subcontract to be voluntarily assigned or transferred or allow it to be performed by anyone other than the original subcontractor listed in the original Proposal without the consent of the using agency.

-No Contractor whose Proposal is accepted, other than in the performance of change orders causing changes or deviations from the original contract, shall sublet or subcontract any portion of the work in excess of the listing threshold as to which his original Proposal did not designate a Subcontractor unless:

(1) the Contractor fails to receive a Proposal from a category of work. Under such circumstances, the contractor may subcontract. The Contractor shall designate on the listing form that **no Proposal was received** or;

(2) the Contractor fails to receive more than one Proposal for a category of work. Under such circumstances, the Contractor may subcontract. The Contractor shall state on the listing form that **only one Subcontractor's Proposal was received**, together with the name of the Subcontractor. This designation shall not occur more than one time on the Subcontractor list.

ADDITIONAL COPIES MAY BE MADE IF NECESSARY

NOTICE OF EXTENDED PAYMENT PROVISION

57-28-5 (NMSA 1978) Payments; prompt pay required; withholding prohibited. (2007)

B. A local public body may make payment within forty-five days after submission of an undisputed request for payment when grant money is a source of funding, if:

(1) the construction contract specifically provides in a clear and conspicuous manner for a payment later than twenty-one days after submission of an undisputed request for payment; and

(2) the following legend or substantially similar language setting forth the specified number of days appears in clear and conspicuous type on each page of the plans, including bid plans and construction plans:

“Notice of Extended Payment Provision

This contract allows the owner to make payment within Forty-Five (45) days after submission of an undisputed request for payment.”

In accordance with the above Statute, this contract is subject to the extended payment provisions of the above Statute.

By signing below Contractor expressly acknowledges that he has read and understands the above provision.

Company Name: _____

Authorized Signature: _____

Name (Printed or Typed): _____

Date: _____, 2018

BID BOND

KNOW ALL MEN BY THSE PRESENT, that we, the undersigned, _____
_____ as Principal and _____
As Surety, are hereby held firmly bound unto _____
As owner in the penal sum of _____ for the payment of
which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs,
executors, administrators, successors and assigns.

Signed, this _____ day of _____, 20____.

The condition of the above obligation is such that whereas the Principal has submitted to
_____ a certain Bid, attached hereto and hereby made a
part hereof to enter into a contract in writing for the _____

NOW THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate,
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulate and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS HEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

Principal

By: _____

Surety

By: _____

SEAL

CONTRACT

THIS AGREEMENT, made this ____ day of _____, 2018, by and between **THE CITY OF GALLUP**, hereinafter called the "OWNER" and _____ hereinafter called the "CONTRACTOR".

WITNESSETH: That for and in consideration of the payment and agreements hereinafter mentioned, to be made and performed by the OWNER, the CONTRACTOR hereby agrees with the OWNER to commence and complete the construction described as follows:

NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.9 FORMAL BID NO. 1903 FUNDED BY THE WATER TRUST BOARD THROUGH NEW MEXICO FINANCE AUTHORITY, WPF #4338 AND U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002

hereinafter called the project, for the sum of: _____ **DOLLARS (\$ _____)** and all extra work in connection therewith, except as noted under the terms as stated in the Special and General Conditions of the Contract; and at his (its or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, labor, insurance and other accessories and services necessary to complete the said project in accordance with the conditions and prices stated in the Proposal, the Special and General Conditions of the Contract, the plans, specifications and contract documents herefore as prepared by DePAULI ENGINEERING & SURVEYING, LLC, herein called the "ENGINEER", all of which are made a part hereof and collectively constitute the Contract.

The Contractor hereby agrees to commence work under this Contract on or before a date to be specified in a written "*Notice to Proceed*" of the OWNER and to fully complete the project within **ONE HUNDRED EIGHTY (180)** consecutive calendar days thereafter. The CONTRACTOR further agrees to pay, as liquidated damages, the sum of **ONE THOUSAND DOLLARS (\$1000.00)** for each consecutive calendar day thereafter as hereinafter provided in the Special and General Conditions.

CONTRACTOR shall be paid within 45 days after submission of an undisputed request for payment as per 57-28-5 NMSA 1978.

IN WITNESS WHEREOF, the parties to these presents have executed this Contract in three (3) counterparts, each of which shall be deemed an original, in the year and day first above mentioned.

(SEAL)
ATTEST: _____

OWNER
BY:

TITLE

(CORPORATE SEAL)

CONTRACTOR
BY:

TITLE

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned _____
_____ hereinafter called the "Principal" and _____
_____ hereinafter called the "Surety", a corporation authorized under
the laws of State of _____ and authorized to transact business in the State
of New Mexico, are held and firmly bound unto _____
_____ hereinafter called the "Owner" in the penal sum of _____
_____ Dollars (\$_____) in
lawful money of the United States, for the payment of which sum well and truly to be made, we
bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly
by these presents.

THE CONDITION OF THIS OBLIGATION is such that: Whereas, the Principal entered
into a written contract with the Owner, dated the _____ day of _____,
20____, a copy of which is hereto attached and made a part of hereof for the construction of:

NOW, THEREFORE, if the Principal shall truly and faithfully perform its duties, all the
undertakings, covenants, terms and agreements of said contract during the original term thereof,
and any extensions thereof which may be granted by the Owner with or without notice to the
Surety, and if he shall satisfy all claims and demands incurred under such 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 default, and if the said
principal shall for a period of one (1) year from and immediately following the completion of
said contract and acceptance thereof by the Owner guarantee all work performed under the
contract against faulty or defective materials and workmanship at his own expense and at no cost
to the Owner, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDE FURTHER, that the said Surety, for value received, hereby stipulates and
agrees that no change, extension of time, alteration or addition to the terms of the contract or to
the work to be performed thereunder or the specifications accompanying the same shall in any
way affect its obligation or this bond, and it does hereby waive notice of any such change,
extension of time, alteration or addition to the terms of the contract or to the specifications.

PROVIDED FURTHER, that no final settlement between the Owner and the Contractor
shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF: this instrument is executed in three (3) counterparts, each one of which shall be deemed an original, this the _____ day of _____ 20__.

ATTEST:

(Principal) Secretary

Principal

By: _____

Address

City State Zip

SEAL

Witness as to Principal

Address

City State Zip

ATTEST:

(Surety) Secretary

Surety

By: _____
Attorney-in-Fact

Address

City State Zip

SEAL

Witness as to Surety

Address

City State Zip

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned _____
_____ hereinafter called "Principal" and _____
_____ hereinafter called the "Surety", a corporation authorized
under the laws of the State of _____ and authorized under the laws of
the State of New Mexico, are held and firmly bound unto _____
_____ hereinafter called the "Owner" in the penal sum of _____
_____ Dollars (\$_____) in lawful money of the United
States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs,
executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that: Whereas, the Principal entered
into a written contract with the Owner, dated the _____ day of _____,
20____, a copy of which is hereto attached and made a part hereof for the construction of:

NOW, THEREFORE, if 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, and any authorized extension or modification thereof,
including all amounts due for materials, lubricants, oil, gasoline, repairs on 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.

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and
agrees that no change, extension of time, alteration or addition to the terms of the contract or to
the work to be performed thereunder or the specifications accompanying the same shall in any
way effect its obligation or this bond, and it does hereby waive notice of any such change,
extension of time, alteration or extension of time, alteration or addition to the terms of the
contract or to the specifications.

PROVIDED FURTHER, that no final settlement between the Owner and the Contractor
shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in three (3) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20____.

ATTEST:

(Principal) Secretary

Principal

By: _____

Address

City State Zip

SEAL

Witness as to Principal

Address

City State Zip

ATTEST:

(Surety) Secretary

Surety

By: _____
Attorney-in-Fact

Address

City State Zip

SEAL

Witness as to Surety

Address

City State Zip



City Purchasing Division
Frances Rodriguez, Director

NOTICE OF AWARD

Dated: _____

TO: _____
(BIDDER)

ADDRESS: _____

Contract: Navajo Gallup Water Supply Project, Reach 27.9
(Insert name of Contract as it appears in the Bidding Documents)

Project: Navajo Gallup Water Supply Project, Reach 27.9

OWNER's Contract No. City of Gallup, Formal Bid No. 1903

You are notified that your Bid dated _____ for the above Contract has been considered. You are the apparent Successful Bidder and have been awarded a Contract for

Navajo Gallup Water Supply Project Reach 27.9. Funded by The Water Trust Board
Through New Mexico Finance Authority, WPF #4338 and U.S. Bureau
of Reclamation Cooperative Agreement No. R11AC40002
(Indicate total Work, alternates or sections of Work awarded)

The Contract Price of your Contract is _____

There are _____ copies of each of the proposed Contract Documents (except Drawings) accompany this Notice of Award. Also, _____ sets of the Drawings will be delivered separately or otherwise made available to you immediately.

You must comply with the following conditions precedent within _____ days of the date of this Notice of Award, that is by _____

1. Deliver to the OWNER _____ fully executed counterparts of the Contract Documents. Each of the Contract Documents must bear your signature
2. Deliver with the executed Contract Documents the Contract security (Performance and Payment Bonds) as specified in the General Conditions
3. Before you may start any Work at the Site, the General Conditions provides that you must each deliver to the OWNER (with copies to Engineer and other identified additional insured's) certificates of insurance which you are required to purchase and maintain in accordance with the Contract Documents.
4. Before starting work, have or obtain a valid City of Gallup Business License
5. Furnish a current IRS form W-9 bearing an original signature
6. Furnish a copy of the Statement of Intent to Pay Prevailing Wages from your firm and from all subcontractors, to the City of Gallup.

Failure to comply with these conditions within the time specified will entitle OWNER to consider your Bid in default, to annul this Notice of Award and to declare your Bid security forfeited.

Within ten days after you comply with the above conditions, OWNER will return to you one fully executed counterpart of the Contract Documents.

City of Gallup
(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

NOTICE TO PROCEED

Dated: _____

TO: _____
(CONTRACTOR)

ADDRESS¹: _____

Contract: Navajo Gallup Water Supply Project, Reach 27.9
(Insert name of Contract as it appears in the Bidding Documents)

Project: Navajo Gallup Water Supply Project, Reach 27.9. Funded by The Water Trust Board
Through New Mexico Finance Authority, WPF #4338 and U.S. Bureau of Reclamation
Cooperative Agreement No. R11AC40002

OWNER's Contract No. Formal Bid No. 1903

You are notified that the Contract Times under the above contract will commence to run on _____. By that date, you are to start performing your obligations under the Contract Documents.

Completion date to be 365 days, or by

Also, before you may start any Work at the Site, you must
(add other requirements)

(OWNER)

By: _____
(AUTHORIZED SIGNATURE)

(TITLE)

GENERAL CONDITIONS

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GENERAL CONDITIONS

These General Conditions are a part of the project contract documents and shall be binding upon the parties to the contract unless specifically modified, revised or deleted by supplemental Special Conditions or Agreements:

1. **DEFINITIONS:** The meaning and intent of the following terms or words, as used in the specifications or other contract documents, shall be interpreted as follows:
 - a. **"Owner":** PARTY OF THE FIRST PART, whether an individual, partnership, corporation, municipality, or division of State or Federal Government, acting through its legally authorized officials.
 - b. **"Engineer":** The Engineer in charge for the Owner.
 - c. **"Contractor":** PARTY OF THE SECOND PART, whether an individual, partnership, or corporation entering into contract for performance of the work covered by this contract and authorized agents or legal representatives.
 - d. **"Contract Documents":** Shall be considered to include the following:
 - Information for Bidders
 - Proposal
 - Contract
 - Performance Bond
 - Payment Bond
 - General Conditions
 - Special Conditions
 - Technical Specifications
 - Drawings
 - Addenda
 - e. **"Date of Contract":** Shall mean the date upon which the successful bidder's proposal is accepted by the Owner.
 - f. **"Day":** Unless specifically defined elsewhere in the documents, shall mean a calendar day.
 - g. **"The Work":** Shall mean the work to be done and the equipment, supplies and materials to be furnished under this contract.
 - h. **"Plans and Drawings":** The approved plans, working drawings or exact reproduction, showing location, character and extent of the work to be done.
 - i. **"Change Order":** A supplementary document to the contract, setting forth the description and value of the changes, increases or decreases in the work ordered by the Owner and agreed to by the Contractor.

- j. "Interpretation of Terms": Whenever the words "as ordered", "as directed", "as required", "as permitted", "as allowed", or words or phrases of like import are used, it shall be understood the order, direction, requirement, permission or allowance of the Owner and Engineer is intended: similarly, the words "approved", "acceptable", "satisfactory", "suitable" or words of like effect and import shall mean approved, reasonable, acceptable, satisfactory or suitable in the judgment or opinion of the Owner and the Engineer.
 - k. "Or Equal": Whenever a material or article required is specified or shown on the plans by using the name of the proprietary product or of a particular manufacturer of vendor, any material or article which will perform adequately and duties imposed by the general design, will be considered equal and satisfactory, provided the material or article so proposed is of equal substance and function in the Owner's and Engineer's opinion.
 - l. "First-Class": The highest quality as defined by consensus in the field which work is in reference to.
2. **THE CONTRACTOR:** It is understood and agreed that the Contractor has, by careful examination, satisfied himself/herself as to the nature and location of the work, the conformation of the ground, the character of the equipment and facilities needed preliminary to and during the performance of the work, the general local conditions, and all other matters which can in any way affect an agent or employee of the Owner, either before or after the execution of the contract in the time and in the manner prescribed.
3. **THE ENGINEER:** The Engineer shall have general supervision of the work as the representative of the Owner. He/she shall have authority to direct the programming of the construction in so far as the proper execution of the contract is affected and to the extent that the forces of labor may be increased or decreased by his/her order to insure the execution of the contract in the time and in the manner prescribed.
- All work performed under this contract shall be done in a first-class workmanship manner and done to the satisfaction of the Engineer. The Engineer shall in all cases determine the amount, quality, acceptability and fitness of the several kinds of work and material herein specified. He/she shall decide all questions which may arise as to the fulfillment of the terms of the contract by the Contractor, or as to the intent or purpose of the contract.
- The Engineer shall, within a reasonable time after presentation, make decisions in writing on claims arising between the principals of the contract and shall make interpretations of the Plans and Specifications. Such decisions and interpretations shall be regarded as final.
4. **INSURANCE:** The Contractor or their subcontractor shall not commence work under this contract until he/she or his/her subcontractors have obtained the insurance required under this paragraph, and certificates of insurance coverage have been filed with and approved by the Owner. All Certificates of Insurance required herein shall state that ten (10) days written notice will be given to the Owner before the policy is cancelled or changed. Extent of insurance carried, and minimum coverage shall be as follows:

- a. **Worker's Compensation Insurance:** The Contractor shall obtain and keep in force during the life of the contract, Worker's Compensation Insurance covering all his/her employees engaged in work under this contract; and if any portion of the work is sublet, the subcontractor shall carry similar coverage for all of his/her employees engaged in the project. Worker's Compensation Insurance shall provide coverage for not less than the following amounts or greater where required by law:

Workers' Compensation Employer's Liability	Statutory \$1,000,000.00

- b. **Comprehensive General Liability Insurance:** The Contractor and his/her subcontractor shall obtain and maintain in effect during the life of the contract, Comprehensive General Liability Insurance including premise/operations; explosion, collapse and underground property damage; products/completed operations, broad form contractual independent contractors, broad form property damage and personal injury liabilities:

Bodily Injury:	\$1,000,000.00 each occurrence \$1,000,000.00 annual aggregate

Property Damage:	\$1,000,000.00 each occurrence \$1,000,000.00 annual aggregate

Personal injury, with Employment exclusion deleted:	\$1,000,000.00 annual aggregate

- c. **Comprehensive Automobile Liability Insurance:** The Contractor and his/her subcontractors shall obtain and maintain in effect during the life of the contract comprehensive automobile liability insurance including all owned (private and others) hired and non-owned vehicles:

Bodily Injury:	\$1,000,000.00 each person \$1,000,000.00 each accident
Property Damage:	\$1,000,000.00 each occurrence

5. **INDEMNIFICATION OF OWNER:** The Contractor hereby expressly binds himself/herself to defend, indemnify and save harmless the Owner, his/her agents and employees, from all suits and actions of every nature and description brought against them, on account of the construction of this work or by reason of any act of omissions, or malfeasance of the Contractor, his/her employees or agents, or any subcontractor or his agents or employees. The Contractor's responsibility under this paragraph applies equally to injuries to the Contractor's employees, sub-contractor employees, and bystanders. The Contractor is responsible for protection of life and property from harm, damage and injury.
6. **PRE-CONSTRUCTION MEETING AND NOTICE TO PROCEED:** A pre-construction meeting shall be held within fifteen (15) calendar days of receipt of contract documents.

A Notice to Proceed will be issued within seven (7) days after the pre-construction meeting.

Contractor must also furnish as part of the contract documents the Notice of "Intent to Pay Prevailing Wages" for himself/herself and all subcontractors that have been approved by the Department of Workforce Solutions prior to an issuance of the Notice to Proceed.

7. **LIQUIDATED DAMAGES:** It is mutually understood and agreed by and between the parties of this contract, in the execution of the same that time is of the essence of the contract. In the event that the Contractor shall fail to complete the work to be performed under this contract by and at the completion time stated in the proposal, the Contractor shall pay unto the Owner as and for the liquidated damages, and not as a penalty, the sum of money specified in the Special Conditions for each and every calendar day that the Contractor shall be in default. Extensions of time granted by the Owner in accordance with the provisions of Paragraph 11 shall not operate to the contrary, unless such extensions granted by the Owner specifically provide for the waiving of liquidated damages during and over such period of time extension.

Liquidated damages will be waived for and during the extent of any delay caused by the inability of the Contractor to obtain materials or equipment by reason of Federal Embargoes, priority order or other restrictions imposed by the United States government, provided that adequate evidence is presented by the Contractor to prove such delay and to enable the Owner to determine with exactness the extent and duration of such delay for each item of material and equipment involved.

The Owner shall have the right to deduct said liquidated damages from any monies in his/her hands, otherwise due, or to become due to said contractors, or to claim for and recover compensation for damages for non-performance of this contract at the time stipulated herein and provided for.

8. **RELEASE OF LIABILITY:** The acceptance by the Contractor of the last payment shall operate as, and be a release to, the Owner and every officer and agent thereof, from all claims and liability to the Contractor for anything done or furnished for, or relating to the work, or for any act of neglect of the Owner, or any person relating to or affecting the work.
9. **SUPERVISION AND INSPECTION:** All materials used, and all work done shall at all times be subject to the inspection, tests and approval of the Engineer and his authorized representatives.

The Contractor shall furnish samples for testing purposes of any material required by the Engineer and any information required concerning the nature or source of any material which he proposes to use. Detailed requirements concerning the making of laboratory tests and the payment therefore are included in the Detailed Specifications.

Inspectors may be appointed by the Engineer or the Owner, whose duty it shall be to see that the work is done properly and in accordance with the plans and specifications. Inspectors shall have authority, subject to the final decision of the Engineers, to condemn and reject any defective work or material and to suspend the work when the same is not being properly done.

Inspectors shall have no authority to permit any deviation from the plans and specifications except on written order from the Engineer. The Contractor will be liable for any deviation except on such written order.

All condemned work shall be promptly taken out and replaced by satisfactory work, and all condemned materials shall be promptly removed from the vicinity of the work. Should the Contractor fail or refuse to comply with instructions in this respect, the Owner may, upon certification by Engineer, withhold payment or proceed to terminate contracts as herein provided.

Any defective material or workmanship may be rejected by the Engineer at any time before the final acceptance of the work, even though the same have been previously overlooked and estimated for payment.

The Engineer and all duly authorized representatives shall at all times have the right to inspect the work for compliance with the plans and specifications. It shall be the responsibility of the Contractor to furnish reasonable facilities for the Engineers use in determining the progress and manner of the work, and in evaluating the quality of materials.

10. **WORKMANSHIP AND SUPERINTENDENCE:** The Contractor shall keep on his/her worksite, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Engineer. The superintendent shall represent the Contractor in his/her absence, and directions given to him/her shall be as binding as if given to the Contractor directly.

The Contractor shall provide tools and equipment and the services of all workmen, mechanics, tradesmen and other employees necessary in the construction and execution of the work contemplated and outlined herein. The employees of the Contractor shall be competent and willing to perform satisfactorily the work required of them. Any employee who is disorderly, intemperate or incompetent or who neglects or refuses to perform his/her work in a satisfactory manner, shall upon request of the Engineer, be promptly discharged and shall not be re-employed except with the Engineer's consent.

It is called particularly to the Contractor's attention that only first-class workmanship will be acceptable.

11. **DELAYS AND EXTENSIONS OF TIME:** The Contractor expressly covenants and agrees that in undertaking to complete the work and having made allowances for all of the ordinary delays and hindrances incident to such work whether growing out of delays in securing materials, workmen or otherwise. Should the Contractor, however, be delayed in the prosecution and completion of the work by reason of delayed shipment orders, or by any changes, additions or omissions therein ordered in writing by the Owner or by the abandonment of the work by men engaged hereon through no fault of the Contractor, or by embargoes, etc. which would affect the fabrication or delivery of materials and/or equipment to the work, or by delays caused by court proceedings, the Contractor shall have no claims for damages for any cause or delay, but he/she shall in such cases, be entitled to such extension of the time specified for the completion of the work as the Owner shall award in writing on account of such delays, provided however, that claim for

such extension of time is made by the Contractor to the Owner in writing within one week from the time when any such alleged cause for delay shall occur.

12. **ADDITIONAL, OMITTED OR CHANGED WORK:** Additional work shall be done as ordered in writing by the Owner, stating the location, character and amount of the work authorized. Additional work shall be subject to the same inspection and tests as though therein included.

Additions or deductions to quantities on items included in the proposal shall be adjusted as provided therefore.

Additional, omitted or changed work on which no unit price is provided shall be known as Unclassified Work, and compensation for the same shall be adjusted as follows:

- a. Unit bid prices previously approved.
- b. An agreed lump sum or unit prices.
- c. The actual cost of: (1) Labor, including foremen (2) Materials entering permanently into the work (3) The Ownership or rental cost of construction plant and equipment during the time of use on the extra work (4) Power and consumable supplies for the operation of power equipment (5) Insurance (6) Social Security and old age and unemployment contributions.

To the cost under (c) there shall be added a fixed fee to be agreed upon but not to exceed fifteen percent (15%) unless stated otherwise in the Bid Proposal of the actual cost of the work. The fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expenses. To the charge for extra work under (c) the Contractor may add applicable Local and State Gross Receipts Taxes.

Changed work shall be adjusted as mentioned, considering separately the parts of work and material omitted and parts of work and material added. Prior to the issuance of a change order for unclassified work, the Contractor shall furnish the Owner with an itemized list of cost for the proposed unclassified work.

Unclassified work bills shall be rendered by the Contractor no later than fifteen (15) days after the completion of each assignment of additional work, and if found correct, will be recommended for approval by the Engineer and presented for payment with the next regular monthly estimate. An itemized statement of the cost of the work, together with such material and labor bills as may be required, shall be filled with all Unclassified Work bills.

Unclassified Work bills for work omitted from plans shall be estimated at the time omission of the work is authorized and the estimated cost therefore is deducted from subsequent monthly estimates.

If the Contractor claims compensation for additional work not ordered as aforesaid, or for damages sustained, he/she shall make a written statement of claims for compensation of damages to the Engineer, which shall be in the hands of the Engineer within such time as will allow a full consideration of the basis for such claim, and in no case later than fifteen (15) days after the work has been completed or damages sustained. The Contractor shall

furnish, if required, any accounts, bills, and vouchers relating thereto. Unless such claims are made as required they shall be considered forfeited and invalid.

The Owner reserves the right to contract with any person or firm other than the Contractor for any or all extra work. The Contractor's attention is especially called to the fact that he/she shall be entitled to no claim for damages for anticipated profits on any portion of the work that may be omitted.

13. **SUSPENSION OF WORK:** The Owner may at any time suspend the work, or any part thereof for a period not to exceed ninety (90) days by notice to the Contractor in writing. The work shall be resumed by the Contractor within ten (10) days after the date fixed in the written notice from the Owner to the Contractor to do so.

But if the work, or any part thereof, shall be stopped by the notice in writing aforesaid, and if the Owner does not give notice in writing to the Contractor to resume work at a date within ninety (90) days of the date fixed in the written notice to suspend, then the Contractor may abandon that portion of the work so suspended, and he will be entitled to the estimate and payments for all work done on the portions so abandoned.

14. **OWNER'S RIGHT TO DO WORK:** If the Contractor should neglect to perform the work properly or fail to perform any provision of this contract, the Owner may, without prejudice to any other remedy, make good such deficiencies and deduct the thereof from the payment then or thereafter due to the Contractor.

15. **PAYMENT TO CONTRACTORS:** On or about the 25th day of each month, the Engineer will make an approximate estimate of the value of work done and unused materials delivered and stored on the site of the work during the previous calendar month. After each such estimate has been approved by the Owner, the Owner shall pay to the Contractor up to one hundred (100%) percent of the amount of the work completed less previous partial payments. Payments to the contractor will be made within 21 days of receipt of undisputed amount of any pay request based on work completed.

16. **PAYMENT WITHHELD FROM CONTRACTOR:** The Owner may withhold or nullify the whole or a part of any certificate, on account of subsequently discovered evidence, to such extent any may be necessary to protect himself or herself from loss on account of:

- a. Defective work not remedied.
- b. Claims filed or reasonable evidence indicating probable filing of claims.
- c. Failure of the Contractor to make payments properly to subcontractors or for material or labor.
- d. A reasonable doubt that the contract can be completed for the unpaid portion of the contract amount.
- e. Damage to another Contractor.
- f. Failure to maintain traffic control, Storm Water Pollution Prevention and dust control.
- g. Any other violation of, or failure to comply with the provisions of this contract.

When the above grounds are removed, payment shall be made for amounts withheld because of them.

17. **ACCEPTANCE AND FINAL PAYMENT:** The Contractor shall not be entitled to demand or receive payment for any portion of the work except in the manner and amount and in accordance with terms and provisions of this agreement. Payment of the final amount due under the contract shall release the Owner from all liability to the Contractor and his/her subcontractors and suppliers on the project; provided that such payment and acceptance shall not relieve the Owner or the Contractor from the duty of complying with all applicable State Statutes, Laws, Rules and Regulations.

As soon as the work has been substantially and satisfactorily completed, the Engineer will make a final estimate stating that the work provided for under this contract, has been completed and is accepted by him/her under the terms and conditions thereof, with qualifications, if any, as stated and the balance found to be due. Required submittals to receive final payment include approved affidavit of wages paid from Department of Work Force Solution must be received by the Owner prior to final payment to be released, Certification of Labor Standards Compliance, Release of Liens, Written Consent of Surety, Manufacturers O&M Manuals, Final Pay Request and Change Order. Prior to filing of the final estimate, the Contractor shall file with the Engineer, a receipt in full from each manufacturer, subcontractor and dealer for all equipment and materials used on the work and a complete release on all liens which may have arisen from this contract. In lieu, thereof, the Contractor shall file statements showing balance due on all accounts.

The making and acceptance of the final payment shall not constitute a waiver of claims by the Owner for faulty work or materials appearing or discovered after final payment, or to relieve the Contractor of his obligations under provisions of the Contract Surety Bond.

The as-built drawings, final adjusting change order, and release of lien from surety, subcontractors, suppliers and property owners shall be provided to the Owner before final payment will be made.

18. **CONSTRUCTION SCHEDULE:** Upon award of the contract and prior to the Pre-Construction Meeting, the Contractor shall submit to the Owner a progress schedule satisfactory to the Owner, showing the Notice to Proceed date and completion of major subdivisions of the work. The Contractor must agree to start work on the date indicated in the Notice to Proceed and complete the work within the prescribed contract time, including monthly anticipated adverse weather days.

Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
6	4	3	2	3	3	8	9	4	3	2	7

Time Extensions for Unusually Severe Weather - Time extensions for unusually severe weather shall be considered provided the following conditions are present:

1. The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.
2. The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without fault or negligence of the Contractor. The following schedule of monthly anticipated adverse weather delays due to precipitation and temperature is based on National Oceanic and Atmospheric Administration (NOAA) data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all-weather dependent activities. Wind is not considered in the Monthly Anticipated Adverse Weather Calendar Day Schedule.

Monthly Anticipated Adverse Weather Delay

Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the Contractor's scheduled work day. If the number of days anticipated above is exceeded, the Contractor will be given full consideration for equivalent fair-weather work days and issue a change order at the conclusion of the contract.

19. **WATER, GAS AND ELECTRICITY:** All water, gas, electricity or other facilities required to complete the project shall be provided by the Contractor at his expense, unless specifically modified in other portions of the Contract Documents.
20. **CHARGES FOR ENGINEERING AND INSPECTION:** Should completion of the work extend beyond the time allowed by the Contract Documents or supplements thereto, it is expressly understood that in addition to any other penalty or damage suffered by the Owner, the Engineering inspection cost, caused by virtue of the delay, may be charged to the Contractor and be deducted from monies due the Contractor. This cost is included in the liquid damages as specified in the special conditions.
21. **OWNER'S RIGHT TO TERMINATE CONTRACT:** In the event that any of the provisions of this contract are violated by the Contractor, or by any of his/her subcontractors, the Owner may serve written notice upon the Contractor and the surety of his/her intention to terminate the contract. Such notices are to contain the reasons for intention to terminate the contract and unless within ten (10) days after the serving of such notice upon the Contractor, such violation or delay shall cease, and satisfactory arrangement of correction be made, the contract shall, upon the expiration of said ten (10) days, cease and terminate. In the event of any such termination, the Owner shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the contract; provided, however, that if the Surety does not commence performance thereof within ten (10) days from the date of the mailing to such surety of notice of termination, the Owner may take over the work and prosecute the same to completion by contract or by force account for the account and at the expense of the Contractor. The Contractor and his/her Surety shall be liable to the Owner for any excess cost incurred by the Owner thereby, and in such event the Owner

may take possession of and utilize in completing the work such materials, appliances and plant as may be on the site of the work and necessary therefore.

TERMINATION FOR CONVENIENCE: Upon written notice to contractor owner may, without cause and without prejudice to any other right or remedy, elect to terminate the agreement. In such case, the Contractor shall be paid for all work executed and any reasonable expense sustained.

22. **TESTING:** All materials, supplies, equipment and soil to be incorporated into the work under this contract, shall be tested as specified in the technical specifications. Test results shall be furnished to the Engineer as soon as possible after completion of tests.
23. **SUBMITTALS, SHOP AND ERECTION DRAWINGS:** The Contractor shall submit to the Engineer for his/her approval, five (5) copies of all Manufacturer's data and literature and shop and erection drawings for all material required for the work. Submittal data shall include the storm water pollution plan, construction schedule and traffic control plans. A submittal registry shall be provided to identify date of material submittal. Submittals shall be provided in a timely manner. Two (2) copies of submittal literature will be returned to the Contractor with the Engineer's approval or disapproval noted thereon.
24. **COMPLETED WORK REQUIRED:** The plans and specifications for the work to be carried out under this contract are intended to include all components of the total job and to show all information and detail for completion of a workable facility, notwithstanding that each and every item of work may or may not be shown or detailed. It shall be the responsibility of the Contractor to complete the improvement and turn over to the Owner a good and workable facility.
25. **SECURITY:** The City does not assume any responsibility, at any time, for the protection of or loss of materials from the time that contract operations have commenced until the final acceptance of the work by the project manager.
26. **CLEANING:** The contractor shall keep the premises clean of all rubbish and debris generated by the work involved. All surplus material, rubbish, debris shall be disposed of by the contractor at the contractor's expense. The City will not be responsible for theft or damage to the contractor's property. It shall be the contractor's responsibility to at all times maintain a safe working environment. All possible safety hazards to workers or the public shall be corrected immediately, and the premises left in a safe condition at the end of each work day.

SPECIAL CONDITIONS

- SC-1 **SPECIAL CONDITIONS:** If any conflict is found between the Special Conditions and other portions of these specifications, the Special Conditions shall govern.
- SC-2 **INTERPRETATION OF DRAWINGS AND DOCUMENTS:** Any interpretation of the documents by the Owner will be made by addendum issued by the Engineer.
- SC-3 **DRAWINGS:** The project drawings are hereby made a part of the Contract Documents.
- SC-4 **SAFETY:** The Contractor shall, at all times, exercise reasonable precautions for the safety of employees on the work, bystanders or observers of the project, engineering personnel, inspectors and shall comply with all applicable provisions of the State and Municipal Safety Laws and Building Construction Codes. The Contractor shall be solely responsible for safety on the project.
- SC-5 **USE OF EXPLOSIVES:** Use of explosives is not permitted on this project.
- SC-6 **BID QUANTITIES:** The quantities set forth in the Bid Proposal are estimated quantities required to complete the work shown on the drawings. Payment will be made for the actual work performed. The Owner reserves the right to increase or decrease quantities any reasonable amount as required to complete the work and as best serves its interest.
- SC-7 **INSURANCE:** The Contractor will be required to carry insurance coverage as specified in Section 4 of the General Conditions. Insurance certificates naming the City of Gallup as a certificate holder shall be provided.
- SC-8 **EXISTING UTILITIES:** The location, size and depth of existing buried utility lines shown on the drawings are based on information available from the Owners of the utilities but in some locations, are not accurately known. The Contractor shall make a diligent effort to locate all existing utilities in the construction area and to protect them from damage as a result of his construction activity. Any utility damaged through the Contractors negligence and failure to use due caution in carrying out his work shall be repaired at his cost to the utility Owners satisfaction.
- SC-9 **WATER FOR CONSTRUCTION:** Water for waterline construction and earthwork shall be taken from the east plant water loading station. Water for waterline testing and disinfection shall be taken from a city fire hydrant or waterline designated by the City. Connections to fire hydrants or city waterlines shall be equipped with a flow meter and back flow prevention device. Contact Gallup Joint Utilities for access and payment.
- SC-10 **TIME OF COMPLETION AND LIQUIDATION DAMAGES:** The Bidder must agree to commence work on a date to be specified in a written Notice to Proceed

issued by the Engineer and to fully complete the project within one hundred eighty (180) calendar days thereafter. The bidder must agree, also to pay as liquidated damages, the sum of one thousand (\$1000) for each consecutive day thereafter as provided in the General Conditions.

- SC-11 WASTE DISPOSAL: All waste materials from this project shall be disposed of in an environmentally acceptable manner. Private entities located near the City limits, accept recyclable materials. Bidders should make themselves aware of the location of these entities.

The Contractor shall be responsible for locating acceptable sites for placing waste soil or rock.

- SC-12 TRAFFIC CONTROL: The Contractor shall provide warning signs, barricades, night time flashers and other devices as required to adequately warn the public and protect the workmen involved for all work in adjacent streets.

The Contractor will be responsible for setting up, revising and relocating while maintaining traffic control devices for the numerous construction sequences of the project. Daily requirements for minor changes for special situations shall be the responsibility of the Contractor.

- SC-13 PROJECT CONDITIONS DURING CONSTRUCTION: The Contractor shall maintain the project site as orderly and secure as possible during construction. The amount of open trench at any time shall be held to a minimum, with backfill complete at the end of each work day. Streets and detour routes shall be maintained to be passable and safe. Access to businesses, residences, utilities and public facilities shall be protected from the effects of storm runoff that may become greater due to construction activities. Gravel (base course) shall be placed as required for temporary or permanent access to businesses or residences. Brooming and dust suppression shall be carried out as required. The work site shall be secured at days end and to a greater extent on weekends. The Contractor shall provide local personnel, available on 24-hour call to check conditions and handle weekend emergencies in connection with the project.

All streets and intersections shall be open to traffic each weekend.

The Contractor shall protect shrubs, grass and decorative landscape to the extent possible. When removal of such is required for construction, replacement shall be with equal or better items.

It is suggested that the Contractor's construction sequences should be such that the amount of the project that could be damaged by runoff from summer rains at any one time, is held to a minimum. Water that collects in the work area from runoff or damaged utility lines shall be removed by pumping or providing drainage routes immediately

SC-14 SUBMITTALS: Complete submittal data including shop drawings shall be furnished for approval on all materials and items to be supplied for the project. All calculations shall be included in the submittals. A traffic control plan for minor operations shall also be submitted to the City and Engineer for approval.

SC-15 LINES, GRADES AND CONSTRUCTION STAKING: All lines and grades for preliminary layout of the work will be established by the Owner's representative (Engineer), but the Contractor shall provide such material and give such assistance as may be required. After the preliminary layout of the work has been accomplished, the Contractor shall, at his own expense, furnish all labor, materials and supplies for detail, layout and location of work and shall be responsible for constructing the work to the established lines and grades. The Contractor shall give notice to the Owner for lines and grades at least two (2) working days prior to the time he plans to commence work. The Contractor shall be responsible for protecting and preserving established lines and grades.

The Engineer will provide the following construction staking:

1. Offsets for channels and waterlines
2. Offsets for roadway
3. Grade stakes in flat areas

Occasional stake replacement required when stakes are unavoidably lost due to construction will be replaced by the Engineer, provided however, that the cost of stake replacement due to carelessness or inattentive construction around survey control will be deducted from Payment to the Contractor.

Random bench marks will be established for use by the Contractor. The Contractor will be responsible for bluetop staking for subgrade and base course. Detailed measurements and elevations for structures and pipelines shall be the responsibility of the Contractor with occasional checks by the Engineer.

Blue Top construction staking requirements by the Contractor shall be considered incidental to the project.

SC-16 STORM WATER POLLUTION PREVENTION: It shall be the responsibility of the Contractor to formulate plans, implement plans, obtain permits, and file Notices of Intent and Notices of Termination (Appendix A) in regard to Storm Water Pollution Prevention. Work on this item shall be considered incidental to the project. Section 107 of the Technical Specifications is contained herein to provide information for the Contractor in regard to requirements that may apply to this item.

SC-17 **TESTING COSTS:** Testing for soil densities, concrete strength, welding, and asphalt quality shall be performed by an approved independent testing lab and paid for by the Contractor. The Contractor will be reimbursed his invoice cost.

SC-18 **CLEANUP AND RESTORATION OF PROPERTY:** Prior to preparation of the final pay estimate, the Contractor shall remove from the site of the work, all rubbish, unused material, temporary buildings, excess earth or pavement rubble, and shall leave the premises in good order and condition, subject to approval of the Owner.

SC-19 **IMPORTED GRANULAR MATERIAL:** This material may be furnished from any suitable source chosen by the Contractor. The material shall be sandy in nature, friable with no clods or clay balls and exhibit minimal "pumping" characteristics when compacted at moisture content slightly below optimum. In addition, material shall meet the following general gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
1"	100
No. 4	40-100
No. 200	less than 35

PI<12

Acceptable sources on past projects include the following locations:

1. Crusher fines from local aggregate companies
2. Rio Puerco from locations approved by the City Public Works Director. Locations will be in the vicinity of the area between Highway 491 overpass and the Allison Rio Puerco crossing.

SC-20 **COMPACTION:** Material shall be compacted to the designated percentage of Standard Proctor, or Modified Proctor as called for.

SC-21 **SEQUENCE OF WORK:** This construction sequence of work shall minimize the duration and number of times existing water facilities are taken off line or shut down. The contractor shall closely coordinate all work with city personnel and the engineer.

SC-22 **WEATHER EFFECTS:** Typical intense rains and/or rapid snow melt will cause substantial runoff. Contractor shall take precaution as required to keep water (runoff) away from new concrete construction including subgrade and basecourse and utility trenches. Private and public property shall be protected from ponding and accompanying diversions that would cause damage.

SC-23 **WEEKEND PERSONNEL:** The Contractor shall provide personnel for handling emergencies and maintaining traffic control during weekends and holidays when

the normal crews are not available. Personnel shall be readily accessible by phone on a 24 hour basis and shall be living in the City while on duty.

SC-24 TRENCH SAFETY: The Contractor shall be solely responsible for safety on the project however; the City will expect that all project operations proceed in a planned, safety conscious manner. The Contractor will be expected to use shoring, sloped ditch banks, moveable boxes of various combinations of these and other techniques per state and local requirements to achieve a safe project. Bidders should be thoroughly familiar with requirements of CFR 29 prior to bidding.

SC-25 PERMITS: The Bidder should inform himself as to permits required, such as NMDOT Utility Work Permit. Contractor is responsible for obtaining all work permits.

Note: Contractor to provide insurance as required by NMDOT for work within Right of Way.

SC-26 DESCRIPTION OF BID ITEMS AND BASIS OF PAYMENT: A description of the work included in each bid item together with method of measurement and payment for items of work follows:

LOT 1 - 24" WATERLINE CONSTRUCTION

Note: Items for this lot consist of furnishing all materials, plant, equipment and labor required to install, construct, or provide items described herein.

ITEMS 1, 2, & 3: These items of work consist of installing water pipe of the diameter and material specified complete with horizontal and vertical main line fittings designated on the project drawings and specifications. Pipe installed on horizontal curves shall be within recommended maximum joint deflection tolerances. Shorter pipe joints, additional solid sleeves or additional fittings as required to maintain alignment along curve and meet deflection requirements are included with these items. These items include trenching, granular bedding and rock free native backfill, required restrained joints and poly wrap (on ductile iron pipe) are included in these items. The required cutting of pipe to provide required joint distance from sewer service or mains shall be considered incidental to these items. Required repair of damaged items that were accurately located by the utility owner, such as existing services that are crossed and all operations required to maintain service to the fullest extent possible shall be included in the Unit Price Bid. "Potholing" to gather information on existing facilities at crossings shall be incidental to this item. Vertical fittings that are required because of conditions encountered during construction will be paid for under a separate item. These items do not include pavement removal and replacement or rock excavation. Measurement will be by the linear foot taken horizontally along the centerline of the pipe through valves, manholes, and fittings without correction for slope

LOT 1 - 24" WATERLINE CONSTRUCTION- CONTINUED

distance. Payment will be for the actual linear feet of pipe installed complete and in place at the **Contract Unit Price Bid per Linear Foot.**

ITEM 4: This item of work consists of installing 24" AWWA C515 horizontal resilient wedge, epoxy coated gate valves with bypass valves as specified and MJ connections of the diameter specified complete and in place with concrete collars, concrete supports and screw type cast iron valve boxes as shown on the project drawings. Payment will be for the actual number of valves installed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 5: This item of work consists of installing 12" AWWA C509 resilient wedge, epoxy coated gate valves with bypass valves as specified and MJ connections of the diameter specified complete and in place with concrete collars, concrete supports and screw type cast iron valve boxes as shown on the project drawings. Payment will be for the actual number of valves installed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 6: This item of work is for installing Type 2A air release station including vault, vent piping, piping, 2" valve and fittings between ARV and main line tee, 2" air and vacuum devices as specified, protection bollards, excavation and backfill main line tee, but not mainline pipe. Payment will be for the actual number of stations installed as detailed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 7: This item of work is for installing GRP Type 2 air release station including vault, vent piping, piping, 2" valve, fittings and main line tee, 2" air and vacuum devices as specified, protection bollards, excavation and backfill main line tee, but not mainline pipe. Payment will be for the actual number of stations installed as detailed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 8: This item of work consists of installing 24" 1 1/4° vertical ells including restraints and thrust blocks as required during construction, but not designated on the project drawings. Payment will be made for each 1 1/4° ell installed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 9: This item of work is for the installation of flushing apparatus with pipe, reducers, and pipe restraint as required on the mainline fitting as called for in project drawings. Including the subsequent removal of ells, discharge piping and installation of permanent plug and blocking and flowable fill. This item does not include 12" gate valve or main line fittings. Payment will be made at the **Contract Unit Price Bid per Each** apparatus installed at designated locations only. Other locations, as may be desired by the Contractor will be incidental to the project.

LOT 1 - 24" WATERLINE CONSTRUCTION- CONTINUED

ITEMS 10 & 11: These items of work consist of completing tie-ins of existing water lines to new 24" waterline at the designated locations as detailed. The connection shall include fittings, specials, polyethylene wrap concrete blocking, piping as required, trenching, granular bedding and rock free native backfill. This item does not include valves, pavement removal and replacement and rock excavation. "Megalug" restraining glands (or equal) shall be provided for the M.J. fittings and shall be considered incidental to the tie-ins. Plugging of existing lines (for permanent abandonment) shall be considered incidental to tie-ins. All coordination required with the City, other utilities and notification of areas effected by outage shall be included. Payment will be made for the tie-in at each location as detailed complete and in place at the **Contract Lump Sum Price Bid**.

ITEM 12: This item of work consists of installing a fire hydrant assembly including 6" gate valve, up to 10' of 6" ductile iron pipe, fire hydrant, fittings, specials as required. This item includes trenching, granular bedding, and rock free backfill. Disinfection and set up of fire hydrant. This item also includes one 10.5-ounce bottle of A-51 hydrant lubricating oil and one hydrant operating wrench. Payment will be made for a fire hydrant assembly installation as detailed complete and in place at the **Contract Unit Price per Each**.

ITEM 13: This item of work consists of installing high pressure water service meter including 6" gate valve, up to 5' of 6" ductile iron pipe, up to 10' of Type K copper service line, ¾" tapped 6" cap, meter, pressure reducing valve, tandem meter can, valves, fittings, specials, and connection to customer service lines as required. This item includes trenching, granular bedding, and rock free backfill. Disinfection, set-up, and calibration of meter assembly including pressure reducing valve and meter is included in this item. This item also includes coordination with customer to set-up City of Gallup water accounts. Payment will be made for a high pressure meter service installation as detailed complete and in place at the **Contract Unit Price per Each**.

ITEM 14: This item of work consists of installing ¾" Type K copper service line, from main line plug water service meter can as required. This item includes trenching, granular bedding, and rock free backfill. Disinfection of service line is also included in this item. This item also includes coordination with customer to set-up City of Gallup water accounts. Payment will be made for service line installed as detailed complete and in place at the **Contract Unit Price per Linear Foot**.

ITEM 15: This item of work consists of removing an existing flanged ductile iron pipe spool piece and replacing it with a City supplied flanged pressure reducing valve in the Kachina PRV station as detailed. This item includes disassembly of existing flanged pipe fittings, and valves as required and re-assembly with new gaskets. All gaskets shall be replaced on disassembled flanges. Disinfection, set-

LOT 1 – 24” WATERLINE CONSTRUCTION- CONTINUED

up, and calibration of pressure reducing valve is included in this item. Set-up and calibration shall be performed by a Cla-Val representative. This item also includes coordination with City personnel to set-up City distribution and valve closures. Payment will be made for the PRV installation as detailed complete and in place at the **Contract Lump Sum Price Bid**.

ITEMS 16 & 17: These items of work are for the excavation of Type “A” and Type “B” rock for waterline, valve, and tie-in construction. Removal and disposal of rock is included in this item. Rock type definitions are contained in the technical specifications and rock type samples are available in the office of the Engineer. The use of equipment such as manual or machine operated jack hammers on Type ‘B’ rock does not mean payment will be made at the Type ‘A’ rate. Measurement for rock shall be by the rock trench pay width as detailed, with depth and classification by the Engineer with the Contractors’ representative present when trench is open. Payment for this item will be made at the **Contract Unit Price Bid per Cubic Yard**.

ITEMS 18 & 19: These items of work consist of completing grade control structures as detailed. The structures shall include rock fill, wire baskets, wire fabric, tie and splice wire, non-woven geofabric, excavation, backfill, and appurtenances. These items do not include rock excavation. Payment will be made for each grade control structure as detailed complete and in place at the **Contract Lump Sum Price Bid**.

ITEM 20: This item of work is for wire enclosed rip-rap as detailed on the project drawings. This item includes the removal of existing rip-rap as required for waterline construction. Measurement will be based on actual surface dimension along the slope. Payment will be made for wire enclosed rip-rap complete and in place at the **Contract Unit Price Bid per Square Yard**.

ITEM 21: This item of work is for removing existing asphalt paved road section from 24” Station 24+15 to Station 45+40 and constructing a 20’ wide Typical Gravel Road as detailed. This item includes removal of existing asphalt pavement and excess material, grading to match existing finished grades and tie into existing bar ditches, 6” thick base course surfacing, and compaction. Payment will be made for typical gravel road complete and in place for the **Contract Unit Price per Linear Foot**.

ITEM 22: This item of work is for asphalt pavement removal and patch (6” PMBP asphalt on 6” base course) as detailed on project drawings. Payment will be made for asphalt patch complete and in place at the **Contract Unit Price Bid per Square Yard**.

LOT 1 – 24” WATERLINE CONSTRUCTION- CONTINUED

ITEM 23: This item of work is for removing existing gravel and installing 4” of gravel (NMDOT TYPE 1 or 2 base course) surfacing for roads, driveways and other areas. Gravel is to be watered, rolled and compacted in place. Payment will be made for gravel surfacing complete and in place at the **Contract Unit Price Bid per Square Yard.**

ITEM 24: This item of work is for installing archeological fencing with orange plastic safety fence, bracing, corner posts and pull posts Payment will be made for archeological fencing complete and in place at the **Contract Unit Price Bid per Linear Foot.**

ITEM 25: This item of work is for implementation, execution and maintenance of a traffic control and safety plan including, but not limited to, temporary fencing, signs, and channeling devices as required throughout the project. Traffic control plans shall conform to MUTCD standards and be approved by the Engineer for all phases of work. Partial payments shall be made equal to the percentage of waterline complete and in place. Payment for this item will be made per the **Contract Lump Sum Price Bid.**

ITEM 26: This item of work is for providing soil and materials testing (PMBP, soils, base course, and concrete) by an approved independent testing lab employed by the Contractor. Costs for excessive testing indicating non-compliance shall be borne by the Contractor. Note: testing labs and personnel to be approved by the City. Lab distances from the project, and required travel times will be a major consideration for approval. Travel times, per diem, mileage and gross receipts tax will not be reimbursable. **Payment will be made on an approved invoice charge.**

ITEM 27: This item of work is for furnishing a hydraulic valve operator and two (2) “T” handle operators, as specified to the City. Payment for this item will be made per the **Contract Lump Sum Price Bid.**

ITEM 28: This item of is for significant down time caused by unexpected encounters with historical, archaeological or environmental items. The down time begins after the encounter and when the Archaeologist or Biologist (Government or Engineers) is notified. The down time ends when trenching or pipe laying resumes, either at the location of the encounter or at the different “leap frog” location. Such a new location will be determined after communication between the Archaeologist or Biologist, Engineer and Contractor. Notice to resume work to be verbal, followed by a written notice. The Contractor is to be aware that certain auxiliary operations may continue after shutdown such as backfilling, imported material hauling, water hauling, backfill processing, and other related operations. The Contractor is to consider the net effect of all the items above to compute the cost during down time.

LOT 1 – 24” WATERLINE CONSTRUCTION- CONTINUED

Holidays, weekends and after hour work hours are not included in this item. If unknowns encountered are such that major design revisions are required and that there is no other location to direct construction to utilizing the equipment operating prior to shutdown; then the contract price is to be adjusted in accordance with provisions in the General Conditions. Payment will be made at the **Contract Unit Price Bid per Hour of Shutdown**.

LOT 2 – 16” WATERLINE CONSTRUCTION

Note: Items for this lot consist of furnishing all materials, plant, equipment and labor required to install, construct, or provide items described herein.

ITEMS 1, 2, & 3: These items of work consist of installing water pipe of the diameter and material specified complete with horizontal and vertical main line fittings designated on the project drawings and specifications. Pipe installed on horizontal curves shall be within recommended maximum joint deflection tolerances. Shorter pipe joints, additional solid sleeves or additional fittings as required to maintain alignment along curve and meet deflection requirements are included with these items. These items include trenching, granular bedding and rock free native backfill, required restrained joints and poly wrap (on ductile iron pipe) are included in these items. The required cutting of pipe to provide required joint distance from sewer service or mains shall be considered incidental to these items. Required repair of damaged items that were accurately located by the utility owner, such as existing services that are crossed and all operations required to maintain service to the fullest extent possible shall be included in the Unit Price Bid. “Potholing” to gather information on existing facilities at crossings shall be incidental to this item. Vertical fittings that are required because of conditions encountered during construction will be paid for under a separate item. These items do not include pavement removal and replacement or rock excavation. Measurement will be by the linear foot taken horizontally along the centerline of the pipe through valves, manholes, and fittings without correction for slope distance. Payment will be for the actual linear feet of pipe installed complete and in place at the **Contract Unit Price Bid per Linear Foot**.

ITEM 4: This item of work is for 274 linear foot jack and bore crossing of U.S. Hwy 491 with 16” Cl. 350 DIP carrier pipe with restrained push-on type joints using ductile iron locking segments in a 26” diameter, 0.375” wall, steel casing including casing spacers, end seals and appurtenances complete and in place as detailed. Payment will be made for waterline crossing complete and in place at the **Contract Lump Sum Price Bid**.

LOT 2 - 16" WATERLINE CONSTRUCTION- CONTINUED

ITEM 5: This item of work is for 65 linear foot jack and bore crossing a steep slope with 16" Cl. 350 DIP carrier pipe with restrained push-on type joints using ductile iron locking segments in a 26" diameter, 0.375" wall, steel casing including casing spacers, end seals and appurtenances complete and in place as detailed. Payment will be made for waterline crossing complete and in place at the **Contract Lump Sum Price Bid.**

ITEM 6: This item of work consists of installing 16" AWWA C515 horizontal resilient wedge, epoxy coated gate valves as specified and MJ connections of the diameter specified complete and in place with concrete collars, concrete supports and screw type cast iron valve boxes as shown on the project drawings. Payment will be for the actual number of valves installed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 7: This item of work consists of installing 12" AWWA C509 resilient wedge, epoxy coated gate valves with bypass valves as specified and MJ connections of the diameter specified complete and in place with concrete collars, concrete supports and screw type cast iron valve boxes as shown on the project drawings. Payment will be for the actual number of valves installed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 8: This item of work is for installing Type 2 air release station including vault, vent piping, piping, 2" valve, fittings and main line tee, 2" air and vacuum devices as specified, protection bollards, excavation and backfill main line tee, but not mainline pipe. Payment will be for the actual number of stations installed as detailed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 9: This item of work consists of installing 16" 11¼° vertical ells including restraints and thrust blocks as required during construction, but not designated on the project drawings. Payment will be made for each 11¼° ell installed complete and in place at the **Contract Unit Price Bid per Each.**

ITEM 10: This item of work is for the installation of flushing apparatus with pipe, reducers, and pipe restraint as required on the mainline fitting as called for in project drawings. Including the subsequent removal of ells, discharge piping and installation of permanent plug and blocking and flowable fill. This item does not include 12" gate valve or main line fittings. Payment will be made at the **Contract Unit Price Bid per Each** apparatus installed at designated locations only. Other locations, as may be desired by the Contractor will be incidental to the project.

LOT 2 - 16" WATERLINE CONSTRUCTION- CONTINUED

ITEM 11: This item of work consists of completing Tie-in 'C' of existing water lines to new 16" waterline at the designated location as detailed. The connection shall include fittings, specials, polyethylene wrap concrete blocking, piping as required, trenching, granular bedding and rock free native backfill. This item does not include valves, pavement removal and replacement and rock excavation. "Megalug" restraining glands (or equal) shall be provided for the M.J. fittings and shall be considered incidental to the tie-ins. Plugging of existing lines (for permanent abandonment) shall be considered incidental to tie-ins. All coordination required with the City, other utilities and notification of areas effected by outage shall be included. Payment will be made for the tie-in at each location as detailed complete and in place at the **Contract Lump Sum Price Bid**.

ITEM 12: This item of work consists of installing a fire hydrant assembly including 6" gate valve, up to 10' of 6" ductile iron pipe, fire hydrant, fittings, specials as required. This item includes trenching, granular bedding, and rock free backfill. Disinfection and set up of fire hydrant. This item also includes one 10.5-ounce bottle of A-51 hydrant lubricating oil and one hydrant operating wrench. Payment will be made for a fire hydrant assembly installation as detailed complete and in place at the **Contract Unit Price per Each**.

ITEM 13: This item of work consists of installing high pressure water service meter including 6" gate valve, up to 5' of 6" ductile iron pipe, up to 10' of Type K copper service line, ¾" tapped 6" cap, meter, pressure reducing valve, tandem meter can, valves, fittings, specials, and connection to customer service lines as required. This item includes trenching, granular bedding, and rock free backfill. Disinfection, set-up, and calibration of meter assembly including pressure reducing valve and meter is included in this item. This item also includes coordination with customer to set-up City of Gallup water accounts. Payment will be made for a high pressure meter service installation

ITEM 14: This item of work consists of installing ¾" Type K copper service line, from main line plug water service meter can as required. This item includes trenching, granular bedding, and rock free backfill. Disinfection of service line is also included in this item. This item also includes coordination with customer to set-up City of Gallup water accounts. Payment will be made for service line installed as detailed complete and in place at the **Contract Unit Price per Linear Foot**.

ITEM 15 & 16: These items of work are for the excavation of Type "A" and Type "B" rock for waterline, valve, and tie-in construction. Removal and disposal of rock is included in this item. Rock type definitions are contained in the technical specifications and rock type samples are available in the office of the Engineer. The use of equipment such as manual or machine operated jack hammers on Type

LOT 2 - 16" WATERLINE CONSTRUCTION- CONTINUED

'B' rock does not mean payment will be made at the Type 'A' rate. Measurement for rock shall be by the rock trench pay width as detailed, with depth and classification by the Engineer with the Contractors' representative present when trench is open. Payment for this item will be made at the **Contract Unit Price Bid per Cubic Yard**.

ITEMS 17, 18 & 19: These items of work consist of completing grade control structures as detailed. The structures shall include rock fill, wire baskets, wire fabric, tie and splice wire, non-woven geofabric, excavation, backfill, and appurtenances. These items do not include rock excavation. Payment will be made for each grade control structure as detailed complete and in place at the **Contract Lump Sum Price Bid**.

ITEM 20: This item of work is for removing existing gravel and installing 4" of gravel (NMDOT TYPE 1 or 2 base course) surfacing for roads, driveways and other areas. Gravel is to be watered, rolled and compacted in place. Payment will be made for gravel surfacing complete and in place at the **Contract Unit Price Bid per Square Yard**.

ITEM 21: This item of work is for the installation of 6' high, 12' wide, double panel chain link gates. This item includes post, gate frames, chain link fabric, hardware, concrete, and appurtenances, Payment will be made for chain link gate as detailed complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 22: This item of work is for implementation, execution and maintenance of a traffic control and safety plan including, but not limited to, temporary fencing, signs, and channeling devices as required throughout the project. Traffic control plans shall conform to MUTCD standards and be approved by the Engineer for all phases of work. Partial payments shall be made equal to the percentage of waterline complete and in place. Payment for this item will be made per the **Contract Lump Sum Price Bid**.

ITEM 23: This item of work is for providing soil and materials testing (PMBP, soils, base course, and concrete) by an approved independent testing lab employed by the Contractor. Costs for excessive testing indicating non-compliance shall be borne by the Contractor. Note: testing labs and personnel to be approved by the City. Lab distances from the project, and required travel times will be a major consideration for approval. Travel times, per diem, mileage and gross receipts tax will not be reimbursable. **Payment will be made on an approved invoice charge.**

LOT 2 - 16" WATERLINE CONSTRUCTION- CONTINUED

ITEM 24: This item of work is for furnishing the following wire fence materials and seed mix to the City.

Wire Fence Materials:

- 180 6' long steel T-posts
- 8 rolls of 11-gauge barbed wire
- 200 steel fence stays

Seed Mix:

- 2 50-pound bags of seed mix as specified.

Payment for this item will be made per the **Contract Lump Sum Price Bid**.

ITEM 25: This item is for significant down time caused by unexpected encounters with historical, archaeological or environmental items. The down time begins after the encounter and when the Archaeologist or Biologist (Government or Engineers) is notified. The down time ends when trenching or pipe laying resumes, either at the location of the encounter or at the different "leap frog" location. Such a new location will be determined after communication between the Archaeologist or Biologist, Engineer and Contractor. Notice to resume work to be verbal, followed by a written notice. The Contractor is to be aware that certain auxiliary operations may continue after shutdown such as backfilling, imported material hauling, water hauling, backfill processing, and other related operations. The Contractor is to consider the net effect of all the items above to compute the cost during down time.

Holidays, weekends and after hour work hours are not included in this item. If unknowns encountered are such that major design revisions are required and that there is no other location to direct construction to utilizing the equipment operating prior to shutdown; then the contract price to be adjusted in accordance with provisions in the General Conditions. Payment will be made at the **Contract Unit Price Bid per Hour of Shutdown**.

TECHNICAL SPECIFICATIONS

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101 SUBMITTAL PROCEDURES

101.1 GENERAL

The Contractor shall make submittals as required by the specifications. The Engineer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor.

101.1.1 DEFINITIONS

101.1.1.1 Submittal: Shop drawings, product data, samples, operation and maintenance data presented for review and approval. Contract General Condition Paragraph 10, Workmanship and Superintendence shall apply to all submittals.

101.1.1.2 Types of Submittals: All submittals shall be grouped as follows:

101.1.1.2.1 Shop drawings: Drawings, schedules, diagrams, and other data prepared specifically for this contract, by Contractor or through Contractor by way of subcontractor, manufacturer, supplier, distributor, or other lower tier Contractor, to illustrate portion of work. Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated

101.1.1.2.2 Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data including size, physical appearance and other characteristics of materials or equipment to illustrate portion of work, but not prepared exclusively for this contract. Samples of warranty language when the contract requires extended product warranties.

101.1.1.2.3 Samples: Physical examples of materials, equipment, products, assemblies or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged. Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project. Field samples and mock-ups constructed on the project site establish standards by which the ensuing work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

101.1.1.2.4 Operation and Maintenance (O&M) Data: Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance, and repair of the item. The data is to be on hand when the item is delivered to the project site.

101.1.1.2.5 Design Data: Calculations, mix designs, analyses, or other data pertaining to a part of work.

101.1.1.2.6 Test Reports: Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product, or system to be provided has been tested in accord with specified requirements. Testing shall be within three (3) years of date of contract award for the project. Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation, including investigation reports, daily checklists, final acceptance tests, and operational test procedures.

101.1.1.2.7 Certificates: Statements signed by responsible officials of manufacturer of product, system, or material attesting that product, system, or material meets specification requirements. The certificates must be dated after the award of the project contract and clearly name the project. Certificates shall be documents required of the Contractor, or of a supplier, installer, or subcontractor through the Contractor, the purpose of which is to further the quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

101.1.1.2.8 Manufacturer's Instructions: Preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data sheets concerning impedances, hazards, and safety precautions.

101.1.1.2.9 Manufacturer's Field Reports: Documentation of factory test reports, testing, and verification actions taken by the manufacturer's representative to confirm compliance with the manufacturer's standards or instructions shall be provided.

101.1.1.3 Closeout Submittals: Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

101.1.1.4 Approving Authority: Contractor's authorized person to approve submittal.

101.1.1.5 Submittal Register: At the end of this Section a list showing items of equipment and material for which submittals are required by the specifications is provided. This list may not be all inclusive and additional submittals may be required. It is the Contractor's responsibility to maintain a complete register of all the submittals.

101.1.1.6 Work: As used in this section, on- and off-site construction required by Contract Documents including labor necessary to produce submittals, materials, products, equipment, and systems incorporated or to be incorporated.

101.2 MATERIALS

101.2.1 TRANSMITTAL FORM

Transmit each submittal, except sample installations and sample panels, to the office of the

engineer. The transmittal form shall identify the Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in Paragraph 101.2.2. Process transmittal forms to record actions regarding sample panels and sample installations.

101.2.2 IDENTIFYING SUBMITTALS

Identify submittals, except sample panel and sample installation, with the following information permanently adhered to or noted on each separate component of each submittal and noted on transmittal form. Mark each copy of each submittal identically, with the following:

- I. Project title and location
- II. Construction contract number
- III. Section number of the specification section by which submittal is required
- IV. Submittal description of each component of submittal
- V. Each submittal shall be numbered, for example, Section # - 2, for accurate tracking
- VI. When a resubmission is required add alphabetic suffix on submittal number, for example, Section # - 2A to indicate resubmission
- VII. Name, address and telephone number of subcontractor, supplier, manufacturer and any other second tier Contractor associated with submittal
- VIII. Product identification and location in project

101.2.3 FORMAT FOR SHOP DRAWINGS

- I. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 24 by 36 inches
- II. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for required submittals
- III. Present larger drawings in sets
- IV. Include on each drawing the drawing title, number, date, and revision numbers and dates
- V. Drawing information shall be included in addition to information required in the Paragraph 101.2.2
- VI. Drawings shall be to scale and dimensioned except for diagrams and schematic drawings
- VII. Drawings shall be prepared to demonstrate interface with other trades
- VIII. Shop drawings' dimensions shall be the same unit of measure as indicated on the contract drawings
- IX. Shop drawings shall identify materials and products for work shown

101.2.4 FORMAT OF PRODUCT DATA

- I. Present product data submittals for each section as a complete, bound volume
- II. Volume shall include a table of contents, listing page, and catalog item numbers for product data
- III. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains
- IV. Supplement product data with material prepared for the project to satisfy submittal

requirements for which product data does not exist and identify this material as developed

101.2.5 FORMAT OF SAMPLES

Furnish samples in sizes as described below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified below:

- I. Sample of equipment or devices shall be full sized
- II. Samples of materials less than 2 by 3 inches shall be built up to 8 1/2 by 11 inches
- III. Sample of materials exceeding 8 1/2 by 11 inches shall be cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations
- IV. Sample of linear devices or materials shall be 10 inches in length or the length to be supplied for construction if less than 10 inches
- V. Examples of linear devices or materials include conduit and handrails
- VI. Samples of non-solid materials, such as sand and paint, shall be submitted in the volume of a pint
- VII. Color selection samples shall be 2 by 4 inches
- VIII. The sample panels shall be 4 by 4 feet
- IX. The sample installation shall be 100 square feet

101.2.5.1 Samples Showing Range of Variation: Where variations are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range.

101.2.5.2 Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples shall be in undamaged condition at time of use.

101.2.5.3 Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final cleanup of project.

101.2.5.4 Other: When color, texture or pattern is specified by naming a manufacturer and style, include one (1) sample of that manufacturer and style, for comparison.

101.2.6 FORMAT OF OPERATION AND MAINTENANCE (O&M) DATA

O&M Data formats shall comply with the requirements specified by each Section indicating a O&M Data submittal requirement.

101.2.7 QUANTITY OF SUBMITTALS

101.2.7.1 Number of Copies of Shop Drawings: Submit five (5) copies of submittals and shop drawings for review and approval.

101.2.7.2 Number of Copies of Product Data: Submit product data in compliance with the quantity requirements specified for shop drawings per each Section. If quantities are not so described, submit five (5) copies of product data for review and approval.

101.2.7.3 Number of Copies of Samples:

- I. Submit two (2) samples, or two (2) sets of samples, showing range of variation of each required item
- II. One (1) approved sample or set of samples will be retained by the Engineer and one will be returned to the Contractor
- III. Submit one sample panel and include components listed in technical section or as directed
- IV. Submit one sample installation where directed
- V. Submit one sample of non-solid materials

101.2.7.4 Number of Copies of Operation and Maintenance Data: Submit five (5) copies of O&M Data to the Engineer for review and approval.

101.3 EXECUTION

101.3.1 REVIEWING, CERTIFYING

The Contractor shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. Only one manufacturer per product item shall be submitted. Submission of multiple manufacturers for one product shall be grounds for disapproval.

101.3.1.1 Procedures: The Engineer will further discuss detailed submittal procedures with the Contractor at the Preconstruction Conference.

101.3.1.2 Preconstruction Submittals: The following list shall be provided prior to start of construction:

- I. List of proposed products
- II. Construction Progress Schedule
- III. Submittal register
- IV. Environmental protection plan
- V. Storm Water Pollution Prevention Plan
- VI. Traffic control plan(s)

101.3.2 CONSTRAINTS

- I. Submittals listed or specified in this contract shall conform to provisions of this section unless explicitly stated otherwise by the Engineer
- II. Submittals shall be complete for each definable feature of work; components of definable feature interrelated as a system shall be submitted at same time
- III. When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review
- IV. Approval of a separate material, product, or component does not imply approval of assembly in which item functions

101.3.3 APPROVED SUBMITTALS

The Engineer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory to the project requirements. Approval will not relieve the Contractor of the responsibility for any error which may exist. After submittals have been approved by the Engineer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

101.3.4 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Engineer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract General Condition ADDITIONAL, OMITTED OR CHANGED WORK shall be given promptly to the Engineer.

101.3.5 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made and approved prior to acquisition of material or equipment covered therein. The Contractor shall provide ample time for review and delivery of the approved material prior to installation of material or equipment.

101.4 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered by this Section of the specifications shall be considered incidental to the items of work described in the Special Conditions.

102 PROGRESS SCHEDULE - INDEX

102.1 GENERAL

102.1.1 CONSTRUCTION PROGRESS CHART

102.2 MATERIALS

102.3 EXECUTION

102.4 MEASUREMENT AND PAYMENT

102 PROGRESS SCHEDULE

102.1 GENERAL

102.1.1 CONSTRUCTION PROGRESS CHART

Pursuant to the General Conditions Paragraph 18 entitled "Construction Schedule" the Contractor shall prepare a schedule of construction utilizing a construction progress chart as described herein.

102.2 MATERIALS

The Contractor shall prepare the construction progress chart with the following considerations and features:

- I. The contract work shall be divided into definable contract features and as a minimum, the Contractor shall address each specification bid item as a principal contract feature
- II. The weighted value (WT.) column should indicate the percentage of the contract for which each principle contract feature accounts
- III. The vertical lines shall be identified by specific time frames, (i.e., weekly, bi-weekly, monthly) with one (1) space accounting for no more than one (1) month
- IV. Identify the date when Notice to Proceed is acknowledged on the chart
- V. Identify the contract completion date on the chart

The Contractor shall place bars on the chart indicating scheduled progress and actual progress for each feature of work. The Contractor shall note the anticipated and actual percentage complete for each item at the end of each month and at the end of each scheduled block. Activities shall be identified by respective bid items.

The progress chart shall reflect the construction sequencing required to maintain utility service (water, sewer, gas, electric communication, etc.) to customers throughout the project.

102.3 EXECUTION

The Contractor shall submit a copy of the Construction Progress Chart for review and approval prior to issuing the Notice to Proceed. No progress payments will be made without an approved progress chart.

Contractor shall submit an updated schedule at the end of each month illustrating the actual progress verses anticipated progress.

102.4 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered by this section of the Specifications shall be considered incidental to the items of work described in the Special Conditions.

103 DEMOLITION - INDEX

103.1 GENERAL

- 103.1.1 GENERAL REQUIREMENTS
- 103.1.2 RELATED SECTIONS
- 103.1.3 SUBMITTALS
- 103.1.4 REGULATORY AND SAFETY REQUIREMENTS
- 103.1.5 NOTIFICATIONS
- 103.1.6 PROTECTION
- 103.1.7 BURNING
- 103.1.8 RELOCATIONS
- 103.1.9 REQUIRED DATA
- 103.1.10 ENVIRONMENTAL PROTECTION
- 103.1.11 REFERENCES

103.2 MATERIALS

103.3 EXECUTION

- 103.3.1 EXISTING STRUCTURES TO BE REMOVED
- 103.3.2 DUST AND DEBRIS CONTROL
- 103.3.3 CLEANUP
- 103.3.4 DISPOSAL OF REMOVED MATERIALS

103.4 MEASUREMENT AND PAYMENT

103 DEMOLITION

103.1 GENERAL

103.1.1 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Owner or their representative. Remove rubbish and debris from the project site daily do not allow excess accumulation of debris within and outside of the project site.

103.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 107, Storm Water Pollution Prevention
- III. Section 108, Water Pollution Control
- IV. Section 301, Cast-In-Place Concrete
- V. Section 303, Masonry
- VI. Section 401, Hot Mix Bituminous Pavement
- VII. Section 901, Design Codes and References

103.1.3 SUBMITTALS

Engineer approval is required for submittals. The following shall be submitted in accordance with Section 101.

103.1.3.1 Preconstruction Submittals:

- I. Existing Conditions
- II. Certificates

103.1.3.2 Demolition Plan:

- I. Notifications
- II. Notification of Demolition and Renovation forms
- III. A proposed demolition and removal procedure for approval before work is started.

103.1.3.3 Closeout Submittals:

- I. Receipts
- II. Receipts or bills of laden, as specified.

103.1.4 REGULATORY AND SAFETY REQUIREMENTS

Comply with Federal, State, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ANSI A10.6.

103.1.5 NOTIFICATIONS

103.1.5.1 General Requirements: Furnish timely notification of demolition activities to local residents. Complete and submit Notice of Intent (NOI) to State Authorities and Engineer. NOI shall be delivered at least ten working days prior to commencement of work.

103.1.6 PROTECTION

The following list describes items to be protected or methods of protection. Methods of protection shall be adhered to during deo procedures.

103.1.6.1 Traffic Control Signs: Where pedestrian and driver safety are endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the local police and fire department prior to beginning such work. Repair, replace, and relocate existing signs if needed.

103.1.6.2 Existing Conditions Documentation: Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the demolition. Record existing conditions in the presence of the Engineer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized four (4) inches will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish floor elevations, possible conflicting electrical conduits, plumbing lines, the location and extent of existing cracks; and other damage and description of surface conditions that exist prior to starting work.

It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work and to note these outages on the record document.

103.1.6.3 Items to Remain in Place: Take necessary precautions to avoid damage to existing items to remain in place. Repair or replace damaged items as approved by the Engineer. Coordinate the work in this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required.

103.1.6.4 Existing Construction Limits and Protection: Do not disturb existing surface conditions beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and

migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

103.1.6.5 Trees: Protect trees within the project site, which might be damaged during demolition, that are indicated to be left in place with a 6-foot-high fence. Erect and secure the fence a minimum of five (5) feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. The Contractor shall replace any tree designated to remain, with the cost bore by the Contractor, that is damaged during the work under this contract with like-kind or as approved by the Engineer.

103.1.6.6 Utility Service: Maintain existing utilities indicated to stay in service and protect said utilities from damage during demolition operations.

103.1.6.7 Facilities: Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities.

103.1.6.8 Protection of Local Residents: Before, during and after the demolition work the Contractor shall continuously evaluate the condition of the structures being demolished and take immediate action to protect all personnel working in and around the project site, and all local residents that may be affected by demolition activities.

103.1.7 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

103.1.8 RELOCATIONS

Perform the removal and reinstallation of relocated items indicated with workmen skilled in the trades involved. Items to be relocated, which are damaged by the Contractor, shall be repaired or replaced, with the cost bore by the Contractor, with new undamaged items as approved by the Engineer.

103.1.9 REQUIRED DATA

Prepare a demolition plan. Include in the plan procedures for careful removal and disposition of materials specified to be salvaged, coordination with other work in progress. A detailed description of methods and equipment to be used for each operation shall be provided.

103.1.10 ENVIRONMENTAL PROTECTION

The Contractor shall comply with requirements of the Environmental Protection Agency.

103.1.11 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 145 (1991; R 2000) Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

AASHTO T 180 (2001; R 2004) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in) Drop

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6 (1990; R 1998) Safety Requirements for Demolition Operations

103.2 MATERIALS

Materials are not listed in this section.

103.3 EXECUTION

103.3.1 EXISTING STRUCTURES TO BE REMOVED

Inspect and evaluate existing structure(s) on site.

103.3.1.1 Structures: Remove indicated existing structure(s) to the grade shown. Interior walls, other than retaining partitions, shall be removed to two (2) feet below grade. Remove sidewalks, curbs, gutters, and retaining walls as indicated.

Demolish structure(s) in a systematic manner from the top of the structure to the ground. Demolish concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods.

103.3.1.2 Utilities and Related Equipment: Do not interrupt existing utilities serving occupied or used facilities, except when authorized by the Engineer. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use as indicated.

103.3.1.2.1 Disconnecting Existing Utilities: Remove existing utilities and terminate in a manner conforming with all code requirements. When utility line is encountered that are not shown on the drawings, the Engineer shall be notified prior to further work in that area.

103.3.1.3 Patching: Where removals leave holes and damaged surfaces exposed in the finished work, patch and repair these holes and damaged surfaces to match adjacent

finished surfaces, using on-site materials when available. Where new work is to be applied to existing surfaces, perform removals and patching in a manner to produce surfaces suitable for receiving new work. Finished surfaces of patched area shall be approximately 1/4 inch higher than the adjacent existing surface and shall match the existing texture and finish as closely as possible. Patching shall be as specified and indicated by the Engineer and shall include:

103.3.1.3.1 Concrete and Masonry: Completely fill holes and depressions, caused by previous physical damage or left as a result of removals in existing masonry walls to remain, with an approved masonry patching material, applied in accordance with the manufacturer's printed instructions.

103.3.1.4 Concrete: Saw concrete along straight lines to a depth of a minimum two (2) inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete.

103.3.1.5 Air Conditioning Equipment: Remove air conditioning, refrigeration, and other equipment containing refrigerants without releasing chlorofluorocarbon refrigerants into the atmosphere in accordance with the Clean Air Act Amendment of 1990. Recover all refrigerants prior to removing air conditioning, refrigeration, and other equipment containing refrigerants and dispose of them in accordance with the Clean Air Act Amendment of 1990.

103.3.1.6 Cylinders and Canisters: Remove all fire suppression system cylinders and canisters and dispose of them in accordance with Clean Air Act Amendment of 1990.

103.3.1.7 Locksets on Swinging Doors: The Contractor shall remove all locksets from all indicated swinging doors to be removed and disposed of. Deliver the locksets and related items to a designated location for receipt by the Owner after removal.

103.3.1.8 Mechanical Equipment and Fixtures: Disconnect mechanical hardware at the nearest connection to existing services to remain, unless otherwise noted. Mechanical equipment and fixtures must be disconnected at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit. Equipment and fixtures shall be listed, indexed, tagged, and stored. Salvage each unit with its normal operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated storage area as directed by the Engineer. Do not remove equipment without approval.

103.3.1.8.1 Preparation for Storage: Remove water, dirt, dust, and foreign matter from all units. Tanks, piping and fixtures shall be drained. Interiors previously used to store flammable, explosive, or other dangerous liquids, must be steam cleaned. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit. Change lubricating systems with the proper oil or grease.

103.3.1.8.2 Piping: Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve shall be attached to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Wrap sprinkler heads individually in plastic bags before boxing. Classify piping not designated for salvage, or not reusable, as scrap metal.

103.3.1.8.3 Ducts: Classify removed duct work as scrap metal.

103.3.1.8.4 Fixtures, Motors and Machines: Remove fixtures, motors and machines associated with plumbing, heating, air conditioning, refrigeration, and other mechanical system installations.

103.3.1.9 Electrical Equipment and Fixtures: Remove motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Remove wiring systems and components.

103.3.2 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris to neighboring dwellings and facilities and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Sweep pavements as often as necessary to control the spread of debris and dirt to prevent the objectionable accumulation of material.

103.3.3 CLEAN UP

Remove debris and rubbish from excavated areas. Remove and transport the material in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

103.3.4 DISPOSAL OF REMOVED MATERIALS

103.3.4.1 Regulation of Removed Materials: Dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified. If disposal is to be on private property, a consent letter from the property owner shall be presented to the Engineer prior to proceeding with this activity. A Storm Water Discharge Plan shall accompany the letter. In addition, the contractor shall obtain a Release of Lien from the property owner.

103.3.4.2 Burning on Site: Burning of materials removed from demolished and deconstructed structures will not be permitted.

103.4 MEASUREMENT AND PAYMENT

Measurement and payment shall be in accordance with provisions of the Special Conditions.

104 TRAFFIC CONTROL - INDEX

104.1 GENERAL

104.1.1 DESCRIPTION

104.1.2 GENERAL TRAFFIC REGULATIONS

104.2 MATERIALS

104.2.1 TRAFFIC CONTROL DEVICES

104.3 EXECUTION

104.3.1 FLAGMEN OR PILOT CAR

104.3.2 TRAFFIC CONTROL MEASURES

104.4 MEASUREMENT AND PAYMENT

104 TRAFFIC CONTROL

104.1 GENERAL

104.1.1 DESCRIPTION

Traffic control shall consist of traffic control devices and flagmen or pilot cars. All traffic control devices, the application of traffic control measures, and traffic regulation in these specifications are to supplement and are not intended to delete any of the provisions of the Standard Specifications, NMDOT Traffic Control Specifications, MUTCD standards, or any agency's supplements to these.

104.1.2 GENERAL TRAFFIC REGULATIONS

The Contractor shall provide and maintain all necessary traffic controls to protect and guide traffic for all work in the construction area.

104.1.2.1 Traffic Lanes: A traffic lane shall be a minimum of 10 feet of clear street width with a safe motor vehicle operating speed of at least 25 miles per hour. A minimum of two traffic lanes, one for each direction, shall be maintained and open to traffic at all times on all major streets. A traffic lane shall not be considered as satisfactorily open to traffic unless it is paved with hot mix or cold mix asphalt paving if surrounded by or adjacent to existing pavement. Where pavement did not previously exist or where all of the existing pavement has been removed, a traffic lane shall not be considered as satisfactorily open to traffic unless it is graded reasonably smooth and maintained dust free as directed by the Engineer.

104.1.2.2 Intersection: An intersection shall be all of the area within the right of way intersection streets plus 300 feet beyond the edge of the intersected right of way on all legs of the intersection.

104.1.2.3 Local Access: Local access shall be maintained to all properties on the project at all possible times. When local access cannot be maintained, the Contractor must notify the affected property owner at least 24 hours in advance and restore access as soon as possible.

104.1.2.4 Street Closure: Arrangements for partial or complete street closure permits shall be handled through the Engineer on local projects or the City Roads Department. An advance notice of 48 hours for major streets and 24 hours for local streets and alleys is required from the Contractor. If at any time, project construction shall require the closure or disruption of traffic in any roadway, alley, or refuse collection easement such that normal refuse collection will be interfered with, the Contractor shall, prior to causing such closure or disruption, make arrangements with the City's Road Department and the Engineer in order that refuse collection service can be maintained.

104.1.2.5 Existing Signs: The Contractor shall maintain all existing STOP, YIELD, and street name signs erect, clean, and in full view of the intended traffic at all times. If these signs interfere with construction, the Contractor shall temporarily relocate the signs away from construction but still in full view of the intended traffic. Existing traffic signs other than STOP, YIELD, and street name signs shall be maintained by the Contractor until such time as construction renders them obsolete. At that time the Contractor shall remove signs and posts without damage and deliver them as directed by the Engineer.

104.1.2.6 Construction Signs: Subject to the approval of the Engineer, the Contractor shall furnish and install the MPH Construction Zone Speed Limit Signs. The Contractor shall maintain the signs erect, clean and in full view of the intended traffic at all times. Should the signs interfere with construction, the Contractor shall relocate the signs as necessary.

104.2 MATERIALS

104.2.1 TRAFFIC CONTROL DEVICES

Traffic control devices shall consist of providing, erecting, and maintaining necessary and adequate devices for the protection of the work, the workmen, and the traveling public as approved by the Engineer. Contractor shall provide traffic control as designated on the project drawings for specific locations. All traffic control devices shall conform to MUTCD standards.

104.2.1.1 Temporary Traffic Control Devices: Temporary traffic control devices shall be used to guide traffic through construction areas. They include traffic cones to channel traffic, portable barricades for warning, vertical panel channeling devices to divert traffic, and lighting devices between the hours of sunset and sunrise.

104.2.1.2 Advanced Warning Devices: Advance warning devices shall be used to alert the motorist of an obstruction in the roadway. They include diamond-shaped signs, flags, and flasher type high level warning devices mounted eight (8) feet above the roadway.

104.3 EXECUTION

104.3.1 FLAGMEN OR PILOT CAR

Contractor shall provide sufficient flagmen, uniformed off-duty law enforcement officers, or pilot cars to expedite the safe passage of traffic.

104.3.2 TRAFFIC CONTROL MEASURES

The application of all traffic control measures shall be based primarily upon the conditions existing at the time that such measures are deemed necessary. Prior to the start of any work that would interrupt the normal flow of traffic, sufficient and adequate devices and measures

shall be provided and erected as directed by the Engineer. These devices shall be immediately removed when no longer needed.

104.4 MEASUREMENT AND PAYMENT

Measurement and payment shall be in accordance with provisions in the Special Conditions.

105 PROTECTED SPECIES- INDEX

105.1 GENERAL

105.1.1 PROJECT CONDITIONS

105.2 MATERIALS

105.3 EXECUTION

105.3.1 CONTRACTOR RESPONSIBILITIES

105.3.2 SPECIES REMOVAL

105.4 MEASUREMENT AND PAYMENT

105 PROTECTED SPECIES

105.1 GENERAL

105.1.1 PROJECT CONDITIONS

Certain native species in the State of New Mexico are protected plant or animal species under State law(s). The Government has ascertained that endangered Migratory Birds may exist in the areas to be disturbed by construction activities.

This project is designed to comply with the final biological opinion for the Navajo-Gallup Water Supply Project as issued by the U.S. Fish and Wildlife Service on February 26, 2009.

105.1.1.1 Migratory Birds:

- I. Between March 15th and August 15th
 - i. The Federal Government will retain a qualified wildlife biologist to survey any vegetated area to be disturbed for endangered migratory birds. The evaluation shall be performed no more than five (5) days before an area is to be disturbed.
 - ii. Notify the Contracting Officer Representative (COR) 72 hours before disturbing an area. Contact information to be made available at the Pre-Construction Meeting.
 - iii. Do not disturb a mating pair of endangered migratory birds with an egg.
 - A. Avoid the birds directed by the COR

105.2 MATERIALS

Materials are not listed in this Section.

105.3 EXECUTION

105.3.1 CONTRACTOR RESPONSIBILITIES

Insert this section in subcontracts which involve performance of work in areas where protected species may occur

105.3.2 SPECIES REMOVAL

In accordance with State law, the Government may arrange for removal of protected species, and the Contractor shall cooperate with those performing such removal. If these species are not removed, cooperate with and abide by protection plans developed by appropriate State entities to avoid damage to or disturbance of protected species.

105.4 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered by this section of the specifications shall be considered incidental to the items of work described in the Special Conditions.

106 PRESERVATION OF HISTORICAL AND ARCHAEOLOGICAL DATA- INDEX

106.1 GENERAL

106.1.1 DEFINITIONS

106.1.2 PROJECT CONDITIONS

106.2 MATERIALS

106.3 EXECUTION

106.3.1 DISCOVERY OF RESOURCES

106.3.2 DELAYS

106.3.3 ACCESS

106.3.4 CONTRACTOR RESPONSIBILITIES

106.4 MEASUREMENT AND PAYMENT

106 PRESERVATION OF HISTORICAL AND ARCHAEOLOGICAL DATA

106.1 GENERAL

Federal legislation provides for protection, preservation, and collection of scientific, prehistoric, historical, and archaeological data, including relics and specimens, which might otherwise be lost due to alteration of terrain as a result of any Federal construction project.

Any person who, without permission, injures, destroys, excavates, appropriates, or removes any historical or pre-historical artifact, object of antiquity, or archaeological resource on public lands of the United States is subject to arrest and penalty of law.

Comply with State laws when operating on non-Federal and non-Indian lands.

106.1.1 DEFINITIONS

106.1.1.1 Cultural Resources: Includes prehistoric, historic, architectural, and traditional cultural properties. These include, but are not limited to, human skeletal remains, archaeological artifacts, records and material remains related to such property.

106.1.1.2 Cultural Items: Native American cultural items (i.e., funerary objects, sacred objects, objects of cultural patrimony, or human remains) for which protection is prescribed under the Native American Graves Protection and Repatriation Act (NAGPRA) – Public Law 101-601; Stat. 3042, Section 3(d); and 43 CFR Part 10.4.

106.1.1.3 Human Remains: Physical remains of the body of a person.

106.1.1.4 Funerary Objects: Native American items that, as part of the death rite or ceremony of a culture, are reasonably believed to have been placed intentionally at the time of death or later with or near individual human remains.

106.1.1.5 Native American: Of, or relating to, a tribe, people, or culture that is indigenous to the United States.

106.1.1.6 Sacred Objects: Native American items that are specific ceremonial objects needed by traditional Native American religious leaders for the practice of traditional Native American religions by their present-day adherents. These items are specifically limited to objects that were devoted to a traditional Native American religious ceremony or ritual and which have religious significance or function in the continued observance or renewal of such ceremony.

106.1.1.7 Objects of Cultural Patrimony: Native American items having ongoing historical, traditional, or cultural importance central to the Indian tribe itself, rather than property owned by an individual tribal member. These objects are of such central

importance that they may not be alienated, appropriated, or conveyed by any individual tribal member.

106.1.2 PROJECT CONDITIONS

The project site has been surveyed and potential archaeological sites have been identified.

- I. The project crosses areas with cultural resources
 - i. No work shall proceed in between the stations listed for the Exclusion Zones until receipt of a written Notice to Proceed from the Contracting Officer Representative (COR) that includes them.
 - A. Exclusion Zones:
 - a. 24 inch Waterline: Station 50+35 to Station 51+50
 - b. 24 inch Waterline: Station 124+80 to Station 130+50
 - c. 24 inch Waterline: Station 134+50 to Station 137+50
 - d. 24 inch Waterline: Station 186+65 to Station 187+15
 - ii. The Government or Engineer will retain an Archaeologist to monitor the work in these areas.
 - A. The Contractor shall coordinate all work within these zones with Government or Engineer's Archaeologist.

106.2 MATERIALS

Materials are not used in this Section.

106.3 EXECUTION

106.3.1 DISCOVERY OF RESOURCES

When the Contractor, or any of the Contractor's employees, or parties operating or associated with the Contractor, in performance of this contract discover cultural resources on any lands:

- I. Immediately cease work at that location.
- II. Provide immediate verbal notification to the COR, giving the location and nature of the findings
- III. Provide immediate verbal notification to the United States Bureau of Reclamation (USBR) staff archaeologist in Durango, Colorado.

IV. Follow with written confirmation to the COR within 12 hours.

In addition to notifying the COR; where the discovery occurs on state, tribal, municipal, or private lands, notify the appropriate Law Enforcement officials as prescribed by law or within two (2) days, whichever is more stringent.

Exercise care so as not to disturb or damage cultural resources uncovered during construction activities, and provide such cooperation and assistance as may be necessary to preserve the findings for removal or other disposition by the COR.

Do not resume work in the area of discovery until receipt of written notice to proceed from the COR.

Note: Contact information to be provided at the preconstruction meeting.

106.3.2 DELAYS

Where appropriate by reason of discovery, the COR may order delays in time of performance or changes in work, or both. When such delays or changes are ordered, an equitable adjustment will be made in the contract in accordance with applicable clauses of the contract.

106.3.3 ACCESS

Coordinate for Government access in arrangements for use of private lands for use areas or borrow sources. Government access to the private land shall be to identify cultural resources and conduct appropriate inspections

106.3.4 CONTRACTOR RESPONSIBILITIES

Insert this section in agreement of contracts with subcontractors which involve performance of work on jobsite terrain.

106.4 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered by this Section of the specifications shall be considered incidental to the items of work described in the Special Conditions.

107 STORM WATER POLLUTION PREVENTION - INDEX

107.1 GENERAL

- 107.1.1 GENERAL REQUIREMENTS
- 107.1.2 RELATED SECTIONS
- 107.1.3 DESCRIPTION
- 107.1.4 SUBMITTALS
- 107.1.5 EROSION AND SEDIMENT CONTROLS

107.2 MATERIALS

- 107.2.1 COMPONENTS FOR SILT FENCES
- 107.2.2 COMPONENTS FOR STRAW BALES

107.3 EXECUTION

- 107.3.1 INSTALLATION
- 107.3.2 MAINTENANCE
- 107.3.3 RESEEDING
- 107.3.4 INSPECTIONS

107.4 MEASUREMENT AND PAYMENT

107 STORM WATER POLLUTION PREVENTION

107.1 GENERAL

107.1.1 GENERAL REQUIREMENTS

Implement the Storm Water Pollution Prevention measures to prevent sediment from entering streams or water bodies as specified in this Section. Conform with the requirements of the National Pollution Discharge Elimination System (NPDES) permit that can be found in the appendices of these Specifications.

107.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related sections include but are not limited to the following:

- I. Section 101, Submittal Procedures
- II. Section 108, Water Pollution Control

107.1.3 DESCRIPTION

This item of work shall consist of furnishing all material, supplies, plant and labor required for construction, installment and maintenance of temporary erosion control measures to prevent the erosion of cleared and grubbed areas and the sedimentation of rivers, streams and impoundments, and pollution of private properties from storm water. The items of work covered in this section are required for implementation of the Storm Water Pollution Prevention Plan.

Storm Water Pollution Prevention Plan is to be prepared by the Contractor for approval by the City, the Bureau of Reclamation, and the New Mexico State Highway Department.

107.1.4 SUBMITTALS

Engineer approval is required for submittals. The following shall be submitted in accordance with Section 101.

107.1.4.1 Certificates:

- I. Mill Certificate or Affidavit.
- II. Certificate attesting that the Contractor has met all specified requirements.

107.1.5 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described below.

107.1.5.1 Stabilization Practices: The stabilization practices to be implemented include but are not limited to vegetative buffer strips, erosion control mats, protection of trees, preservation of mature vegetation, etc. On a daily report, record the dates when the major grading activities occur, (e.g., clearing and grubbing, excavation, embankment, and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in Paragraphs 107.1.5.1.1 and 107.1.5.1.2, stabilization practices must be initiated as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have temporarily or permanently ceased.

107.1.5.1.1 Unsuitable Conditions: Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases or is precluded by unsuitable conditions caused by the weather, stabilization practices shall be initiated as soon as practicable after conditions become suitable.

107.1.5.1.2 No Activity for Less Than 21 Days: When the total time period in which construction activity is temporarily ceased on a portion of the site is 21 days minimum, stabilization practices do not have to be initiated on that portion of the site until 14 days have elapsed after construction activity temporarily ceased.

107.1.5.2 Structural Practices: Structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Structural practices shall include the following devices.

107.1.5.2.1 Silt Fences: The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Silt fences shall be installed in the locations indicated on the drawings. Final removal of silt fence barriers shall be upon approval by the Engineer.

107.1.5.2.2 Straw Bales: Provide bales of straw as a temporary structural practice to minimize erosion and sediment runoff. If bales are used, properly place the bales to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (e.g., after clearing and grubbing in an area between a ridge and drain, place the bales as work progresses, remove/replace/relocate the bales as needed for work to progress in the drainage area). Show on the drawings areas where straw bales are to be used. The Engineer will approve the final removal of straw bale barriers. Rows of bales of straw shall be provided as follows:

- I. Along the downhill perimeter edge of all areas disturbed

- II. Along the top of the slope or top bank of drainage ditches, channel, swales, etc. that traverse disturbed areas
- III. Along the toe of all cut slopes and fill slopes of the construction areas
- IV. Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas
- V. Space the rows a maximum of two (2) feet apart
- VI. Perpendicular to the flow in the bottom of new drainage ditches, channels, and swales. Space the rows a maximum of two (2) feet apart
- VII. At the entrance to culverts that receive runoff from disturbed areas

107.1.5.2.3 Diversion Dikes: Build diversion dikes with a maximum channel slope of 2 percent and adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be two (2) feet. Ensure that the diversion dikes are not damaged by construction operations or traffic. Locate diversion dikes where shown on the drawings.

107.2 MATERIALS

107.2.1 COMPONENTS FOR SILT FENCES

107.2.1.1 Filter Fabric: The geotextile must comply with the requirements of ASTM D 4439 and consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and shall contain stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six (6) months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the requirements in Table 1 and Table 2.

TABLE 1: FILTER FABRIC FOR SILT SCREEN FENCE (METRIC)

PHYSICAL PROPERTY REQUIREMENT	TEST PROCEDURE	STRENGTH
Grab Tensile	ASTM D 4632	445 N min.
Elongation (%)		30% max.
Trapezoid Tear	ASTM D 4533	245 N min.
Permittivity	ASTM D 4491	0.2 sec-1
V.AOS (U.S. Std. Sieve)	ASTM D 4751	20-100

TABLE 2: FILTER FABRIC FOR SILT SCREEN FENCE (IMPERIAL)

PHYSICAL PROPERTY REQUIREMENT	TEST PROCEDURE	STRENGTH
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (%)		30% max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
V.AOS (U.S. Std. Sieve)	ASTM D 4751	20-100

107.2.1.2 Silt Fence Stakes and Posts: Use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction shall have a minimum cross section of 2 by 2 inches when oak is used and 4 by 4 inches when pine is used. The minimum length shall be a minimum length of five (5) feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction shall have a minimum mass of 1.33 pounds/linear foot and a minimum length of five (5) feet.

107.2.1.3 Mill Certificate or Affidavit: A mill certificate or affidavit shall be provided attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

107.2.1.4 Identification Storage and Handling: Filter fabric shall be identified, stored, and handled in accordance with ASTM D 4873.

107.2.2 COMPONENTS FOR STRAW BALES

The straw in the bales shall be stalks from oats, wheat, rye, barley, rice, or from grasses such as byhalia, bermuda, etc., furnished in air dry conditions. The bales shall have a standard cross section of 14 by 18 inches. All bales shall be either wire-bound or string-tied. The Contractor may use either wooden stakes or steel posts to secure the straw bales to the ground. Wooden stakes utilized for this purpose shall have a minimum dimension of 2 by 2 inches in cross section and shall have a minimum length of three (3) feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales shall have a minimum mass of 1.33 pounds/linear foot and a minimum length of three (3) feet.

107.3 EXECUTION

107.3.1 INSTALLATION

107.3.1.1 Silt Fences: Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Filter fabric shall form a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, filter fabric shall be spliced together at a support post, with a minimum 6-

inch overlap, and securely sealed. A trench shall be excavated approximately four (4) inches wide and four (4) inches deep on the upslope side of the location of the silt fence. The 4 by 4-inch trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed upon approval by the Engineer.

107.3.1.2 Straw Bales: Place the straw bales in a single row, lengthwise on the contour, with ends of adjacent bales tightly abutting one another. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of four (4) inches. After the bales are staked and chinked (gaps filled by wedging with straw), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to four (4) inches against the uphill side of the barrier. Loose straw shall be scattered over the area immediately uphill from a straw bale barrier to increase barrier efficiency. Each bale shall be securely anchored by at least two (2) stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 18 inches deep into the ground to securely anchor the bales.

107.3.2 MAINTENANCE

The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

107.3.2.1 Silt Fence Maintenance: Silt fences shall be inspected in accordance with Paragraph 107.3.4. Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach 1/3 of the height of the barrier. When a silt fence is no longer required, it shall be removed upon the approval of the Engineer. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

107.3.2.2 Straw Bale Maintenance: Straw bale barriers shall be inspected in accordance with Paragraph 107.3.4. Close attention shall be paid to the repair of damaged bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales shall be accomplished promptly. Sediment deposits shall be removed when deposits reach 1/2 of the height of the barrier. Bale rows used to retain sediment shall be turned uphill at each end of each row. When a straw bale barrier is no longer required it shall be removed unless otherwise specified by the Engineer. The immediate area occupied by the bales

and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

107.3.2.3 Diversion Dike Maintenance: Diversion dikes shall be inspected in accordance with Paragraph 107.3.4. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded.

107.3.3 RESEEDING

Reseeding to be accomplished only in areas shown on the drawings or as directed. Areas cleared and grubbed for construction activity shall be returned to their original grade and contour to the extent possible. These areas shall be reseeded within two (2) weeks of final construction.

107.3.3.1 Seed Mixture: Use the following pure live seed mixture per acre for certified seed, where PLS (Pure Live Seed) = Germination times Purity. Planting Rate of 14.0 PLS/Acre. No primary or secondary noxious weeds shall be present in seed mixture. The local seed mixture shall be as described in Table 3.

TABLE 3: SEED MIXTURE REQUIREMENTS

Pure Live Seed	Application PLS# / ACRE
Indian Rice Grass, Paloma	5.00
Galleta, Caryloopsis Blue, Viva	2.00
Gramma, Hachita	3.00
Western Wheatgrass, Arriba	4.00

107.3.3.2 Application: Compacted areas shall be ripped or scarified to a depth of twelve inches and disked to a depth of six (6) inches before seeding. Seed with a disk type drill with two boxes for various seed sizes. The drill rows shall be eight (8) to ten (10) inches apart. The seed shall be planted at not less than 1/2 inch deep or more than one (1) inch deep. The seeder shall be followed with a drag, packer or roller to ensure uniform coverage of the seed and adequate compaction. Drilling shall be done on the contour where possible, not up and down the slope.

Water for dust control shall be provided during the seeding process. Seeding shall be accomplished and 100% complete two (2) weeks after project completion.

Labels from each seed bag shall be available for inspection.

107.3.3.3 Provisions: Contractor shall provided two (2) 50 lbs sacks of seed mix to the City.

107.3.4 INSPECTIONS

107.3.4.1 General: The Contractor shall inspect disturbed areas of the construction site at least once every month. Areas that have not been finally stabilized, used for storage of materials, exposed to precipitation, covered with stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month.

107.3.4.2 Inspections Details: Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

107.3.4.3 Inspection Reports: For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. The report shall be furnished to the Engineer within 24 hours of the inspection as a part of the Contractor's daily activities. A copy of the inspection report shall be maintained on the job site.

107.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specification shall be incidental to the project costs.

108 WATER POLLUTION CONTROL - INDEX

108.1 GENERAL

- 108.1.1 RELATED SECTIONS
- 108.1.2 SUBMITTALS
- 108.1.3 REGULATORY REQUIREMENTS
- 108.1.4 REQUIRED PERMITS
- 108.1.5 CONTRACTOR RESPONSIBILITIES
- 108.1.6 REFERENCE STANDARDS

108.2 MATERIALS

108.3 EXECUTION

- 108.3.1 POLLUTION CONTROLS

108.4 MEASUREMENT & PAYMENT

108 WATER POLLUTION CONTROL

108.1 GENERAL

108.1.1 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 107, Storm Water Pollution Prevention

108.1.2 SUBMITTALS

108.1.2.1 Submittal Procedures: Submit the following in accordance with Section 101.

108.1.2.2 Updated Stormwater Pollution Prevention Plan: As required by the stormwater permit for discharges from construction sites. Include copy of permits.

108.1.2.3 Spill Prevention, Control, and Countermeasure (SPCC) Plan:

- I. Submit when SPCC Plan is required in accordance with 40 CFR, Part 112.
 - i. SPCC Plan is required where release of oil and oil products could reasonably expected to enter into or upon navigable waters of the United States or adjoining shorelines in quantities that may be harmful (40 CFR, Part 110), and aggregate on site oil storage capacity is over 1,320 gallons. Only containers with capacity of 55 gallons and greater are included in determining on site aggregate storage capacity.
- II. Reviewed and certified by a registered professional Engineer in accordance with 40 CFR, Part 112, as required by Section 311 of the Clean Water Act (Public Law 92-500 as amended)
- III. Submit a spill prevention plan for oil storage less than 1,320 gallons. The spill prevention plan shall be certified by a professional Engineer and include:
 - i. Oil storage quantity.
 - ii. Drawings of containment.
 - iii. Response plan to spill.

108.1.3 REGULATORY REQUIREMENTS

108.1.3.1 Construction Safety Standards: All Federal, State, and local requirements apply.

108.1.3.2 Laws, Regulations, and Permits: Perform construction operations to comply, and ensure subcontractors comply with:

- I. Applicable Federal, State, Navajo Nation and local laws, orders, regulations, and Water Quality Standards concerning control and abatement of water pollution; and terms and conditions of applicable permits issued by permit issuing authority.
- II. If conflict occurs between Federal, State, Navajo Nation and local laws, regulations, and requirements, the most stringent shall apply.

108.1.3.3 Contractor Violations:

- I. If noncompliance should occur, immediately (verbally) report noncompliance to the City. Submit specific written information within 2 days.
- II. Violation of applicable Federal, State, or local laws, orders, regulations, or Water Quality Standards may result in the City stopping site activity until compliance is ensured.
- III. The Contractor shall not be entitled to extension of time, claim for damage, or additional compensation by reason of such a work stoppage.
- IV. Corrective measures required to bring activities into compliance shall be at the Contractor's expense.

108.1.4 REQUIRED PERMITS

108.1.4.1 Wastewater Discharge Permit:

108.1.4.1.1 Permit:

- I. Prior to discharging wastewater or other pollutants, Contractor shall secure permit(s) to discharge pollutants as required under Section 402 of the Clean Water Act (Public Law 92-500 as amended), and/or The New Mexico Environment Department, Surface Water Quality Bureau and/or the Navajo Nation Environment Protection Agency.
- II. Submit application(s) to the City, and to USBR for review before submitting to the agencies.

108.1.4.1.2 Terms and Conditions:

- I. Comply with terms and conditions as stated in the permit.

108.1.4.1.3 Monitoring and Treatment:

- I. Provide monitoring and water treatment, if necessary, to achieve compliance with permit conditions.
- II. Provide recordkeeping required of the permittee, as stated in the permits.

108.1.4.1.4 Sampling:

- I. Include sampling in monitoring required of the Contractor to meet section requirements, as well as required laboratory tests to determine effluent characteristics.

108.1.4.1.5 Monitoring Results:

- I. Provide monitoring results to the appropriate agency as required by the permit.
- II. Send copies of all information transmitted to the appropriate agency and to the City.

108.1.4.2 Dredge and Fill Permit: The Bureau of Reclamation has submitted or will submit an application to the United States Army Corps of Engineers for a Nationwide Permit to discharge dredged or fill material into waters of the United States (including wetlands) as required under Section 404 of the Clean Water Act (Public Law 92-500 as amended).

The Bureau of Reclamation is the Section 404 dredge and fill permit holder (permittee), Reclamation will make known the conditions of permit to the Contractor and then may transfer the permit to the Contractor. The granted Nationwide Permits are contained in the appendices of these Specifications.

108.1.4.3 Stormwater Discharge Permit Associated with a Construction Site:

The Contractor shall obtain a stormwater general permit to control stormwater discharges from the construction site as required under Section 402 of the Clean Water Act (Public Law 92-500, as amended)

108.1.4.3.1 Pollution Prevention Plan:

- I. The Contractor shall prepare a Pollution Prevention Plan as required by the permit.
- II. Comply with terms and conditions to obtain and maintain the stormwater discharge permit.

108.1.4.3.2 Monitoring and Water Treatment:

- I. Provide monitoring and water treatment, if necessary, to achieve compliance with applicable Water Quality Standards.
- II. Provide the recordkeeping required by the stormwater discharge permit associated with construction activity.

108.1.4.4 Stormwater Discharge Permit Associated with Industrial Activity:

108.1.4.4.1 Stormwater Discharge Permit:

- I. If construction activities will entail the use of a mobile plant, or nonmetallic borrow areas, a stormwater discharge permit associated with industrial activity may be required.

108.1.4.4.2 Notice of Intent (NOI):

- I. Sign the NOI to obtain coverage under a stormwater general permit to control stormwater discharges from industrial activity at the construction site as required under section 402 of the Clean Water Act (Public Law 92-500, as amended) and/or The New Mexico Environmental Department, Surface Water Quality Bureau and/or the Navajo Nation Environmental Protection Agency.

108.1.4.4.3 Term and Conditions:

- I. Comply with terms and conditions to obtain and maintain the industrial stormwater discharge permit, including the preparation of a Pollution Prevention Plan.

108.1.4.4.4 Monitoring and Water Treatment:

- I. Provide monitoring and water treatment, if necessary, to achieve compliance with applicable Water Quality Standards.
- II. Provide monitoring results to the appropriate agency as required by the permit.
- III. Send copies of all information transmitted to the appropriate agency and to the City.

108.1.5 CONTRACTOR RESPONSIBILITIES

108.1.5.1 Permits: Contractor is responsible for all permits.

108.1.5.2 Monitoring: Conduct monitoring in order to meet the requirements of the permits which may include:

- I. Sampling,
- II. Site inspections, and
- III. Required laboratory tests to determine effluent characteristics.

108.1.5.3 Reporting Results: Provide monitoring results to the appropriate agency as required by the permit. Send copies of all information transmitted to the appropriate agency to the City.

108.1.5.4 Recordkeeping: Retain records and data for the life of the project or as required by permits, whichever is longer.

108.1.6 REFERENCE STANDARDS

108.1.6.1 Bureau of Reclamation (USBR): RSHS-2009 Reclamation Safety and Health Standards.

108.1.6.2 Code of Federal Regulations (CFR): 40 CFR, Part 112 Oil Pollution Prevention.

108.1.6.3 Public Law: Sections 311, 402, and 404 Clean Water Act (Public Law 92-500, as amended)

108.2 MATERIALS

Materials are not listed in this section.

108.3 EXECUTION

108.3.1 POLLUTION CONTROLS

108.3.1.1 On Site Controls: Control pollutants by use of sediment and erosion controls, wastewater and stormwater management controls, construction site management practices, and other controls including State and local control requirements.

108.3.1.2 Sediment and Erosion Controls:

- I. Establish methods for controlling sediment and erosion which address vegetative practices, structural control, slit fences, straw dikes, sediment controls, and operator controls as appropriate.
- II. Institute stormwater management measures as required, including velocity dissipaters, and solid waste controls which address controls for building materials and offsite tracking of sediment.

108.3.1.3 Wastewater and Stormwater Management Controls:

108.3.1.3.1 Pollution Prevention Measures:

- I. Use methods of dewatering, unwatering, excavating, or stockpiling earth and rock materials which include prevention measures to control silting and erosion, and which will intercept and settle any runoff of sediment-laden waters.
- II. Prevent wastewater from general construction activities such as drain water collection, aggregate processing, concrete batching, drilling, grouting, or other construction operations, from entering flowing or dry watercourses without the use of approved turbidity control methods.
- III. Divert stormwater runoff from upslope areas away from disturbed areas.

108.3.1.3.2 Turbidity Prevention Measures:

- I. Use methods for prevention of excess turbidity which include, but are not restricted to, intercepting ditches, settling ponds, gravel filter entrapment dikes, flocculating processes, recirculation, combinations thereof, or other approved methods that are not harmful to aquatic life.
- II. Wastewaters discharged into surface waters shall meet conditions of the permit(s).
- III. Do not operate mechanized equipment in water bodies without having first obtained a Section 404 permit, and then only as necessary to construct crossings or perform the required construction.

108.3.1.4 Construction Site Management:

108.3.1.4.1 Contractor Construction Operations:

- I. Perform construction activities by method that will prevent entrance, or accidental spillage, of solid matter, containments, debris, or other pollutants or wastes into stream, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources.
 - i. Pollutants and wastes include, but are not restricted to: refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.

108.3.1.4.2 Stockpiled or Deposited Materials:

- I. Do not stockpile or deposit excavated materials or other construction materials, near or on, stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can in any way encroach upon the watercourse.

108.3.1.4.3 Petroleum Product Storage Tanks Management:

- I. Place oil or other petroleum product storage tanks at least 50 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source.
- II. Do not use underground storage tanks.
- III. Construct storage area dikes at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to storage tank capacity located in the area plus sufficient freeboard to contain the 25-year rainstorm.
 - i. Line diked areas with an impermeable barrier at least 50 mils thick.
- IV. Area for refueling operations: Lined with impermeable barrier at least 10 mils thick covered with two (2) to four (4) inches of soil.

108.4 MEASUREMENT & PAYMENT

Measurement and payment for items of work covered by this section of the specification shall be incidental to the project costs.

201 GENERAL EARTHWORK – INDEX

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201.4 MEASUREMENT AND PAYMENT

201 GENERAL EARTHWORK

201.1 GENERAL

201.1.1 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 107, Storm Water Pollution Prevention
- III. Section 203, Trenching, Excavation, and Backfilling
- IV. Section 204, Fill Materials

201.1.2 DESCRIPTIONS

201.1.2.1 Laws and Regulatory Requirements: All excavation, trenching, bracing, etc., shall comply with the requirements of OSHA Excavation Safety Standards (29 CFR Part 1926.650 Subpart P) and any state and local requirements. Where conflict between OSHA, state or local regulations exist, the most stringent requirements shall apply.

201.1.3 DEFINITIONS

201.1.3.1 Satisfactory Materials: Satisfactory materials comprise of any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, SW, SP, SM, SW-SM. Satisfactory materials for grading shall comprise of stones less than eight (8) inches, except for fill material for pavements and railroads which comprise of stones less than three (3) inches in any dimension.

201.1.3.2 Unsatisfactory Materials: Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; and material classified as satisfactory which contains root and other organic matter or frozen material. Notify the Engineer when encountering any contaminated materials.

201.1.3.3 Cohesionless and Cohesive Materials: Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D 4318, ASTM C 136, ASTM D 422, and ASTM D 1140.

201.1.3.4 Degree of Compaction: Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the

test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum density. Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4-inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180 and corrected with AASHTO T 224.

201.1.3.5 Hard/Unyielding Materials: Hard/Unyielding materials comprise of weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than six (6) inches in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

201.1.3.6 Rock: Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also, large boulders, buried masonry, or concrete other than pavement exceeding one (1) cubic yard in volume. Removal of hard material will not be considered rock excavation because of intermittent drilling that is performed merely to increase production. All stone or boulders less than eight (8) cubic feet in volume will be classified as earth.

Rock shall be broken into two (2) types as further defined below:

Type "A" Rock - extremely hard rock that is defined as rock which cannot be excavated by means other than those listed:

- I. Drilling and blasting
- II. Drilling and splitting with expandable chemical compound.
- III. Jack hammering.
- IV. Adjacent excavation and removal with large earth/rock moving equipment.

Type "B" rock - not at difficult to excavate as Type "A" rock. Type "B" rock can be excavated by any methods stated above or by large backhoes with rock teeth and experienced operators.

Rock that is hard, but ledgy or fractured and can be excavated with large backhoes, will be considered Type "B" rock. Rock that is intermittently layered with shale and that is readily excavated with backhoes will not be considered rock. Hard shale will not be considered as rock excavation. Samples of Type "A" and Type "B" rocks are available at the office of the Engineer for inspection by bidders or project Contractors.

201.1.3.7 Unstable Material: Unstable materials do not properly support the building, utility pipe, conduit, or appurtenant structure due to oversaturation.

201.1.3.8 Granular Material: Granular fill material shall be unfrozen gravel, sandy gravel or gravelly sand free of organic material, loam, trash, snow, ice or other objectionable material and shall be as specified in Section 204.

201.1.3.9 Backfill and/or Final Backfill Material: Final backfill consists of granular material or satisfactory materials (imported or native) free from rocks 3/4 inch or larger in any dimension or free from rocks of such size as required for final surfacing, whichever is smaller.

201.1.3.10 Expansive Soils: Expansive soils are defined as soils that have a plasticity index equal to or greater than 20 when tested in accordance with ASTM D 4318.

201.1.4 CLASSIFICATION OF EXCAVATION

201.1.4.1 Common Excavation: The Contractor shall perform excavation of every type of material encountered within the limits of the project to the lines, grades and elevation shown. Grading shall be in conformity with the typical cross sections shown on project drawings. Satisfactory excavated materials shall be stockpiled for use as backfill within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated and disposed of as stated in "Disposal of Surplus Material". Surplus satisfactory excavated material shall also be disposed of as stated in "Disposal of Surplus Material". During construction, excavation and fill shall be performed in a manner and sequence that will provide proper drainage at all times.

201.1.4.2 Rock Excavation: Rock excavation includes excavating, grading, and disposing of material defined as rock. If at any time during excavation, the Contractor encounters material that may be defined as rock, uncover such material and notify the Engineer. The Contractor shall not proceed with the excavation of this material until the Engineer has classified the materials as common excavation or rock excavation and has taken cross sections as required. Failure on the part of the Contractor to uncover such material, notify the Engineer, and allow ample time for classification and cross sectioning of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the Engineer for the areas of work in which such deposits occur.

Rock excavation shall be broken into two categories according to the type of rock being excavated as defined in Paragraph 201.1.3.6 of this Section.

201.1.5 SUBMITTALS

201.1.5.1 Submittal Procedures: All submittal procedures shall be per Section 101 of the Specifications.

201.1.5.1.1 Product Data: Imported material, gradation, unit weight, proctor and PI sample results shall be approved before utilizing the following:

- I. Imported Material
- II. Utilization of Excavated Materials
- III. Excavated Rock Materials (modified or unmodified)
- IV. Borrow Pit Materials

201.1.5.1.2 Procedure and Location: Procedure and location for the following:

- I. Disposal of unused satisfactory material
- II. Proposed source of borrow material

201.1.5.1.3 Notification: Notification of encountering rock in the project and the advanced notice on the opening of excavation and borrow areas.

201.2 MATERIALS

201.2.1 BACKFILL

Backfill materials shall be as defined in Paragraph 201.1.3.9 or as specified in Section 204.

201.2.2 TIMBER

Timber used for excavation support system shall be pressure treated.

201.2.3 BURIED WARNING AND IDENTIFICATION TAPE FOR ENCOUNTERED UTILITY LINES

Replace disturbed polyethylene plastic warning tape manufactured specifically for warning and identification of existing buried utility lines. Replace disturbed tape with rolls, three (3) inches minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes:

- I. Red: Electric
- II. Blue: Water Systems
- III. Green: Sewer Systems

201.2.3.1 Warning Tape for Metallic and Non-Metallic Piping: Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch and a minimum strength of 1500 pounds per square inch (psi) lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

201.2.3.2 Detection Wire for Metallic and Non-Metallic Piping: Insulated single strand, solid copper detection wire with a minimum of 12AWG.

201.3 EXECUTION

201.3.1 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified in the project documents. Perform the grading in accordance with the typical sections shown and the tolerances specified in Paragraph 201.3.4. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Dispose surplus satisfactory excavated material not required for fill or embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times.

201.3.1.1 Test Pits: In addition to the removal and demolition shown on the drawings, the Contractor shall perform exploratory excavation work, Test Pits, as required in order to verify the location of existing underground utilities and structures prior to excavation activities. Test pits shall be backfilled as soon as the location of the utilities has been determined. Backfilled locations shall be such that erosion of the area is minimized.

201.3.1.2 Dewatering, Drainage, and Drainage Systems: Temporary dewatering and drainage systems shall be in place prior to beginning excavation. Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry

soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions and to employ necessary measures to permit construction to proceed.

201.3.1.3 Excavation Support: The Contractor shall furnish, put in place, and maintain a braced or tied back cofferdam to support the sides of the excavation to prevent movement which could in anyway diminish the width of the excavation below that necessary for proper construction.

201.3.1.3.1 Bracing and Sheeting: In congested areas where narrowness or right-of-way, traffic, other installed utilities line, buildings or structures prevent sloping of banks, the Contractor shall be responsible to install sheet piling or operate a “boat” or caisson to maintain side slope and to protect existing improvements and work personnel. The Contractor will not be compensated for replacement of any improvements damaged due to his failure to provide proper bracing, sheeting or other restraining devices.

201.3.1.4 Drainage Structure Excavation Requirements: Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

201.3.1.5 Existing Underground Utilities: The Contractor is responsible for movement of construction machinery and equipment over existing pipes and utilities during construction. Perform work adjacent to non-City utilities as indicated in accordance with procedures outlined by utility company. Excavation made with power-driven equipment is not permitted within two (2) feet of known City-owned utility or subsurface construction. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the Engineer. Report damage to utility lines or subsurface construction immediately to the Engineer.

201.3.1.6 Structural Excavation: Ensure that footing subgrades have been inspected and approved by the Engineer prior to gabion basket, revetment mattress or concrete placement.

201.3.1.7 Opening & Drainage of Excavation and Borrow Pits: The Contractor is responsible for notifying the Engineer sufficiently in advance of the opening of any excavation to permit elevations and measurements of the undisturbed ground surface to be taken. Transport overburden and other spoil material to designated spoil areas or otherwise dispose of as directed. Ensure that excavation of any area or dumping of spoil material results in minimum detrimental effects on natural environmental conditions.

201.3.2 BACKFILLING AND COMPACTION

Backfilling operations shall commence after concrete has cured for approximately 72 hours. Materials for backfill shall conform to those described in Section 204, as specified in this Section, or as called for in project documents.

Backfill shall be brought up evenly in maximum eight (8) inch lifts. Each layer of backfill material shall be thoroughly compacted by rolling, tamping or vibrating with mechanical compacting equipment or hand tamping. Compaction, shall be as called for as a percentage of standard or modified proctor. If rolling is used, it shall be by use of a suitable roller or tractor and insuring compaction throughout the backfilling area.

When the construction is within the New Mexico Department of Transportation Right-Of-Way, the construction practices and compaction densities required in backfill shall comply with the requirements of the New Mexico Highway Commission's "Standard Specifications for Road Bridge Construction" and shall be subject to inspection by personnel of the New Mexico State Highway Department.

201.3.2.1 Utilization of Backfill Materials: Use satisfactory material removed from excavations, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes. Clear and grub designated waste areas before disposal of waste material thereon. Unsatisfactory materials removed during excavation shall be disposed into designated waste disposal or spoil areas.

201.3.2.2 Ground Surface Preparation:

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Engineer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of eight (8) inches before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than one (1) vertical to four (4) horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of eight (8) inches, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground, scarify the excavated or natural ground portion to a depth of 12 inches and compact it as specified for the adjacent fill.

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

201.3.2.3 Backfill for Appurtenances: After the manhole, catch basin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for three (3) days, place backfill in such a manner that the structure is not to be damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for final backfill, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress.

201.3.3 SUBGRADE PREPARATION

201.3.3.1 Proof Rolling: Finish proof rolling on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. Proof roll the existing subgrade with a 15 ton, pneumatic-tired roller. Operate the roller in a systematic manner to ensure the number of passes over all areas, and at speeds between 2 1/2 to 3 1/2 miles per hour (mph). Notify the Engineer a minimum of three (3) days prior to proof rolling. Perform proof rolling in the presence of the Engineer. Undercut rutting or pumping of material as directed by the Engineer and replace with select material.

201.3.3.2 Construction: Shape subgrade to line, grade, and cross section, and compact as called for in project documents. Include plowing, disking, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6 inches below finished grade for the subgrade. Bring up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. Do not vary the elevation of the finish subgrade more than 0.05 feet from the established grades and cross sections.

201.3.3.3 Compaction: Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Except for paved areas.

201.3.3.3.1 Subgrade for Pavements: Compact subgrade for pavements to at least 96 percent laboratory maximum theoretical density for the depth below the surface of the pavement shown. When more than one soil classification is present in the subgrade, thoroughly blend, reshape, and compact the top six (6) inches of subgrade.

201.3.4 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown in project documents. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in Paragraph 201.3.3. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turving materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

201.3.4.1 Subgrade: During construction, keep embankments and excavations shaped and drained. Maintain ditches and drains along subgrade to drain effectively at all times. Do not disturb the finished subgrade by traffic or other operation. The Contractor is responsible for protecting and maintaining the finished subgrade in a satisfactory condition until ballast, subbase, base, or pavement is placed. Do not permit the storage or stockpiling of materials on the finished subgrade. Do not lay subbase, base course, ballast, or pavement until the subgrade has been checked and approved, and in no case place subbase, base, surfacing, pavement, or ballast on a muddy, spongy or frozen subgrade.

201.3.4.2 Grading Around Structures: Construct areas within five (5) feet outside of each building and structure line true-to-grade, shape to drain, and maintain free of trash and debris until final inspection has been completed and the work has been accepted.

201.3.5 TESTING

Testing shall be the responsibility of the Contractor and shall be performed as directed by the Engineer. Perform testing by a certified commercial testing laboratory. Determine field in-place density in accordance with ASTM D 2922. When test results indicate, as determined by the Engineer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompacted areas to determine conformance with specification requirements. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type operation.

201.3.5.1 Fill and Backfill Material Gradation: One test per each different material encountered or in-place source material. Determine gradation of fill and backfill material in accordance with ASTM C 136.

201.3.5.2 In-Place Densities:

- I. One test per 200 linear feet of trench, or fraction thereof, of each lift of fill or backfill areas compacted by other than hand-operated machines.
- II. One test per 100 linear feet, or fraction thereof, of each lift of fill or backfill areas compacted by hand-operated machines.

201.3.5.3 Moisture Contents: In the stockpile or excavation areas, perform a minimum of two (2) tests per day per type of material or source of material being placed during stable weather conditions. During unstable weather, perform tests as dictated by local conditions and approved by the Engineer. It is considered acceptable to test for moisture within compacted material. If moisture content is not considered acceptable, compacted material will be removed in its entirety and reprocessed prior to retesting.

201.3.5.4 Optimum Moisture and Laboratory Maximum Density: Perform tests for each type material or source of material including borrow material to determine the optimum moisture and laboratory maximum density values. One representative test per 500 cubic yards of fill and backfill, or when any change in material occurs which may affect the optimum moisture content or laboratory maximum density.

201.3.5.5 Tolerance Tests for Subgrades: Perform continuous checks on the degree of finish specified in Paragraph 201.3.3 during construction of the subgrades.

201.3.5.6 Displacement of Sewers: After other required tests have been performed and the trench backfill compacted to the finished grade surface, inspect the pipe to determine whether significant displacement has occurred. Conduct this inspection in the presence of the Engineer. Inspect pipe sizes larger than 36 inches, while inspecting smaller diameter pipe by shining a light or laser between manholes or manhole locations, or by using television cameras passed through the pipe. If, in the judgment of the Engineer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, replace or repair the defects as directed at no additional cost.

201.3.6 DISPOSITION OF SURPLUS MATERIAL

Dispose of surplus material or other soil material not required or suitable for filling or backfilling, including brush, refuse, stumps and roots in accordance with all local, state and federal requirements.

Excavated material may be stockpiled without excessive surcharge on the trench bank. Contractor may temporarily stockpile in an area within the limits of construction that do not disrupt construction activities, create any nuisance or safety hazards or otherwise restrict access to the work site.

201.3.7 EXSISTING UTILITIES

The Contractor shall, at his own expense, repair all damages to street, sidewalks, curbs, gutters, paving, utility lines and any other private or public properties caused by general earthwork or other construction activities. This includes damages caused by backfill settlement within a period of one (1) year after final acceptance of the project by the City.

201.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specifications shall be in accordance with provisions of the Special Conditions.

202 CLEARING AND GRUBBING – INDEX

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- 202.3.5 REMOVAL AND DISPOSAL OF MATERIAL

202.4 MEASUREMENT AND PAYMENT

202 CLEARING AND GRUBBING

202.1 GENERAL

202.1.1 DESCRIPTION OF WORK

This work shall consist of clearing, grubbing, removing and disposing of vegetation and debris, trash and rubble in accordance with the contract requirements and in compliance with these specifications. This work shall also include the preservation from damage or defacement of all vegetation and items designated to remain.

The Contractor shall establish Right-of-Way lines, property lines and construction lines based on project drawings and coordination with project Engineer. The Contractor shall preserve all trees, shrubs, plants, and other items designated to remain.

Within the construction limits, all surface debris, trees, stumps, roots, and other objectionable protruding obstructions shall be cleared and grubbed as required. The Contractor may leave undisturbed stumps and other solid objects provided they are outside the construction limits and do not interfere with construction activities.

Between the Right-of-Way lines and construction limits, hazardous objects and unsightly debris shall be removed. Stump holes and other holes within this area shall be backfilled with suitable material. Vegetation outside of designated demolition limits to remain.

202.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 105, Protected Species (If applicable)
- III. Section 106, Preservation of Historical and Archaeological Data
- IV. Section 107, Storm Water Pollution Prevention

202.1.3 SUBMITTALS

The Engineer approval is required for submittals. The following shall be submitted in accordance with Section 101:

202.1.3.1 Product Data: Non-salvageable materials. Written permission to dispose of such products on private property shall be filed with the Engineer.

202.1.3.2 Samples:

- I. Tree wound paint
- II. Herbicide

Submit samples in cans with manufacturer's label.

202.1.4 DELIVERY, STORAGE, AND HANDLING

Deliver, store, and handle materials in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

202.2 MATERIALS

202.2.1 TREE WOUND PAINT

Bituminous based paint of standard manufacture specially formulated for tree wounds.

202.2.2 HERBICIDE

Comply with Federal Insecticide, Fungicide, and Rodenticide Act (Title 7 U.S.C. Section 136) for requirements on Contractor's licensing, certification, and record keeping.

202.3 EXECUTION

202.3.1 PROTECTION

202.3.1.1 Roads and Walks: Keep roads and walks free of dirt and debris at all times.

202.3.1.2 Trees, Shrubs, & Existing Facilities: Trees and vegetation to be left standing shall be protected from damage due to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

202.3.1.3 Utility Lines: Protect existing utility lines from damage. Notify the Engineer immediately of damage to or an encounter with an unknown existing utility line. The Contractor shall be responsible for the repairs of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer in ample time to minimize interruption of the service.

202.3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation designated or directed to be left in place. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1 1/2 inches or more in diameter to the heights indicated or directed. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches. Cuts more than 1 1/2 inches in diameter shall be painted with an approved tree-wound paint.

Apply herbicide in accordance with the manufacturer's label to the top surface of stumps designated not to be removed.

202.3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in Paragraph 202.3.4. Trees shall be disposed of as specified in Paragraph 202.3.5.

202.3.4 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than three (3) inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

202.3.5 REMOVAL AND DISPOSAL OF MATERIAL

202.3.5.1 Non-Salvageable Materials: Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations shall be disposed of in an environmentally acceptable manner. The Contractor shall be responsible for compliance with all Federal and State laws and regulations and with reasonable practice relative to disposal of unusable debris.

202.3.5.2 Alternate Disposal Methods: Materials removed from the limits of the Right-of-way maybe disposed of on designated offsite private property. Contractor shall arrange for and obtain written permission from the property owner on whose property material is to be disposed of. Burning of material is strictly prohibited.

202.3.5.3 Site Conditions: The project right-of-way and adjacent areas shall be left neat and appear to be finished. Accumulation of debris on adjacent property will not be allowed, unless approved, in writing, by the property owner.

202.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the Specifications shall be in accordance with provisions of the Special Conditions.

203 TRENCHING, EXCAVATION, AND BACKFILLING – INDEX

203.1 GENERAL

- 203.1.1 DESCRIPTION
- 203.1.2 RELATED SECTIONS
- 203.1.3 DEFINITIONS
- 203.1.4 SUBMITTALS

203.2 MATERIALS

- 203.2.1 SATISFACTORY MATERIALS,
- 203.2.2 UNSATISFACTORY MATERIALS
- 203.2.3 COHESIONLESS AND COHESIVE MATERIALS
- 203.2.4 ROCK
- 203.2.5 UNYIELDING MATERIAL
- 203.2.6 UNSTABLE MATERIAL
- 203.2.7 GRANULAR MATERIAL
- 203.2.8 BEDDING OR INITIAL BACKFILL MATERIAL

203.3 EXECUTION

- 203.3.1 EXCAVATION
- 203.3.2 BRACING AND SHEETING
- 203.3.3 BACKFILLING
- 203.3.4 PAVEMENT CUT AND PATCHES
- 203.3.5 EXISTING UTILITIES
- 203.3.6 SPECIAL REQUIREMENTS
- 203.3.7 TESTING
- 203.3.8 DE-WATERING
- 203.3.9 ACCESS TO PUBLIC STREETS, ALLEYS, RIGHTS-OF-WAY,
RAILROAD, AND PRIVATE PROPERTY

203.4 MEASUREMENT AND PAYMENT

203 TRENCHING, EXCAVATION, AND BACKFILLING

203.1 GENERAL

203.1.1 DESCRIPTION

This item of work shall consist of trenching, excavation, backfilling, restoration of site, and miscellaneous operations pertaining to installation of pipelines, facilities, structures, and appurtenances complete in strict accordance with provisions of this section of the specifications and applicable drawings. Workmanship and materials for required earthwork shall conform to the NMDOT Standard Specifications for Highway and Bridge Construction, 2014 Edition provided however, that the specifications, measurement and payment methods contained therein, or the Special Conditions shall apply.

203.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 201, General Earthwork
- III. Section 204, Fill Materials
- IV. Section 507, Jacking and Boring

203.1.3 DEFINITIONS

All definitions of materials and types of products shall be as defined in Section 201.

203.1.4 SUBMITTALS

203.1.4.1 Submittal Procedures: Engineer approval is required for submittals. The following shall be submitted in accordance with Section 101 of the Specifications.

203.1.4.1.1 Test Reports:

- I. Field Density Tests
- II. Testing of Backfill Materials

Copies of all laboratory and field test reports within seven (7) days of the completion of the test.

203.2 MATERIALS

203.2.1 SATISFACTORY MATERIALS

Satisfactory materials shall be as defined in Section 201.

203.2.2 UNSATISFACTORY MATERIALS

Unsatisfactory Materials shall be as defined in Section 201.

203.2.3 COHESIONLESS AND COHESIVE MATERIALS

Cohesion-less and Cohesive Materials shall be as defined in Section 201.

203.2.4 ROCK

Rock is defined in Section 201. Rock also consists of boulders measuring 1/2 cubic yard or more, materials that cannot be removed without systematic drilling and blasting such as rock material in ledges, bedded deposits, un-stratified masses, conglomerate deposits, and below ground concrete or masonry structures, exceeding 1/2 cubic yard in volume, except that pavement shall not be considered as rock.

203.2.5 UNYIELDING MATERIAL

Unyielding material shall consist of rock and gravelly soils with stones greater than 12 inches in any dimension or as defined by the pipe manufacturer, whichever is smaller.

203.2.6 UNSTABLE MATERIAL

Unstable Material shall be as defined in Section 201.

203.2.7 GRANULAR MATERIAL

Granular Material shall be as defined in Section 201.

203.2.8 BEDDING OR INITIAL BACKFILL MATERIAL

Bedding or initial backfill shall consist of granular material free from rocks 3/4 inch or larger in any dimension or free from rocks of such size as recommended by the pipe manufacturer, whichever is smaller. When the pipe is coated or wrapped for corrosion protection, the initial backfill material shall be free of stones larger than 3/8 inch in any dimension or as recommended by the pipe manufacturer, whichever is smaller.

203.3 EXECUTION

203.3.1 EXCAVATION

Excavation shall be performed in accordance with Section 201. Rock excavation shall include removal and disposition of material defined as rock in Section 201. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to half (1/2) the depth of the excavation but in no instance closer than two (2) feet.

203.3.1.1 Trench Excavation Requirements: Excavate the trench as recommended by the manufacturer of the pipe to be installed. Shore trench walls more than four (4) feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave-in. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter, and do not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, provide special installation procedures. The Contractor is responsible for the cost of the special installation procedures without any additional cost to the Owner.

203.3.1.1.1 Bottom Preparation: Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones of 3/4 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

203.3.1.1.2 Removal of Unyielding Material: Where over depth is not indicated, and unyielding material is encountered in the bottom of the trench, remove such material eight (8) inches below the required grade and replace with suitable materials as provided Section 201.

203.3.1.1.3 Removal of Unstable Material: Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in Section 201. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Owner.

203.3.1.1.4 Excavation for Appurtenances: Provide excavation for manholes, catch-basins, inlets, or similar structures of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete is to be placed.

203.3.1.2 Rock Excavation: Reference Section 201 for the description of rock excavation. All stone or boulders less than eight (8) cubic feet in volume will be classified as earth. The Engineer shall, in all cases, be advised if blasting is deemed necessary for removal of material encountered in the trench. Normally blasting will not

be permitted in the City limits. That portion of the trench bottom excavated in rock shall be over-excavated a minimum of four (4) inches below all pipe elevations and backfilled to trench invert grade with suitable granular material approved by the Engineer.

203.3.1.3 Jacking, Boring, and Tunneling: Shall conform to Section 507 of these specifications.

203.3.1.4 Stockpiles: Stockpiles of satisfactory and wasted materials shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations shall be cleared and grubbed. Excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Owner.

203.3.2 BRACING AND SHEETING

In congested areas where narrowness of Right-of-Way, traffic, other installed utility lines, buildings or structures prevents sloping of trench banks, it shall be the Contractor's responsibility to install sheet piling or operate a trench box or caisson to maintain trench widths to protect existing improvements and work personnel. The Contractor will not be compensated for replacement of any improvements damaged due to his failure to provide proper bracing, sheeting, or other restraining devices. Sheeting, bracing, or other restraining devices shall not be removed after pipe lines are laid until sufficient backfill is in place to protect the pipe or existing improvements from damage by slides or cave-ins. Should it become necessary to leave sheeting or piling in place, it shall be cut-off at least four (4) feet below the ground.

203.3.3 BACKFILLING

Backfilling operations shall be performed in accordance with Section 201 and normally be carried immediately behind the pipe laying operations. Long stretches of open trench will not be permitted. All pits that will require future access for additional project operations shall be temporarily backfilled. The Contractor shall be prepared at all times to take measures to prevent flood damage to facilities connected with this project, and private or public property.

203.3.3.1 Trench Backfill: Backfill trenches to the grade shown. Backfill the trench at least three (3) feet above the top of pipe prior to performing the required pressure tests. Leave the joints and couplings uncovered during the pressure test.

203.3.3.1.1 Replacement of Unyielding Material: Replace unyielding material removed from the trench with select granular material or initial backfill material.

203.3.3.1.2 Replacement of Unstable Material: Replace unstable material removed from the trench or excavation with select granular material placed in layers not exceeding eight (8) inch loose thickness.

203.3.3.1.3 Bedding and Initial Backfill: Provide bedding of the type and thickness shown in the project drawings. Place bedding material and compact it with approved tampers to a height of at least one foot above the utility pipe conduit or structure. Bring up the bedding evenly on both sides of the pipe for the full length of the pipe. Take care to ensure thorough compaction of the fill under the haunches of the pipe. Provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Compact backfill to percentage of standard proctor as called for.

203.3.3.1.4 Final Backfill: Fill the remainder of the trench, except for special materials for roadways, sidewalks and other structures with satisfactory material. Place backfill material and compact to 95 percent standard proctor.

203.3.3.1.5 Flowable Backfill: Flowable fill as defined in Section 204 may be used for bedding, initial backfill, and final backfill as called for in project documents or at Contractor's choice. The consistency of the backfill shall be such that all voids are filled with minimum rodding or vibrating but not so wet as to cause excessive shrinkage, prolonged set times or detrimental reduction in strength. Cured flowable fill shall have compressive strengths greater than compacted soil as specified on the project drawings yet shall be suitable for future excavation by conventional methods. Test methods to conform to NMDOT 516.2.10.

203.3.3.1.6 Granular Material: In areas where the natural material is encountered in the trench bottom meets the specified gradation requirements in Section 204 for granular fill, over excavation and placing of granular material will not be required, but accurate shaping and grading of the trench bottom to provide the above cited pipe support shall be carried out.

203.3.4 PAVEMENT CUT AND PATCHES

Pavement patches and cuts shall conform to applicable Sections of these specifications.

203.3.5 EXISTING UTILITIES

The Contractor shall call for utility "locates" by the utility companies prior to any construction activities. The Contractor should familiarize himself of the fees involved for the initial and return "locates". The Contractor shall, in addition, expose certain existing lines which could cause grade, alignment, or tie-in problems for the proposed facilities.

The Contractor shall exercise due care to ensure that existing water and sewer laterals and service connections are not disturbed or damaged. Any laterals or service connections

damaged as a result of the Contractor's operations shall be replaced with materials of like kind or as specified. Repaired and/or replaced laterals and service connections shall not be covered until inspected and approved by the Owner or his representative. The Contractor shall, after locates are provided by City Personnel, or others, carefully probe for and locate service lines on the blind side or trench side of existing mains. It is recommended that the Contractor have on hand for the project, an electronic device suitable for locating underground copper or ferrous lines. Contractor shall be responsible for tying in all service lines to new main construction.

Contractor shall work whatever hours are required to repair and replace damaged or cut water and sewer services or mains back into operation with a minimum of inconvenience to the user.

Contractor shall use extreme caution when trenching in areas with sewer service lines so that flow from cut service lines does not come near newly laid water pipe. Water pipe that is infiltrated by sewage will be rejected and shall be removed. Workmen shall have available, at all times, potable water and soap to wash up after working on sewer lines. Diluted chlorine solution shall also be available at all times to wipe down water pipe and fittings if deemed necessary.

203.3.6 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

203.3.6.1 Waterlines: Trenches shall be of a depth to provide a minimum cover of four (4) feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.

203.3.6.2 Electrical Distribution Systems: Direct burial cable and conduit or duct line shall have a minimum cover of two (2) feet for secondary services and four (4) feet for primary services.

203.3.6.3 Plastic Marking Tape: Warning tapes shall be installed 1 foot above the pipe, at a depth of approximately 2 1/2 feet below finished grade unless otherwise shown. Wire shall be installed under or wrapped around pipe.

203.3.7 TESTING

Testing shall be in accordance with Section 201.

203.3.8 DE-WATERING

At the cost of the Contractor, the Contractor shall furnish all equipment, perform all operations required to remove all water from trenches or other parts of the work in accordance with Section 201, and fully protect the work from slides or cave-ins by

installation, shoring or other restraining. De-watering and/or shoring shall be continued until all work below the water table has been completed and backfilled. Water from de-watering operations shall be disposed of as directed by the Engineer.

203.3.9 ACCESS TO PUBLIC STREETS, ALLEYS AND RIGHTS-OF-WAY, RAILROAD AND PRIVATE PROPERTY

Work to be performed under this project shall be carried out in a manner that will cause the least inconvenience to public travel and damage to adjacent private property. In general, the Contractor will not be permitted to completely close off any public or private streets, driveways, alleys or other routes or travel by the public. Closure of any public route of travel will be only after obtaining permission of the City Director of Public Works, Street Superintendent, or County Road Superintendent. Such closure shall be for the minimum period necessary for construction. Where private property is served by two (2) driveways or wide frontage on public rights of way, access will be provided at all times. In some cases, it may be necessary that the Contractor construct temporary roads or driveways. Temporary access routes shall be properly constructed and maintained by the Contractor.

Contractor shall place and maintain barricades, warning lights, and signs as required to inform and protect the general public and project workmen. Contractor shall be courteous and attempt to work with businesses and residents to the fullest extent possible until the project is complete.

Traffic Routing Plans for work within the City shall be submitted to the City Director of Public Works for approval. The plan shall address each phase of construction. Traffic routing plans for work within NMDOT Right-of-Ways will be contained in the Contract Documents.

The Contractor shall water the streets for dust control when requested by the City or by the Engineer. In addition, the Contractor shall "broom" the streets as required during the time period between pipe installation and patching.

All work on railroad property shall be done in such a manner as to least interfere with rail traffic, railroad workmen and railroad lessee business operations. All work shall be planned in close coordination with appropriate railroad officials and lessee representatives. No work shall be performed on railroad property unless a permit is obtained.

203.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specifications shall be as set forth in the Special Conditions.

204 FILL MATERIALS – INDEX

204.1 GENERAL

204.1.1 RELATED SECTIONS

204.1.2 SUBMITTALS

204.2 MATERIALS

204.2.1 GRANULAR FILL

204.2.2 NATIVE ROCK FREE FILL

204.2.3 FLOWABLE FILL MIX DESIGN

204.3 EXECUTION

204.3.1 NATIVE ROCK UTILIZATION

204.3.2 PLACING FLOWABLE FILL

204.4 MEASUREMENT AND PAYMENT

204 FILL MATERIALS

204.1 GENERAL

204.1.1 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the Work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 201, General Earthwork
- III. Section 203, Trenching, Excavation, and Backfilling
- IV. Section 301, Cast-In-Place Concrete

204.1.2 SUBMITTALS

Engineer approval is required for submittals. The following shall be submitted in accordance with Section 101 of the Specifications.

Certification: Engineer's Approval

204.1.2.1 Granular Fill: Contractor to provide certified test reports made by an independent testing laboratory indicating that material meets or exceeds the requirements of these specifications. The term "granular fill" shall apply to granular fill, granular backfill, or granular embankment.

204.1.2.2 Native Rock Free Fill: Contractor to provide certified test reports made by an independent testing laboratory indicating that materials meet or exceed the requirements of these specifications. The term "native rock free fill" shall apply to native rock free fill, native rock free backfill, or native rock free embankment.

204.1.2.3 Test Reports: Engineer's Approval

- I. Flowable Fill Mix Design
- II. Filter Aggregate

204.2 MATERIALS

204.2.1 GRANULAR FILL

Granular fill material shall be unfrozen gravel, sandy gravel or gravelly sand free of organic material, loam, trash, snow, ice or other objectionable material and shall have a plasticity index of less than or equal to 12 (per ASTM D4318) and shall conform to the gradation limits:

Table 1:

Sieve Size	Percent Passing
1 inch	100
No. 4	40-100
No. 200	Less than 35

The maximum allowable aggregate size shall be 3/8-inches, or the maximum allowable size recommended by the pipe manufacturer, whichever is smaller.

204.2.2 NATIVE ROCK FREE FILL

Native fill shall not contain rocks, broken concrete, masonry rubble, asphalt pavement, or any material larger than six (6) inches in any one direction. Native fill shall have a plasticity index of less than 20 and shall conform to Table 2 limits:

Table 2:

Sieve Size	Percent Passing
No. 200	15-70

204.2.3 FLOWABLE FILL MIX DESIGN

Flowable Fill shall conform to requirements of NMDOT Highway & Bridge Construction Specifications, 2014 Edition except as modified below.

Flowable backfill may be composed of sand, crusher fines, fly ash, other suitable materials, and Portland Cement. The consistency of the backfill shall be such that all voids are filled with minimum rodding or vibrating but not so wet as to cause excessive shrinkage, prolonged set times, or detrimental reduction in strength. Cured flowable fill shall have compressive strengths greater than compacted soil as specified on the project drawings yet shall be suitable for future excavation by conventional methods. Flowable Fill Mix Design shall be established in accordance with the following limits:

204.2.3.1 Strength: Strength of flowable fill shall be 50 – 150 pounds per square inch (psi) as described above per ASTM D4832 (except that in some cases additional cement may be added to accelerate initial set or increase strength).

204.2.3.2 Cement: 50 - 94 lb/CY as required to meet strength requirement above (except that in some cases additional cement may be requested to increase strength. Cement shall comply with Section 301 and shall be low alkali type I or II.

204.2.3.3 Fly Ash: Class F fly ash shall be used, no blends of other classes. Fly Ash shall comply with Section 301.

204.2.3.4 Aggregates: Aggregates shall comply with Section 301 and conform to the following requirements:

Fine aggregate shall provide a uniform mixture and have the gradation characteristics as shown in Table 3:

Table 3:

Sieve Size	Percent Passing
3/8 inch	95-100
No. 4	80-100
No. 8	60-95
No. 16	45-80
No. 30	25-60
No. 50	5-45
No. 100	5-35
No. 200	0-30

204.2.3.5 Slump: Five (5) inches – Eight (8) inches

204.2.3.6 Water: Water shall be portable water from municipal or another approved source.

204.2.3.7 Temperature: Air temperature at the time of placement shall be 35 degrees Fahrenheit and rising. If air temperature is less than 40 degrees Fahrenheit then flowable fill is to be at least 50 degrees Fahrenheit. If forecast temperatures are to be less than 35 degrees Fahrenheit after placement then fill is to be covered by a minimum of 12 inches of loose soil for a period of three (3) days or until temperatures rise or until load application tests indicate initial set has been achieved.

204.2.3.8 Load Application Tests: Load application tests shall be administered per NMDOT Specification 516.3.5 or ASTM D6024-07 (the ball drop test).

Note: Flowable Fill materials are subject to approval by the State Materials Bureau and the City's appointed Project Manager.

204.3 EXECUTION

204.3.1 NATIVE ROCK UTILIZATION

204.3.1.1 Slope Cover: Rock excavated from proposed site development to be placed in designated areas as a means of proper disposal and for the prevention of erosion of slopes. Rock dust and fines to be held to a minimum. Rock size to range from 6 inches to 24 inches. Trees to remain amongst the rock placement to the extent possible.

Rock to be placed by hand and machine to a depth not to exceed 24 inches. Finished slope cover to have the appearance of having been “placed,” rather than dumped.

204.3.1.2 Rock Fill: Rock excavated from proposed site material may be placed in areas requiring fill when approved by the Engineer. The rock may be contained in a mixture of soil and rock dust fines. The rock fill shall not encroach on any portion of what is designated as a pipeline trench.

Excavated rock to be used in areas approved for fill shall be placed in uniform layers not to exceed 24 inches and “walked in” with heavy equipment. When soil or rock dust is the dominant component water shall be added and processed to aid in compaction. The finished surface shall be suitable for dressing to site grading requirements.

204.3.2 PLACING FLOWABLE FILL

The flowable fill shall be placed in a uniform manner that will prevent voids or segregation of the bedding and filling material. Culvert or pipe shall be secured from movement. The flowable fill shall be placed by direct discharge from a ready-mix truck, pumping, or other approved method. Flowable fill shall have a placed minimum thickness of six (6) inches. It shall not be placed in standing water and shall be protected from flooding for at least 24 hours after placement. The flowable fill shall not be placed on frozen ground nor during rain. Newly placed flowable fill shall be undisturbed by construction activities for at least 24 hours after placement or as required to support subsequent construction activities. Backfill material shall not be placed over newly placed flowable fill until initial set has been reached as determined by ASTM D6024-07, ASTM D1558, or approved by Engineer. All testing must be done in the presence of Engineer.

204.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specifications shall be as set forth in the Special Conditions.

205 EROSION CONTROL – INDEX

205.1 GENERAL

- 205.1.1 DESCRIPTION
- 205.1.2 RELATED SECTIONS
- 205.1.3 SUBMITTALS
- 205.1.4 DELIVERY, STORAGE, AND HANDLING
- 205.1.5 WEATHER CONDITIONS

205.2 MATERIALS

- 205.2.1 WIRE ENCLOSED RIP-RAP
- 205.2.2 GABIONS
- 205.2.3 NON-ENCLOSED RIP-RAP
- 205.2.4 EROSION CONTROL BLANKETS
- 205.2.5 REINFORCEMENT MATS

205.3 EXECUTION

- 205.3.1 WIRE ENCLOSED RIP-RAP
- 205.3.2 GABIONS
- 205.3.3 NON-ENCLOSED RIP-RAP
- 205.3.4 EROSION CONTROL BLANKETS AND REINFORCEMENT MATS
- 205.3.5 CLEAN-UP

205.4 MEASUREMENT AND PAYMENT

205 EROSION CONTROL

205.1 GENERAL

205.1.1 DESCRIPTION

- I. The work under this specification includes furnishing, assembling, filling and tying open wire mesh rip-rap rectangular compartmented gabions and mattresses placed on a prepared surface of geotextile materials, as specified and detailed in accordance with the lines, grades, and dimensions shown or otherwise established in the field.

Wire Enclosed Rip-Rap shall be Class A wire enclosed per NMDOT specifications. Wire Enclosed Rip-Rap shall form a uniform, flexible, permeable grade control structure(s).

- II. Gabions and mattresses are wire mesh containers of variable sizes, uniformly partitioned into internal cells, interconnected with other similar units, and filled with stone at the project site to form flexible, permeable, monolithic structures.
- III. Non-enclosed Rip-Rap
- IV. Erosion control blankets and erosion control mats will be used where asked for on the project drawings.

205.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the Work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 107, Storm Water Pollution Prevention
- III. Section 108, Water Pollution Control
- IV. Section 201, General Earthwork
- V. Section 202, Clearing and Grubbing
- VI. Section 204, Fill Materials
- VII. Section 206, Geotextile Fabric and Geogrids

205.1.3 SUBMITTALS

Submit the following in accordance with Section 101:

205.1.3.1 Samples: Samples of the materials used to fabricate the gabions or mattresses shall be furnished to the Engineer prior to assembly of units onsite.

205.1.3.1.1 Stone: Engineer's Approval. Samples of stone for the items listed below shall be submitted prior to delivery.

- I. Wire Enclosed Rip-Rap
- II. Gabions or Mattresses
- III. Non-Enclosed Rip-Rap

205.1.3.1.2 Stakes: Engineer's approval. Description of stakes to be used for the items listed below shall be submitted prior to delivery.

- I. Wire Enclosed Rip-Rap
- II. Gabions or Mattresses
- III. Non-Enclosed Rip-Rap
- IV. Alternative Wire Fasteners

205.1.3.1.3 Erosion Control Blankets and Reinforcement Mats: Engineer's approval. Description of blanket to be used shall be submitted prior to delivery. Provide engineer with manufacturer's examples of blankets to be used.

205.1.3.2 Test Reports: Supply test reports for the following:

- I. Wire Enclosed Rip-Rap
- II. Gabions or Mattresses
- III. Alternative Wire Fasteners
- IV. Non-Enclosed Rip-Rap
- V. Erosion Control Blankets and Reinforcement Mats

Furnish to the Engineer, in duplicate, test reports or records that have been performed during the last year on all materials from each shipment delivered to the site. All material contained within the shipment shall meet the composition, physical, and manufacturing requirements stated in this specification.

205.1.3.3 Certifications: A certificate or affidavit, signed by a legally authorized official of the supplier of the stone fill, natural filter material, or other, that it meets the quality required and gradation limits specified.

- I. Wire Mesh: Engineers approval. Contractor to provide certified test reports made by an independent testing laboratory indicating that material meets or exceeds the requirements of these specifications.
- II. Stone Fill
- III. Filter Material
- IV. Gabion Mattresses
- V. Erosion Control Blankets and Reinforcement Mats

205.1.4 DELIVERY, STORAGE, AND HANDLING

205.1.4.1 Gabions and Rip-Rap: Gabions and mattresses shall be delivered with all components mechanically connected at the production facility with the exception of the mattress lid, which is produced separately from the base. All gabions and mattresses are supplied in the collapsed form, either folded, bundled, or rolled, for shipping. Bundles are banded together at the factory for ease of shipping and handling. Mattress bases and lids may be packed in separate bundles.

- I. Mattress lids may be supplied either as individual units (bundled) or in roll form. Lacing wire shall be shipped in coils with a diameter of the coil approximately two (2) feet. Fasteners shall be shipped in boxes. Preformed stiffeners shall be shipped in bundles.
- II. Gabions and mattresses shall be delivered to the jobsite labeled in bundles. Labels shall show the dimensions of the gabions or mattresses received, the number of pieces and the color code.

205.1.4.2 Erosion Control Blankets and Reinforcement Mats: Prior to delivery of materials, submit certificates of compliance attesting that materials meet the specified requirements. Store materials in designated areas to keep materials protected from the elements, direct exposure, and damage. Do not drop containers from trucks. Material must be free of defects that would void required performance or warranty. Deliver geosynthetic binders and synthetic soil binders in the manufacturer's original sealed containers and store in a secure area.

- I. Furnish erosion control blankets and geotextile fabric in rolls with suitable wrapping to protect against moisture and extended ultraviolet exposure prior to placement. Label erosion control blanket and geotextile fabric rolls to provide identification sufficient for inventory and quality control purposes.
- II. All synthetic grids, synthetic sheets, and articulating cellular concrete block grids must be sound and free of defects that would interfere with the proper placing of the block or impair the strength or permanence of the construction. Minor cracks in synthetic grids and concrete cellular block, incidental to the usual methods of manufacture, or resulting from standard methods of handling in shipment and delivery, will not be deemed grounds for rejection.
- III. Inspect seed upon arrival at the jobsite for conformity to species and quality. Seed that is wet, moldy, or bears a test date five months or older, must be rejected.

205.1.5 WEATHER CONDITIONS

Perform erosion control operations under favorable weather conditions; when excessive moisture, frozen ground or other unsatisfactory conditions prevail, the work must be stopped as directed. When special conditions warrant a variance to earthwork operations, submit a

revised construction schedule for approval. Do not apply erosion control materials in adverse weather conditions.

205.2 MATERIALS

205.2.1 WIRE ENCLOSED RIP-RAP

205.2.1.1 Stone for Wire Enclosed Rip-Rap: Stone used for Wire Enclosed Rip-Rap shall be rocks or rough quarry stone with a percent wear of not more than 60 percent as determined by AASHTO T96 and a soundness loss of not more than 21 percent as determined by AASHTO T104 using a magnesium sulfate solution with a test duration of five (5) cycles. Stone shall be durable and of suitable quality to ensure permanence in the structure and climate in which it is to be used.

205.2.1.2 Wire: The wire mesh shall be fabricated so as to be non-raveling and furnished in such lengths and widths so that the number of splices is kept to a minimum. The composite wire mesh shall be in conformance with the NMSHTD specification Section 602.35 wire mesh testing and certification.

Wire shall conform to the requirements of ASTM A641 and shall have a Class 3 zinc coating. Zinc coating shall be in accordance with ASTM A90. Wire shall be 11 1/4 Gauge or larger. Wire mesh openings shall be uniform in size with opening size no more than 4 3/4 inches in the largest dimension but must have at least one dimension of 3 1/4 inches or less.

205.2.1.3 Stakes: Stakes shall be steel railroad rails, standard weight galvanized steel pipe or steel angles.

- I. Steel railroad rails shall have a unit weight of at least 30 pounds per yard.
- II. Standard weight galvanized steel pipe shall be four (4) inches in outside diameter.
- III. Steel angles shall be 4 x 4 x length called for in inches in dimension.

205.2.1.4 Geotextile: Geotextile fabric, including threads, shall conform to Section 206 of these Specifications.

205.2.2 GABIONS

205.2.2.1 Double Twisted Mesh Gabions and Mattresses: Double twisted wire mesh gabions and mattresses shall be manufactured with a non-raveling mesh made by twisting continuous pairs of wires through three half turns (commonly called double twisted) to form a hexagonal-shaped opening. Gabion and mattress sizes, wire diameters, mesh opening sizes, and tolerances shall comply with the requirements of ASTM A 975 (Tables 1, 3, 4, 5, and 6). Gabions and Mattresses shall meet the following:

205.2.2.1.1 Classification: Classified according to the wire coating, which is applied prior to manufacturing the mesh. Coating styles are as follows.

205.2.2.1.1.1 Style 1: Wire mesh made from wire which is zinc coated before being double twisted into mesh. Fasteners, lacing wire, and stiffeners are produced from zinc-coated wire. Style 1 for the wire coating is normally recommended for:

- I. Permanent gabion or mattress structures, for works installed in non-aggressive or non-polluted environments, and this condition remains unaltered over time;
- II. Temporary gabion or mattress structures, for works in moderately aggressive environments, depending on the minimum design life of the structure.

205.2.2.1.1.2 Style 2: Wire mesh made from wire which is coated with Zn-5Al-MM before being double twisted into mesh. Fasteners, lacing wire, and stiffeners are also produced from Zn-5Al-MM coated wire. Gabions and mattress shall be Style 2 unless otherwise called for in project documents. Style 2 for the wire coating is normally recommended for:

- I. Permanent gabion or mattress structures, for works installed in moderately aggressive environments;
- II. Temporary gabion or mattress structures, for works in aggressive environments, depending on the minimum design life of the structure.

205.2.2.1.2 Metallic Coating: The coating weights shall conform to the requirements of ASTM A 641/A 641M, Class 3 (Style 1) or ASTM A 856/A 856M (Style 2).

205.2.2.1.3 Wire Tensile Strength: The tensile strength of the wire used for the double twisted mesh, lacing wire, and stiffener, when tested in accordance with test methods and definitions ASTM A 370, shall be in accordance with the requirements of ASTM A 641/A 641M (Style 1) or ASTM A 856/A 856M (Style 2) for soft temper wire.

205.2.2.1.4 Mesh Strength and Panel to Panel Joint Strength: The minimum strength requirements of the mesh, selvedge wire to mesh connection, panel to panel connection, and punch test, when tested in accordance with ASTM A 975 Section 13.1, shall be as shown in Table 1. The strength values reported in pound per foot (lb./ft) are referred to the unitary width of the specimen. The panel to panel test shall demonstrate the ability of the fastening system to achieve the required strength, and indicate the number of wire revolutions for the lacing wire or the ring spacing for ring fasteners used. The same number of wire revolutions or ring spacing shall be used in the field installation. Pleating the based panel to obtain internal panels is prohibited.

**TABLE 1: MINIMUM STRENGTH REQUIREMENTS OF
MESH AND CONNECTIONS**

Test Description	Gabions, metallic coated (lb./ft)	Revet mattresses metallic coated (lb./ft)
Tensile Strength parallel to twist	3500	2300
Tensile Strength perpendicular to twist	1800	900
Connection to selvages	1400	700
Panel to panel (using lacing wire or ring fasteners)	1400	700
Punch Test	6000	4000

205.2.2.2 Alternative Wire Fasteners for Gabions and Mattresses: Subject to approval of the Engineer, alternative fastening systems may be used in lieu of lacing wire. Alternative fasteners to lacing wire recommended for woven wire gabions and mattresses, according to ASTM A 975, are steel ring fasteners for metallic coated gabions and mattresses. Ring fasteners for woven wire gabions and mattresses shall comply with the minimum requirements indicated in Paragraph 205.2.2.2.1 below, and they shall develop a minimum panel to panel joint strength as indicated in Table 1. Provide a complete description of the fastener system and a description of a properly installed fastener, including drawings or photographs if necessary. Provide test results that demonstrate that the alternative-fastening system meets the requirements of the specifications, according to the following criteria:

- I. That the proposed fastener system can consistently produce a panel to panel joint strength as indicated in the Table 1 for double twisted wire mesh gabions;
- II. That the proposed fastener system does not cause damage to the protective coating on the wire;
- III. That the Contractor has the proper equipment and trained employees to correctly install the fasteners;
- IV. That proper installation can be readily verified by visual inspection. Samples of wire fasteners with their certified test records shall be submitted at least 10 days in advance to the Engineer for approval.

205.2.2.2.1 Ring Fasteners: The tensile strength of the zinc-coated steel wire used for fasteners shall be in accordance with the requirements of ASTM A 764. Any fastener system shall give the number of fasteners required to comply with Table 1 of this specification, in accordance with ASTM A 975 for woven wire gabions. Ring

fasteners shall not be installed more than four (4) inches apart. Each fastener type shall be closed, and the free ends of the fastener shall overlap a minimum of one (1) inch. The manufacturer or supplier shall state the number of fasteners required for all vertical and horizontal connections for single and multiple basket joining.

205.2.2.2.2 Spiral Binders: Spiral binders are defined as a length of metallic coated steel wire preformed into a spiral, used to assemble and interconnect empty gabion and/or mattress units, and to close and secure stone-filled units. Spiral binders shall be fabricated with the same wire and coating style as the wire mesh.

205.2.2.3 Testing: Test records made within one year by certified laboratories. Samples of wire fasteners and samples of material for fabricating the gabions and mattresses with their certified test records shall be submitted at least 10 days in advance to the Engineer for approval.

205.2.2.4 Stone Fill: For gabions and mattresses, the ability to function properly depends upon their stability, which is partly dependent upon the rocks filling them. Rock sizes should be chosen to prevent them from falling through the mesh of the gabions or mattresses. The rock has to also withstand natural weathering processes during the life of the project that would cause it to breakdown to sizes smaller than the wire mesh opening dimensions. Rock to fill gabions and mattresses shall be durable and of suitable quality to ensure permanence in the structure and climate in which it is to be used.

205.2.2.4.1 Delivery: Rock shall be delivered to the work site in a manner to minimize its reduction in size (breakdown) during the handling of the rock and be placed and secured within the assembled and interconnected gabion or mattress.

205.2.2.4.2 Sources: The sources from which the Contractor proposes to obtain the material shall be selected well in advance of the time when the material will be required in the work. The inclusion of more than five (5) percent by weight of dirt, sand, clay, and rock fines will not be permitted. Rock may be of a natural deposit of the required sizes or may be crushed rock produced by any suitable method and by the use of any device that yields the required size limits chosen in Table 2 of this specification.

205.2.2.4.3 Properties: Rocks shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. All stone shall be obtained from one source.

205.2.2.4.4 Stone Quality: Stone fill, crushed stone, shall meet the quality requirements of ASTM C 33/C 33M, and freezing and thawing requirements of ASTM D 312 for the region of the United States in which the structure will be constructed.

205.2.2.4.5 Gradation: Gradation of stone for gabions shall be performed every 1000 tons placed under this contract in accordance with ASTM C 136. Sizes of rock to fill gabions and mattresses are chosen based on the mesh sizes, the structure's thickness,

and within the limits shown in Table 2 of this specification. Within each range of sizes, the rock shall be large enough to prevent individual pieces from passing through the mesh openings. Each range of sizes may allow for a variation of five (5) percent oversize rock by weight, or five (5) percent undersize rock by weight, or both within each gabion or mattress compartment.

205.2.2.4.5.1 Oversize Rock: In all cases, the sizes of any oversize rock shall allow for the placement of three or more layers of rock within each gabion compartment and two or more layers of rock within each mattress compartment dependent upon the height of the mattress.

205.2.2.4.5.2 Undersize Rock: In all cases, undersize rock shall be placed within the interior of the gabion or mattress compartment and shall not be placed on the exposed surface of the structure.

**TABLE 2: REQUIRED ROCK GRADATION FOR
GABIONS AND MATTRESSES**

Type of Structure	Thickness (height), inch	Rock Sizes, inch
Mattresses	6 – 9	3 – 5
Gabions	18 or higher	4 – 8

205.2.3 NON-ENCLOSED RIP-RAP

205.2.3.1 Stone for Non-Enclosed Rip-Rap: Provide non-erodible rock not exceeding 15 inches in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of one (1) foot. Stone used for Wire Enclosed Rip-Rap shall be rocks or rough quarry stone with a percent wear of not more than 60 percent as determined by AASHTO T96 and a soundness loss of not more than 21 percent as determined by AASHTO T104 using a magnesium sulfate solution with a test duration of five (5) cycles. Stone shall be durable and of suitable quality to ensure permanence in the structure and climate in which it is to be used.

205.2.3.2 Geotextile: Geotextile fabric, including threads, shall conform to Section 206 of these Specifications.

205.2.4 EROSION CONTROL BLANKETS

Erosion Control Blankets are to be degradable and able to hold the natural landscape, seed and soils in place. As vegetation begins to grow, and as the blankets are no longer needed, the blankets are to decompose. Erosion control blankets must be a machine-produced mat consisting the material described in the manufacture's recommendations. The blanket must be of consistent thickness with the inside materials evenly distributed over the entire area of the mat. The netting shall consist of photodegradable polypropylene.

The Hancor® product(s) in Table 3 or equal shall be used where indicated on the project design drawings.

TABLE 3: EROSION CONTROL BLANKET TYPE(S) AND SPECIFICATIONS

Hancor Landlok S1®			
Thickness ASTM D1777	0.11 inches	Life	< One (1) year
Tensile Strength ASTM D 5035	50 x 65 lb./ft	Use	Low-flow & moderate slopes
Elongation ASTM D 5035	20%	Fill	Pure wheat straw fibers
Mass per Unit Area	8.5 oz/yd ²	Netting	Top side only
Hancor Landlok S2®			
Thickness ASTM D1777	0.25 inches	Life	Up to 1 year
Tensile Strength ASTM D 5035	75 x 75 lb./ft	Use	Low-flow & moderate slopes
Elongation ASTM D 5035	25%	Fill	Pure wheat straw fibers
Mass per Unit Area	8.8 oz/yd ²	Netting	Top and bottom sides
Hancor Landlok CS2®			
Thickness ASTM D1777	0.4 inches	Life	Up to 2 years
Tensile Strength ASTM D 5035	100 x 100 lb./ft	Use	Vegetation protection
Elongation ASTM D 5035	30%	Fill	Straw and coconut fibers
Mass per Unit Area	8.7 oz/yd ²	Netting	Top and bottom sides
Hancor Landlok C2®			
Thickness ASTM D1777	0.3inches	Life	Up to 3 years
Tensile Strength ASTM D 5035	150 x 150 lb./ft	Use	Moderate flow/long to vegetate
Elongation ASTM D 5035	25%	Fill	Coconut fibers
Mass per Unit Area	10.5 oz/yd ²	Netting	Top and bottom sides
Hancor Landlok ENCS2 Series®			
Thickness ASTM D1777	0.3 inches	Life	Up to 18 months
Tensile Strength ASTM D 5035	190 x 190 lb./ft	Use	Environmental restoration
Elongation ASTM D 5035	7%	Fill	Straw, coconut fibers or blend
Mass per Unit Area	10.6 oz/yd ²	Netting	leno-weave jute biodegradable

205.2.5 REINFORCEMENT MATS

Reinforcement mats are to be used in areas to enhance the natural ability of vegetation to protect soil from erosion. These are permanent erosion control devices for slopes and channels that need more stabilization than the natural vegetation can offer. The mats can help accelerate vegetative establishment and then anchor the mature plants to the soil.

The Hancor® product(s) in Table 4 or equal shall be used where indicated on the project design drawings.

TABLE 3: REINFORCEMENT MAT TYPE(S) AND SPECIFICATIONS

Hancor Landlok TRM 436®			
Thickness ASTM D1777	0.35 inches	Use	Economical version of 450®
Resiliency ASTM D1777	80%	Fill	3D web of polyolefin fibers
Porosity	96.50%	Netting	Top and bottom nets
Ground Cover Factor	60%		
Tensile Strength ASTM D 5035	145 x 110 lb./ft		
Elongation ASTM D 5035	50% maximum		
Mass per Unit Area	8.0 oz/yd ²		
UV Resistance @ 1000 hours	80%		

Hancor Landlok 450 TRM®			
Thickness ASTM D1777	0.5 inches	Use	Moderate flow/long to vegetate
Resiliency ASTM D1777	80%	Fill	3D web of polyolefin fibers
Porosity	-	Netting	Top and bottom sides
Ground Cover Factor	75%		
Tensile Strength ASTM D 5035	3100 x 2000 lb./ft		
Elongation ASTM D 5035	55% maximum		
Mass per Unit Area	14.0 oz/yd ²		
UV Resistance @ 3000 hours	90%		

Hancor Landlok TRM 1060®			
Thickness ASTM D1777	0.6 inches	Use	Allows soil filling and/or retention and plant emergence
Resiliency ASTM D1777	80%	Fill	3D web of polyolefin fibers
Porosity	96.60%	Netting	Top and bottom nets, biaxially oriented and mechanically bounded
Ground Cover Factor	60%		
Tensile Strength ASTM D 5035	220 x 165 lb./ft		
Elongation ASTM D 5035	40% maximum		
Mass per Unit Area	14.0 oz/yd ²		
UV Resistance @ 1000 hours	80%		

Hancor Landlok Pyramat High-Performance TRM®			
Thickness ASTM D1777	0.5 inches	Use	Used on the most demanding slopes and storm water applications
Resiliency ASTM D1777	80%	Fill	3D matrix of polypropylene e yarns woven to form a pyramid like projection
Porosity	-	Netting	Top and bottom sides
Ground Cover Factor	75%		
Tensile Strength ASTM D 5035	3100 x 2000 lb./ft		
Elongation ASTM D 5035	55% maximum		
Mass per Unit Area	14.0 oz/yd ²		
UV Resistance @ 3000 hours	90%		

205.3 EXECUTION

205.3.1 WIRE ENCLOSED RIP-RAP

205.3.1.1 Site Preparation: Area to receive fabric shall be cleared and graded as required within the contract documents. Contractor is to remove all large, sharp objects which include but are not limited to rocks, cut trees, shrubs, glass, etc., which may damage fabric. Contractor is to ensure that all areas to be covered are stable and compacted to that indicated on the Contract Drawings.

205.3.1.2 Fabric Placement: Fabric shall be placed in accordance with Section 206.

205.3.1.3 Wire Enclosed Rip-Rap Placement: Stones shall be enclosed on all sides with wire mesh and shall be constructed in accordance with the details shown in the Contract Documents. Wire Enclosed Rip-Rap stones shall be placed to form a continuous blanket of the minimum thickness indicated on the Contract Drawings. Stones shall be placed with their long axis parallel to the toe of the slope and shall have a stable bearing upon the underlying soil or stones. Stone sizes are to be no less than four (4) inches in the shortest dimensions and are to be between 1/6 – 2/3 cubic feet by volume. The joints between larger stones shall be as close as practical and shall be filled with smaller slope. The Contractor shall use extreme care in placing stones on the geotextile fabric so not to tear or otherwise damage the fabric. The Contractor is to ensure that a layer of fabric is placed at the interface between the sloped and stone surfaces as shown on the Contract Drawings.

The wire mesh shall be drawn tightly against the stones on all sides. Edges of wire mesh shall be connected using lacing wire (13 1/2 GA or larger) and shall be double loop woven at adjacent edges to ensure that the strength and flexibility at the point of connection is equal to or greater than that of the mesh.

Lacing shall be continuous as far as practicable and shall pass through each mesh opening.

Galvanized tie wire (9 GA or larger) shall be provided at two (2) feet on center each way.

205.3.2 GABIONS

205.3.2.1 Foundation Preparation: Foundation preparation shall not take place on frozen or snow-covered ground. After excavation or stripping, to the extent indicated on the drawings or as directed by the Engineer, all remaining loose or otherwise unsuitable materials shall be removed. All depressions shall be carefully backfilled to grade. If pervious materials are encountered in the foundation depressions, the areas shall be backfilled with free-draining materials. Otherwise, the depressions shall be backfilled with suitable materials from adjacent required excavation, or other approved source, and

compacted to a density at least equal to that of the adjacent foundation. Any debris that will impede the proper installation and final appearance of the gabion layer shall also be removed, and the voids carefully backfilled and compacted as specified above. Immediately prior to placing the material, the Engineer shall inspect the prepared foundation surface, and no material shall be placed thereon until that area has been approved.

205.3.2.2 Assembly:

205.3.2.2.1 Double Twisted Wire Mesh Gabions: The gabions shall be opened and unfolded one by one on a flat, hard surface. Gabion units over six (6) feet in length usually have an extra shipping fold, which must be removed. The sides, ends and diaphragms shall be lifted into a vertical position to form an open box shape. The back and the front panels of the gabion shall be connected to the end panels and center diaphragms. The top corner of the end panels and center diaphragms have a selvedge wire extending approximately four (4) inches out from the corner edge. The end panels and the diaphragms shall be raised to a vertical position and the selvedge wire shall be wrapped around the edge wire of the top and back panels.

205.3.2.2.2 Double Twisted Wire Mesh Revet Mattresses: The mattress shall be laid on a flat, hard surface. When the units are unfolded for assembly, depending on their length, they will have one or two shipping folds, which must be removed. The double flap of the side panel shall be folded in and wired to the diaphragm. At the corners, the end flaps shall be folded along the sides and the joint laced up. Each revet mattress shall be assembled individually, by erecting the sides, ends and diaphragms, ensuring that all creases are in the correct position and the tops of all sides are level.

205.3.2.3 Lacing Operations:

205.3.2.3.1 Double Twisted Wire Mesh Gabions and Mattresses: Lacing wire or ring fasteners are permitted to either lace double twisted wire mesh gabions or Revet mattresses.

- I. When using lacing wire, a piece of wire 1.2 to 1.5 times the length of the edge to be laced shall be cut off. If the edge of the basket is three (3) foot long, no more than four (4) to five (5) feet of wire should be used at a time to lace. For vertical joints, starting at the bottom end of the panel, the lacing wire shall be twisted and wrapped two times around the bottom selvedge and double and single loops shall be alternated through at intervals no larger than four (4) to six (6) inches. The operation shall be finished by looping around the top selvedge wire. The use of pliers to assemble the units with lacing wire is normally recommended.
- II. When steel wire ring fasteners are used, the rings shall be installed at the top and bottom connections of the end and center diaphragms. The ring spacing shall be based on the minimum pull part strength as specified in Table 1 of

this specification. In any case, the maximum ring spacing along the edges shall not exceed six (6) inches. The use of either a mechanical or a pneumatic fastening tool for steel wire ring fasteners is required.

205.3.2.4 Installation and Filling: Empty gabion and mattress units shall be assembled individually and placed on the approved surface to the lines and grades as shown or as directed, with the sides, ends, and diaphragms erected in such a manner to ensure the correct position of all creases and that the tops of all sides are level. All gabion units shall be properly staggered horizontally and vertically as shown in the construction drawings. Finished gabion or mattress structures shall have no gaps along the perimeter of the contact surfaces between adjoining units. All adjoining empty gabion units shall be connected along the perimeter of their contact surfaces to obtain a monolithic structure. All lacing wire terminals shall be securely fastened. All joining shall be made through selvedge-to-selvedge or selvedge-to-edge wire connection; mesh-to-mesh or selvedge-to-mesh wire connection is prohibited except in the case where baskets are offset or stacked, and selvedge-to-mesh or mesh-to-mesh wire connection would be necessary. As a minimum, a fastener shall be installed at each mesh opening at the location where mesh wire meets selvedge or edge wire.

- I. The initial line of basket units shall be placed on the prepared filter layer surface or foundation and adjoining empty baskets set to line and grade, and common sides with adjacent units thoroughly laced or fastened. They shall be placed in a manner to remove any kinks from the mesh and to a uniform alignment. The basket units then shall be partially filled to provide anchorage against deformation and displacement during the filling operation. The stone shall be placed in the units as specified in Paragraph 205.2.2.4.
- II. Undue deformation and bulging of the mesh shall be corrected prior to further stone filling. Care shall be taken, when placing the stone by hand or machine. All visible faces shall be filled with some hand placement to ensure a neat and compact appearance and that the void ratio is kept to a minimum.
- III. Gabions and mattresses shall be uniformly overfilled by about one (1) to two (2) inches to compensate for future rock settlements. Gabions and mattresses can be filled by any kind of earth-filling equipment, such as a backhoe, gradall, crane, etc. The maximum height from which the stones may be dropped into the baskets shall be three (3) to four (4) feet.

205.3.2.4.1 Double Twisted Wire Mesh Gabions: After the foundation has been prepared, the pre-assembled gabions shall be placed in their proper location to form the structure. Gabions shall be connected and aligned before filling the baskets with rock. All connections (panel-to-panel) and basket-to-basket shall be already carried out as described in Paragraph 205.3.2.2. Stone fill shall have a gradation of four (4) to eight (8) inches, as described in Paragraph 205.2.2.4.5, and shall be placed in one (1) foot lifts. Cells shall be filled to a depth not exceeding one (1) foot at a time. The fill

layer should never be more than one (1) foot higher than any adjoining cell. Stiffeners or internal crossties shall be installed in the front and side of the gabions at 1/3 and 2/3 of the height for three (3) feet high gabions, as the cell is being filled. Stiffeners shall be installed in the center of each cell. In 1.5-foot-high units, stiffeners or internal crossties are not required. Internal crossties, or alternatively the preformed stiffeners, shall be looped around three twisted wire mesh openings at each basket face and the wire terminals shall be securely twisted to prevent their loosening. The number of voids shall be minimized by using a well-graded stone to achieve a dense, compact stone fill. All corners shall be securely connected to the neighboring baskets of the same layer before filling the units. When more than one layer of gabions is required, for the individual units to become incorporated into one continuous structure, the next layer of gabions shall be connected to the layer underneath after this layer has been securely closed. Gabions shall be uniformly overfilled by about one (1) inch to two (2) inches to compensate for future rock settlements.

205.3.2.4.2 Double Twisted Wire Mesh Revet Mattresses: After being assembled, the revet mattresses shall be placed in their proper location and securely attached to the adjacent units. For structural integrity, all adjoining empty units shall be connected by means of lacing wire or ring fasteners along the edges of their contact surfaces to form a monolithic structure. Revet mattresses shall be placed and securely connected while empty. The filling shall be done unit by unit; however, several units can be pre-assembled prior to filling the units. Revet mattress units shall be filled with hard, durable, clean stone having a gradation as indicated in Paragraph 205.2.2.4.3. Care shall be taken to ensure that diaphragm tops are accessible for wiring. On slopes, the revet mattress shall be laid with the six (6) foot dimension (width) longitudinally to the slope and progressing up the slope, except for small ditches or where otherwise specified in the project. When the installation is performed on a slope, the filling of the baskets shall start from the lower side of the bank. Where revet mattresses are to be placed on steep slopes (2V to 3H), the units shall be secured by hardwood pegs driven into the ground just below the upper end panel, at six (6) foot centers, or as specified in the project. When the revet mattress is to be placed over a geotextile, care shall be taken to ensure that any projecting ends of wire are bent upward to avoid puncturing or tearing the cloth. Lids shall be securely connected to the ends of the mattress and to the top sides and diaphragms using alternate double and single loops, or steel wire ring fasteners. In the case that additional adjacent bases are to be covered at one time, mesh rolls shall be used in place of unit size lids. Revet mattresses shall be uniformly overfilled by about one (1) inch to two (2) inches to compensate for future rock settlements.

205.3.2.4.3 Non-Rectangular Shapes: Gabion and mattress units can conform to bends up to a radius of curvature of 60 to 70 feet without alterations. Units shall be securely connected first, and be placed to the required curvature, holding them in position by staking the units to the ground with hardwood pegs before filling. For other shapes, bevels and miters can be easily formed by cutting and folding the panels to the required angles.

205.3.2.5 Closing: Lids shall be tightly secured along all edges, ends and diaphragms in the same manner as described for assembling. Adjacent lids may be securely attached simultaneously. The panel edges shall be pulled to be connected using the appropriate closing tools where necessary. Single point leverage tools, such as crowbars, may damage the wire mesh and shall not be used. All end wires shall then be turned in.

205.3.3 NON-ENCLOSED RIP-RAP

205.3.3.1 Site Preparation: Area to receive fabric shall be cleared and graded as required within the contract documents. Contractor is to remove all large, sharp objects which include but are not limited to rocks, cut trees, shrubs, glass, etc., which may damage fabric. Contractor is to ensure that all areas to be covered are stable and compacted to that indicated on the Contract Drawings.

205.3.3.2 Fabric Placement: Fabric shall be placed in accordance with Section 206.

205.3.3.3 Wire Enclosed Rip-Rap Placement: Rip-Rap stones shall be placed to form a continuous blanket of the minimum thickness indicated on the Contract Drawings. Stones shall be placed with their long axis parallel to the toe of the slope and shall have a stable bearing upon the underlying soil or stones. Stone sizes are to be no less than four (4) inches in the shortest dimensions and are to be between $1/6 - 2/3$ cubic feet by volume. The joints between larger stones shall be as close as practical and shall be filled with smaller slope. The Contractor shall use extreme care in placing stones on the geotextile fabric so not to tear or otherwise damage the fabric. The Contractor is to ensure that a layer of fabric is placed at the interface between the sloped and stone surfaces as shown on the Contract Drawings.

205.3.4 EROSION CONTROL BLANKETS AND REINFORCEMENT MATS

205.3.4.1 Site Preparation: Area to receive erosion control blankets and/or reinforcement mats to receive fabric shall be cleared and graded as required within the contract documents. Contractor is to remove all large, sharp objects which include but are not limited to rocks, cut trees, shrubs, glass, etc., which may damage blankets and mats. Contractor is to ensure that all areas to be covered are stable and compacted to that indicated on the Contract Drawings.

Before placing the erosion control blankets, ensure the subgrade has been graded smooth; has no depressed, void areas; is free from obstructions, such as tree roots, projecting stones or other foreign matter. Verify that mesh does not include invasive species. Vehicles will not be permitted directly on the blankets.

205.3.4.2 Protecting Existing Vegetation: When there are established lawns in the work area, the turf must be covered and/or protected or replaced after construction operations. Identify existing trees, shrubs, plant beds, and landscape features that are to be preserved

on site by appropriate tags and barricade with reusable, high-visibility fencing along the dripline. Mitigate damage to existing trees at no additional cost to the Owner.

205.3.4.3 Obstructions Below Ground: When obstructions below ground affect the work, submit shop drawings showing proposed adjustments to placement of erosion control material for approval

205.3.4.4 Finished Grade: Provide condition of finish grade status prior to installation, location of underground utilities and facilities. Verify that finished grades are as indicated on the drawings; complete finish grading and compaction in accordance with Section EARTHWORK, prior to the commencement of the work. Verify and mark the location of underground utilities and facilities in the area of the work. Repair damage to underground utilities and facilities at the Contractor's expense.

205.3.4.5 Placement: Immediately stabilize exposed soil using fabric, mulch, compost, and/or seed. Stabilize areas for construction access immediately as specified in the paragraph Construction Entrance. Install principal sediment basins and traps before any major site grading takes place. Provide additional sediment traps and sediment fences as grading progresses. Provide inlet and outlet protection at the ends of new drainage systems. Remove temporary erosion control measures at the end of construction and provide permanent seeding.

- I. Install erosion control blankets as indicated and in accordance with manufacturer's recommendations. The extent of erosion control blankets must be as indicated.
- II. Orient erosion control blankets in vertical strips and anchored with staples, as indicated. Abut adjacent strips to allow for installation of a common row of staples. Overlap horizontal joints between erosion control blankets sufficiently to accommodate a common row of staples with the uphill end on top.
- III. Where exposed to overland sheet flow, locate a trench at the uphill termination. Staple the erosion control blanket to the bottom of the trench. Backfill and compact the trench as required.
- IV. Where terminating in a channel containing an installed blanket, the erosion control blanket must overlap installed blanket sufficiently to accommodate a common row of staples.

205.3.5 CLEAN UP

Dispose of excess material, debris, and waste materials offsite at an approved landfill or recycling center. Clear adjacent paved areas. Immediately upon completion of the installation in an area, protect the area against traffic or other use by erecting barricades and providing signage as required, or as directed.

205.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this Section of the specifications shall be as set forth in the Special Conditions.

206 GEOTEXTILE FABRIC AND GEOGRIDS - INDEX

206.1 GENERAL

- 206.1.1 RELATED SECTIONS
- 206.1.2 SUBMITTALS
- 206.1.3 DELIVERY, STORAGE, AND HANDLING

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206 GEOTEXTILE FABRIC AND GEOGRIDS

206.1 GENERAL

206.1.1 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 107, Storm Water Pollution Prevention
- III. Section 108, Water Pollution Control
- IV. Section 202, Clearing and Grubbing
- V. Section 204, Fill Materials

206.1.2 SUBMITTALS

206.1.2.1 Product Data: Manufacturing Quality Control Sampling and Testing

A minimum of seven (7) days prior to scheduled use, manufacturer's quality control manual shall be submitted.

206.1.2.2 Certificates: A minimum of seven (7) days prior to scheduled use, submit manufacturer's Certificate of Compliance stating that the geotextile fabric and/or geogrids meet the requirements of this Section. The Certificate of Compliance shall be attested to by a person having legal authority to bind the geotextile manufacturer and/or geogrid manufacturer. Items submitted shall also be approved by the Engineer prior to use.

206.1.3 DELIVERY, STORAGE, AND HANDLING

Delivery, storage, and handling of geotextile and geogrids shall be in accordance with the manufacturer's literature.

206.1.3.1 Delivery: The Engineer shall be notified a minimum of 24 hours prior to delivery and unloading of geotextile rolls or geogrids, and the Contractor shall verify the intended product was received.

Geotextile rolls shall be packaged in an opaque, waterproof, protective plastic wrapping. The plastic wrapping shall not be removed until ready for use. Geotextile or plastic wrapping damaged during storage or handling shall be repaired or replaced, as directed. Each roll shall be labeled with the manufacturer's name, geotextile type, roll number, roll dimensions (length, width, gross weight), and date manufactured.

Geogrid rolls shall be delivered to the jobsite in roll form with each roll individually identified and with the correct nominal measurements of width and length as noted in the manufacturer's specifications.

206.1.3.2 Storage: Rolls of geotextiles and/or geogrids shall be protected from construction equipment, chemicals, sparks and flames, temperatures more than 160 degrees Fahrenheit, or any other environmental conditions that may damage the physical properties of the geotextile. To protect geotextile from becoming saturated, rolls shall be elevated off the ground or placed on a sacrificial sheet of plastic in an area where water will not accumulate.

Store rolls in a manner that prevents excessive mud, wet concrete, epoxy or other deleterious materials from coming in contact with and affixing to the geogrid. Store geogrids above -20 degrees Fahrenheit. Rolls may be stored vertically (rolls stood on end) or, typically, horizontally in stacks not exceeding five (5) rolls high.

206.1.3.3 Handling: Geotextile and geogrid rolls shall be handled and unloaded with load carrying straps, a fork lift with a stinger bar, or an axial bar assembly. Rolls shall not be dragged along the ground, lifted by one end, or dropped to the ground.

Avoid handling rolls below 14 degrees Fahrenheit.

206.2 MATERIALS

206.2.1 GEOTEXTILES

Geotextile shall be a nonwoven pervious sheet of polymeric material and shall consist of long-chain synthetic polymers composed of at least 95 percent by weight polyolefins, polyesters, or polyamides. Stabilizers and/or inhibitors shall be added to the base polymer, as needed, to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Geotextile shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Geotextiles shall meet the requirements specified in Table 1. Where applicable, Table 1 property values represent minimum average roll values (MARV) in the weakest principal direction.

**TABLE 1: MINIMUM PHYSICAL REQUIREMENTS
FOR DRAINAGE GEOTEXTILE**

<u>Property</u>	<u>Required Min. Value</u>	<u>Test Method</u>
Tensile Strength, lbs.	200.0	ASTM D4632
Weight, oz./ yd ² ,	8.0	ASTM D3776
Puncture Strength, lbs.	75.0	ASTM D4833
Trapezoid Tear, lbs.	75.0	ASTM D4533
Apparent Opening Size units	70.0	ASTM D4751
Permittivity, gal/min/sf	30.0	ASTM D4491
Ultraviolet Degradation Retained Strength @ 150 hrs., %	70.0	ASTM D4355

206.2.2 GEOGRIDS

Geogrids used as ground stabilizing solutions shall be manufactured from punched polypropylene sheets oriented in multiple, equilateral directions to form triangular apertures. The geogrids shall have a high radial stiffness throughout a full 360 degrees to create an in-service stress transfer from the aggregate to the stabilizing geogrid. Contractor shall use Tensar® TriAx® (TX) Geogrids called for in the project documents and/or described in the table below. An approved or equal can be submitted by the Contractor for use, if applicable, in accordance with Paragraph 206.1.2.

**TABLE 2a: MINIMUM PHYSICAL REQUIREMENTS
FOR GEOGRID: TX 130S GEOGRID**

<u>Property</u>	<u>Required Value</u>	<u>Test Method</u>
Rib Pitch (Longitudinal)	1.3 inches	ASTM D4759
Rib Pitch (Diagonal)	1.3 inches	ASTM D4759
Rib Shape	Rectangular	-
Aperture Shape	Triangular	-
Junction Efficiency	93%	ASTM D6637 ASTM D7737
Isotropic Stiffness Ratio	0.6	-
Radial Stiffness at 0.5% Strain	13,708 lb/ft	ASTM D6637
Resistance to Chemical Degradation	100%	EPA 9090
Resistance to Ultra-Violet Light and Weathering	70%	ASTM D4355

**TABLE 2b: MINIMUM PHYSICAL REQUIREMENTS
FOR GEOGRID: T X 140 GEOGRID**

<u>Property</u>	<u>Required Value</u>	<u>Test Method</u>
Rib Pitch (Longitudinal)	1.6 inches	ASTM D4759
Rib Pitch (Diagonal)	1.6 inches	ASTM D4759
Mid-Rib Depth (Diagonal)	0.5 inch	ASTM D4759
Mid-Rib Depth (Transverse)	0.5 inch	ASTM D4759
Mid-Rib Width (Diagonal)	0.4 inch	ASTM D4759
Mid-Rib Width (Transverse)	0.4 inch	ASTM D4759
Rib Shape	Rectangular	-
Aperture Shape	Triangular	-
Junction Efficiency	93%	ASTM D6637 ASTM D7737
Radial Stiffness at 0.5% Strain	15,430 lb./ft	ASTM D663
Resistance to Chemical Degradation	100%	EPA 9090
Resistance to Ultra-Violet Light and Weathering	70%	ASTM D4355

206.3 EXECUTION

206.3.1 INSTALLATION OF GEOTEXTILE FABRIC

Installation of geotextiles shall be in accordance the manufacturer's literature.

206.3.1.1 Subgrade Preparation: Contractor shall remove all vegetation in accordance with Section 202. Contractor shall then scarify eight (8) inches down and recompact existing soil to 95 percent Standard Proctor unless otherwise called for in project documents. The surface underlying the geotextile shall be smooth and free of ruts or protrusions which could damage the geotextile. Fabric placement shall start at the bottom of the slope, or lowest elevation, and work up the slope.

206.3.1.2 Placement: The Contractor shall notify the Engineer a minimum of 24 hours prior to installation of geotextile. Geotextile rolls which are damaged or contain imperfections shall be repaired or replaced as directed. The geotextile shall be laid flat and smooth so that it is in direct contact with the subgrade. The geotextile shall also be free of tensile stresses, folds, and wrinkles. On slopes steeper than 1 vertical to 10 horizontal and in trenches, the geotextile shall be laid with the machine direction of the fabric parallel to the slope direction.

206.3.1.3 Seams: Geotextile panels shall be continuously overlapped a minimum of 12 inches at all longitudinal and transverse joints. Where seams must be oriented across the slope or in trenches, the upper panel shall be lapped over the lower panel.

206.3.1.4 Protection: The geotextile shall be protected during installation from clogging, tears, and other damage. Damaged geotextile shall be repaired or replaced as directed. Adequate ballast (e.g. sand bags) shall be used to prevent uplift by wind. The geotextile shall not be left uncovered for more than 14 days after installation.

206.3.1.5 Repairs: Torn or damaged geotextile shall be repaired. Clogged areas of geotextile shall be removed. Repairs shall be performed by placing a patch of the same type of geotextile over the damaged area. The patch shall extend 12 inches beyond the edge of the damaged area. Patches shall be continuously fastened using approved methods. Geotextile rolls which cannot be repaired shall be removed and replaced.

206.3.1.6 Penetrations: Engineered penetrations of the geotextile shall be constructed by methods recommended by the geotextile manufacturer.

206.3.1.7 Covering: Geotextile shall not be covered prior to inspection and approval by the Engineer. Cover aggregate shall be placed in a manner that prevents soil from entering the geotextile overlap zone, prevents tensile stress from being mobilized in the geotextile, and prevents wrinkles from folding over onto themselves. On sloped surfaces, aggregate backfill shall be placed from the bottom of the slope upward. Cover gravel

shall not be dropped onto the geotextile from a height greater than three (3) feet. No equipment shall be operated directly on top of the geotextile without approval of the Engineer. Equipment with ground pressures less than seven (7) pounds per square inch (psi) shall be used to place the first lift over the geotextile. Cover aggregate, compaction, and testing requirements as specified in contract documents. Equipment placing cover aggregate shall not stop abruptly, make sharp turns, spin their wheels, or travel at speeds exceeding two (2) miles per hour (mph).

206.3.2 INSTALLATION OF GEOGRIDS

Install geogrids in accordance with geogrid manufacture's recommendations. General installation procedures are explained below, but are superseded by manufacturer's recommendations unless otherwise determined by the Engineer. Refer to the manufacturer's recommendations for special considerations.

206.3.2.1 Subgrade Preparation: Contractor shall refer to the manufacture's recommendations on subgrade preparation to determine if special precautions shall be taken due to soil strength of the project site. All vegetation removal shall be in accordance with Section 202. Excavate (if necessary) to the design subgrade elevation, stripping topsoil, debris and unsuitable material from the site. Smooth grade and compact the soils using appropriate compaction equipment. Grade or crown the surface for positive drainage away from the construction zone.

206.3.2.2 Placement: The Contractor shall notify the Engineer a minimum of 24 hours prior to installation of geogrids. Geogrid rolls which are damaged or contain imperfections shall be repaired or replaced as directed. Unroll the geogrid and overlap adjacent rills along their sides and ends in the direction(s) specified by the manufacturer.

206.3.2.3 Seams: Overlap geogrids in the direction the fill placement will be spread to avoid peeling of geogrid at overlaps by the advancing fill. Mechanically fastening adjacent geogrids to one another is not required unless the need is determined following an examination of the subgrade and manufacturer's literature. Mechanical fasteners can help maintain overlap dimensions. Cut and overlap the geogrid to accommodate curves and to conform to manhole covers and other immovable protrusions. Place geogrids in daily work sections so that proper alignment is maintained. The installer shall take appropriate measures to ensure that the product lies flat during fill placement.

206.3.2.4 Tensioning and Pinning: Geogrids may be anchored in place to maintain overlaps and alignment over the coverage area. Before fully unrolling the geogrid, anchor the beginning of the roll, in the center and at the corners, to the underlying surface. After unrolling the Geogrid fully, align it and pull it taught to remove wrinkles and laydown slack with hand tension, then secure in place. Additional actions may be required to hold the geogrid in place prior to placement of the aggregate fill.

206.3.2.5 Covering: Geogrids shall not be covered prior to inspection and approval by

the Engineer. See manufacturer's instructions for initial lift thickness of aggregate needed to fill over geogrids. Aggregate fill may be dumped directly onto the geogrid if competent subgrades lie underneath. On sloped surfaces, aggregate backfill shall be placed from the bottom of the slope upward. Cover gravel shall not be dropped onto the geotextile from a height greater than three (3) feet. The desired effect is fill that cascades onto the geogrid, rather than being pushed into it. For most subgrades, standard, highway-legal, rubber-tired trucks may drive over the geogrid at very slow speeds (less than five (5) mph) and dump aggregate fill as they advance, provided this construction traffic will not cause significant rutting upon bare subgrade. Turns and sudden starts and stops should be avoided. The Contractor shall refer to manufacturer's literature and recommendations for how to proceed when dealing with softer subgrades.

Do not drive tracked equipment directly on the geogrid product and ensure required minimum design or at least six (6) inches of aggregate fill is spread between the geogrid and tracked equipment. Also, only operate rubber-tired equipment directly on the geogrid if the underlying subsoil is not prone to rutting under limited construction traffic. Refer to manufacture's recommendations for instructions on how to proceed over softer subgrades.

206.3.2.6 Compacting: Standard compaction methods may be used unless the soils are very soft. Reference the manufacturer's literature and recommendations prior to each compacting event to ensure standard compaction methods are appropriate and that aggregate fill thickness is sufficient to support imposed load when constructing over certain materials. Measures should be taken to ensure the proper thickness of granular fill is placed atop the geogrid to maximize support and minimize movement at the surface.

Compact aggregate fill to project specifications, after it has been graded smooth and before it is subject to accumulated traffic. Inadequate compaction will result in surface rutting under wheel loads. This rutting reduces the total effective thickness of the fill and increases stress on the subgrade. Compaction equipment and methods should be appropriate for the type of fill being used, its thickness and the underlying subgrade conditions. In the case of rutting or severe pumping under truck or dozer traffic, immediately reference the manufacturer's recommendations to determine the best way to mediate the issue.

206.4 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered by this section of the specifications shall be considered incidental to the items of work described in the Special Conditions.

301 CAST-IN-PLACE CONCRETE – INDEX

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301 CAST-IN-PLACE CONCRETE

301.1 GENERAL

301.1.1 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 201, General Earthwork
- III. Section 204, Fill Materials
- IV. Section 302, Concrete Formwork

301.1.2 DEFINITIONS

301.1.2.1 Cementitious Material: Used herein shall include all Portland cement, pozzolan, and fly ash.

301.1.2.2 Exposed to Public View: Means situated so that it can be seen from eye level from a public location after completion. A public location is accessible to persons not responsible for operation or maintenance.

301.1.2.3 Deformed Reinforcing Steel: Reinforcing steel to conform to provisions of ASTM A615, Grades 40 or 60 as designated in the project drawings.

301.1.3 SUBMITTALS

The following shall be submitted in accordance with Section 101.

301.1.3.1 Certifications: Certify that admixtures used in the same concrete mix are compatible with each other and the aggregates.

301.1.3.2 Shop Drawings:

- I. Formwork, Reinforcing Steel
 - i. Reproductions of contract drawings are unacceptable

301.1.3.3 Product Data:

- I. Sources of cement, fly ash and aggregates
- II. Material safety data sheets (MSDS) for all concrete components and admixtures.
- III. Air Entrainment Admixture. Product data including catalogue cuts, technical data, storage requirements, product life, recommended dosage, temperature considerations, and conformity to ASTM standards.

- IV. High range water reducing admixture (plasticizer). Product data including catalogue cuts, technical data, storage requirements, product lift, recommended dosage, temperature considerations, retarding effects, slump range, and conformity to ASTM standards. Identify proposed location of use.
- V. Concrete mix for each formulation of concrete proposed for use including constituent quantities per cubic yard, water-cementitious materials ratio versus cylinder strength for each formulation of concrete proposed based on laboratory tests. The cylinder strength shall be the average of the 28 day cylinder strength test result for each mix. Provide results of seven (7) and 14 day tests if available.
- VI. Sheet curing material. Product data including catalogue cuts, technical data.
- VII. Liquid curing compound. Product data including catalogue cuts, technical data, storage requirements, product life, application rate.

301.1.3.4 Design Data: Concrete mix design shall be submitted thirty days minimum prior to concrete placement. Submit a complete list of materials including type, brand, source, and amount of cement, fly ash, pozzolans, polypropylene fibers, and admixtures. If source material changes, the Contractor shall resubmit mix proportion data using revised source material. Submit additional data regarding concrete aggregates if the source of aggregate changes. In addition, copies of the fly ash, polypropylene fibers, and pozzolan test results shall be submitted.

301.1.3.5 Test Reports: The following test reports shall be less than twelve months old.

- I. Fine Aggregates - sieve analysis, physical properties, ASR resistance and deleterious substances
- II. Coarse aggregates - sieve analysis, physical properties, ASR resistance and deleterious substances
- III. Cements - chemical analysis and physical properties
- IV. Fly Ash - chemical analysis and physical properties
- V. Proposed Concrete Mixes - compressive strength, slump, air content, admixtures, material sources, physical properties, and mixture proportions. Field test data meeting ACI 301.4.2.3.2.a or compressive strength test results on three (3), six (6) inch cylinders, at seven (7) days; and 28 days shall be provided.

301.1.3.5.1 Concrete Mix Design: The Contractor shall submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified here in and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other tests for cement, aggregates, and admixtures. The Contractor shall provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test reports shall be submitted along with the concrete mix design.

301.1.3.5.2 Fly Ash and Pozzolan: The Contractor shall submit test results in accordance with ASTM C 618 for fly ash and pozzolan.

301.2 MATERIALS

301.2.1 MATERIALS FOR FORMS

Materials for forms shall conform to Section 302.

301.2.2 FORM TIES AND ACCESSORIES

Form ties and accessories shall conform to Section 302.

301.2.3 CEMENT

Cement shall conform to ASTM C 150, Type I or II. The cement shall consist of a mixture of ASTM C 150, Type I or II, cement and one of the following materials: ASTM C 618 pozzolan or fly ash. The pozzolan or fly ash content shall not exceed 25 percent by weight of the total cementitious material. For exposed concrete, use one manufacturer for each type of cement, fly ash, and pozzolan.

301.2.3.1 Fly Ash and Pozzolan: Shall conform to ASTM C 618, Type F, or C. The maximum allowable loss on ignition shall be three (3) percent.

301.2.4 CONCRETE

301.2.4.1 Concrete Mix: Concrete mix shall produce a compressive strength, f'_c , of a minimum 4000 or 4500 pounds per square inch (psi) at 28 days with 4.5 percent - 7.5 percent entrained air. The maximum allowable slump shall not be in excess of four (4) inches, and/or the water cement ratio shall not exceed 0.45. The strength of the concrete will be considered satisfactory so long as the average of all sets of the three (3) consecutive test results equals or exceeds the specified compressive strength, f'_c , and no individual test result falls below the specified strength, f'_c , by more than 500 PSI. Correction of the replacement of deficient concrete will be done at the Contractor's expense.

301.2.4.1.1 Mix Proportions for Normal Weight Concrete: Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C192/C192M-16a and tested in accordance with ASTM C 39. Samples of all materials used in mixture, proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of material proposed for use shall have separate trial mixture. Accelerator or retarder use can be provided without separate trial mixture. The temperature of concrete in each trial batch shall be reported.

301.2.4.1.2 Required Average Strength of Mix Design: The selected mixture shall produce an average compressive strength exceeding the specified strength by the amount indicated in ACI 214. When a concrete production facility has a record of at least 15 consecutive tests the standard deviation shall be calculated and the required average compressive strength shall be determined in accordance with ACI 214. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength for mix designs between 3000 and 5000 psi shall be 1200 psi plus f_c .

301.2.5 WATER

Water shall be fresh, clean, potable, and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete. Water shall meet ASTM C1602/C1602M-12, including Table 2, from a municipal or other approved source.

301.2.6 AIR-ENTRAINED ADMIXTURE FOR CONCRETE

Concrete shall conform to the requirements of AASHTO M154.

301.2.7 CHEMICAL ADMIXTURE

Shall conform to the requirements of AASHTO M194 or ASTM C 494/C 494M:

- I. Type A: Water-reducing admixtures
- II. Type B: Retarding mixtures
- III. Type C: Accelerating mixtures
- IV. Type D: Water-reducing & retarding admixtures
- V. Type E: Water-reducing & accelerating admixtures
- VI. Type F: Water-reducing, high-range admixtures

Do not use calcium chloride admixtures.

301.2.7.1 High Range Water Reducer (HRWR) (Superplasticizers): Reference Type F and ASTM C 1017/C1017M.

301.2.8 MATERIALS FOR CURING CONCRETE

301.2.8.1 Impervious Sheeting: Waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap shall meet the requirements of AASHTO M171 or ASTM C 171. Only white reflective type shall be permitted.

301.2.8.2 Pervious Sheeting and Burlap: Pervious Sheeting and burlap shall conform to AASHTO M182.

301.2.8.3 Liquid Membrane-Forming Compound: Compound shall be Type 1 or Type 2, Class B. Reference AASHTO M148 or ASTM C 309 for standard specifications for Liquid Membrane-Forming Compound.

301.2.9 EXPANSION/CONTRACTION JOINT FILLER

Filler shall conform to ASTM D1751, ASTM D1752, or 100 percent recycled material meeting ASTM D1752. Material shall be 1/2 inch thick, unless otherwise indicated.

301.2.10 JOINT SEALANTS

301.2.10.1 Horizontal Surfaces: Horizontal three (3) percent slope, Maximum ASTM D 1190 or ASTM C 920, Type M, Class 25.

301.2.10.2 Vertical Surfaces Greater Than 3 Percent Slope: ASTM C 920, Type M, Grade NS, Class 25.

301.2.11 BIODEGREADABLE FORM RELEASE AGENT

Form release agent shall be biodegradable with a maximum of 350 grams/liter volatile organic compounds (VOCs). Product shall not bond with, stain, or adversely affect concrete surfaces and shall not impair subsequent treatments of concrete surfaces. The form release agent shall not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

301.2.12 AGGREGATES

The following items are required for concrete aggregate:

- I. Assure aggregates are not deleteriously alkali-silica reactive (ASR).
- II. Test for potential of deleterious alkali-silica reaction of coarse and fine aggregate shall be conducted in accordance with ASTM C1260.
 - i. If expansion at 16 days does not exceed 0.10 percent then the coarse or fine aggregates will be acceptable.
 - ii. If expansion at 16 days is greater than 0.10 percent, but less than 0.20 percent, aggregates are acceptable if petro-graphic examination shows the expansion is not due to ASR.
 - A. Otherwise, test specimens according to ASTM C 1567 using all components (e.g. coarse aggregate, fine aggregate, cementitious materials, and/or specific reactivity reducing chemicals) in the proportions proposed for the mixture design and retest.
 - B. For mixtures using lithium admixtures use test procedure CRD-C662.
 - C. Expansion of the proposed mixture design test specimens, tested in accordance with ASTM C1567, shall not exceed 0.10 percent after 16 days from casting.
 - D. If the expansion of the proposed mixture design test specimens is greater than 0.10 percent after 16 days, the aggregates will not be acceptable unless adjustments to

the mixture design can reduce the expansion to less than 0.10 percent after 16 days, or new aggregates shall be evaluated and tested, or testing by ASTM C1293 indicates the aggregates will not experience deleterious expansion.

- iii. If expansion at 16 days is greater than 0.20 percent, the aggregate will not be acceptable unless a combination of cement, aggregate, and supplemental cementitious materials is found to effectively mitigate the expansion using ASTM C1567.
- iv. Substitution of ASTM C1293 test results for ASTM C1260 test results is acceptable, however, the average concrete prism expansion shall be less than 0.04 percent at one (1) year.
- v. ASTM C33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source.

301.2.13 FINE AGGREGATE

Shall consist of natural sand or other inert materials with similar characteristics conforming to Table 1:

TABLE 1

Sieve Size	Percent Passing
3/8	100
No. 4	90-100
No. 16	45-80
No. 50	5-30
No. 100	0-8
No. 200	0-3

301.2.14 COARSE AGGREGATE

Shall consist of crushed stone, crushed gravel or natural washed gravel conforming to Table 2:

TABLE 2

Sieve Size	Percent Passing
1 ½ inches	100
1 inch	95-100
½ inch	25-60
No. 4	0-10
No. 8	0-5
No. 200	0-1

301.2.15 FLY ASH

Class C fly ash shall not be utilized. Class F fly ash should be required in the range of 15 percent – 25 percent replacement of the total cementitious material by weight. The Environmental Protection Agency (EPA) requires that all federally funded projects use at least 15 percent recovered materials such as fly ash.

301.2.15.1 ASTM C 618, Class F, except:

- I. Sulfur trioxide; maximum of 4.0 percent.
- II. Calcium oxide; maximum of 8.0 percent.
- III. Loss on ignition; maximum of 3.0 percent.
- IV. Test for effectiveness in controlling alkali-silica reaction under supplementary optional physical requirements in Table 3 of ASTM C 618. Use low-alkali cement for test.
- V. Does not decrease sulfate resistance of concrete by use of pozzolan.
 - i. Demonstrate pozzolan will have an “R” factor less than 2.5.
 - ii. $R = (C-5)/F$.
 - iii. C: Calcium oxide content of pozzolan, in percent, determined in accordance with ASTM C 114.
 - iv. F: Ferric oxide content of pozzolan, in percent, determined in accordance with ASTM C 114.

301.2.16 REINFORCEMENT

301.2.16.1 Reinforcing Bars: ASTM A 615/A 615M and ASTM A 617/A 617M with the bars marked A, S, W, Grade 40 or 60.

301.2.16.2 Welded Wire Fabric: ASTM A 185 or ASTM A 497. Provide flat sheets of welded wire fabric for slabs and toppings.

301.2.16.3 Wire: ASTM A 82 or ASTM A 496 standards.

301.2.16.4 Reinforcing Bar Supports: Provide bar ties and supports of coated or non-corrodible material.

301.3 EXECUTION

301.3.1 FORMWORK INSTALLATION

Formwork installation shall comply to all of Section 302.

301.3.2 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

Provide bars, wire fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the

effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

301.3.2.1 Reinforcement Supports: Place reinforcement and secure with galvanized or non-corrodible chairs, spacers, or metal hangers. For supporting reinforcement on the ground, use concrete or other non-corrodible material having a compressive strength equal to or greater than the concrete to be poured.

301.3.2.2 Splicing: Splice reinforcing steel as indicated. Splices shall be a minimum of 40 bar diameters in length unless otherwise indicated. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires plus two (2) inches.

301.3.2.3 Cover: Minimum coverage shall be three (3) inches, or as indicated.

301.3.2.4 Setting Miscellaneous Material: Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

301.3.2.5 Construction Joints: Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

301.3.2.6 Expansion Joints and Contraction Joints: Expansion and contraction joints shall be in accordance with the details shown or as otherwise specified. Provide expansion joint at edges of slabs on grade abutting vertical surfaces and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within four (4) to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

303.3.3 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

Batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances: One (1) percent for cement and water, two (2) percent for aggregate, and three (3) percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

303.3.3.1 Mixing: Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 85 degrees Fahrenheit. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees Fahrenheit. If

set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

303.3.3.2 Transporting: Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Remove concrete which has segregated in transporting and dispose of as directed.

301.3.4 CONCRETE PLACEMENT

The measuring, mixing, manufacture, transporting, and placing of concrete shall comply with ACI 304 and ASTM C94 and as specified. All concrete shall be placed in the presence of the Engineer. Aluminum pipe and chutes shall not be used in concrete placement.

Water shall only be added to batched concrete on site if the water to cement ratio of the mix design is not exceeded and the addition is approved by the Engineer. Additional water shall be added before the concrete is discharged from the truck. Concrete shall be mixed for a minimum of 20 revolutions of the mixer drum at mixing speed before concrete is discharged. Additional water shall be recorded on batch ticket to the nearest gallon. No water shall be added to the concrete after discharge to aid in the finishing of concrete. Concrete that has become so stiff it cannot be placed or finished shall not be used.

The Contractor will only be allowed to add air entraining admixtures to the batched concrete once at the site, and as approved by the Engineer. After the admixture is added, the concrete shall be re-mixed for a minimum of 20 revolutions of the mixer drum, at mixing speed. Contractor quality testing and the Owner's quality assurance tests will be taken after the addition and additional revolutions. Additional air entraining admixture should be recorded on the batch ticket to the nearest ounce.

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Concrete placement shall not be permitted when weather conditions (precipitation, wind, temperature, and standing or flowing water) prevent proper placement and consolidation of concrete. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. The concrete shall be delivered to the site of the work and discharge shall be completed within 1 1/2 hours when temperatures are less than 90 degrees Fahrenheit. Discharge shall be completed in one (1) hour when temperatures are above 90 degrees Fahrenheit. Concrete shall be placed from the mixer to the forms as rapidly as practicable by methods which prevent segregation or loss of ingredients. Concrete shall be in place and consolidated within 15 minutes after discharge from the mixer. Concrete shall be

deposited as close as possible to its final position in the forms and be so regulated that it may be effectively consolidated in horizontal layers 18 inches or less in thickness with a minimum of lateral movement. Do not exceed a free vertical drop of three (3) feet from the point of discharge. The placement shall be carried on at such a rate that the formation of cold joints will be prevented. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 20-foot centers maximum for exterior slabs.

301.3.4.1 Footing Placement: Concrete for footings may be placed in excavations without forms upon inspection and approval by the Engineer. Excavation width shall be a minimum of four (4) inches greater than indicated.

301.3.4.2 Consolidation: Each layer of concrete shall be consolidated by internal vibrating equipment. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete. Consolidate concrete slabs greater than four (4) inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs four (4) inches or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. The Contractor shall furnish a spare, working, vibrator on the job site whenever concrete is placed.

301.3.4.2.1 Internal vibration: Internal vibration shall be systematically accomplished by inserting the vibrator through fresh concrete in the layer below at a uniform spacing over the entire area of placement. The distance between insertions shall roughly be the smaller of 18 inches apart or 1.5 times the radius of action of the vibrator less two (2) inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least six (6) inches into the layer below, if such a layer exists. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. It should be held stationary until the concrete is consolidated and then withdrawn slowly at a rate of approximately three (3) inches per second. Penetrate the previously placed lift with the vibrator when more than one (1) lift is required. Place concrete in 18-inch maximum vertical lifts. Do not use vibrators to transport the concrete in the forms.

301.3.4.3 Pumping: Pumping shall not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment shall not exceed two (2) inches. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy. Rapid changes in pipe sizes shall be avoided. Maximum size of coarse aggregate shall be limited to 33 percent of the diameter of the pipe. Maximum size of well-rounded aggregate shall be limited to 40 percent of the pipe diameter. Samples for testing shall be taken at both the point of delivery to the pump and at the discharge end.

301.3.4.4 Cold Weather Requirements: No concrete placement shall be made when the ambient temperature is below 35 degrees Fahrenheit or if the ambient temperature is below 40 degrees Fahrenheit and falling. Placement may begin when the air temperature

reaches 35 degrees Fahrenheit and is rising or is already above 40 degrees Fahrenheit. Provisions shall be made to protect concrete from freezing during the specified curing period. If it is necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees Fahrenheit, placement and protection shall be approved in writing by the Engineer. Suitable covering and other means, as approved, shall be provided for maintaining the concrete at a temperature of at least 50 degrees Fahrenheit minimum adjacent to both the formwork and the structure for not less than 72 hours after placing and at a temperature above freezing for the remainder of the curing period. Limit the rate of cooling to five (5) degrees Fahrenheit in any one (1) hour, and 50 degrees Fahrenheit per 24 hours after heat application. Cold weather concrete shall be placed in accordance with ACI 306R as appropriate. Any concrete damaged by freezing shall be removed and replaced at the expense of the Contractor.

301.3.4.5 Hot Weather Placement: Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable, material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. When the rate of evaporation of surface moisture, as determined by use of Figure 1 of ACI 308R, is expected to exceed 0.2 pounds per square foot per hour, provisions for windbreak, shading, fog spraying, or covering with a light-colored material shall be made in advance of placement and such protective measures shall be taken as quickly as finishing operations will allow. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set. Contractor to pour and finish slabs in the cool morning hours to the extent possible in hot weather. Hot weather concrete to be placed in accordance with ACI 305R as appropriate.

301.3.5 FINISHES

No finishing or repair will be done when either the concrete or the ambient temperature is below 40 degrees Fahrenheit.

301.3.5.1 Finishing Formed Surfaces: All fine and loose materials shall be removed and surface defects including tie holes shall be filled. All "honeycomb" areas and other defects shall be repaired. All unsound concrete shall be removed from areas to be repaired. Surface defects greater than 1/2 inch in diameter holes left by removal of tie rods, and other surfaces not to receive additional concrete shall be reamed or chipped and filled with dry-pack mortar. The prepared area shall be brush-coated with an approved epoxy, resin, or latex bonding compound or with a neat cement grout after dampening and filling with mortar or concrete. The cement used in mortar or concrete for repairs to

all surfaces permanently exposed to view shall be a blend of Portland Cement and white cement so that the final color when cured will be the same as the adjacent concrete.

301.3.5.1.1 Rubbed Surface: Provide a “rubbed” surface finish when called for in the project documents. Surface shall be rubbed with an abrasive stone and a watery grout mixture to produce a sand like finish. The finished surface is to be etched into the concrete face rather than a plastered layer.

301.3.5.2 Finishing Slab Surfaces: All slab surfaces not to be covered by additional concrete or backfill shall be float finished to elevations shown. Surfaces shall be sloped for drainage unless otherwise shown. Joints shall be carefully made using a jointing tool of minimum 3/4-inch depth. Edges to be rounded with a small radius tool. Slab surfaces shall be finished to a tolerance of 1/8-inch for a float finish as determined by a 10 foot straight edge placed on surfaces shown on the plans to be level or having a constant slope. No water or cement shall be added to the surface during finishing.

301.3.5.2.1 Float Finish: Surfaces to be float finished shall be screeded or hand floated and bull floated to eliminate the ridges and to fill in the voids left by the screed. In addition, the bull float shall fill all surface voids and only slightly embed the coarse aggregate below the surface of the fresh concrete. Floating should remove slight imperfections, humps, and voids to produce a plane surface.

301.3.5.2.2 Broom Finish: A broom finish shall be applied to all exterior flat work. Flat work is to be finished as mentioned above, and trowled with a steel tool. After surface moisture disappears, the surface shall be brushed or broomed with a broom or fiber bristle brush in a direction transverse to that of foot or vehicular traffic.

301.3.5.2.3 Smooth Troweled Finish: Interior building slabs shall have a smooth troweled finish unless otherwise noted.

301.3.6 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

301.3.6.1 Defects: Repair formed surfaces by removing minor “honeycombs”, pits greater than 1 square inch surface area or 1/4 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with non-shrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive “honeycomb”, including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects which affect the serviceability or structural strength, will be rejected unless correction of defects is approved. Obtain approval of corrective action prior to repair from the Engineer. The surface of the concrete shall not vary more than the allowable tolerances as specified. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise specified.

301.3.6.2 Not Against Forms (Top of Walls): Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

301.3.6.3 Formed Surfaces:

301.3.6.3.1 Tolerances: Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10 foot straight edge.

301.3.6.3.2 As-Cast Rough Form: Provide for surfaces not exposed to public view. Patch holes and defects and level abrupt irregularities. Remove or rub off fins and other projections exceeding 1/4 inch in height.

301.3.7 CURING AND PROTECTION

Beginning immediately after placement and continuing for seven (7) days, all concrete shall be cured and protected from the elements such as; sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. All materials required for adequate curing and protection shall be present on site at the location of concrete placement prior to the start of the placement. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Preservation of moisture within concrete not in contact with the forms shall be accomplished by the application of membrane forming compound conforming to these specifications or by covering with plastic. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period.

301.3.7.1 Moist Curing:

301.3.7.1.1 Ponding or Immersion: Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees Fahrenheit less than the temperature of the concrete. For temperatures between 40 and 50 degrees Fahrenheit, increase the curing period by 50 percent.

301.3.7.1.2 Fog Spraying or Sprinkling: Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees Fahrenheit, increase the curing period by 50 percent.

301.3.7.1.3 Pervious Sheeting: Completely cover surface and edges of the concrete with two (2) thicknesses of wet sheeting. Overlap sheeting six (6) inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor

over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

301.3.7.1.4 Impervious Sheeting: Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting no less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting, overlap and continuously tape sheeting joints, and introduce sufficient water to soak the entire surface prior to completely enclosing.

301.3.7.2 Liquid Membrane-Forming Curing Compound: Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period.

301.3.7.2.1 Application: Otherwise recommended by the manufacturer, apply compound immediately after the surface loses its water sheen and has a dull appearance and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Re-spray concrete surfaces subjected to rainfall within three (3) hours after the curing compound application.

301.3.7.2.2 Protection of Treated Surfaces: Prohibit pedestrian, vehicular traffic, and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

301.3.7.3 Curing Periods: Protect concrete from premature drying, excessively hot temperatures, and mechanical injury. Maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Engineer.

301.3.7.4 Requirements for Type III, High-Early-Strength Portland Cement: The curing periods shall be not less than one-fourth of those specified for Portland Cement, but in no case less than 72 hours.

301.3.8 CONCRETE REINFORCING STEEL

301.3.8.1 Reinforcing Steel Placement: Steel placement to conform to NM SSHBC (07) 540.3.1.4.1 and 540.3.1.4.2.

301.3.8.2 Reinforcing Steel Cover: Steel cover to conform to ACI 318-08 7.7.

301.3.8.3 Reinforcing Bar Bending: Bar bending to conform to NM SSHBC (07) Table 540.3.1.2:1.

301.3.8.4 Reinforcing Bar Cleaning: Cleaning of reinforcing bars to conform to NM SSHBC (07) Section 540.3.1.5.

301.3.8.5 Reinforcing Bar Storage: Bars shall not be stored on the ground – NM SSHBC (07) 540.3.1.

301.3.8.6 Bundling and Tagging: Tag and mark reinforcing bars in accordance with CSRI's Code of Standard Practice.

301.3.9 FIELD QUALITY CONTROL

301.3.9.1 General Requirements: The Contractor shall perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing.

Based upon the results of these inspections and tests, the Contractor shall take the action and submit reports as required below and any additional tests to ensure the requirements of these specifications are met.

301.3.9.2 Sampling: Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

301.3.9.3 Concrete Testing:

301.3.9.3.1 Strength Testing: The Contractor shall provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken at a frequency no less than once a day nor less than once for every 50 cubic yards of concrete. The samples for strength tests shall be taken in accordance with ASTM C172. Cylinders for acceptance shall be molded in conformance with ASTM C31/C31M by an approved testing laboratory. Each strength test result shall be the average of two (2) test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved by the Engineer. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three (3) consecutive strength test results equal or exceed the specified strength and no individual strength test result falls below the specified strength by more than 500

psi. Concrete represented by core test shall be considered structurally adequate if the average of three (3) cores is equal to at least 85 percent of f'_c and if no single core is less than 75 percent of f'_c .

301.3.9.3.2 Air Content: Air content shall be determined in accordance with ASTM C173 or ASTM C231. ASTM C231 shall be used with concretes and mortars made with relatively dense natural aggregates. Two (2) tests for air content shall be made on randomly selected batches of each class of concrete placed during each shift. Additional tests shall be made when excessive variation in concrete workability is reported by the placing foreman. If results are out of tolerance the placing foreman shall be notified and he shall take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until the air content is within the tolerance specified. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

301.3.9.3.3 Slump Test: Two (2) slump tests shall be made on randomly selected batches of each class of concrete for every 50 cubic yards, or fraction thereof, of concrete placed during each shift. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

301.3.9.3.4 Temperature Tests: Test the concrete delivered and the concrete in the forms. Perform tests in cold weather conditions below 50 degrees Fahrenheit and in hot weather conditions above 80 degrees Fahrenheit for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

301.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specifications shall be as set forth in the Special Conditions.

302 CONCRETE FORMWORK - INDEX

302.1 GENERAL

302.1.1 CERTIFICATION

302.2 MATERIALS

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302 CONCRETE FORMWORK

302.1 GENERAL

302.1.1 CERTIFICATION

- I. Manufacturer's data including literature describing form materials, accessories, and form releasing agent.
- II. Manufacturer's recommendation on method and rate of application of form release agents.
- III. Certification for the design of the formwork
- IV. Design analysis and calculations for form design and methodology used in design.
- V. Sequence of concrete placement. Indicate locations of form joints, panel sizes and patterns.

Review of the sequence of concrete placement, form system and panel layout shall be for appearance and strength of the completed structure only. Approval of forming plans or procedures shall not relieve the Contractor of responsibility for the strength, safety or correctness of methods used, the adequacy of equipment, or from carrying out the work in full compliance with the requirements of the drawings and as specified herein.

302.2 MATERIALS

302.2.1 FORMS

Forms for cast-in-place concrete shall be made of wood, plywood, steel, or other approved materials. Use plywood or steel forms where a smooth form finish is required. Wood forms for the project shall be nearly new. Wood forms shall be constructed utilizing sound lumber and plywood of suitable dimensions and free of raised grain, knotholes, and loose knots. Where used for exposed surfaces, dress and match boards and fit adjacent panels with tight joints. Plywood: PS1, B-B concrete form panels or better or AHA A135.4 hardboard shall be used for smooth form lining. Steel form surfaces shall not contain irregularities, dents, or sags. Metal forms may be used if approved by the Engineer and shall be appropriate type and class. All forms shall be designed and constructed to provide a flat, uniform concrete surface with minimal finishing and/or repair.

302.2.1.1 Wall Forms: Forms for all concrete walls shall be in good condition. Exterior grade plywood panels shall be manufactured in compliance with the APA and the trademark of that group, or equal as approved by the Engineer. The class of material and grades of interior plies shall be of sufficient strength and stiffness to provide a flat, uniform, concrete surface requiring minimal finishing and grinding. All joints or gaps in forms shall be taped, gasketed, plugged, and/or caulked with an approved material so that under pressure the joint will remain watertight, will not bulge outward or create surface patterns.

302.2.1.2 Form Release Agent: Coat all forming surfaces in contact with concrete using an effective, non-shrinking, non-residual, water based, and bond breaking form coating unless otherwise noted in the project documents.

302.2.1.3 Form Ties and Accessories: Form ties encased in concrete shall have no metal within 1 1/2 inch of the face of the concrete after eyelet has been removed. The part of the tie to be removed shall be at least 1/2 inch in diameter and be provided with a plastic cone at least 1/2 inch in diameter and 1 1/2 inches long. The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement.

302.3 EXECUTION

302.3.1 FORMWORK INSTALLATION

Provide forms, shoring, and scaffolding for concrete placement. Forms shall be properly aligned, adequately supported, and mortar tight. Forms shall be used for all cast-in-place concrete including sides of footings. Forms shall be constructed and placed so that the resulting concrete will be the shape, lines, dimensions and appearance as shown on the drawings. Forms for walls shall have removable panels at the bottom for cleaning. Tremies and hoppers for placing concrete shall be used to prevent segregation and accumulation of hardened concrete on forms and reinforcing steel above fresh concrete. The form surface shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed faces. Chamfer all above grade exposed joints, edges, and external corners 3/4 inch unless otherwise indicated. Forms are to be sufficiently rigid to withstand construction loads and vibration and to prevent displacement or sagging between supports. During form removal, the Contractor shall ensure concrete is not damaged. The Contractor shall be responsible for the adequacy of the forming system. Forming material is to be thoroughly cleaned prior to reuse.

302.3.1.1 Coating: Before concrete placement coat the contact surfaces of forms with a non-staining mineral oil, non-staining form coating compound, or two (2) coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

302.3.1.2 Removal of Forms and Supports: After placing concrete, forms shall remain in place until the concrete has reached its design strength usually 28 days from the date of placement. Prevent concrete damage during form removal.

302.3.1.2.1 Special Requirements for Reduced Time-Period: Forms may be removed earlier than specified if the results of field-cured samples from a representative portion of the structure indicate that the concrete has reached a minimum of 85 percent of the design strength.

302.3.2 FORMED SURFACES

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

Edges of all form panels in contact with concrete shall be flush within 1/8 inch in 5 feet. The maximum deviation of the finish wall surface at any point shall not exceed 1/4 inch from the intended surface as shown on the drawings.

All wood forms in contact with the concrete shall be coated with an effective, approved, releasing agent prior to form setting. Steel forms shall be thoroughly cleaned, and all mill scale and other ferrous deposits shall be sandblasted and removed from the contact surface.

302.3.3 INSPECTION

The Engineer shall be notified 24 hours prior to proposed concrete placement. Failure of the forms to comply with the requirements specified herein or to produce concrete complying with the requirements of this section shall be grounds for rejection of that portion of the concrete work. Rejected work shall be replaced or repaired as directed by the Engineer at no additional cost to the Owner. Such repairs or replacement shall be subject to the requirements of this section and approved by the Engineer.

302.4 MEASUREMENT AND PAYMENT

Measurement and payment for the work covered by this section of the specifications shall be considered incidental to the items of work described in the Special Conditions.

401 HOT MIX BITUMINOUS PAVEMENT – INDEX

401.1 GENERAL

- 401.1.1 DESCRIPTION
- 401.1.2 RELATED SECTIONS
- 401.1.3 SUBMITTALS
- 401.1.4 REQUIRED DATA
- 401.1.5 ENVIRONMENTAL CONDITIONS

401.2 MATERIALS

- 401.2.1 CONSTRUCTION EQUIPMENT
- 401.2.2 PLANT MIX BITUMINOUS PAVEMENT
- 401.2.3 BASE COURSE
- 401.2.4 ASPHALT TREATED BASE COURSE
- 401.2.5 ASPHALTIC SURFACE COURSE

401.3 EXECUTION

- 401.3.1 PREPARATION
- 401.3.2 PLACEMENT OF NEW ASPHALT
- 401.3.3 PATCH SCHEDULING

401.4 MEASUREMENT AND PAYMENT

- 401.4.1 ASPHALT PATCH/PAVING
- 401.4.2 BASIS FOR PAYMENT

401 HOT BITUMINOUS PAVEMENT

401.1 GENERAL

401.1.1 DESCRIPTION

This item of work shall consist of furnishing all materials, supplies, plant and labor required for removal of existing asphalt and construction of new asphalt patch over utility trenches, new roads and other excavated areas in accordance with applicable provisions of these specifications and the project drawings.

401.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this section. Related sections are:

- I. Section 101, Submittal Procedures
- II. Section 201, General Earthwork
- III. Section 202, Clearing and Grubbing
- IV. Section 205, Erosion Control
- V. Section 402, Base Course Material

401.1.3 SUBMITTALS

The following shall be submitted in accordance with Section 101:

401.1.3.1 Design Data:

- I. Job-mix formula: Submit a job-mix formula for review prior to preparing and placing the bituminous mixture. Formulas shall indicate physical properties of the mixes as shown by tests made by a commercial laboratory within the year.
- II. Asphalt Cement Binder
- III. Mix Design

401.1.3.2 Test Reports:

- I. Specific gravity test of asphalt
- II. Coarse aggregate tests
- III. Weight of slag test
- IV. Percent of crushed pieces in gravel
- V. Fine aggregate tests
- VI. Specific gravity of mineral filler
- VII. Bituminous mixture tests
- VIII. Aggregates tests
- IX. Bituminous mix tests
- X. Pavement courses

401.1.4 REQUIRED DATA

Job-mix formula shall show the following:

- I. Source and proportions, percent by weight, of each ingredient of the mixture
- II. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture.
- III. Amount of material passing the No. 200 sieve determined by dry sieving
- IV. Number of blows of hammer compaction per side of molded specimen
- V. Temperature viscosity relationship of the asphalt cement
- VI. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight
- VII. Asphalt absorption by the aggregate
- VIII. Effective asphalt content as percent by weight of total mix
- IX. Temperature of the mixture immediately upon completion of mixing
- X. Asphalt performance grade viscosity grade
- XI. Curves for the leveling and wearing courses.

401.1.5 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature of the underlying course is greater than 45 degrees Fahrenheit for course thicknesses greater than two (2) inches and 55 degrees Fahrenheit for course thicknesses two (2) inches or less.

401.2 MATERIALS

401.2.1 BASE COURSE

Base course shall be as specified in Section 402 of these specifications. Thickness shall be as shown on the project drawings.

401.2.2 ASPHALT TREATED BASE COURSE

The treated base aggregate shall be crushed and shall conform to the gradation requirements as specified in Section 402. Thicknesses shall be constantly checked to insure conformance to project drawings.

401.2.3 PLANT MIX BITUMINOUS PAVEMENT

Aggregate for asphaltic surface course shall conform to NMSHTD Specifications and one of the following gradation requirements as called for.

Table 1: Gradation Requirements

<u>Sieve Size</u>	<u>Percent Passing Type B</u>	<u>Percent Passing Type C</u>
3/4 inch	100	
1/2 inch	80-98	100
3/8 inch	70-90	70-100
No. 4	50-65	45-85
No. 10	32-45	30-67
No. 40	10-22	7-25
No. 200	3-8	2-10.2

L.A. Abrasion to be 40 or less.

The Asphaltic mix shall in general meet the gradation requirements of the gradation listed above, except that the Contractor and the Engineer may, by mutual agreement, increase sand content and asphalt content of the wearing surface course to produce a mix that is "dense" and "closed" after final rolling. The Contractor may use a previous job mix formula or may establish a new formula for this project.

The asphaltic mix shall be the result of proportioning by a job-mix formula to produce characteristics as follows:

I. Stability:	2500 pounds plus
II. Flow:	16 or less
III. Sand Equivalent:	40 or more
IV. Voids filled with asphalt (VFA):	70 – 78 percent
V. Final densities:	92 – 96 percent of maximum theoretical

Note: Lime shall be added in accordance with NMSHTD Specs.

Note: When HMA Superpave is designated, mix design to conform to NMDOT 432.2.8 Specifications.

The surface course may be laid immediately on the asphalt treated base unless the base has become contaminated with dust or mud, in which case cleaning and an emulsion prime coat will be required. The surface course shall be laid uniformly and subsequently rolled by experienced workmen with vibratory steel roller and pneumatic rollers to produce densities of 94 to 96 percent of Maximum Theoretical Density. Normally, thicknesses shall be checked constantly so that the finished surface is 3/8 inch $\pm$ above adjacent edges and crowned in the center of the patch. The finished surface shall be "closed" with no sags which will pond: Surfaces that are "open" upon completion will require a suitable seal coat.

Prior to patch construction, the Contractor shall submit a job-mix formula used on other work or permit sampling and testing of his product currently being used in the area which would

indicate compliance with these specifications. Patch material will be subject to testing during the project.

Patches shall be installed only during dry, warm weather (50 degrees Fahrenheit).

401.3 EXECUTION

401.3.1 PREPARATION

401.3.1.1 Subgrade Preparation: Subgrade shall be compacted to densities as specified on the project drawings. The subgrade surface shall be to the proper grade in all areas and shall be true and uniform. The surface shall be tamped or rolled at or near optimum moisture content so that it is tight with no loose or uneven material present. Subgrade preparation shall be done immediately prior to base course installation. Subgrade that has become saturated or that has shown evidence of "pumping" shall be removed and replaced with suitable material.

401.3.1.2 Edge Preparation: All efforts shall be made to bond and seal existing asphalt and concrete edges with new patch. Asphalt edges shall be broomed and scraped to remove all mud, dust, and other contaminants. Cleaned edges shall be thoroughly coated with emulsified asphalt immediately prior to installation of surface course. Emulsion that has been repeatedly cut and thinned will not be permitted.

401.3.1.3 Pavement Cut: All paving within the limits of the pipe line trench and appurtenances shall be removed and replaced, unless otherwise noted on the project drawings. Asphalt pavement cuts may be made utilizing hand operated pavement cutters, saws, wheel cutters mounted on motor graders or other approved equipment.

Cuts shall be made along straight chalk line marks which run parallel to the utility alignment. Patches for areas excavated and backfilled for tie-ins shall be "squared up" for neat appearance. Cut edges that are damaged during excavation shall be re-cut in the damaged area. The width of pavement cuts shall be the minimum required to facilitate trenching and excavation operations and such widths shall be arrived at by the Contractor and Project Engineer. Single cuts along curb and gutter edges shall be of sufficient width that excavation operations will not disturb or dis-lodge curb & gutter stones.

Old asphalt paving shall be removed and disposed of by the Contractor. The Contractor should be aware that many areas of the city streets have been overlaid one (1) or more times and that substantial pavement thicknesses could be encountered. All paving within the limits shown shall be removed by means of sawing. Cuts in pavement of substantial thickness shall be deep enough to insure a vertical edge upon pavement removal without lifting adjacent paving.

401.3.2 PLACEMENT OF NEW ASPHALT

401.3.2.1 Leveling Course: Asphalt leveling course shall be placed in layers not to exceed three (3) inches and thoroughly rolled with steel wheel and pneumatic rollers to produce densities in excess of 92 percent of maximum theoretical. Layers shall be placed as required to ensure that final overlay course conforms to the desired grade and drains properly.

401.3.2.2 Final Overlay: The surface course shall be laid on a surface that has been cleaned and is free from mud and dirt. An emulsion prime coat shall be applied prior to the final surface course. The surface course shall be laid uniformly and subsequently rolled with a vibratory steel roller and pneumatic rollers to produce densities of 93 to 96 percent of maximum theoretical. Thicknesses shall be checked so that the finished surface is 1/4 inches ($\pm$) above adjacent concrete edges. The finish shall be "closed" with no depressions that will pond water. Surfaces found to be "opened" will require a suitable seal coat. Asphalt surface course shall only be placed during dry, warm weather (+50 degrees Fahrenheit).

401.3.3 PATCH SCHEDULING

Patch construction shall be scheduled for shortly after completion of all mains, service lines and appurtenances for a particular area. Backfill levels shall be brought to street grade and maintained during the time between utility installation and patch construction. Trench subgrade material or base course may be used during this temporary period however, areas of heavy traffic may require base course.

401.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specifications shall be in accordance with provision of the Special Conditions.

401.4.1 ASPHALT PATCH/PAVING

The quantities of asphalt patch to be paid for will be the number of square yards of each depth of patch constructed as indicated.

401.4.2 BASIS FOR PAYMENT

401.4.2.1 Asphalt Patch/Paving: Payment of the quantities of patch measured as specified will be at the contract unit price per square yard of the thickness specified.

402 BASE COURSE MATERIAL - INDEX

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- 402.3.1 GENERAL REQUIREMENTS
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402.4 MEASUREMENT & PAYMENT

402 BASE COURSE MATERIAL

402.1 GENERAL

Base course for roads (paved and graveled), asphalt patch under concrete, curb & gutter, sidewalk, walls, valley gutters, fillets, driveways and parking areas shall conform to the dimensions and sections as shown on the project drawings. Gravel shall be placed on firm, compacted, accurately graded subgrade after all utility lines and appurtenances have been installed. Gravel is to be placed at near optimum moisture and rolled to achieve densities of 90 percent Modified Proctor. The final gravel surface shall be smooth and uniform with accurate lateral and vertical dimensions called for.

402.1.1 DESCRIPTION

This item of work shall consist of furnishing all material, supplies, plant and labor required for construction of gravel roads and driveways complete in accordance with applicable provisions of these specifications and project drawings.

402.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this section. Related sections are:

- I. Section 101, Submittal Procedures
- II. Section 201, General Earthwork
- III. Section 203, Trenching, Excavation, and Backfilling
- IV. Section 401, Hot Mix Bituminous Pavement

402.1.3 DEFINITIONS

For the purposes of this specification, the following definitions apply.

402.1.3.1 Aggregate Base Course: Aggregate Base Course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

402.1.3.2 Degree of Compaction: Degree of compaction required is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 or AASHTO T 180 Method D and corrected with AASHTO T 224 abbreviated as a percent of laboratory maximum dry density.

402.1.4 SUBMITTALS

402.1.4.1 Product Data:

- I. Plant, Equipment, and Tools
- II. List of proposed equipment to be used in performance of construction work, including descriptive data.

402.1.4.2 Delivery Tickets: Copies of delivery tickets during the progress of the work.

402.1.4.3 Test Reports:

- I. Sampling and Testing
- II. Field Density Tests
- III. Certified copies of test results for approval no less than 10 days before material is required for the work.
- IV. Calibration curves and related test results prior to using the device or equipment being calibrated.
- V. Copies of field test results within seven (7) days after the tests are performed.

402.1.5 SAMPLING AND TESTING

Sampling and testing shall be the responsibility of the Contractor. Sampling and testing shall be performed by a testing laboratory approved by the Engineer. Work requiring testing will not be permitted until the testing laboratory has been approved. The materials shall be tested to establish compliance with the specified requirements; testing shall be performed at the specified frequency. The Engineer may specify the time and location of the tests. Copies of test results shall be furnished to the Engineer within seven (7) days of completion of the tests.

402.1.5.1 Sampling: Samples for laboratory testing shall be taken in conformance with ASTM D 75. When deemed necessary, the sampling will be observed by the Engineer.

402.1.5.2 Tests: The following tests shall be performed in conformance with the applicable standards listed.

402.1.5.2.1 Sieve Analysis: Sieve analysis shall be made in conformance with ASTM C 117 and ASTM C 136. Sieves shall conform to ASTM E 11.

402.1.5.2.2 Liquid Limit and Plasticity Index: Liquid limit and plasticity index shall be determined in accordance with ASTM D 4318.

402.1.5.2.3 Moisture-Density Determinations: The laboratory maximum dry density and optimum moisture content shall be determined in accordance with AASHTO T 180, Method D and corrected with AASHTO T 224.

402.1.5.2.4 Field Density Tests: Density shall be field measured in accordance with ASTM D 1556, ASTM D 2167 or ASTM D 2922.

402.1.5.3 Testing Frequency:

402.1.5.3.1 Initial Tests: Tests shall be performed on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements when furnished. If materials from more than one (1) source is going to be utilized, this testing shall be completed for each source.

402.1.5.3.2 In Place Tests: Each of the following tests shall be performed on samples taken from the placed and compacted ABC. Samples shall be taken and tested at the rates indicated. Sampling and testing of recycled concrete aggregate shall be performed at twice the specified frequency until the material uniformity is established.

- I. Density tests shall be performed on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.
- II. Sieve Analysis shall be performed on every lift of material placed and at a frequency of one sieve analysis for every 1500 square yards, or portion thereof, of material placed.
- III. Liquid limit and plasticity index tests shall be performed at the same frequency as the sieve analysis.
- IV. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course. Measurements shall be made in three (3) inch diameter test holes penetrating the base course.

402.1.5.4 Approval of Material: The source of the material shall be selected 15 days prior to the time the material will be required in the work. Tentative approval of material will be based on initial test results. Final approval of the materials will be based on sieve analysis, liquid limit, and plasticity index tests performed on samples taken from the completed and fully compacted course(s).

402.1.6 WEATHER LIMITATIONS

Construction shall be done when the atmospheric temperature is above 35 degrees Fahrenheit. When the temperature falls below 35 degrees Fahrenheit, the Contractor shall

protect all completed areas by approved methods against detrimental effects of freezing. Completed areas damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements. Additional testing may be required at Contractor's expense.

402.1.7 PLANT, EQUIPMENT, AND TOOLS

All plant, equipment, and tools used in the performance of the work shall be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. The equipment shall be adequate and shall have the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

402.1.8 DELIVERY TICKETS

Before the final statement is allowed, the Contractor shall file certified delivery tickets for all aggregates used, as specified in the submittals paragraph.

402.2 MATERIALS

402.2.1 AGGREGATES

The ABC shall consist of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, crushed recycled concrete, angular sand, or other approved material. ABC shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve shall be known as coarse aggregate; that portion passing the No. 4 sieve shall be known as fine aggregate.

402.2.1.1 Coarse Aggregate: Coarse aggregates shall be angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

- I. **Crushed Gravel:** Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.
- II. **Crushed Stone:** Crushed stone shall consist of freshly mined quarry rock, and shall meet all the requirements specified below.
- III. **Crushed Recycled Concrete:** Crushed recycled concrete shall consist of previously hardened Portland Cement concrete or other concrete containing pozzolanic binder material. The recycled material shall be free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and shall be crushed and processed to meet the required gradations for coarse aggregate. The recycled concrete aggregate shall have a percent of expansion not to exceed 0.08 percent, when tested in accordance with ASTM C 1260. Recycled concrete

aggregate exceeding this value shall be rejected. Crushed recycled concrete shall meet all other applicable requirements specified below.

402.2.1.1.1 Aggregate Base Course: ABC coarse aggregate shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall not exceed 30 percent. A flat particle is one (1) having a ratio of width to thickness greater than three (3); an elongated particle is one having a ratio of length to width greater than three (3). In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two (2) or more freshly fractured faces with the area of each face being at least equal to 75 percent of the smallest mid sectional area of the piece. When two (2) fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two (2) fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in Table 1.

402.2.1.2 Fine Aggregate: Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

402.2.1.2.1 Aggregate Base Course: ABC fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

402.2.1.3 Gradation Requirements: The specified gradation requirements shall apply to the completed base course. The aggregates shall be continuously well graded within the limits specified in Table 1. Sieves shall conform to ASTM E 11.

The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected.

402.2.2 LIQUID LIMIT AND PLASTICITY INDEX

Liquid limit and plasticity index requirements shall apply to the completed course and shall also apply to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either non-plastic or have a liquid limit not greater than 25 and a plasticity index not greater than five (5).

402.2.3 BASE COURSE FOR PAVED ROAD, DRIVEWAYS AND PARKING LOTS

Base course thickness shall be as shown on the project drawings. The base course furnished shall be crushed aggregate conforming to NMSHTD specifications with one of the following gradation requirements as called for:

TABLE 1: BASE COURSE GRADATION

<u>Sieve Size</u>	<u>Percent Passing</u> <u>Type I</u>	<u>Percent Passing</u> <u>Type II</u>
1 inch	100	100
¾ inch	80-100	85-100
No. 4	30-60	40-70
No. 10	20-45	30-55
No. 200	3-10	4-12

L.A. Abrasion to be 50 or less.

Base course shall be placed at or near optimum moisture content to achieve densities of 95 percent or better (as called for) of Modified Proctor (AASHTO T-180-95, Method D). Base course shall be accurately graded so that subsequent asphalt layers will be of proper thickness.

402.3 EXECUTION

402.3.1 GENERAL REQUIREMENTS

Adequate drainage shall be provided during the entire period of construction to prevent water from collecting or standing on the working area. Line and grade stakes shall be provided as necessary for control. Grade stakes shall be in lines parallel to the centerline of the area under construction and suitably spaced for string lining.

402.3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating shall be the responsibility of the Contractor. The aggregate sources shall be operated to produce the quantity and quality of materials meeting these specifications requirements in the specified time limit.

402.3.3 STOCKPILING MATERIAL

Prior to stockpiling of material, storage sites shall be cleared and leveled by the Contractor. All materials, including approved material available from excavation and grading, shall be

stockpiled in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

402.3.4 PREPARATION OF UNDERLYING COURSE

Prior to constructing the base course(s), the underlying course or subgrade shall be cleaned of all foreign substances. At the time of construction of the base course(s), the underlying course shall contain no frozen material. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the requirements set forth herein shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the base course(s). Stabilization shall be accomplished by mixing ABC into the underlying course and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements of the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained by the Contractor in a satisfactory condition until the base course is placed.

402.3.5 INSTALLATION

402.3.5.1 Mixing the Materials: The coarse and fine aggregates shall be mixed in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. The Contractor shall make adjustments to mixing procedures or equipment as directed to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification. Adjustments to the JMF shall be limited to $\pm$ five (5) percent on the No. 4 sieves; $\pm$ five (5) percent on the No. 30 sieve, and $\pm$ three (3) percent on the No. 200 sieve.

402.3.5.2 Placing: The mixed material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. A compacted layer of material shall be placed in a single layer when a thickness of six (6) inches is required. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

402.3.5.3 Grade Control: The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

402.3.5.4 Edges of Base Course: The base course(s) shall be placed so that the completed section will be a maximum of 12 inches wider than the typical road section, back of curb to back of curb, on all sides.

402.3.5.5 Compaction: Base course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within $\pm$ two (2) percent of the optimum water content determined from laboratory tests as specified in Paragraph 402.1.5 of this Section. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least 96 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

402.3.5.6 Thickness: Compacted thickness of the base course shall be as indicated. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, re-blading, and recompact as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course.

402.3.5.7 Finishing: The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least three (3) inches and new

material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, the unsatisfactory portion shall be scarified, reworked and recompactd or it shall be replaced as directed.

402.3.5.8 Smoothness: The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12-foot straightedge. Measurements shall be taken in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50-foot intervals. Deviations exceeding this amount shall be corrected by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

402.3.6 TRAFFIC

Completed portions of the base course may be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Heavy equipment shall not be permitted except when necessary to construction, and then the area shall be protected against marring or damage to the completed work.

402.3.7 MAINTENANCE

The base course shall be maintained in a satisfactory condition until the full pavement section is completed and accepted. Maintenance shall include immediate repairs to any defects and shall be repeated as often as necessary to keep the area intact. Any base course that is not paved over prior to the onset of winter, shall be retested to verify that it still complies with the requirements of this specification. Any area of base course that is damaged shall be reworked or replaced as necessary to comply with this specification.

402.3.8 DISPOSAL OF UNSATISFACTORY MATERIALS

Any unsuitable materials that must be removed shall be disposed of in accordance with all state and local requirements at no additional cost to the Owner. No additional compensation shall be made for materials that must be replaced.

402.4 MEASUREMENT & PAYMENT

Measurement and payment for the work covered by this section of the specifications shall be considered incidental to the items of work described in the Special Conditions.

404 GRAVEL ROADS AND DRIVEWAYS - INDEX

404.1 GENERAL

404.1.1 DESCRIPTION

404.1.2 RELATED SECTIONS

404.2 MATERIALS

404.2.1 GRAVEL MATERIAL REQUIREMENTS

404.3 EXECUTION

404.3.1 INSTALLATION

404.4 MEASUREMENT AND PAYMENT

404 GRAVEL ROADS AND DRIVEWAYS

404.1 GENERAL

Gravel roads, driveways, and parking areas shall conform to the dimensions and sections as shown on the project drawings. Gravel shall be placed on firm, compacted, accurately graded subgrade after all utility lines and appurtenances have been installed. Gravel is to be placed at near optimum moisture and rolled to achieve densities of 90 percent Modified Proctor. The final gravel surface shall be smooth and uniform with accurate lateral and vertical dimensions called for.

404.1.1 DESCRIPTION

This item of work shall consist of furnishing all material, supplies, plant, and labor required for construction of gravel roads and driveways complete in accordance with applicable provisions of these specifications and project drawings.

404.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related sections are:

- I. Section 402, Base Course Material

404.2 MATERIALS

404.2.1 GRAVEL MATERIAL REQUIREMENTS

Gravel provided shall meet requirements for NMSHTD base course as specified in Section 402.

404.3 EXECUTION

404.3.1 INSTALLATION

404.3.1.1 Placing: The material shall be placed on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. A compacted layer of material shall be placed in a single layer when a thickness of six (6) inches is required. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one (1) layer, the previously constructed layers shall be cleaned of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms as directed. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

404.3.1.2 Grade Control: The finished and completed base course shall conform to the lines, grades, and cross sections shown. Underlying material(s) shall be excavated and prepared at sufficient depth for the required base course thickness so that the finished base course and the subsequent surface course will meet the designated grades.

404.3.1.3 Edges of Base Course: The base course(s) shall be placed so that the completed section will be a maximum of 12 inches wider than the typical road section, back of curb to back of curb, on all sides.

404.3.1.4 Compaction: Base course shall be compacted as specified with approved compaction equipment. Water content shall be maintained during the compaction procedure to within $\pm$ two (2) percent of the optimum water content determined from laboratory tests as specified in Section 402. Rolling shall begin at the outside edge of the surface and proceed to the center, overlapping on successive trips at least half the width of the roller. Alternate trips of the roller shall be slightly different lengths. Speed of the roller shall be such that displacement of the aggregate does not occur. In all places not accessible to the rollers, the mixture shall be compacted with hand-operated power tampers. Compaction shall continue until each layer has a degree of compaction that is at least 96 percent of laboratory maximum density through the full depth of the layer. The Contractor shall make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

404.3.1.5 Thickness: Compacted thickness of the base course shall be as indicated. The total compacted thickness of the base course(s) shall be within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, such areas shall be corrected by scarifying, adding new material of proper gradation, re-blading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course shall be considered as conforming to the specified thickness requirements. Average job thickness shall be the average of all thickness measurements taken for the job, but shall be within 1/4 inch of the thickness indicated. The total thickness of the base course shall be measured at intervals in such a manner as to ensure one measurement for each 500 square yards of base course.

404.3.1.6 Finishing: The surface of the top layer of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Thin layers of material shall not be added to the top layer of base course to meet grade. If the elevation of the top layer of base course is 1/2 inch or more below grade, then the top layer should be scarified to a depth of at least three (3) inches and new material shall be blended in and compacted to bring to grade. Adjustments to rolling and finishing procedures shall be made as directed to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to

completion, the unsatisfactory portion shall be scarified, reworked and recompactd or it shall be replaced as directed.

404.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of the specifications shall be as set forth in the Special Conditions.

501 WATER LINES AND APPURTENANCES - INDEX

501.1 GENERAL

- 501.1.1 DESCRIPTION
- 501.1.2 RELATED SECTIONS
- 501.1.3 SUBMITTALS
- 501.1.4 DELIVERY, STORAGE, AND HANDLING

501.2 MATERIALS

- 501.2.1 PIPES, FITTINGS, AND APPURTENANCES
- 501.2.2 VALVES AND HYDRANTS
- 501.2.3 METERS
- 501.2.4 WATER SERVICE LINE APPURTENANCES

501.3 EXECUTION

- 501.3.1 GENERAL INSTALLATION OF WATER PIPELINES
- 501.3.2 SPECIAL REQUIREMENTS FOR INSTALLATION OF WATER MAINS
- 501.3.3 INSTALLATION OF WATER SERVICE PIPING
- 501.3.4 SPECIAL REQUIREMENTS FOR INSTALLATION OF WATER
SERVICE PIPING
- 501.3.5 TESTING OF PIPE LINES
- 501.3.6 DISINFECTION OF WATER LINES
- 501.3.7 FIELD QUALITY CONTROL
- 501.3.8 TIE-INS, MAINTAINING EXISTING SERVICE AND SCHEDULING OF
WORK
- 501.3.9 CLEANUP

501.4 MEASUREMENT AND PAYMENT

501 WATER LINES AND APPURTENANCES

501.1 GENERAL

501.1.1 DESCRIPTION

This item of work shall consist of furnishing all materials, supplies, plant and labor required for construction of water lines and appurtenances complete in accordance with applicable provisions of these specifications and the project drawings.

501.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related sections include but are not limited to the following:

- I. Section 101, Submittal Procedures
- II. Section 203, Trenching, Excavation, and Backfilling
- III. Section 204, Fill Materials
- IV. Section 301, Cast-In-Place Concrete
- V. Section 503, Station Valves, Piping, Appurtenances, and Associated Painting

501.1.3 SUBMITTALS

Engineer approval is required for submittals. The following shall be submitted in accordance with Section 101.

505.1.3.1 Product Data:

- I. Water distribution main piping, fittings, joints, couplings, and appurtenances
- II. Valves, hydrants, and appurtenances
- III. Meters and appurtenances
- IV. Water service line piping, fittings, joints, valves, couplings, and appurtenances

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on and rubber-gasketed bell-and-spigot joints. Include information concerning gaskets with submittal for joints and couplings.

505.1.3.2 Test Reports:

- I. Bacteriological disinfection
- II. Test results shall be from a certified commercial laboratory verifying disinfection

501.1.3.3 Certificates: Certificates shall attest that tests set forth in each applicable referenced publication have been performed, whether specified in that publication to be mandatory or otherwise and that production control tests have been performed at the intervals or frequency specified in the publication. Other tests shall have been performed within three (3) years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project. The contractor shall provide certificates for the following:

- I. Water distribution main piping, fittings, joints, couplings, and appurtenances
- II. Valves, hydrants, and appurtenances
- III. Meters and appurtenances
- IV. Water service line piping, fittings, joints, valves, couplings, and appurtenances
 - I. Manufacturer's instructions
 - II. Delivery, storage, and handling
 - III. Installation procedures for water piping

501.1.4 DELIVERY, STORAGE, AND HANDLING

501.1.4.1 Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials, and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves, and hydrants free of dirt and debris. Pipe that is left unprotected and that receives storm runoff water shall be removed, cleaned and approved prior to resuming construction. Pipe that is infiltrated by sewage shall be removed from the project and replaced at no additional cost to the owner.

501.1.4.2 Handling: The Contractor shall handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the assigned location undamaged. Take special care to avoid injury to coatings and linings on pipe and fittings. The Contractor shall make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag, pipe to the trench. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Owner. Store rubber gaskets that are not to be installed immediately under cover and out of direct sunlight.

501.1.4.3 Miscellaneous Plastic Pipe and Fittings: Handle Polyvinyl Chloride (PVC) pipe and fittings in accordance with the manufacturer's recommendations. Store plastic piping and jointing materials, that are not to be installed immediately, under cover and out of direct sunlight. Storage facilities shall be classified and marked in accordance with NFPA 704, NFPA 49, and NFPA 325.

501.2 MATERIALS

Water lines, fire hydrants, valves and appurtenances shall be installed at the locations shown on the drawings. All materials incorporated in the work shall be new and unused, of the quality specified herein and shall be installed in accordance with the recommendations of the manufacturer.

501.2.1 PIPES, FITTINGS, AND APPURTENANCES

Pipe for water mains shall be of material called for on the project drawings and shall meet specifications below.

501.2.1.1 Ductile Iron Piping: Water lines, unless otherwise specified, shall be Class 350 ductile iron pipe. The pipe shall be cement lined and shall meet the requirements of AWWA Specifications C104 and C151. Joints for ductile iron pipe shall be rubber gasket push-on type or restrained joint as called for on the drawings. Restrained ductile iron pipe joints called for on project drawings shall have push on joints with ductile iron locking elements independent of gasket. Pipe shall be US pipe TR flex or equal. External joint restraints are not permitted.

Fittings shall be ductile iron fittings as specified in Paragraph 501.2.1.3.

501.2.1.2 PVC Water Pipe: Pipe 4 inches through 36 inches diameter, shall meet the requirements of AWWA C900, "Standard for Polyvinyl Chloride Pressure Pipe." PVC pipe shall be furnished with outside diameters equivalent to cast iron pipe with rubber gasket joints as listed in above paragraph. PVC pipe shall be furnished in the pressure class and DR designation per the latest edition of AWWA C900 as listed on the project drawings.

PVC pipe of IPS sizes 1.5 to 3.0 inches with "slip-on" connections shall conform to ASTM D2241. The DR (dimension ratio) shall be specified.

Fittings shall be ductile iron fittings as specified Paragraph 501.2.1.3 unless otherwise called for.

501.2.1.3 Ductile Iron Pipe Fittings: Fittings shall be cement lined, ductile iron, with mechanical joints or flanged joints as called for in the project documents. Fittings shall conform to the requirements of AWWA Specifications C104 and C110, provided however, that ductile iron mechanical joint fittings, such as U.S. Pipe Trim Tye conforming to AWWA C153 (in sizes available), or equal, are acceptable. Mechanical joint glands shall be Megalug, or equal, and suited for pipe material used. Fittings shall be Class 350 for 12 inch pipe and smaller. Fitting larger than 12 inches shall be rated to match adjoining pipe pressure rating with a minimum pressure rating of Class 250.

501.2.1.4 Glass Reinforced Polymer (GRP) Pipe: Glass reinforced polymer pipe shall be installed at locations designated on the project drawings. GRP pipe shall conform to requirements of AWWA C950 and ASTM D3517 and have a pressure rating of 250 psi (pounds per square inch). Pipe stiffness shall be as called for, or as required, to exceed long term (50 year) deflection requirements.

Unrestrained joints shall consist of glass reinforced plastic sleeve couplings that utilize elastomeric sealing gaskets to maintain the water tightness meeting performance requirements of ASTM D4161. GRP pipe outside diameter shall be equal to that of cast iron pipe.

Restrained joints shall utilize glass reinforced plastic sleeves with elastomeric sealing gaskets (per ASTM D4161). Restrained joint coupling and spigot ends shall have matching grooves for installing a locking, non-metallic, shear restraint rod to complete the connection. All joints at GRP fittings shall be restrained joints.

GRP pipe shall be as manufactured by US Composite Pipe South or approved equal.

Fittings shall be GRP fittings unless otherwise called for or at connections to other pipe materials.

501.2.1.4.1 Glass Reinforced Polymer (GRP) Fittings: Elbows, reducers, and tees shall be of the same structural design as adjoining pipe. Fittings manufactured with mitered section of pipe shall be overlaid with fiber-glass. All fittings shall utilize elastomeric sealing gaskets (per ASTM D4161) and shall be restrained with a groove for installing a locking, non-metallic, shear resistant rod to complete connection to GRP pipe. Fittings shall be restrained type rated for 250 psi.

501.2.1.5 Steel Pipe: Steel pipe shall be of the minimum schedule as called for with minimum yield strength of 35 thousand pounds per square inch. Pipe shall be coated as called for in project documents. Fittings shall be weld neck type beveled for welding.

501.2.1.6 Polyethylene Pipe: Pipe shall be HDPE (High Density Polyethylene) conforming to AWWA C901/C906 specifications.

501.2.1.7 Ductile Iron Plastic Encasement: Encasement shall be polyethylene plastic conforming to AWWA C105. Two layers shall be installed on all ductile iron pipe and fittings for buried service. Layers shall consist of a single layer of V-Bio polyethylene plastic followed by eight (8) mil. polyethylene plastic with staggered joints.

501.2.1.8 Warning Tape: Polyethylene plastic warning tape shall be manufactured specifically for warning and identification of existing buried utility lines. Tape rolls shall have be three (3) inches minimum in width, color coded as specified for the intended utility, and have warning and identification imprinted in bold black letters continuously

over the entire tape length. Warning and identification shall read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Permanent color and printing shall be unaffected by moisture or soil exposure. Warning tape color for water systems shall be blue.

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above. Tape shall have a minimum thickness of 0.003 inches and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise and a maximum of 350 percent elongation.

501.2.1.9 Detection Wire: Wire shall be insulated single strand, solid copper detection wire with a minimum of 12AWG.

501.2.2 VALVES AND HYDRANTS

501.2.2.1 Gate Valves: Buried gate valves, two (2) inches and larger, shall be NRS resilient wedge type conforming to AWWA C509 (and AWWA C515 when larger than 12 inches). Gate valves shall have a factory applied epoxy coating (3 coat or fusion bond system), interior and exterior, conforming to AWWA C550. Valves shall be mechanical joint or flanged by MJ as called for. Buried valves shall have a two (2) inch AWWA operating nut. Exposed valves shall be equipped with operator hand wheels.

Valve body fasteners shall be Type 316 stainless steel. The sealing mechanism shall consist of a cast iron or ductile iron gate with a resilient wedge and shall be bonded or mechanically attached. It shall be designed to seal when unbalanced-balanced pressure is applied to either side of the gate. The sealing mechanism shall provide no leakage at 250 psi or less, working pressure with line flow in either direction. Valve shall turn clockwise to close.

Buried gate valves shall be installed in the horizontal position when so designated. Valves 18 inch and larger in size shall have bypass lines. Bypass lines with valves shall be equipped with two (2) inch operating nuts. Bypass lines and valves shall be of the sizes listed below:

Main Valve Size	Bypass Valve Size
18", 20"	2"
24"	2½"
30"	3"

Main valves in the horizontal position shall be operated with bevel gearing. Valve boxes with appurtenances as detailed shall be installed for all buried valves.

501.2.2.1.1 Gate Valve Boxes: Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is

to be used and shall be adjustable two-piece screw type with 5 1/4 inch shafts. Cast-iron boxes shall have a minimum cover and wall thickness of 1/4 inch as indicated. Cast-iron box shall have a heavy coat of bituminous paint. Valve boxes shall be suitable for finished bury without full extension.

501.2.2.2 Butterfly Valves: Butterfly valves shall conform to ANSI/AWWA C504 standard as Mueller or approved equal. Valves shall be class 150 with actuator for buried service and have a two (2) inch standard AWWA nut. Nut shall turn clockwise to close. Fasteners shall be 304 or 316 stainless steel.

501.2.2.2.1 Butterfly Valve Boxes: Provide a valve box for each gate valve on buried piping. Valve boxes shall be of cast iron of a size suitable for the valve on which it is to be used and shall be adjustable two-piece screw type with 5 1/4 inch shafts. Cast-iron boxes shall have a minimum cover and wall thickness of 1/4 inch as indicated. Cast-iron box shall have a heavy coat of bituminous paint. Valve boxes shall be suitable for finished bury without full extension.

501.2.2.3 Check Valve: Valve shall be AWWA C508 or UL 312 with bronze facing, lever arm, weight and provisions for temporarily holding valve open where called for. Valve to have stainless steel nuts and bolts and shall be epoxy coated. Valves shall be mechanical joint or flanged as called for and be rated for the working pressure as specified.

501.2.2.4 "T" Handle Valve Operator: Buried gate valves shall be furnished with one (1) operating wrench with "T" handle and socket to fit a two (2) inch square wrench nut for every eight (8) buried valves installed. The "T" wrench length shall be eight (8) ft.

501.2.2.5 Hydraulic Valve Operator: Valve operator shall be suitable for one (1) or two (2) man operation. Operator shall be capable of generating up to 350-foot pounds of torque. Operator shall have key shaft sections, when connected, capable of reaching the two (2) inch operating nut at depths of four (4) feet below ground level with handles for operating personnel at waist level. A hydraulic valve operator shall be furnished on a project with four (4) or more buried valves 16 inches or larger. One (1) actuator shall be supplied for every ten (10) buried valves 16 inches or larger installed.

Hydraulic system shall be capable of operating with hydraulic fluid flows of 3.5-10 gallons per minute (gpm) at 1750 to 2250 psi. Operator shall be capable of being used as a manual wrench with appropriate locking devices.

501.2.2.5.1 Electronic Turn Counter: LCD counter shall give numeric display of turns to open with reverse count for turns to close. Counter shall be self-contained with seven (7) year lithium battery.

501.2.2.5.2 Torque Control: Torque control knob and display shall allow for torque adjustment from ZERO at no torque to maximum allowed by system hydraulic pressure.

501.2.2.5.3 Hydraulic Hose Pigtails: Hydraulic connects shall be quick disconnect male and female, 3/8-inch flush face.

501.2.2.5.4 Equal Product: Hydraulic Valve Operator shall be the EXERCISER by Transmate, a division of Romac Industries Inc. or approved equal.

501.2.2.6 Vacuum and Air Relief Valves: Vacuum and air relief valves shall be of the size shown on the contract drawings and shall be of a type that will release air and prevent the formation of a vacuum. The valves shall automatically release air when the lines are being filled with water. It shall also admit air into the line when water is being withdrawn in excess of the inflow. Valves shall be cast iron body with stainless steel trim and float and full ported valves. Table 501.1 provides recommendations for various valves.

TABLE 501.1 : VALVE RECOMMENDATIONS

Air Valve Type	Model
Basic Air Vacuum Valves	Val-matic Models VM-101 through VM-104 or equal
Air Release Valves	Val-matic Models 22.9 through 50 or equal
Combination Air Valves (Single Body Type)	Val-matic Models 201 C.2 through 204 C.2 or equal
Combination Air Valves (Dual Body Type)	Val-matic Model 104/38 or equal

Valves and appurtenances shall be rated for 250 psi working pressure provided, however, that valves with 125 pound flanged inlets are shall be rated for 150 psi working pressure. Valves shall be equipped with low pressure seats when called for.

Hooded valves shall be equipped with stainless steel inlet screens.

501.2.2.7 Fire Hydrant Assembly: Fire hydrants shall have a six (6) inch diameter inlet with mechanical joint connection. Inlet shall have mechanical-joint end only. The end shall conform to the applicable requirements as specified for the joint. The hydrant shall be designed for 250 psi maximum working pressure and shall be equipped with two (2), 2 1/2 inch standard hose connections, and one (1), 4 1/2 inch pumper connection. Hydrants shall be dry-barrel type conforming to AWWA Specification C502 and shall have a minimum 5 1/4 inch valve opening. Normally, hydrants shall have four (4) feet minimum pipe cover, provided however, that grade conditions behind curbs or at fire hydrant

locations are sometimes different and require taller fire hydrant barrels. Contractor shall note depth requirements on project drawings and provide barrels of proper height.

All fire hydrant bolts and nuts below grade shall be stainless steel. Fire hydrants shall be Mueller Super Centurion unless otherwise specified.

Unless otherwise called for in the project documents. One (1) 10.5-ounce bottle of A-51 hydrant lubricating oil shall be furnished for every fire hydrant installed. An A-311 operating wrench shall be furnished for every five (5) fire hydrants installed. A minimum of one (1) wrench shall be supplied for projects calling for fire hydrants to be installed.

501.2.2.8 Post Indicator Valves: Post indicator valves shall consist of a UL 263 listed, FM 1120/1130 approved. AWWA C515 non-rising stem gate valve shall have UL listed indicator post. Gate valve shall have a triple o-ring seal, AWWA C550 epoxy coating, two (2) inch operating nut, and a stuffing box bolted with stainless steel fasteners. Indicator posts shall be adjustable type, indicate valve position, have a tamper proof operating wrench with padlock, and 1/2 inch NPT cast boss in upper barrel for a supervisory switch to be installed.

501.2.2.9 Sanitary Freeze Proof Yard Hydrants: Hydrants shall be Woodford Model S4H or equal with ASSE 1052 double check backflow preventer and reservoir below frost line. The reservoir is emptied when flow occurs through the 3/4 inch hose bib nozzle with no resultant soil contact.

501.2.3 METERS

501.2.3.1 Displacement Type – 2 Inches and Smaller: Meters shall be AWWA C700 positive displacement meters utilizing nutating disc measuring chamber and a floating chamber design. Meter shall register in cubic feet via a magnetic drive, low torque register, be Automatic Meter Reading (AMR) capable, and be easily ungraded from direct read registers to an absolute encoder register. Meters shall be Neptune T-10 with R900i pit interface units complete with lithium ion batteries. Meter must be proven compatible with the City's Neptune meter reading system.

501.2.3.2 Turbine Type Meters – 3 Inches and Larger: Meters shall be AWWA C701 Class I turbine type meters with a magnetic drive, low torque register, and have a bronze case with stainless steel fasteners. Registers shall be straight-reading type. It shall be permanently sealed and shall read in U.S. gallons or cubic feet as required. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct reading remote register designed in accordance with AWWA C706 or an encoder type remote register designed in accordance with AWWA C707. Meters shall comply with the accuracy and capacity requirements of AWWA C701. Meters shall be Neptune High Performance Turbine Meter with matching upstream strainer and R900i pit interface units complete with lithium ion batteries. Meter must be proven compatible with the City's Neptune meter reading system.

501.2.3.3 Magnetic Flow Meter: As called for, the meters shall be electromagnetic flow type meters, based on Faraday's law of induction, accurate to $\pm$ one (1) percent of flow. Meter shall be NSF approved for potable drinking water, rated for 250 psi, and have flanged connections. Meter shall include a remote display/amplifier with signal processor with four (4) programmable digital and two (2) analog outputs for SCADA system. Meter shall be powered by 120 VAC. Display shall have a large, eight-line LCD remote display with backlight. Meter liner shall be NSF approved fusion bonded epoxy. Meters shall be Mx Ultra Mag meter with M-Series signal converter and cable as required or equal.

501.2.4 WATER SERVICE LINE APPURTENANCES

501.2.4.1 Corporation Stops: Stops shall be brass bodied with CC tapered threaded inlet by compression fitting and stainless-steel gripper bands. Stops shall be suitable for the working pressure of the system and conform to AWWA C800.

501.2.4.2 Curb or Service Stops: Stops shall be slotted key type and made of bronze. Curb or Service Stops shall conform to ASTM B 61 and have conductive compression connection for CTS O.D. tubing. Both ends of Tubing shall have quarter turn check and Minneapolis top thread and be suitable for the working pressure of the system. Arrow shall be cast into body of the curb or service stop and indicate the direction of flow.

501.2.4.3 Service Saddles: Service Saddles, of the sizes indicated for connection to existing main, shall be brass bodied with stainless steel double strap. Saddles shall be outlet tapped with AWWA taper (C.C.) thread, rated for 200 psi working pressure, and shall have an O-ring sealed outlet.

501.2.4.4 Meter Boxes: Meter boxes shall be made of PVC 0.30 inches minimum wall thickness, have a white interior, and an aluminum bottom. Meter shall sit anchored to meter box wall to maintain alignment. The boxes shall be of sufficient size to completely enclose one meter. The box diameter and height shall be as indicated. Meter inlet shall be locking angle ball valve with full port. The outlet shall be A.S.S.E. dual check and have a non-locking lid. A side-locking lid shall be provided for meters one (1) inch and larger. A four (4) inch-thick insulating pad, made from closed cell polystyrene foam which provides insulation and resist moisture absorption, shall be provided with boxes. Boxes set in sidewalks, not subject to vehicular traffic, shall be PVC with cast iron lid and cast-iron meter reader lid. PVC boxes and lids shall be used in unpaved areas or grass areas not subject to vehicular traffic. Box height shall extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

501.2.4.5 Curb Boxes: Curb Boxes shall be extension type with Minneapolis pattern bases. Boxes shall have stationary rods, with lengths appropriate for fitting inside the box, and a lid with a plug. A pentagon key constructed of ductile iron shall be provided with all boxes. Key shall have one end for digging ice or dirt away from lid and shall fit standard water works pentagon nuts.

501.2.4.6 Disinfection: Chlorinating materials shall conform to the following:

- I. Chlorine, Liquid: AWWA B301
- II. Liquid Hypochlorite, Calcium and Sodium: AWWA B300

501.3 EXECUTION

501.3.1 GENERAL INSTALLATION OF WATER PIPELINES

These requirements shall apply to all pipeline installation except where specific exception is made in the "Special Requirements" paragraphs detailed in the bid proposal.

501.3.1.1 Location of Water Lines: The location of water lines shall be referred to in the project drawings.

501.3.1.2 Earthwork: Trenching, Excavation, and Backfilling for water lines and accessories shall be in accordance with provisions of Section 203 of these specifications. Select granular material per Section 204 shall be provided as backfill in areas of rock excavation and where called for.

501.3.1.3 Pipe Laying and Jointing: Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches.

Cut pipe in a neat, work-person-like, manner accurately to the length established at the site and work into place without springing or forcing. Any pipe or fitting that does not allow sufficient space for proper installation of jointing material shall be replaced with that of proper length. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying.

Grade the pipeline in straight lines and avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure with firm and uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings.

Spigot ends shall be inserted so that the "Stop Line" is at the edge of the bell. Care shall be taken to ensure that the insertion depth is not exceeded on previous joints when making up a particular joint. Joint deflections shall accommodate vertical or horizontal change in directions but shall not exceed the allowable deflection recommended by the pipe manufacturer. Fittings shall be used in making direction changes requiring joint deflections greater than that recommended by the pipe manufacturer. Provide anchors and supports where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines.

Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Work personnel shall inspect each pipe joint immediately prior to installation to make sure there are no rodents or other undesirable items in the pipe. Pipe ends shall be capped and secured at the end of each day's work. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall be as indicated on the contract drawings.

501.3.1.4 Thrust Blocks: Concrete "thrust blocks" shall be provided at all pipe direction changes in excess of 11 1/4 degrees as detailed in the project drawings. Additional requirements for vertical direction changes are also contained in the project drawings. "Thrust Blocks" shall be Cast-In-Place Concrete per Section 301, poured against undisturbed trench banks to provide positive restraint for the water line, and include fittings at the operating pressure plus surge events.

501.3.1.5 Installation of Tracer Wire and Warning Tape: Install a continuous length of tracer wire for the full length of each run of pipe. Attach wire to bottom of pipe in such manner that it will not be displaced during construction operations. Splices shall be suitable for direct bury but shall be held to a minimum. Contractor shall provide apparatus as required for continuity verification after installation.

501.3.1.6 Connections to Existing Water Lines: Make connections to existing water lines after approval is obtained from the Engineer and with a minimum interruption of service on the existing line.

501.3.1.7 Flanged Pipe: Flanged pipe shall only be installed above ground or with the flanges in manways or vaults.

501.3.1.8 Installation of Valves and Hydrants:

501.3.1.8.1 Installation of Valves: Valves and valve boxes shall be installed plumb and to the depth specified on the project drawings with concrete support, as detailed on the project drawings. Make and assemble joints to gate valves and check valves as specified for making and assembling the same type joints between pipe and fittings.

501.3.1.8.2 Installation of Hydrants: Install hydrants in accordance with AWWA C600 for hydrant installation and as detailed. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, contact the Engineer for further instructions.

Fire hydrants shall be set to such depth as to provide cover for connecting pipe equal to the water main. The bottom flange of fire hydrants shall be above the finished

grades as shown on the project drawings. The Contractor shall be responsible for providing fire hydrants of proper barrel lengths for job conditions. A minimum of 8 cubic feet of gravel backfill around the base of the hydrant shall be provided for disposing of water from the hydrant barrel. In some areas where drain-back will not be absorbed into surrounding soil, or where it will cause foundation problems, additional gravel pits and piping may be required.

501.3.1.8.3 Installation of Air Release and Vacuum Valves: Shall be installed at locations shown on the drawings. Pipe shall be laid to grade up to the valves. Extra pipe line depth may be required so that valves and appurtenances may be installed within the vaults.

501.3.2 SPECIAL REQUIREMENTS FOR INSTALLATION OF WATER MAINS

501.3.2.1 Installation of Ductile-Iron Piping: Unless otherwise specified, install pipe and fittings in accordance with Section 203 and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

501.3.2.1.1 Jointing: Make push-on joints with the gaskets and lubricant specified for type of joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly. Make restrained joints with the gaskets, glands, locking segments, bolts, and nuts specified for this type of joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendations of Appendix A to AWWA C111/A21.11. Make flanged joints with the gaskets, bolts, and nuts specified for this type of joint. Make flanged joints up-tight and avoid undue strain on flanges, fittings, valves, and other [equipment and] accessories. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes. The use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces shall be out of parallel to such degree that the flanged joint cannot be made watertight without overstraining the flange.

501.3.2.1.2 Allowable Deflection: The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.

501.3.2.1.3 Polyethylene Encasement of Ductile Iron Pipe: Installation of two layers of polyethylene encasement shall be in accordance with the provisions of methods A, B, and C, AWWA C105, the manufacturers recommendations, and with modifications as contained here-in.

- I. Encasement material shall be clean and free of clay lumps, sand, rock, or any foreign material prior to placement. The trench bottom surface of granular

material shall be accurately graded with depressions for bell holes. Trench shall be free of water.

- II. Equipment used for lifting or inserting pipe shall be of a material that will not damage the encasement material. Chains are not permitted.
- III. Layer 1 shall utilize tubular V-Bio polyethylene as described in methods A or B with required overlaps (min. 1 ft.) and taping of joints with polyethylene adhesive tape. Longitudinal tube overlaps shall be taped at the 1/4 points. Layer 1 shall be snug, free of loose, bunched up areas, closed, and taped prior to proceeding to Layer 2.
- IV. Layer 2 shall utilize tubular sheet or polyethylene as described in Methods A, B, or C. Sheet encasement shall be in place on trench floor prior to lowering or partially lowering pipe with Layer 1 intact. Plastic shall be lapped along longitudinal seams, at the top portion of pipe. Tubular encasement shall be installed over each layer as described in Step III. The Layer 2 end laps shall be staggered from Layer 1 end laps. Layer 2 shall be snug with taped joints.
- V. Special shapes such as valves and fittings will require cutting and fitting plastic to conform to the shape of the item. Protrusions that may puncture the plastic to have foam or other material applied adjacent to or as a cover to decrease the protruding effect. Plastic around special shapes shall be well taped.
- VI. The result of a repair of damaged encasement due to installation mishaps or a need to view portions of the installed pipeline, shall be a secure, 2 layer system that is snug fitting and well taped. Mishaps that result in soil material accumulations between the plastic and pipe will require removing that portion of plastic and replacing with new (2 layers).
- VII. Workmanship – Installation of the polyethylene 2-layer system is crucial to the life of the pipeline. Work personnel shall have been trained and/or shall be trained on this project for installation of the plastic system. The initial 4 hours of continuous installation shall be in the presence of the Contractor, Contractor's foreperson, the Engineer, and his field personnel. The techniques used to enhance quality and production are to be refined during this period. Work personnel and laborers that are not trained shall not be allowed to work in the encasement operation.
- VIII. Techniques for backfilling and compacting bedding material around encased pipe shall be such as not to disturb or damage the plastic.

501.3.2.2 Installation of PVC Plastic Water Main Pipe and Associated Fittings:

Unless otherwise specified, install pipe and fittings in accordance with Paragraph 501.3.1. Adhere to the requirements of UBPPA UNI-B-3 for laying of pipe, joining PVC pipe to fittings and accessories, and setting of hydrants, valves, and fittings. Follow the recommendations for pipe joint assembly and appurtenance installation detailed in AWWA M23.

501.3.2.2.1 Jointing: Make push-on joints with the elastomeric gaskets specified for this type of joint by using elastomeric-gasket bell-end pipe. For pipe-to-pipe push-on joint connections, use only pipe with push-on joint ends having factory-made bevel. For push-on joint connections to metal fittings, valves, and other accessories, cut spigot end of pipe off square and re-bevel pipe end to a bevel approximately the same as that on ductile-iron pipe used for the same type of joint. Use an approved lubricant recommended by the pipe manufacturer for push-on joints. Assemble push-on joints for pipe-to-pipe joint connections in accordance with the requirements of the pipe manufacturer. Assemble push-on joints for connection to fittings, valves, and other accessories in accordance with the requirements of the pipe manufacturer and standard industry practices. Make compression-type joints/mechanical joints with the gaskets, glands, bolts, nuts, and internal stiffeners previously specified for this type of joint and assemble in accordance with standard industry practices. Cut off spigot end of pipe for compression-type joint/mechanical-joint connections and do not re-bevel. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Use internal stiffeners as previously specified for compression-type joints.

501.3.2.2.2 Offset: Maximum offset in alignment between adjacent pipe joints shall be as recommended by the manufacturer and approved by the Engineer, but shall not exceed five (5) degrees.

501.3.2.2.3 Fittings: Install Fittings in accordance with AWWA C605.

501.3.2.3 Installation of Glass Reinforced Polymer Pipe (GRP): Glass Reinforced Polymer pipe shall conform to the requirements of AWWA C950 and ASTM D3517 for installation.

501.3.2.4 Installation of Polyethylene Pipe: Polyethylene pipe shall conform to the requirements of AWWA C901/C906 for installation.

501.3.3 INSTALLATION OF WATER SERVICE PIPING

501.3.3.1 Location: Connect water service piping to the building service where the building service has been installed.

501.3.3.2 Installation: Service line tubing shall be installed on compacted soil, free of kinks, and graded to prevent air traps. Tubing ends shall be taped shut during placement in trench to prevent entrance of soil and rocks. Service lines shall be flushed immediately prior to connecting meter cans. Care shall be taken when making taps on the main to ensure that the wall of the main is fully penetrated and that the tab is retrieved. The Contractor shall flush the completed service line and meter after installation on user side to verify flow and proper meter operation. Evidence of excessive head loss through new

service lines may require re-excavating to check tap or removal of meter to check for foreign matter.

Installation of water mains and service lines shall conform to proximity requirements detailed on drawings.

501.3.3.3 Service Line Connections to Water Mains: Connect service lines, 3/4 inch to 2-inch size, to the main line by a brass saddle and corporation stop. Install a service stop below the frost line.

501.3.3.4 Earthwork: Trenching, Excavation, and Backfilling shall conform to the requirements of Section 203. Backfill under service connections shall be in place and compacted to specification requirements prior to connecting new service lines. Backfilling with voids under service lines will not be permitted. Hand work for backfill operations around service connections will be expected. Whenever lead or galvanized service lines are encountered, they shall be replaced between main and meter.

501.3.4 SPECIAL REQUIREMENTS FOR INSTALLATION OF WATER SERVICE PIPING

501.3.4.1 Installation of Plastic Piping: Install pipe and fittings in accordance with Paragraph 501.3.1 General Installation of Water Pipelines and with the applicable requirements of ASTM D 2774, unless otherwise specified.

501.3.4.1.1 Jointing: Make solvent-cemented joints for PVC plastic piping using the solvent cement previously specified for this material. Assemble joints in accordance with ASTM D 2855. Make plastic pipe joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

501.3.4.1.2 Plastic Pipe Connections to Appurtenances: Connect plastic pipe service lines to corporation stops and gate valves in accordance with the recommendations of the plastic pipe manufacturer.

501.3.4.2 Location of Meters: Meters and meter boxes shall be installed at the locations shown on the drawings. The meters shall be centered in the boxes to allow for reading and ease of removal or maintenance.

501.3.5 TESTING OF PIPE LINES

Pipe lines (PVC, ductile, iron, and GRP) installed under this specification shall be tested in accordance with the following provisions before acceptance by the Owner and subsequent tie-ins. The completed piping system shall be filled with water and subjected to a hydrostatic pressure test.

For the hydrostatic pressure test, use a hydrostatic pressure of 150 percent greater than the maximum working pressure, the system anticipated maximum surge pressure, or 200 psi, whichever is greater. Hold this pressure for not less than two (2) hours at the low end of the test segment. Prior to the pressure test, fill that portion of the pipeline being tested with water and ensure all air within the line has been vacated. The Contractor shall be responsible for setting up all equipment for the test including flow meter, backflow preventer, and pressure pump and shall have the option of testing against the new system valves or against temporary caps or plugs if valve leakage is suspected. Provisions shall be made for removing all air from the system.

Methods of conducting the pressure and leakage test shall be in accordance with provisions of AWWA Specification C600 provided that allowable line leakage shall be not more than the following:

$$\text{Leakage} = \text{NDP} \cdot \frac{.5}{7400} \text{ gallons/hr}$$

From the above Equation, N is the number of joints, D is the pipe diameter in inches, and P is the test pressure in psi.

501.3.6 DISINFECTION OF WATER LINES

Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. All water mains installed under this project shall be disinfected, thoroughly flushed, and tested before being placed into service.

Chlorine solution shall be pumped into the line in a manner to prevent air entrapment in the line. Contractor shall provide filling, sampling, flow meters, and air release taps as required. Liquid chlorine concentrate shall be used for chlorine solution. Powder chlorine concentrate will not be permitted. The amounts applied shall be pre-calculated so as to yield initial concentrations in the line of no less than 50 ppm. The detention period in the line shall be 24 hours. After the 24-hour detention period, the line shall be flushed until the residual chlorine concentration is approximately one (1) ppm or the residual chlorine content of domestic water supply, whichever is lower. The line shall then be left to set for 48 hours (full of water). After completion of the 48 hour period, samples shall be taken for bacteriological testing. Samples shall be taken from suitable locations (such as service taps) and placed into commercial sterilized containers furnished by the Contractor. Upon completion of a successful cold form test, the line may be put into service. Test results that indicate unacceptable coliform levels shall call for the repeat of the disinfection procedure until a successful coliform test is achieved.

A copy of the bacteriological (coliform) test results shall be delivered to the Project Engineer and the City prior to tie-ins.

501.3.7 FIELD QUALITY CONTROL

501.3.7.1 Field Tests and Inspections: Prior to hydrostatic testing, obtain Engineer approval of the proposed method for disposal of wastewater from hydrostatic testing. The Engineer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least five (5) days after placing of the concrete.

501.3.8 TIE-INS, MAINTAINING EXISTING SERVICE AND SCHEDULING OF WORK

The Contractor shall keep the Project Engineer and affected public informed as to when water outages are to be expected. The Contractor shall inform the public by radio, the newspaper, or by handouts and door to door contact, providing adequate lead time. Generally, the outages affecting small areas may be handled by informing residents in person.

All new water line construction shall be done while maintaining water service with the existing systems. If the Contractor is required to place the new main in or near the same locations as the existing main, because crowded conditions, the Contractor shall provide a temporary main lying on the ground and connect existing meters to maintain service during construction. The Contractor shall be required to arrange his construction schedule to maintain continuous service to water users for the fullest extent possible. Temporary mains shall be disinfected in a manner similar to new mains described above.

Tie-ins shall be thoroughly planned prior to beginning construction. Contractor shall familiarize himself with pipe sizes and materials of the existing City system. Contractor shall have required adaptors, pipe, sleeves, pumps, tampers, water trucks, bolts, nuts and other equipment and materials of the size to complete the tie-in, in as short a time as possible.

Reservoir valve replacement, if required, will require draining the vessel. This will require extensive planning and coordination with the City Water Production personnel.

The Contractor shall coordinate all construction activities including tie-ins with the City Water Department.

501.3.9 CLEANUP

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

501.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this Section of the Specifications shall be as set forth in the Special Conditions.

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502 CONCRETE VAULTS AND MANWAYS

502.1 GENERAL

502.1.1 DESCRIPTION

This item of work shall consist of furnishing all material, supplies, plant and labor required for the construction of concrete vaults, manways, and appurtenances complete in accordance with applicable provisions and the contract documents.

Concrete vaults and manways shall be of the size and type shown or required by job conditions and be built at the locations shown on the drawings or at a location designated by the Engineer.

502.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related sections include but are not limited to the following:

- I. Section 101, Submittal Procedures
- II. Section 203, Trenching, Excavation and Backfilling
- III. Section 204, Fill Materials
- IV. Section 301, Cast-in-Place Concrete
- V. Section 302, Concrete Formwork
- VI. Section 501, Waterlines and Appurtenances
- VII. Section 503, Station Valves, Piping, and Appurtenances, & Associated Painting

502.1.3 SUBMITTALS

Engineer approval is required for all submittals. The following shall be submitted in accordance with Section 101.

- I. Frame and cover that shall be used with associated weights
- II. Liner type including embedment technique
- III. Coating material, supplies, application method, and factory testing results
- IV. Certificate for applicators
- V. Shop drawings of precast concrete vaults and manways

502.2 MATERIALS

502.2.1 CONCRETE VAULTS AND MANWAYS MATERIAL

Concrete vaults and manways shall be constructed of precast units when called for in the contract documents. Precast riser sections, transition top sections, flat slab tops, and grade rings shall be manufactured in accordance with ASTM C478. The bottom slab thickness shall

be a minimum of six (6) inches or as designated on the project drawings. The top section shall be flat reinforced slab lids with an access hatch or manway frame and cover as designated on the project documents. The flat top lids shall be H-20 rated and furnished with provisions to remove lid by lifting. All joints between riser sections shall be tongue and grooved. Precast base sections shall be formed with floor penetrations to accommodate the gravel drain when called for on the project drawings.

Cast-in-place reinforced concrete vaults and manways shall be as designated on the project drawings and shall adhere to Sections 301 and 302.

The Contractor may elect to place a ready mix concrete base and set the first riser in lieu of having a precast base. Placed concrete shall be a minimum 12 inches thick with dimensions equal to the riser section's exterior geometry or outside diameter with an additional six (6) inches.

502.2.2 ACCESS HATCHES AND COVERS

502.2.2.1 Manway Frame and Cover: Manway frames and covers shall be traffic grade cast iron conforming to ASTM A48 36C, Class 30, and shall have no vent holes of any kind. Manway covers shall have a suitable pattern, recessed lifting bars, and the appropriate word for the utility cast in three (3) inch letters. The frame shall be cast-in flat reinforced slab lid or as detailed on the project drawings.

502.2.2.1.1 Manufacturer: Manway covers shall be Neenah Foundry or an approved equal.

502.2.2.2 Aluminum Access Hatches: Aluminum access hatches shall have special aluminum or stainless-steel lids with hinged opening(s), a hold open feature, and a fall protection feature. The locking mechanism shall be provided when designated on the project drawings. Hinged doors of the dimensions shown on the project drawings shall be Halliday or an approved equal rated for H-20 loading.

502.2.3 SEAL TONGUE AND GROOVE JOINT

502.2.3.1 Jointing Precast Riser Sections: Seal all tongue and groove joints of precast riser sections with a preformed flexible sealant or a rubber o-ring gasket (on circular riser sections). Rubber gasket(s) shall conform to ASTM C443.

502.2.3.1.1 Preformed Flexible Sealants: Preformed flexible sealants shall be Ram Nek as manufactured by K.T. Snyder Company or an approved equal.

502.2.4 STEP RUNGS

If no materials are so described on the project drawings the following shall apply:

Step rungs shall be aluminum, steel reinforced polyethylene, or steel reinforced copolymer polypropylene. Steel reinforced copolymer polypropylene shall be 16 inches wide as manufactured by M.A. Industries, Inc., P.F. Series or an approved equal.

502.2.4.1 Cast Aluminum: Cast aluminum shall be an aluminum alloy 6061-T6 and have a drop front design, 16 inches wide with an abrasive step surface.

503.2.4.2 Grout: The grout used to fill the space around the rung penetrations shall be a non-shrink grout.

503.2.4.3 Steel Reinforcement: Steel reinforcement shall be Grade 60 and continuous throughout the rung.

502.2.5 PIPE CONNECTIONS TO VAULTS AND MANWAYS

Pipe connections to vaults and manways shall be as described on the project drawings. If no materials are so described on the project drawings, the following shall apply:

502.2.5.1 Tight-Fitting Neoprene Gasket: The Contractor shall provide a tight-fitting neoprene gasket.

502.2.5.2 Grout: Grout shall be non-shrink and water proof as manufactured by Embeco, Waterplug, or an approved equal.

502.2.6 EXTERIOR VAULT AND MANWAY COATINGS

The exterior vault and manway coating shall be NSF potable water approved, ASTM D4479 Type I, bituminous material damp proofing. The coatings shall be Henry HE794 or an approved equal.

502.3 EXECUTION

502.3.1 CONSTRUCTION

502.3.1.1 Concrete Vault and Manway Bases: Concrete vault and manway bases shall be constructed on firm, compacted, or neat cut subgrade. After the base is placed, the material from the gravel drain area shall be removed and gravel shall be placed as required. Cut holes in precast barrel sections for pipe penetrations prior to setting sections in place to prevent jarring and loosening or mortar joints. Precast sections shall be plumb with a 1/4 inch out of plumb tolerance. Seal joints with either a rubber O-ring or preformed flexible joint sealant. Finish joints shall be filled with non-shrink grout and finished flush with the adjoining surfaces. All other penetrations shall be finished flush with non-shrink grout and/or silicon seal.

For cast in place bases, concrete shall be poured on firm, compacted or neat cut ground with a minimum thickness of eight (8) inches or as detailed on the project drawings. The

cast-in-place concrete base shall have a tongue and groove depressed in the concrete for the riser sections to sit on and formed gravel drain penetrations.

502.3.1.2 Access Hatches: Access hatches and covers shall be cast in a flat top lid unless otherwise called for on the project drawings. Utilize precast concrete grade rings, 12 inches maximum, to ensure frame and cover are set to the finished grade. Frame and cover shall be set and held in place with a reinforced concrete collar, as shown on the contract drawings, prior to placement of permanent paving.

502.3.1.3 Step Rungs: Step rungs shall only be installed if specifically called for on the project drawings and, if called for, shall be installed as shown on the project drawings and/or in accordance with this Section.

Step rungs shall be installed by grouting rungs into preformed holes in riser and cone sections and shall have 12 inch centers. Holes shall be 1 1/8 inches in diameter and be a minimum of 3 1/2 inches deep. The space around the rung penetrations shall be filled with a non-shrink grout. The Contractor may drill holes for rungs to accommodate field conditions when approved by the Engineer. All rung installation methods shall withstand a pull-out resistance of 1500 pounds.

502.3.2 PIPE CONNECTION TO VAULT OR MANWAY

502.3.2.1 Connection to Existing Vault or Manway: Pipe connections to existing vaults or manways shall be made so finished work will conform as nearly as practicable to the applicable requirements specified for new vaults or manways, including all necessary concrete work, cutting, and shaping. The connections shall be centered on the vaults or manways. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the entire periphery of the pipe but no longer than 1 1/2 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

502.3.2.2 Connection to Vault or Manway: A tight-fitting neoprene gasket shall be placed on the pipe where it will center in the vault or manway wall to prevent seepage along the pipe. The pipe shall then be grouted in place.

502.3.3 EXTERIOR VAULT AND MANWAY COATING APPLICATION

The manufacturer's recommendations shall be followed for surface preparation and damp proof application. Protective equipment, clothing and respirator requirements must be followed according to the product's MSDS.

The exterior vault and manway shall receive two (2) coats of NSF potable water approved, ASTM D4479 Type I, bituminous material damp proofing. The material shall be applied after grouting of horizontal joints and areas around penetrations.

502.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this Section of the Specifications shall be as set forth in the Special Conditions.

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507.4 MEASUREMENT AND PAYMENT

507 JACKING AND BORING

507.1 GENERAL

507.1.1 DESCRIPTION

This Section includes requirements for jacking and boring casing pipe.

507.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related sections include, but are not limited to the following:

- I. Section 101, Submittal Procedures
- II. Section 201, General Earthwork
- III. Section 203, Trenching, Excavation, and Backfilling
- IV. Section 204, Fill Materials
- V. Section 301, Cast-In-Place Concrete
- VI. Section 501, Waterlines and Appurtenances
- VII. Section 601, Sanitary Sewer and Drain Lines
- VIII. Section 603, Force Mains and Pressurized Drains

507.1.3 DEFINITIONS

507.1.3.1 Carrier Pipe: Carrier pipe is any pipe used for sewer pipelines, water pipelines, or force mains.

507.1.3.2 Casing Pipe: Casing pipe is the sleeve through which carrier pipe will be placed.

507.1.3.3 Jacking and Boring: Jacking and boring is the method of installing casing pipe by cutting, hand mining, or boring an opening in soil material, simultaneously forcing casing pipe through it with hydraulic jacks.

507.1.3.4 Casing Spacer: Casing spacers are fabricated items for positioning a carrier pipe inside the casing pipe.

507.1.4 SUBMITTALS

Submit the following items and a Certificate of Compliance to the Engineer in accordance with Section 101 before delivery of materials.

- I. Shop drawings for the casing pipe showing sizes and hold down assemblies or casing spacers for the carrier pipe
- II. Shop drawings of bulkheads when shown on project drawings
- III. Shop drawings of access manholes when shown on project drawings
- IV. Design mixes for concrete, grout, and flowable fill
- V. Working drawings and written procedures describing in detail the proposed jack and bore method including the entire operation to be used, for information only, including, but not limited to:

- i. Working and receiving shafts
- ii. Dewatering
- iii. Method of removing soils and installation of casing and carrier pipe
- iv. Size, capacity, and arrangement of equipment
- v. Backstop
- vi. Shaft base material
- vii. Type of cutter head
- viii. Method and procedure for monitoring and controlling line and grade
- ix. Detection of surface movement
- x. Procedure for installing pipe supports, anchors, or placement of grout between carrier pipe and casing pipe
- xi. Bulkhead details and proposed positive method of anchoring carrier pipe to prevent flotation
- xii. Catalog data for casing spacers when used for temporary support during construction
- VI. Modifications to methods if required during construction
 - i. Submit working drawings delineating modifications
 - ii. Include reasons for modifications

507.1.5 DELIVERY, STORAGE AND HANDLING

Unload and handle the materials with equipment of adequate capacity. Store materials on site and in a reasonably level, well drained area that is free from brush. Store individual pieces and bundles with safe walking spaces between them into allow full view for inspection purposes.

507.1.6 PROJECT CONDITIONS

- I. Bore so as not to interfere with, interrupt, or endanger surface and activity thereon
- II. Minimize subsidence of surface, structures, and utilities above and in the vicinity of the bore
- III. Support ground continuously to prevent loss of ground and keep perimeters stable
- IV. Be responsible for settlement resulting from operations
- V. Repair and restore damaged property to its original condition before being disturbed at no cost to the project

Follow applicable ordinances, codes, statues, rules, and regulations of NMDOT and affected Railroad Company, applicable regulations of the Federal Government, OSHA 29CFR 1926, and applicable criteria of ANSI A10.16-1995 (R2001), "Safety Requirements for Tunnels, Shafts, and Caissons."

507.1.7 ADDITIONAL CRITERIA FOR WORK UNDER RAILROADS

Do not schedule work within and adjacent to railroad property until the Engineer and Railroad approve submittals including proper railroad insurance. Any approvals do not relieve the Contractor of responsibility for adequacy and safety of procedures. The Contractor shall give the Railroad advance written notice, as described in the permit copied to the Engineer, before entering and working on the Railroad's property. Place in effect

before work proceeds, safety, precautionary, and protective devices and services required by the Railroad. Follow AREMA or other applicable railroad specifications and permit requirements.

507.2 MATERIALS

507.2.1 CASING PIPE

Use casing pipe as detailed on the project drawings. When boring installation methods for eight (8) inches and smaller diameter carrier pipe is not shown in the contract documents, use one of the following types of casing pipes with minimum inside diameter of no less than one (1) inch larger than the largest outside diameter of carrier pipe.

507.2.1.1 Steel Pipe: The steel pipe shall follow the standards of ASTM A1011, Grade 36. The steel pipe shall be smooth walled with a minimum yield strength of 36,000 pounds per square inch (psi) and a minimum wall thickness of 3/8 inch unless indicated on the project drawings differently. Joints shall be fully welded around the circumference of the pipe with a complete penetration weld. The weld shall be of sufficient strength to withstand forces at the pipe joints without distorting the pipes. Minimum welds shall follow AWS standard details.

Coatings shall not be used on steel pipes.

507.2.1.2 Reinforced Concrete Pipe: Reinforced concrete pipe shall adhere to ASTM C76, minimum Class IV, and have a concrete joint and smooth exterior without a joint bulge.

507.2.1.2.1 Joint Material: Use resilient material for placement in the joint to prevent concrete damage when jacking forces are applied.

507.2.2 CARRIER PIPE

Carrier pipe shall be as specified in the contract documents and in Section 501, 601, or 603 of these Specifications.

507.2.3 CASING SPACERS

507.2.3.1 Bands and Risers: The bands and risers shall be a minimum of two (2) pieces, stainless steel plates that adhere to ASTM A666, Type 403 standards. The bands shall have a minimum thickness of 14 Gauge, for carrier pipes up to 12 inches in diameter, and 12 Gauge for pipe more than 12 inches in diameter.

507.2.3.2 Runners: Runners shall be high density molecular polyethylene or polymer reinforced fiberglass with DURO Hardness A of 80 with sufficient compressive and shear strengths. The runners shall be able to attach to risers with bolts or welded studs. Bolt holes shall be filled with a silicone caulk.

507.2.3.3 Spacer Band: The spacer band shall be lined with minimum 0.090-inch-thick ribbed PVC liner of DURO Hardness A of 80.

507.2.3.4 Approved Manufacturers: The Contractor shall provide casing end seals and all other items specified by the chosen manufacture for proper installation of the casing end seals.

- I. Pipeline Seal and Insulator Inc.
- II. Cascade Waterworks Manufacturing Company.
- III. Advanced Products and Systems, Inc. (APS)
- IV. BWM Company
- V. CCI Pipeline Systems, LLC
- VI. "Or Equal" (Minimum five (5) years of fabricating casing spacers in the United States)

507.2.4 CASING END SEALS

507.2.4.1 Approved Manufacturers: The Contractor shall provide casing end seals and all other items specified by the chosen manufacture for proper installation of the casing end seals.

- I. Advance Products & Systems, Model AC or AM
- II. Pipeline Seal & Insulator, Inc., Model S or C
- III. Maloney Technical Products, MULTIFLEX End Seal
- IV. BWM Company
- V. CCI Pipeline Systems, LLC.
- VI. "Or Equal"

507.2.5 GROUT

Grout for carrier pipe bedding and filling annular space between casing pipe and carrier pipe shall be three (3) parts ASTM C144 sand to one (1) part ASTM C150 cement.

507.2.6 FLOWABLE FILL

Flowable fill for carrier pipe bedding and filling annular space, when called for in the contract documents, between casing pipe and carrier pipe shall conform to Section 204.

507.2.7 CASING PIPE ACCESS MANHOLE

When casing pipe access manholes are required on project drawings, they shall follow the details listed on the project drawings.

507.3 EXECUTION

507.3.1 GENERAL

507.3.1.1 Geotechnical Reports: Review and interpret available geotechnical reports and investigate work site soil conditions. Encountering rock or water will not entitle the Contractor to additional compensation.

507.3.1.2 Construction Obstruction: Notify the Engineer immediately if obstruction stopping forward motion of operation is encountered during installation. When impossible to advance bore hole or pipe, discontinue operation, abandon completed portion in place, and fill with grout or plug, unless otherwise directed by Engineer.

507.3.1.3 Dewatering: When water is encountered, develop and maintain dewatering system of sufficient capacity to remove water continuously, keeping excavations free of water until backfill operation is in progress.

- I. Keep removal of soils particles to minimum
- II. Dewater into sediment trap
- III. Observe settlement or displacement of surface facilities due to dewatering
- IV. Should settlement or displacement be detected, notify Engineer immediately and act to maintain safe conditions and prevent damage

507.3.2 PREPARATION

Excavate the shafts by following the working drawings and Section 201. Constructing backstop, placing guide timbers and placing boring apparatus shall be completed as preliminary work. Settlement markers for crossing state highways and other roads shall be placed at this time.

507.3.3 BORING OPERATION

507.3.3.1 General: The Contractor shall use a removable auger and cutting head arrangement for the boring operation and shall control the line and grade.

507.3.3.2 Jacking and Boring: Jack the casing pipe with an auger rotating within the pipe to remove spoil. Hand mining may be used for large bore casing pipe provided method is submitted in detail and acceptable to the Engineer.

Maintain face of cutting head to preclude free flow of soft or poor soils material. Use positive means for continuous monitoring and controlling grade of casing pipe during boring operation.

507.3.3.2.1 Overcut of Cutting Head: The overcut of the cutting head shall not exceed the outside diameter of the casing pipe by more than 1/2 inch. Hand mining to the overcut will be permitted.

507.3.3.2.2 Weld Steel Pipe Casing: Weld steel pipe casing as required herein. When coating is required, repair coating damage on each side of weld and recoat complete weld area.

507.3.3.2.3 Reinforced Concrete Pipe for Casing: Follow the manufacturer's recommendations for rubber gasket joints and all other joints. Place resilient material in pipe joint area to prevent damage to concrete during pipe installation.

507.3.4 DETECTION OF MOVEMENT

Surface settlement markers shall be used for detection of movement. Unless otherwise specified, shown on the project drawings or directed by Engineer, locate surface settlement markers according to a grid, spaced 10 feet by 10 feet and extending as shown on project drawings but no less than 20 feet of either side of the tunnel centerline.

Establish elevation of settlement markers to bench marks unaffected by tunnel operations.

507.3.4.1 Readings and Records: Take readings and permanently record before start of dewatering operations and/or shaft excavation and after steel casing has been advanced beyond pavement limits of each roadway.

507.3.4.2 Elevation Measurements: Take elevation measurements to nearest 0.01 foot and furnish reports to Engineer.

507.3.4.3 Settlement or Heave: In the event of settlement or heave on any marker immediately cease work and take immediate action to prevent further settlement or heave and concurrently report settlement or movement to the Engineer. Restore the surface elevations to that existing before start to tunnel operations at no cost to the project. Report settlement or movement immediately to Engineer and take immediate remedial action, at no cost to the project.

507.3.5 FIELD QUALITY CONTROL

Maintain line and grade following the project drawings to within a two (2) inch tolerance.

507.3.6 INSTALLATION OF CARRIER PIPE

Follow Sections 501, 601, and 603, Standard Details, Drawings, and that specified herein. Unless shown otherwise on Drawings, install ductile iron water pipes and ductile iron sewer force mains following Standard Details.

507.3.6.1 General: Use products between carrier pipe and casing pipe to prevent metal to metal contact and damage to pipe and coating during installation.

507.3.6.2 Hold Down Method in Casing Pipe.

507.3.6.2.1 Water Mains, force Mains, and Pressure Sewer Mains: Concrete invert and hold down assembly or casing spacers following Standard Details and Drawings.

507.3.6.2.2 Gravity Sewer: Fill annular space between pipe and casing with concrete, sand or casing following Standard Details and Drawings. Provide positive means to prevent floatation during placement of fill in casing.

507.3.6.3 Bulkheads: See Drawings.

507.3.8 ACCESS MANHOLES

Install access manhole at each end of casing pipe following Standard Details when required in Drawings.

507.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this Section of the Specifications shall be set forth in the Special Conditions.

702 FENCING - INDEX

702.1 GENERAL

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702.4 MEASUREMENT AND PAYMENT

702 FENCING

702.1 GENERAL

702.1.1 DESCRIPTION

The work covered in this section of the specifications consists of furnishing all plant, labor, equipment, appliances, and materials in installing site fencing complete with gates and appurtenances.

Fencing complete with top rail, tension wire, gates, and appurtenances shall be installed at the locations shown on the drawings.

702.1.2 RELATED SECTIONS

The Contractor shall review installation procedures under other sections and coordinate with the work which is related to this Section. Related Sections are:

- I. Section 101, Submittal Procedures
- II. Section 301, Cast-In-Place Concrete

702.1.3 APPLICABLE REFERENCES

- ASTM A121 Specification for Zinc-Coated (Galvanized) Steel Barbed Wire
- ASTM A392 Specifications for Zinc-Coated Steel Chain Link Fence Fabric
- ASTM F626 Specification for Fence Fittings
- ASTM F1083 Specification for Pipe Steel Hot Dipped Zinc Coated (Galvanized) Welded, for Fence Structures
- ASTM F900 Specification for Industrial and Commercial Swing Gates.

702.1.4 SUBMITTALS

Engineer's approval is required for submittals. The following shall be submitted in accordance with Section 101:

702.1.4.1 Certificates: Chain Link Fence Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the chain link fence and component materials meet the specified requirements.

Woven Wire Fence Statement, signed by an official authorized to certify on behalf of the manufacturer, attesting that the woven wire fence and component materials meet the specified requirements.

702.2 MATERIALS

702.2.1 FENCE FABRIC

Fence fabric shall conform to the following:

702.2.1.1 Chain Link Fence Fabric: Fabric shall be in accordance with ASTM A392, Class 1, zinc coated steel wire with minimum coating weight of 1.2 ounces of zinc per square foot of uncoated wire surface. Fabric shall be fabricated of nine (9) Gauge open hearth, hot dipped galvanized wire, or as indicated on the drawings. Wire shall be woven into a two (2) inch mesh. Fabric height shall be six (6) feet. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom average.

702.2.1.2 Woven Wire: Woven wire shall be "V"-Mesh fence 72 inches high with horizontal wire gauged of 12.5 and a vertical wire gauge of 14. Fence shall be approximately 366 pound rolls and 65 feet long.

702.2.2 GATES

Gate shall be the type and swing shown. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, and requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A, nominal pipe size (NPS) 1 1/2. Gate fabric shall be as specified for chain link fabric. Gate leaves more than eight (8) feet wide shall have both intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than eight (8) feet wide shall have truss rods or intermediate braces. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position. For high security applications, each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence.

702.2.3 POSTS

702.2.3.1 Metal Posts for Chain Link Fence: ASTM F 1083. Group IA, and ASTM F 1043. Group IC Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B and Group II, roll-formed steel sections, shall meet the strength and coating requirements of ASTM F 1043. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate and pull) posts selected shall be of the same designation throughout the fence. Gate post shall be for the gate type specified subject to the limitation specified in ASTM F 900 and/or ASTM F 1184.

702.2.3.2 Metal Posts for Farm Style Fence: Metal posts shall conform to ASTM A 702 zinc-coated, T-section, length as indicated. Accessories shall conform to ASTM A 702.

702.2.4 BRACES AND RAILS

ASTM F 1083, Group IA, and ASTM F 1043, Group IC, size NPS 1-1/4. Steel pipe, zinc-coated.

702.2.5 WIRE

702.2.5.1 Tension Wire: Tension wire shall be Type I or Type II, Class 4 coating, in accordance with ASTM A 824.

702.2.5.2 Barbed Wire for Farm Style Fence: Barbed wire shall conform to ASTM A 121 zinc-coated, Type Z, Class 3, or aluminum-coated, Type A, with 12.5 gauge wire with 14 gauge, round, 4-point barbs spaced no more than five (5) inches apart.

702.2.6 ACCESSORIES

ASTM F 626. Ferrous accessories shall be zinc or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment. Barbed wire support arms shall be the single arm type and of the design required for the post furnished. Tie wire for attaching fabric to rails, braces and posts shall be nine (9) Gauge steel wire and match the coating of the fence fabric. Tie wires for attaching fabric to tension wire on high security fences shall be 16 Gage stainless steel. The tie wires shall be a double loop and 6 1/2 inches in length. Miscellaneous hardware coatings shall conform to ASTM A 153/A 153M unless modified.

702.2.7 BARBED TAPE

Reinforced barbed tape, single coil, for fence toppings shall be fabricated from 430 series stainless steel with a hardness range of Rockwell (30N) 37-45 conforming to the requirements of ASTM A 176. The stainless-steel strip shall be 0.025 inch thick by one (1) inch wide before fabrication. Each barb shall be a minimum of 1.2 inch in length, in groups of four (4), spaced on four (4) inch centers. The stainless-steel core wire shall have a 0.098-inch diameter with a minimum tensile strength of 130 ksi and shall be in accordance with ASTM A 478.

702.2.8 CONCRETE

Concrete to conform to applicable provisions of Section 301 of these Specifications.

702.3 EXECUTION

702.3.1 INSTALLATION

Fence shall be installed to the lines and grades indicated. The area on either side of the fence line shall be cleared to the extent indicated. Fencing shall be as detailed in project drawings. Line posts shall be spaced equidistant at intervals not exceeding 10 feet. Terminal (corner, gate and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 500 feet. Fabric shall be pulled tight and attached to post, top rail, padlocking and open-close stops. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

702.3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a two (2) inch clearance between the bottom of the fabric and finish grade.

702.3.3 POST INSTALLATION

702.3.3.1 Posts for Chain Link Fence: Posts shall be set plumb, in alignment and tops graded to present smooth, pleasing lines. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least one (1) inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids, and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. For high security fences, fence post rigidity shall be tested by applying a 50 pound force on the post, perpendicular to the fabric, at five (5) feet above ground; post movement measured at the point where the force is applied shall be less than or equal to 3/4 inch from the relaxed position; every tenth (10th) post shall be tested for rigidity; when a post fails this test, further tests on the next four (4) posts on either side of the failed post shall be made; all failed posts shall be removed, replaced and retested at the Contractor's expense.

702.3.3.2 Posts for Farm Style Fence: Metal posts shall be driven or set in concrete as indicated.

702.3.4 RAILS

702.3.4.1 Top Rail: Top rail shall be supported at each post to form a continuous brace between terminal posts. Where required, sections of top rail shall be joined using sleeves or couplings that will allow expansion or contraction of the rail. Top rail, if required for high security fence, shall be installed as indicated on the drawings.

702.3.4.2 Bottom Rail: The bottom rail shall be bolted to double rail ends and double rail ends shall be securely fastened to the posts. Bolts shall be peened to prevent easy removal. Bottom rail shall be installed before chain link fabric.

702.3.5 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed on fences over six (6) feet in height. A center brace or two (2) diagonal truss rods shall be installed on 12-foot fences. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences six (6) feet high or less if a top rail is installed.

702.3.6 TENSION WIRES

Tension wires shall be installed along the bottom of the fence line and attached to the terminal posts of each stretch of the fence. Bottom tension wire shall be installed within the bottom six (6) inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

702.3.7 CHAIN LINK FABRIC

Chain link fabric shall be installed on the side of the post indicated. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15 inch intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 24 inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be two (2) $\pm$ 1/2 inch above the ground. For high security fence, after the fabric installation is complete, the fabric shall be exercised by applying a 50 pound push-pull force at the center of the fabric between posts; the use of a 30 pound pull at the center of the panel shall cause fabric deflection of two (2) inches $\pm$ 1/2 inch when pulling fabric from the post side of the fence; every second fence panel shall meet this requirement; all failed panels shall be re-secured and retested at the Contractor's expense.

702.3.8 BARBED WIRE SUPPORTING ARMS AND BARBED WIRE

702.3.8.1 General Requirements: Barbed wire shall be installed as detailed on project drawings. Barbed wire supporting arms and barbed wire shall be installed as indicated and as recommended by the manufacturer. Supporting arms shall be anchored to the posts in a manner to prevent easy removal with hand tools. Barbed wire shall be pulled taut and attached to the arms with clips or other means that will prevent easy removal.

702.3.8.2 Barbed Wire for Farm Style Fence: Wire shall be installed on the side of the post indicated. Wire shall be pulled taut to provide a smooth uniform appearance, free from sag. Wire shall be fastened to line posts at approximately 15 inch intervals unless indicated otherwise.

702.3.9 GATE INSTALLATION

Gates shall be installed at the locations shown. Gates shall have provisions for padlocking. Hinged gates shall be mounted to swing as indicated. Latches, stops and keepers shall be installed as required. Hinge pins and hardware shall be welded or otherwise secured to prevent removal. For farm style fencing, standard metal gate assemblies with frame and fittings necessary for complete installation as shown.

702.4 MEASUREMENT AND PAYMENT

Measurement and payment for items of work covered by this section of specifications shall be in accordance with provisions of the Special Conditions.

901 DESIGN CODES AND REFERENCES - INDEX

901.1 GENERAL

901.1.1 DESCRIPTION

901.2 REFERENCES

901.2.1 EARTHWORK

901.2.2 CONCRETE AND MASONRY

901.2.3 STREETS AND RELATED WORK

901.2.4 WATER AND SANITARY SEWER LINES

901.2.5 STRUCTURES

901.2.6 ELECTRICAL

901.2.7 SAFETY

901 DESIGN CODES AND REFERENCES

901.1 GENERAL

901.1.1 DESCRIPTION

The publications listed below form a part of the specifications to the extent referenced. The publications are referred to within the text by the basic designation only.

901.2 REFERENCES

All Design Codes and References in this Specification shall use the latest editions available complete with applicable withdrawals.

901.2.1 EARTHWORK

AASHTO – STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES

- AASHTO M 145 Classification of Soils and Soil-Aggregate Mixtures for Highway Construction
- AASHTO T 180 Moisture-Density Relations of Soils Using a 4.54-kg (10 lb.) Rammer and a 457-mm (18-in) Drop
- AASHTO T 224 Correction for Coarse Particles in the Soil Compaction Test

ANSI – AMERICAN NATIONAL STANDARDS INSTITUTE

- ANSI A10.6 Demolition Operations - American National Standard for Construction and Demolition Operations

ASTM INTERNATIONAL

- ASTM A 975 Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire with Poly (Vinyl Chloride) (PVC) Coating
- ASTM C 29 / C29M Bulk Density ("Unit Weight") and Voids in Aggregate
- ASTM C 88 Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- ASTM C 117 Materials Finer than 75 micrometer (No. 200) Sieve in Mineral Aggregates by Washing

- ASTM C127 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
- ASTM C128 Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate
- ASTM C 131 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- ASTM C136 / C136M Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- ASTM D 75 Sampling Aggregates
- ASTM D 422 Particle-Size Analysis of Soils
- ASTM D448 Sizes of Aggregate for Road and Bridge Construction
- ASTM D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. Ft.)
- ASTM D792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- ASTM D 854 Specific Gravity of Soil Solids by Water Pycnometer
- ASTM D1140 Standard Test Methods for Determining the Amount of Material Finer than 75- μ m (No. 200) Sieve in Soils by Washing
- ASTM D1241 Materials for Soil-Aggregate Subbase, Base, and Surface Courses
- ASTM D1556 / D1556M Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
- ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- ASTM D 2216 Laboratory Determination of Water (Moisture) Content of Soil and Rock by
- ASTM D 2434 Mass Permeability of Granular Soils (Constant Head)
- ASTM D 2487 Soils for Engineering Purposes (Unified Soil Classification System)

- ASTM D2488 Description and Identification of Soils (Visual-Manual Procedure)
- ASTM D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- ASTM D 3017 Water content of Soil and Rock in Place by Nuclear Method
- ASTM D6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- ASTM D 4318 Liquid Limit, Plastic Limit and Plasticity Index of Soils
- ASTM D4355 / D4355M Deterioration of Geotextiles from Exposure to Light, Moisture and Heat in a Xenon-Arc Type Apparatus
- ASTM D4491 / D4491M Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- ASTM D4595 Tensile Properties of Geotextiles by the Wide-Width Strip Method
- ASTM D4632 / D4632M Grab Breaking Load and Elongation of Geotextiles
- ASTM D4751 Determining Apparent Opening Size of a Geotextile
- ASTM D4873 / D4873M Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- ASTM D4867 / D4867M Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
- ASTM D5321 / D5321M Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear
- ASTM D6638 Determining Connection Strength between Geosynthetic Reinforcement and Segmental Concrete Units (Modular Concrete Blocks)
- ASTM D6706 Standard Test Method for Measuring Geosynthetic Pullout Resistance in Soil
- ASTM D6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- ASTM M 145 Classification of Soils and Soil-Aggregate Mixtures for Highway Construction

-ASTM D3282 Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

-AASHTO T 180 Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

901.2.2 CONCRETE AND MASONRY

AASHTO – STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES

- Design

Allowable Stress Design

$F_c = .40 f'_c$

Grade 40 Reinforcement = 20,000 psi

Grade 60 Reinforcement = 24,000 psi

ACI – AMERICAN CONCRETE INSTITUTE

-ACI 305.R-10 Standard Specification for Hot Weather Concreting

-ACI 306.1-90 Standard Specifications for Cold Weather

-ACI 318 / 318M Building Code Requirements for Structural Concrete and Commentary

-ACI 530 / 530.1 Building Code Requirements and Specifications for Masonry Structures and Related Commentaries

ASTM INTERNATIONAL

-ASTM A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement

-ASTM A1064 / A1064M Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

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

-ASTM A996 / A996M Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

-ASTM C31 / C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field

- ASTM C33 / C33M Standard Specification for Concrete Aggregates
- ASTM C39 / C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C42 / C42M Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
- ASTM C90 Standard Specification for Loadbearing Concrete Masonry Units
- ASTM C91 / C91M Standard Specification for Masonry Cement
- ASTM C 94 / C 94M Ready-Mixed Concrete
- ASTM C114 Standard Test Methods for Chemical Analysis of Hydraulic Cement
- ASTM C129 Standard Specification for Nonloadbearing Concrete Masonry Units
- ASTM C140 / C140M Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
- ASTM C143 / C143M Standard Test Method for Slump of Hydraulic-Cement Concrete
- ASTM C144 Standard Specification for Aggregate for Masonry Mortar
- ASTM C150 / C150M Standard Specification for Portland Cement
- ASTM C171 Standard Specification for Sheet Materials for Curing Concrete
- ASTM C172 / C172M Standard Practice for Sampling Freshly Mixed Concrete
- ASTM C188 Standard Test Method for Density of Hydraulic Cement
- ASTM C207 Standard Specification for Hydrated Lime for Masonry Purposes
- ASTM C231 / C231M Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- ASTM C260 / C260M Standard Specification for Air-Entraining Admixtures for Concrete
- ASTM C270 Standard Specification for Mortar for Unit Masonry

- ASTM C309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C387 / C387M Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar
- ASTM C476 Standard Specification for Grout for Masonry
- ASTM C494 / C494M Standard Specification for Chemical Admixtures for Concrete
- ASTM C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- ASTM C920 Standard Specification for Elastomeric Joint Sealants
- ASTM C1017 / C1017M Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
- ASTM C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
- ASTM C1262 / C1262M Standard Test Method for Evaluating the Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units and Related Concrete Units
- ASTM C1293 Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
- ASTM C1372 Standard Specification for Dry-Cast Segmental Retaining Wall Units
- ASTM C1567 Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
- ASTM C1602 / C1602M Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
- ASTM D1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

NATIONAL CONCRETE MASONRY ASSOCIATION (NCMA)

NCMA TR127B Design Manual for Segmental Retaining Walls

901. 2.3 STREETS AND RELATED WORK

AASHTO – STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES

- AASHTO MP 1a Performance Graded Asphalt Binder Asphalt Institute
- AASHTO M 20 Penetration-Graded Asphalt Cement
- AASHTO M 81 Cut-Back Asphalt (Rapid-Curing Type)
- AASHTO M 82 Cut-Back Asphalt (Medium-Curing Type)
- AASHTO M 199M / M 199 Standard Specification for Precast Reinforced Concrete Manhole Sections
- AASHTO M 198 Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
- AASHTO M 226 Viscosity Graded Asphalt Cement
- AASHTO M 247 Glass Beads Used in Traffic Paints
- AASHTO R 66 Standard Practice for Sampling Asphalt Materials
- AASHTO T 40 Sampling Bituminous Materials
- AASHTO T 102 Spot Test of Asphaltic Materials
- AASHTO T 301 Standard Method of Test for Elastic Recovery Test of Asphalt Materials by Means of a Ductilometer

ASTM INTERNATIONAL

- ASTM D70 Standard Test Method for Density of Semi-Solid Bituminous Materials (Pycnometer Method)
- ASTM D140 / D140M Standard Practice for Sampling Asphalt Materials
- ASTM D242 / D242M Standard Specification for Mineral Filler for Bituminous Paving Mixtures
- ASTM D413 Standard Test Methods for Rubber Property—Adhesion to Flexible Substrate

- ASTM D546 Standard Test Method for Sieve Analysis of Mineral Filler for Asphalt Paving Mixtures
- ASTM D692 / D692M Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
- ASTM D946 / D946M Standard Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction
- ASTM D979 / D979M Standard Practice for Sampling Bituminous Paving Mixture
- ASTM D 995 Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
- ASTM D1073 Standard Specification for Fine Aggregate for Asphalt Paving Mixtures
- ASTM D1188 Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
- ASTM D1250 Standard Guide for Use of the Petroleum Measurement Tables
- ASTM D 1559 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- ASTM D2027 / D2027M Standard Specification for Cutback Asphalt (Medium-Curing Type)
- ASTM D2041 / D2041M Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
- ASTM D2172 / D2172M Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
- ASTM D2397 / D2397M Standard Specification for Cationic Emulsified Asphalt
- ASTM D2726 / D2726M Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Asphalt Mixtures
- ASTM D2995 Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
- ASTM D3381 / D3381M Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
- ASTM D4280 Standard Specification for Extended Life Type, Nonplowable, Raised Retroreflective Pavement Markers

- ASTM D4505 Standard Specification for Preformed Retroreflective Pavement Marking Tape for Extended Service Life
- ASTM D4439 Standard Terminology for Geosynthetics
- ASTM D4491 / D4491M Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- ASTM D4533 / D4533M Standard Test Method for Trapezoid Tearing Strength of Geotextiles
- ASTM D4632 / D4632M Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- ASTM D4751 Standard Test Methods for Determining Apparent Opening Size of a Geotextile
- ASTM D4873 / D4873M Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- ASTM E28 Standard Test Methods for Softening Point of Resins Derived from Pine Chemicals and Hydrocarbons, by Ring-and-Ball Apparatus

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

- FHWA NHI-00-043 Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines (ISDDC)

902.2.4 WATER AND SANITARY SEWER LINES

AASHTO

- AASHTO M 252 Standard Specification for Corrugated Polyethylene Drainage Pipe

ASTM INTERNATIONAL

- ASTM A536 Standard Specification for Ductile Iron Castings
- ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts
- ASTM B42 Standard Specification for Seamless Copper Pipe, Standard Sizes
- ASTM B88 Standard Specification for Seamless Copper Water Tube

- ASTM C478 Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
- ASTM C920 Standard Specification for Elastomeric Joint Sealants
- ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
- ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- ASTM D1149 Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
- ASTM D1785 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
- ASTM D2241 Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
- ASTM D2466 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
- ASTM D2467 Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80

AWWA – AMERICAN WATER WORKS ASSOCIATION

- AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution
- AWWA C104 / A21.4 Cement–Mortar Lining for Ductile-Iron Pipe and Fittings
- AWWA C105 Polyethylene Encasement for Ductile Iron Pipe
- AWWA C110 Ductile Iron and Gray Iron Fittings
- AWWA C111 Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings
- AWWA C115 / A21.15 Flanged Ductile - Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges
- AWWA C150 / A21.50 Thickness Design of Ductile-Iron Pipe

- AWWA C800 Underground Service Line Valves and Fittings
- AWWA C151 / A21.51 Ductile - Iron Pipe, Centrifugally Cast
- AWWA C502 Dry-Barrel Fire Hydrants
- AWWA C700 Cold-Water Meters – Displacement Type, Bronze Main Case
- AWWA C701 Cold-Water Meters - Turbine Type, for Customer Service
- AWWA C702 Cold-Water Meters - Compound Type
- AWWA C704 Propeller - Type Meters for Waterworks Applications
- AWWA C706 Direct-Reading, Remote - Registration Systems for Cold - Water Meters
- AWWA C707 Encoder-Type Remote - Registration Systems for Cold - Water Meters
- AWWA C509 Resilient-Seated Gate Valves for Water Supply Service
- AWWA C515 Reduced - Wall, Resilient-Seated Gate Valves for Water Supply Service
- AWWA C550 Protective Interior Coatings for Valves and Hydrants
- AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances
- AWWA C605 Water Underground Installation of Polyvinyl Chloride (PVC) and Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe and Fittings
- AWWA B301 Liquid Chlorine
- AWWA C651 Standard for Disinfecting Water Mains
- AWWA C652 Standards for Disinfecting Water Storage Facilities

MSS - MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY

- MSS SP-80 Bronze Gate, Globe, Angle and Check Valves

UL - UNDERWRITERS LABORATORIES

- UL 246 Safety Hydrants for Fire - Protection Service
- UL 262 Gate Valves for Fire - Protection Service
- UL 312 Check Valves for Fire - Protection Service
- UL 789 Indicator Posts for Fire - Protection Service

UBPPA - UNI-BELL PVC PIPE ASSOCIATION (UBPPA)

- UBPPA UNI-B-3 Recommended Practice for the Installation of Polyvinyl Chloride (PVC) Pressure Pipe (Nominal Diameters 4-36 Inch)
- UBPPA UNI-B-8 Recommended Practice for the Direct Tapping of Polyvinyl Chloride (PVC) Pressure Water Pipe (Nominal Diameters 6-12 Inch)

ISO - INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

- ISO 1940-1 Mechanical Vibration – Balance Quality Requirements for Rotors in a Constant
- ISO 21940 Mechanical vibration - Rotor balancing - Part 11: Procedures and tolerances for rotors with rigid behavior (Rigid) State - Part 1: Specification and Verification of Balance Tolerance - International Restrictions
- ISO 2858 End Suction Centrifugal Pump (Rating 16 Bar) Designation Nominal Duty Point and Dimensions – International Restrictions
- ISO 5199 Technical Specifications for Centrifugal Pumps, Class II

901.2.5 STRUCTURES

ASTM INTERNATIONAL

- ASTM A53 / A53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
- ASTM A116 Standard Specification for Metallic-Coated, Steel-Woven Wire Fence Fabric
- ASTM A121 Standard Specification for Metallic-Coated Carbon Steel Barbed Wire

- ASTM A307 Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
- ASTM A370 Standard Test Methods and Definitions for Mechanical Testing of Steel Product
- ASTM A392 Standard Specification for Zinc-Coated Steel Chain - Link Fence Fabric
- ASTM A641 / A641M Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
- ASTM A764 Standard Specification for Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs
- ASTM A780 / A780M Standard Practice for Repair of Damaged and Uncoated Areas of Hot - Dip Galvanized Coatings
- ASTM A824 Standard Specification for Metallic-Coated Steel Marcellled Tension Wire for use with Chain Link Fence
- ASTM A853 Standard Specification for Steel Wire, Carbon, for General Use
- ASTM D4541 Standard Test Method for Pull - Off Strength of Coatings Using Portable Adhesion Testers
- ASTM F626 Standard Specification for Fence Fittings
- ASTM F900 Standard Specification for Industrial and Commercial Steel Swing Gates
- ASTM F1043 Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
- ASTM F1083 Standard Specification for Pipe, Steel, Hot - Dipped Zinc - Coated (Galvanized) Welded, for Fence Structures

AWWA – AMERICAN WATER WORKS ASSOCIATION

- AWWA D100 Welded Carbon Steel Tanks for Water Storage

SSPC – SOCIETY FOR PROTECTIVE COATINGS

- SSPC-SP10 Neat White Blast Cleaning

-SSPC-SP6 Commercial Blast Cleaning

NSF - NATIONAL SCIENCE FOUNDATION

-NSF 61 All Welded Materials (Potable Water)

901.2.6 ELECTRICAL

NEC - NATIONAL ELECTRIC CODE

NFPA – NATIONAL FIRE PROTECTION ASSOCIATION STANDARDS

IEEE – INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS

**GJU – CITY OF GALLU JOINT UTILITIES – ELECTRICAL LINE, METER
DISCONNECT AND SERVICE STANDARDS**

901.2.7 SAFETY

OSHA – CONSTRUCTION STANDARDS FOR EXCAVATION

**MUTCD - MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR
STREETS AND HIGHWAYS**

**NM ONE CALL INC. – UNDERGROUND UTILITY DESIGN AND
EXCAVATION LOCATES**

NESC – NATIONAL ELECTRICAL SAFETY CODE

APPENDICIES

- A. EPA FORMS (NPDES)
 - NOTICE OF INTENT
 - NOTICE OF TERMINATION
- B. NEW MEXICO WAGE RATES
- C. REACH 27.9 GEOTECHNICAL REPORT
- D. HIGHWAY PERMITS
 - WORK PERMIT FORM
- E. 404 & 401 PERMITS
 - DEPARTMENT OF THE ARMY ALBUQUERQUE DISTRICTS CORPS OF ENGINEERS
 - ACTION NUMBER SPA-2012-00254-ABQ, USBR NAVAJO-GALLUP WATER SUPPLY PROJECT, REACH 27.9 (404 PERMIT)

NEW MEXICO ENVIRONMENT DEPARTMENT SURFACE WATER QUALITY BUREAU

- CLEAN WATER ACT SECTION 401 WATER QUALITY CERTIFICATION UNITED STATES ARMY CORPS OF ENGINEERS 2012 NATIONWIDE PERMITS
- UNITED STATES DEPARTMENT OF INTERIOR – BUREAU OF RECLAMATION - NOTICE TO PROCEED.

APPENDIX A

EPA Forms (NPDES)

Notice of Intent & Notice of Termination



Submission of this No Exposure Certification constitutes notice that the entity identified in Section A does not require permit authorization for its stormwater discharges associated with industrial activity in the State identified in Section B under EPA's Stormwater Multi Sector General Permit due to the existence of a condition of no exposure.

A condition of no exposure exists at an industrial facility when all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. Industrial materials or activities include, but are not limited to, material handling equipment or activities, industrial machinery, raw materials, intermediate products, by-products, final products, or waste products. Material handling activities include the storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product or waste product. A storm resistant shelter is not required for the following industrial materials and activities:

- drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated and do not leak. "Sealed" means banded or otherwise secured and without operational taps or valves;
- adequately maintained vehicles used in material handling; and
- final products, other than products that would be mobilized in stormwater discharges (e.g., rock salt).

A No Exposure Certification must be provided for each facility qualifying for the no exposure exclusion. In addition, the exclusion from NPDES permitting is available on a facility-wide basis only, not for individual outfalls. If any industrial activities or materials are or will be exposed to precipitation, the facility is not eligible for the no exposure exclusion.

By signing and submitting this No Exposure Certification form, the entity in Section A is certifying that a condition of no exposure exists at its facility or site, and is obligated to comply with the terms and conditions of 40 CFR 122.26(g).

ALL INFORMATION MUST BE PROVIDED ON THIS FORM.

Detailed instructions for completing this form and obtaining the no exposure exclusion are provided on pages 3 and 4.

A. Facility Operator Information

1. Name: 2. Phone: - -

3. Email:

4. Mailing Address: a. Street

b. City: c. State d. Zip Code: -

B. Facility/Site Location Information

1. Facility Name:

2. a. Street Address:

b. City: c. County:

d. State: e. Zip Code: -

3. Is the facility located on Indian Lands? ☐ YES ☐ NO

4. Is this a Federal facility? ☐ YES ☐ NO

5. a. Latitude: ° ' " b. Longitude: ° ' "

6. a. Was the facility or site previously covered under an NPDES stormwater permit? ☐ YES ☐ NO

b. If yes, enter NPDES permit number or tracking number:

7. SIC/Activity Codes: Primary: Secondary (if applicable):

8. Total size of site associated with industrial activity: acres

9. a. Have you paved or roofed over a formerly exposed, pervious area in order to qualify for the no exposure exclusion? ☐ YES ☐ NO

b. If yes, please indicate approximately how much area was paved or roofed over. Completing this question does not disqualify you for the no exposure exclusion. However, your permitting authority may use this information in considering whether stormwater discharges from your site are likely to have an adverse impact on water quality, in which case you could be required to obtain permit coverage.

Less than one acre ☐ One to five acres ☐ More than five acres ☐

C. Exposure Checklist

Are any of the following materials or activities exposed to precipitation, now or in the foreseeable future?
(Please check either "Yes" or "No" in the appropriate box.) If you answer "Yes" to any of these questions
(1) through (11), you are not eligible for the no exposure exclusion.

Yes No

1. Using, storing or cleaning industrial machinery or equipment, and areas where residuals from using, storing or cleaning industrial machinery or equipment remain and are exposed to stormwater	☐	☐
2. Materials or residuals on the ground or in stormwater inlets from spills/leaks	☐	☐
3. Materials or products from past industrial activity	☐	☐
4. Material handling equipment (except adequately maintained vehicles)	☐	☐
5. Materials or products during loading/unloading or transporting activities	☐	☐
6. Materials or products stored outdoors (except final products intended for outside use [e.g., new cars] where exposure to stormwater does not result in the discharge of pollutants)	☐	☐
7. Materials contained in open, deteriorated or leaking storage drums, barrels, tanks, and similar containers	☐	☐
8. Materials or products handled/stored on roads or railways owned or maintained by the discharger	☐	☐
9. Waste material (except waste in covered, non leaking containers [e.g., dumpsters])	☐	☐
10. Application or disposal of process wastewater (unless otherwise permitted)	☐	☐
11. Particulate matter or visible deposits of residuals from roof stacks and/or vents not otherwise regulated (i.e., under an air quality control permit) and evident in the stormwater outflow	☐	☐

D. Certification Statement

I certify under penalty of law that I have read and understand the eligibility requirements for claiming a condition of "no exposure" and obtaining an exclusion from NPDES stormwater permitting.

I certify under penalty of law that there are no discharges of stormwater contaminated by exposure to industrial activities or materials from the industrial facility or site identified in this document (except as allowed under 40 CFR 122.26(g)(2)).

I understand that I am obligated to submit a no exposure certification form once every five years to the NPDES permitting authority and, if requested, to the operator of the local municipal separate storm sewer system (MS4) into which the facility discharges (where applicable). I understand that I must allow the NPDES permitting authority, or MS4 operator where the discharge is into the local MS4, to perform inspections to confirm the condition of no exposure and to make such inspection reports publicly available upon request. I understand that I must obtain coverage under an NPDES permit prior to any point source discharge of stormwater from the facility.

Additionally, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name:

Print Title:

Signature:

Date: / /
Mo Day Year

Email:

Instructions for the NO EXPOSURE CERTIFICATION for Exclusion from NPDES Stormwater Permitting

Who May File a No Exposure Certification

Federal law at 40 CFR Part 122.26 prohibits point source discharges of stormwater associated with industrial activity to waters of the U.S. without a National Pollutant Discharge Elimination System (NPDES) permit. However, NPDES permit coverage is not required for discharges of stormwater associated with industrial activities identified at 40CFR 122.26(b)(14)(i)-(ix) and (xi) if the discharger can certify that a condition of "no exposure" exists at the industrial facility or site.

Stormwater discharges from construction activities identified in 40 CFR 122.26(b)(14)(x) and (b)(15) are not eligible for the no exposure exclusion.

Obtaining and Maintaining the No Exposure Exclusion

This form is used to certify that a condition of no exposure exists at the industrial facility or site described herein. This certification is only applicable in jurisdictions where EPA is the NPDES permitting authority and must be re-submitted at least once every five years.

The industrial facility operator must maintain a condition of no exposure at its facility or site in order for the no exposure exclusion to remain applicable. If conditions change resulting in the exposure of materials and activities to stormwater, the facility operator must obtain coverage under an NPDES stormwater permit immediately.

Where to File the No Exposure Certification Form

No Exposure Forms sent regular mail: Forms sent overnight/express:

SW No Exposure Certification (4203M)
USEPA
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

SW No Exposure Certification
US EPA East Building, Rm. 7420
1201 Constitution Avenue, NW
Washington, D.C. 20004
(202) 564-9545

Completing the Form

You must type or print, using uppercase letters, in appropriate areas only. Enter only one character per space (i.e., between the marks). Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words. One form must be completed for each facility or site for which you are seeking to certify a condition of no exposure. Additional guidance on completing this form can be accessed at EPA's website: www.epa.gov/npdes/stormwater. Please make sure you have addressed all applicable questions and have made a photocopy for your records before sending the completed form to the above address.

Section A. Facility Operator Information

1. Provide the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this certification. The name of the operator may or may not be the same as the name of the facility. The operator is the legal entity that controls the facility's operation, rather than the plant or site manager.
2. Provide the telephone number of the facility operator.
3. Provide the email address of the facility operator.
4. Provide the mailing address of the operator (P.O. Box numbers may be used). Include the city, state, and zip code. All correspondence will be sent to this address.

Section B. Facility/Site Location Information

1. Enter the official or legal name of the facility or site.
2. Enter the complete street address (if no street address exists, provide a geographic description [e.g., Intersection of Routes 9 and 55]), city, county, state, and zip code. Do not use a P.O. Box number.
3. Indicate whether the facility is located on Indian Lands.
4. Indicate whether the industrial facility is operated by a department or agency of the Federal Government (see also Section 313 of the Clean Water Act).
5. Enter the latitude and longitude of the approximate center of the facility or site in degrees/minutes/seconds. Latitude and longitude can be obtained from United States Geological Survey (USGS) quadrangle or topographic maps, by calling 1-(888) ASK-USGS, or by accessing the Census Bureau at: www.census.gov/cgi-bin/qazetteer

Latitude and longitude for a facility in decimal form must be converted to degrees (°), minutes ('), and seconds (") for proper entry on the certification form. To convert decimal latitude or longitude to degrees/minutes/seconds, follow the steps in the following example.

Example: Convert decimal latitude 45.1234567 to degrees (°), minutes ('), and seconds (").

- a) The numbers to the left of the decimal point are the degrees: 45°.
 - b) To obtain minutes, multiply the first four numbers to the right of the decimal point by 0.006: $1234 \times 0.006 = 7.404$.
 - c) The numbers to the left of the decimal point in the result obtained in (b) are the minutes: 7'.
 - d) To obtain seconds, multiply the remaining three numbers to the right of the decimal from the result obtained in (b) by 0.06: $404 \times 0.06 = 24.24$. Since the numbers to the right of the decimal point are not used, the result is 24".
 - e) The conversion for 45.1234567 = 45° 7' 24".
6. Indicate whether the facility was previously covered under an NPDES stormwater permit. If so, include the permit number or permit tracking number.
 7. Enter the 4-digit SIC code which identifies the facility's primary activity and second 4-digit SIC code identifying the facility's secondary activity, if applicable. SIC codes can be obtained from the Standard Industrial Classification Manual, 1987.
 8. Enter the total size of the site associated with industrial activity in acres. Acreage may be determined by dividing square footage by 43,560, as demonstrated in the following example.

Example: Convert 54,450 ft² to acres

Divide 54,450 ft² by 43,560 square feet per acre:
 $54,450 \text{ ft}^2 \div 43,560 \text{ ft}^2/\text{acre} = 1.25 \text{ acres}$.
 9. Check "Yes" or "No" as appropriate to indicate whether you have paved or roofed over a formerly exposed, pervious area (i.e., lawn, meadow, dirt or gravel road/parking lot) in order to qualify for no exposure. If yes, also indicate approximately how much area was paved or roofed over and is now impervious area.

Instructions for the NO EXPOSURE CERTIFICATION for Exclusion from NPDES Stormwater Permitting

Section C. Exposure Checklist

Check "Yes" or "No" as appropriate to describe the exposure condition at your facility. If you answer "Yes" to ANY of the questions (1) through (11) in this section, a potential for exposure exists at your site and you cannot certify to a condition of no exposure. You must obtain (or already have) coverage under an NPDES stormwater permit. After obtaining permit coverage, you can institute modifications to eliminate the potential for a discharge of stormwater exposed to industrial activity, and then certify to a condition of no exposure.

Section D. Certification Statement

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means:

- (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation, or
- (ii) the manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit

application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor, or

For a municipal, State, Federal, or other public facility: by either a principal executive or ranking elected official.

Paperwork Reduction Act Notice

Public reporting burden for this certification is estimated to average 1.0 hour per certification, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose to provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Director, OPPE Regulatory Information Division (2137), USEPA, 401 M Street, SW, Washington, D.C. 20460. Include the OMB control number of this form on any correspondence. Do not send the completed No Exposure Certification form to this address.

APPENDIX B

New Mexico Wage Rates



STATE OF NEW MEXICO
NEW MEXICO DEPARTMENT OF
WORKFORCE SOLUTIONS
Labor Relations Division,
121 Tijeras Ave NE, Suite 3000
Albuquerque, NM 87102
www.dws.state.nm.us

Wage Decision Approval Summary

1) Project Title: Navajo Gallup Water Supply Project Reach 27.9
Requested Date: 01/15/2019
Approved Date: 01/16/2019
Approved Wage Decision Number: MC-19-0076-A

Wage Decision Expiration Date for Bids: 05/16/2019

2) Physical Location of Jobsite for Project:
Job Site Address: Kachina Street
Job Site City: Gallup
Job Site County: McKinley

3) Contracting Agency Name (Department or Bureau): City of Gallup
Contracting Agency Contact's Name: Frances Rodriguez
Contracting Agency Contact's Phone: (505) 863-1334 Ext.

4) Estimated Contract Award Date: 03/26/2019

5) Estimated total project cost: \$5,684,140.00
a. Are any federal funds involved?: Yes - \$3,200,000.00
b. Does this project involve a building?: No
c. Is this part of a larger plan for construction on or appurtenant to the property that is subject to this project?: No
d. Are there any other Public Works Wage Decisions related to this project?: No
e. What is the ultimate purpose or functional use of the construction once it is completed?: This project will carry water from the City of Gallup's existing Gameraco Water Tanks to the Southern, Eastern and Western portions of the City water system.

6) Classifications of Construction:

Classification Type and Cost Total	Description
Highway/Utilities (A) Cost: \$5,684,140.00	Construction of 18,350 Linear feet of 24 inch CL350 ductile iron waterline, 950 linear feet of 24 inch glass re-enforced waterline, 3,260 linear feet of 16 inch CL350 ductile iron waterline, 260 linear feet of 16 inch C905 CL235 PVC waterline, 250 linear feet jack and bore crossing of Highway 491 with a 16 inch carrier pipe and a 26 inch steel casing, 95 linear foot jack and bore installation on a steep slope with a 16 inch carrier pipe and a 26 inch steel casing and tie ins to existing waterlines. Work will also include air release stations, valves, fittings, specials, trenching, back filling and compaction. Asphalt, gravel road surfacing and fencing, removal and replacement will be required.

PUBLIC WORKS PROJECT REQUIREMENTS

As a participant in a Public Works project valued at more than \$60,000 in the state of New Mexico, the following list addresses many of the responsibilities that are defined by statute or regulation to each project stakeholder.

Contracting Agency

- Ensure that all contractors wishing to bid on a Public Works project when the project is \$60,000 or more are actively registered with the Public Works and Apprenticeship Application (PWAA) website: <http://www.dws.state.nm.us/pwaa> (Contractor Registration) prior to bidding.
- Please submit Notice of Award (NOA) and Subcontractor List(s) to the PWAA website promptly after the project is awarded.
- Please update the Subcontractor List(s) on the PWAA website whenever changes occur.
- All sub-contractors and tiers (excluding professional services) regardless of contract amount must be listed on the Subcontractor List and must adhere to the Public Works Minimum Wage Act.
- Ninety days after project completion please go into the PWAA system and close the project. Only contracting agencies are allowed to close the project. Agents or contractors are not allowed to close projects.

General Contractor

- Provide a complete Subcontractor List and Statements of Intent (SOI) to Pay Prevailing Wages for all contractors, regardless of amount of work, to the contracting agency within 3 (three) days of award.
- Ensure that all subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: <http://www.dws.state.nm.us/pwaa> prior to bidding when their bid will exceed \$60,000.
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- Confirm the Wage Rate poster, provided in PWAA, is displayed at the job site in an easily accessible place.
- When the project has been completed, make sure the Affidavits of Wages Paid (AWP) are sent to the contracting agency.
- All subcontractors and tiers (excluding professional services) regardless of contract amount must pay prevailing wages, be listed on the Subcontractor List, and adhere to the Public Works Minimum Wage Act.

Subcontractor

- Ensure that all subcontractors wishing to bid on a Public Works project have an active Contractor Registration with the Public Works and Apprenticeship Application (PWAA) website: <http://www.dws.state.nm.us/pwaa> prior to bidding when their bid will exceed \$60,000.
- Make certain the Public Works Apprentice and Training Act contributions are paid either to an approved Apprenticeship Program or to the Public Works Apprentice and Training Fund.
- All subcontractors and tiers (excluding professional services) regardless of contract amount must pay prevailing wages, be listed on the Subcontractor List, and adhere to the Public Works Minimum Wage Act.

Additional Information

Reference material and forms may be found in the New Mexico Department of Workforce Solutions Public Works web pages at: <https://www.dws.state.nm.us/Labor-Relations/Labor-Information/Public-Works>.

CONTACT INFORMATION

Contact the Labor Relations Division for any questions relating to Public Works projects by email at public.works@state.nm.us or call (505) 841-4400.

TYPE "A" - STREET, HIGHWAY, UTILITY & LIGHT ENGINEERING

Effective January 1, 2019

Trade Classification	Base Rate	Fringe Rate
Bricklayer/Blocklayer/Stonemason	23.78	9.08
Carpenter/Lather	24.08	10.84
Cement Mason	17.42	6.61
Ironworker	26.50	16.20
Painter (Brush/Roller/Spray)	17.00	6.78
Plumber/Pipefitter	29.45	12.37
Electricians (outside)		
Groundman	22.81	11.93
Equipment Operator	32.73	14.51
Lineman/Wireman or Tech	38.51	16.02
Cable Splicer	42.36	17.01
Laborers		
Group I	11.81	5.88
Group II	12.11	5.88
Group III	12.51	5.88
Group IV	12.76	5.88
Operators		
Group I	18.60	5.94
Group II	19.52	5.94
Group III	19.62	5.94
Group IV	19.73	5.94
Group V	19.83	5.94
Group VI	20.01	5.94
Group VII	20.17	5.94
Group VIII	20.46	5.94
Group IX	27.88	5.94
Group X	31.10	5.94
Truck Drivers		
Group I	16.15	7.52
Group II	16.15	7.52
Group III	16.15	7.52
Group IV	16.15	7.52
Group V	16.15	7.52
Group VI	16.15	7.52
Group VII	16.15	7.52
Group VIII	16.21	7.52
Group IX	18.15	7.52

NOTE: All contractors are required to pay **SUBSISTENCE, ZONE AND INCENTIVE PAY** according to the particular trade. Details are located in a PDF attachment at WWW.DWS.STATE.NM.US. Search Labor Relations/Labor Information/Public Works/Prevailing Wage Rates.

STATEMENT OF INTENT TO PAY PREVAILING WAGES
To Be Completed Before Construction Starts
ALL FIELDS ARE REQUIRED

FORM MUST BE SENT TO THE CONTRACTING AGENCY WITHIN 3 DAY OF THE AWARD

General Contractor Information		
Company Name:		
Address:		
City :	State:	Zip:
Phone:	Fax:	E-Mail:
FEIN #		
Estimated Start Date:	State Wage Decision Number:	
Project Title:	Project Physical Address:	
Total Contract Amount:	Estimated Completion Date:	
Print Name:	General Contractor Signature:	
Sub Contractor Information		
Sub Contractor Information	Sub Contract Amount:	Start date on this project:
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	E-Mail:
FEIN #		
Print Name:	Sub Contractor Signature:	
2nd, 3rd, etc. Tier Sub-Contractor Information		
Contract Amount:	Start date on this project:	
Company Name:		
Address:		
City:	State:	Zip:
Phone:	Fax:	E-Mail:
FEIN#		
Print Name:	Tier Signature:	

I hereby certify that the above information is correct and that all workers I employ on this public works project will be paid no less than the Prevailing Wage Rate(s) as determined by the Department of Workforce Solutions, Labor Relations Division for this project as identified by the State Wage Decision Number. I understand that contractors who violate Prevailing Wage Laws (i.e., incorrect job classification, improper payment of prevailing wages, and/or overtime, etc.), are subject to debarment procedures and shall be required to pay any back wages due to workers. (Ref. Labor Relations Division, Public Works Minimum Wage Act Policy Manual (11.1.2 NMAC) & Public Works Minimum Wage Act (13-4-11 through 13-4-18, NMSA 1978).

 Contractor's Signature

 Date

INSTRUCTIONS FOR COMPLETING STATEMENT OF INTENT TO PAY PREVAILING WAGES

GENERAL CONTRACTOR

1. Enter general contractor information and provide signature.
2. Enter State Wage Decision Number as listed in bid documents. (Example: BE-13-0123 B)
3. Enter project title - listed in bid documents.
4. Enter project physical address - exact location of project (job site).
5. Enter estimated start & completion dates of project.
6. Enter general contractor's contract amount.
7. All Statements must be sent to the Contracting Agency.

SUB CONTRACTOR

1. Enter general contractor information, but general contractor signature is not needed.
2. Enter sub contractor information as indicated and provide signature.
3. Enter sub contractor contract amount.

NOTE: A separate signed form is needed for each contractor.

2ND TIER SUB CONTRACTOR

1. Enter general contractor information, but general contractor signature is not needed.
2. Enter sub contractor information; subcontractor signature not needed.
3. Enter 2nd tier sub information and provide signature.
4. Enter 2nd tier contractors contract amount.

3RD TIER AND HIGHER CONTRACTOR

1. Attach a copy of this completed form & list the 3rd tier contractor information under the 2nd tier

AFFIDAVIT OF WAGES PAID
To Be Completed After Construction Is Complete
All FIELDS ARE REQUIRED
FORM MUST BE SENT TO THE CONTRACTING AGENCY

General Contractor Information			
Company Name:			
Address:			
City:	State:	Zip:	
Phone:	Fax:	E-Mail:	
Estimated Completion Date:	State Wage Decision Number:		
Project Title:	Project Physical Address:		
Print Name:	General Contractor Signature:		
Sub Contractor Information			Date you completed work on this project:
Company Name:			
Address:			
City:	State:	Zip:	
Phone:	Fax:	E-Mail:	
Print Name:	Sub Contractor Signature:		
2nd, 3rd, etc. Tier Sub Contractor Information			Date you completed work on this project:
Company Name:			
Address:			
City:	State:	Zip:	
Phone:	Fax:	E-Mail:	
Print Name:	Tier Signature:		

I hereby certify that the above information is correct and that all workers I employ on this public works project were paid no less than the Prevailing Wage Rate(s) as determined by the Department of Workforce Solutions, Labor Relations Division for this project as identified by the State Wage Decision Number. I understand that contractors who violate Prevailing Wage Laws (i.e., incorrect job classification, improper payment of prevailing wages, and/or overtime, etc.), are subject to debarment procedures and shall be required to pay any back wages due to workers. (Ref. Labor Relations Division Public Works Minimum Wage Act Policy Manual (11.1.2 NMAC) & Public Works Minimum Wage Act (13-4-11 through 13-4-18, NMSA 78)).

Contractor's Signature

Date

(Revised 08/23/13)

INSTRUCTIONS FOR COMPLETING AFFIDAVIT OF WAGES PAID

GENERAL CONTRACTOR

1. Enter general contractor information and provide signature.
2. Enter State Wage Decision Number as listed in bid documents. (Example: BE 13-0123 B)
3. Enter project title - listed in bid documents.
4. Enter project physical address - exact location of project (job site).
5. Enter completion date of project.
6. All Affidavits' must be sent to the Contracting Agency.

SUB CONTRACTOR

1. Enter general contractor information, but general contractor signature is not needed.
2. Enter sub contractor information as indicated and provide signature.
3. Enter sub contractor completion date.

NOTE: A separate signed form is needed for each contractor.

2ND, 3RD, etc TIER SUB CONTRACTOR

1. Enter sub contractor information, subcontractor signature is not needed.
2. Enter 2nd tier sub contractor information and provide signature.
3. Enter 2nd tier contract completion date.

(Revised 8/23/13)

APPENDIX C

Reach 27.9

Geotechnical Report

**GEOTECHNICAL ENGINEERING REPORT
NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.9
MCKINLEY COUNTY, NEW MEXICO**

Submitted To:

Donald Sterling, P.E.
DePauli Engineering & Surveying LLC
307 South 4th Street
Gallup, New Mexico 87301

Submitted By:

GEOMAT Inc.
915 Malta Avenue
Farmington, New Mexico 87401

September 1, 2015
GEOMAT Project 152-2296



915 Malta Avenue ♦ Farmington, NM 87401 ♦ Tel (505) 327-7928 ♦ Fax (505) 326-5721

September 1, 2015

Donald Sterling, P.E.
DePauli Engineering & Surveying LLC
307 South 4th Street
Gallup, New Mexico 87301

RE: Geotechnical Engineering Study
Navajo Gallup Water Supply Project
Reach 27.9
McKinley County, New Mexico
GEOMAT Project No. 152-2296

GEOMAT Inc. (GEOMAT) has completed the geotechnical engineering exploration for Reach 27.9 of the Navajo Gallup Water Supply Project to be located between Gallup and Gamero in McKinley County, New Mexico. This study was performed in general accordance with the scope of work described in our Proposal No. 152-06-17, Rev 1, dated June 23, 2015.

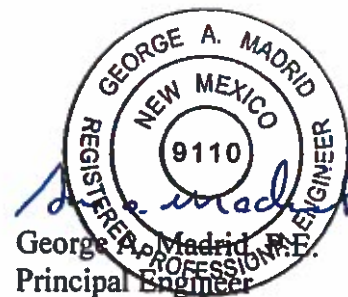
The results of our engineering study, including the geotechnical recommendations, site plan, test pit records, soil resistivity test results, and laboratory test results are attached.

We have appreciated being of service to you in the geotechnical engineering phase of this project. If you have any questions concerning this report, please contact us.

Sincerely yours,
GEOMAT Inc.

Donald R. Baldwin

Donald R. Baldwin
Geologist



Copies to: Addressee (1)

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**GEOTECHNICAL ENGINEERING REPORT
NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.9
MCKINLEY COUNTY, NEW MEXICO
GEOMAT PROJECT NO. 152-2296**

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for Reach 27.9 of the Navajo Gallup Water Supply Project to be located between Gallup and Gamerco in McKinley County, New Mexico, as shown on the Site Plan in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations about:

- subsurface soil conditions
- groundwater conditions
- soil resistivity
- excavation conditions
- pipeline backfill

The opinions and recommendations contained in this report are based upon the results of field and laboratory testing, engineering analyses, and experience with similar soil conditions, structures, and our understanding of the proposed project as stated below.

PROPOSED CONSTRUCTION

We understand that Reach 27.9 of the Navajo Gallup Water Supply Project will consist of approximately 4.4 miles of 24-inch diameter, Class 250 or 350 ductile iron water line located west of U.S. Highway 491 between Gallup on the south and Gamerco on the north. The minimum depth of soil cover over the pipe is understood to be four feet.

SITE EXPLORATION

Our scope of services performed for this project included a site reconnaissance by a staff geologist, in-situ soil resistivity testing, a subsurface exploration program, laboratory testing and engineering analyses.

Field Exploration:

Twelve in-situ soil resistivity tests were performed on July 27 and 28, 2015 at approximately 2,200-foot intervals along the pipeline alignment as shown on the Site Plan. The resistivity tests, designated R-1 through R-12, were performed in general accordance with ASTM G57 (Wenner Four-Electrode Method). The results of the resistivity tests are presented in Appendix C. We understand the test results will be used by others to develop a corrosion prevention plan for the pipeline.

Subsurface conditions along the alignment were explored on August 4 through 7, 2015, by excavating 23 exploratory test pits at the approximate locations shown on the Site Plan in Appendix A. The test pits, designated TP-1 through TP-23, were excavated at roughly 800- to 1,200-foot intervals along the alignment. The test pit locations were chosen and staked in the field by DePauli Engineering & Surveying (DES) prior to our exploration. The station numbers and coordinates shown on the test pit logs were provided by DES.

The test pits were excavated using Case 580 and 590 rubber-tire backhoes with 24- and 18-inch wide buckets, respectively. The test pits were advanced to depths of approximately ten feet or to practical refusal on formational rock or hard clay soils.

The test pits were continuously monitored by a geologist from our office who examined and classified the subsurface materials encountered, obtained representative samples, observed groundwater conditions, and maintained a continuous log of each test pit. Photographs of the test pits are presented in Appendix D.

Groundwater evaluations were made in each test pit at the time of site exploration. Soils were classified in accordance with the Unified Soil Classification System described in Appendix A. Test pit logs were prepared and are presented in Appendix A.

Laboratory Testing:

Samples retrieved during the field exploration were transported to our laboratory for further evaluation. At that time, the field descriptions were confirmed or modified as necessary, and laboratory tests were performed to evaluate the engineering properties of the subsurface materials. The samples were tested for moisture content (ASTM D2216), sieve analysis (ASTM C136/D1140), Atterberg Limits (ASTM D4318), and standard proctor (ASTM D698).

Additionally, three representative soil samples obtained from the test pits were submitted to an independent analytical laboratory for testing to evaluate the potential for the native soils to cause corrosion to concrete and/or ferrous metals.

Formational sandstone was encountered at depths of less than one foot in test pits TP-14 and TP-22. Therefore, no soil samples were obtained, and no laboratory testing performed, for these test pits.

SITE CONDITIONS

From the beginning of the project approximately 0.3 mile north of the community of Gamerco, the Reach 27.9 alignment runs generally south along the west edge of Gamerco, roughly 0.5 mile west of U.S. Highway 491. The end of the project is approximately 3.7 miles to the south near the intersection of Kachina Street and Morello Avenue. The majority of the alignment traverses undeveloped land west and south of Gamerco. The southern-most portion of the alignment follows the west side of Sheryl Lane for approximately 0.8 miles to the end of the project.

In addition to the north-south portion of the alignment, an east-west spur referred to as the East Line connects to the main water line at approximately Station 115+62. The East Line is roughly 3,700 feet long and crosses Highway 491, ending at a tie-in to existing lines on the west side of Ninth Street.

SUBSURFACE CONDITIONS

Soil Conditions:

As presented on the Test Pit Logs in Appendix A, we encountered sandy, silty, and clayey surficial soils along the Reach 27.9 alignment. The surficial soils were generally fine-grained, dry to moist, and exhibited variable degrees of cementation.

Formational rock was encountered below the surficial soils in roughly half of the test pits, and at relatively shallow depth (less than 6 feet below existing ground surface) in 5 of the pits. The rock consisted of sandstone, siltstone, and/or shale, and was generally moderately to highly weathered, becoming less weathered and more sound at greater depths.

Difficulty of excavation varied from relatively easy in the sandy and silty soils some of the shale, to moderately difficult in the moderately to highly weathered rock, to very difficult (refusal) in sound sandstone and hard clay.

The following points summarize the subsurface conditions encountered in the test pits:

- Soils were encountered to the total depths explored in TP-1, 6, 7, 10, 12, 13, 15, 16, 17, 18, 20, and 23;
- Formational rock was encountered at relatively shallow depths (less than 6 feet) in TP-4, 8, 11, 14, and 22;
- The following test pits were terminated short of their planned depth of 10 feet due to practical refusal on sandstone or siltstone: TP-4, 9, 11, 14, 19, and 22;
- The following test pits were terminated short of their planned depth of 10 feet due to practical refusal on hard clay: TP-6, 10, 16, and 17.

Groundwater Conditions:

Groundwater was not encountered in any of the test pits to the depths explored. Groundwater elevations can fluctuate over time depending upon precipitation, irrigation, and runoff and/or infiltration of surface water. We do not have any information regarding the historical fluctuation of the groundwater level in this vicinity.

Laboratory Test Results:

Moisture content (ASTM D2216), sieve analyses (ASTM C136/D1140), Atterberg Limits determinations (ASTM D4318), and standard proctor (ASTM D698) tests were performed on representative samples obtained from approximately the upper four feet in the test pits.

The samples tested had moisture contents ranging from approximately 1 to 6 percent. Fines contents (silt- and/or clay-sized particles passing the U.S. No. 200 sieve) ranged from approximately 11 percent to 63 percent. Plasticity indices ranged from non-plastic (NP) to 25.

Maximum laboratory dry densities based on the proctor tests ranged from approximately 94 to 114 pounds per cubic foot (pcf); optimum moisture contents ranged from approximately 12 to 19 percent.

Results of all laboratory tests are presented in Appendix B.

Laboratory Corrosivity Test Results:

Three representative samples were submitted to an independent analytical laboratory for testing to help evaluate the potential for the on-site soils to corrode buried metal and/or concrete. The samples were tested for pH, electrical resistivity, and soluble sulfates and chlorides. Results of these tests are summarized in the table below. Complete printouts of the results are available upon request.

The field resistivity and laboratory corrosivity testing are intended to provide an indication of the potential for the native soils to corrode metal and/or concrete. The laboratory resistivity tests were performed at specific moisture contents on relatively small samples obtained from approximately the four-foot depth in the test pits. Therefore, the laboratory resistivity results do not necessarily correlate to the in-situ resistivity test results.

Test Pit No.	pH	Laboratory Resistivity ¹ (ohm-cm)	Soluble Sulfate ² (ppm)	Soluble Chloride ² (ppm)
TP-5	8.84	4,740	40.1	ND
TP-12	9.29	1,890	265	22.1
TP-18	9.36	1,420	266	91.2

¹Analysis method EPA 120.1

²Analysis method EPA 300.0

In-Situ Soil Resistivity Results:

In-situ electrical resistivity of the soil/rock was measured at 12 locations along the alignment in accordance with ASTM G57 (Wenner Four-Electrode Method). Resistance measurements (in ohms) were performed at ten different electrode spacings at each location (3, 6, 9, 12, 15, 18, 24, 30, 36, and 45 feet). The resistance values were used to calculate the apparent resistivity (in ohm-centimeters) for each measurement. The apparent resistivity values ranged from approximately 517 to 14,075 ohm-centimeters.

The results of all resistivity measurements are presented in Appendix C.

OPINIONS AND RECOMMENDATIONS

Geotechnical Considerations:

Based on the geotechnical conditions encountered and tested for this report, the site is considered suitable for the proposed pipeline.

Pipe should be installed in accordance with U.S. Bureau of Reclamation (USBOR) guidelines.

Formational rock was encountered in our test pits in some areas along the alignment. Excavation of rock may require heavy-duty equipment and/or specialized techniques.

Hard clay soils in some areas along the alignment presented difficult excavation conditions in our test pits using the available equipment. Efficiency of excavation could likely be improved by using equipment better suited for hard cohesive soils.

Underground utilities, including gas, water, and communications, are known to exist in the vicinity of the alignment, and should be expected during construction of the pipeline.

Excavation Safety:

Construction of stable temporary excavations is the responsibility of the contractor. Temporary slopes and excavations should be designed and constructed in accordance with applicable OSHA or USBOR guidelines, as appropriate.

According to OSHA Construction Standards for Excavations, all excavations greater than four feet in depth and not in stable rock must be sloped, shored, or braced. Spoils must be placed at least two feet from the edge of the excavation to reduce the potential for sidewall failure due to excessive lateral pressures. All details regarding excavation safety, as described in OSHA and/or USBOR guidelines, shall be followed.

Although no significant caving or sloughing was noted in our test pits, it should be noted that conditions affecting stability of slopes and excavations can change over time depending on variables such as weather, vibration or surcharges due to nearby equipment, etc. The contractor shall be responsible for monitoring and assessing conditions affecting soil stability during construction.

Excavation:

We present the following general comments regarding our opinion of the excavation conditions for the designers' information with the understanding that they are opinions based on our test pit data. Our test pits were excavated using a Case 580 rubber-tire backhoe with a 24-inch wide bucket and/or a Case 590 with an 18-inch wide bucket; the relative ease or difficulty of excavation will likely be significantly different if other types of equipment and techniques are used to excavate the trenches. More accurate information regarding the excavation conditions should be evaluated by contractors or other interested parties from test excavations using the equipment that will be used during construction.

Based on our subsurface evaluation it appears that excavations in the sandy, silty, and/or clayey soils along the alignment should be possible using standard excavation equipment. Excavations in areas where sandstone, siltstone, or shale are encountered are expected to be difficult and may necessitate the use of heavy-duty equipment and/or specialized techniques. Excavation/trenching production rates in formational rock will be lower than those in soils. Excavations in the hard clay soils encountered in some areas along the alignment are expected to be difficult and may necessitate the use of specialized equipment.

Backfilling and Compaction:

Excavations should be backfilled to the planned finished grades using native or imported soils that are free of debris, rubble, frozen soil, organic material, or other deleterious material. Fill material should be free of cobbles or boulders greater than six inches in diameter. Additionally, backfill material should conform to any specifications provided by the pipe manufacturer. Excavated bedrock may not be suitable for use as backfill material.

Backfill material should be compacted to a minimum of 90 percent of maximum dry density as determined by ASTM D698. In areas where the final backfill is located under pavements or other structures, the upper two (2.0) feet of backfill should be compacted to a minimum of 95 percent of the D698 maximum dry density. Soils should be compacted at a moisture content between three (3.0) percent below and one (1.0) percent above optimum.

Backfill material should be placed in horizontal lifts using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. In the case of conflicting moisture and/or density specifications, the criteria specified by the prevailing jurisdiction should govern.

The native soils along the alignment are predominantly fine-grained and are expected to be moisture-sensitive. Different soil types each have an optimum moisture content where compaction is most efficient, i.e., where compaction can be accomplished with the least amount of compactive energy. Fine-grained soils typically have higher optimum moisture contents than coarse-grained soils; efficient compaction of these types of soils is generally more dependent on moisture content than with coarse-grained soils.

As shown on the Summary of Soil Tests table in Appendix B, the soils encountered in our test pits had in-place moisture contents lower than the optimum moisture determined by the laboratory proctor tests. Therefore, moisture conditioning of the native soils will likely be required if they are to be used as backfill material over the pipeline. Tilling, blade-rolling, or other methods of processing may be required to uniformly distribute moisture throughout the soil prior to compaction.

The fine-grained native soils may pump or become unstable or unworkable at high water contents. Workability may be improved by scarifying and drying. Over-excavation of wet zones and replacement with granular materials may be necessary. Lightweight excavation equipment may be required to reduce subgrade pumping.

GENERAL COMMENTS

It is recommended that GEOMAT be retained to provide a general review of final design plans and specifications in order to confirm that earthwork recommendations in this report have been interpreted and implemented. In the event that any changes of the proposed project are planned, the opinions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

GEOMAT should also be retained to provide services during the construction phase of the project. Construction testing, including field and laboratory evaluation of fill and/or backfill materials, should be performed to determine whether applicable project requirements have been met.

The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the location of test excavation may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities at the same time. No warranty, express or implied, is intended or made. We prepared the report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction equipment and techniques to be used on this project.

This report is for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken. This report has also not addressed any geologic hazards that may exist on or near the site.

This report may be used only by the Client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on and off site), or other factors may change over time and additional work may be required with the passage of time. Any party, other than the Client, who wishes to use this report, shall notify GEOMAT in writing of such intended use. Based on the intended use of the report, GEOMAT may require that additional

work be performed and that an updated report be issued. Non-compliance with any of these requirements, by the Client or anyone else, will release GEOMAT from any liability resulting from the use of this report by an unauthorized party.

Appendix A

LEGEND

TP-X

TEST PIT LOCATIONS

TP-X/R-X

TEST PIT AND RESISTIVITY LOCATIONS

TP-1/R-1

TP-2

TP-3/R-2

Gamerco Gamarco

TP-4

TP-5/R-3

TP-6

TP-7/R-4

TP-8

TP-9/R-5

TP-10/R-6

TP-11

TP-12/R-7

TP-13

TP-14

TP-15/R-8

TP-16

TP-17/R-9

TP-18

TP-19/R-10

TP-20

TP-21

TP-22/R-11

TP-23/R-12

491

602 W Maloney Ave



PROJECT

Navajo Gallup Water Supply Project
Reach 27.9
McKinley County, New Mexico

SITE PLAN

Exploration Locations (approximate)

GEO MAT Project No. 152-2296

Dates of Exploration: July 27 - Aug. 7, 2015



Approximate

Not to Scale



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Test Pit TP-1

Page 1 of 1

Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/6/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.57856°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76524°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 2+00</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	20	12	4.2			D	SC		1	CLAYEY SAND, brown to gray, fine-grained, slightly damp, moderate cementation
									2	
									3	
							CL		4	SANDY LEAN CLAY, brown to gray, stiff to very stiff, slightly damp relatively easy digging
									5	
									6	
									7	
									8	
									9	
									10	
									11	
									12	Total Depth 11 feet

TEST PIT 152-2296.GPJ 8/31/15

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-2

Page 1 of 1

Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/6/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.57688°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76833°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 13+50</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	20	NP	2.5			D			1	SILTY SAND, brown to gray, fine-grained, slightly damp
									2	
							SM		3	
									4	
									5	
									6	
									7	SANDSTONE, tan, fine-grained, highly weathered
							RK		8	
									9	
									10	able to excavate with moderate difficulty
									11	Total Depth 10 feet
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-3

Page 1 of 1

Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/6/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.57508°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76891°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 21+00</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	28	4	1.9			D	SC-SM		1	SILTY, CLAYEY SAND with trace gravel, brown to tan, fine- to medium-grained, slightly damp, moderate cementation
									2	
									3	
									4	
							CL		5	SANDY LEAN CLAY, brown to gray, very stiff, damp
									6	
									7	
							RK		8	SILTSTONE, dark gray to green-gray, moderately weathered able to excavate with moderate difficulty
									9	
									10	
									11	Total Depth 10 feet
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-4

Page 1 of 1

Project Name: NGWSP - Reach 27.9 Date Excavated: 8/6/2015
Project Number: 152-2296 Latitude: 35.57029°
Client: DePauli Engineering & Surveying Longitude: -108.76886°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 38+50
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	26	7	2.0			D	SC-SM		1	SILTY, CLAYEY SAND, brown to gray, fine- to medium-grained, slightly damp
									2	
									3	
						GRAE	RK		4	SILTSTONE, dark gray to green-gray, highly weathered, highly fractured fractures into gravel to cobble size fragments relatively difficult digging
									5	
									6	
									7	test pit terminated at 7 feet due to practical refusal on siltstone Total Depth 7 feet
									8	
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-5

Page 1 of 1

Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/6/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.56794°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76883°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 47+00</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	32	6	2.8			D			1	SILTY, CLAYEY SAND, brown to gray, fine-grained, slightly damp, moderate cementation
									2	
									3	
									4	
							SC-SM		5	
									6	
									7	
									8	
									9	
							RK		10	SHALE, green-gray, moderately weathered
									11	Total Depth 10 feet
									12	

TEST PIT 152-2296.GPJ 8/31/15

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-6

Page 1 of 1

Project Name: NGWSP - Reach 27.9 Date Excavated: 8/6/2015
Project Number: 152-2296 Latitude: 35.56520°
Client: DePauli Engineering & Surveying Longitude: -108.76879°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 57+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	34	8	2.2			D	SC		1	CLAYEY SAND, brown to tan, fine-grained, slightly damp
									2	
									3	
							CL		4	SANDY LEAN CLAY, brown to tan, slightly damp, very stiff to hard, massive slow, difficult digging
									5	
									6	
									7	test pit terminated at 7 feet due to practical refusal on hard clay Total Depth 7 feet
									8	
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-7

Page 1 of 1

Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/5/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.56266°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76875°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 67+00</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	43	25	6.2			D	SM		1	SILTY SAND, tan, fine-grained, slightly damp
							SC		2	CLAYEY SAND, brown to gray, fine-grained, slightly damp
									3	
									4	
									5	
									6	
									7	
									8	moderately difficult digging
									9	
									10	Total Depth 10 feet
									11	
									12	

TEST PIT 152-2296.GPJ 8/31/15

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-8

Page 1 of 1

Project Name: NGWSP - Reach 27.9
Project Number: 152-2296
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 580
Excavation Method: 24" Bucket
Sampling Method: Bulk sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 8/5/2015
Latitude: 35.56005°
Longitude: -108.76874°
Elevation: Not Determined
Test Pit Location: Sta 76+50
Groundwater Depth: None Encountered
Logged By: DB
Remarks: None

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	11	NP	1.0			D	SP- SM		1 2 3 4	SAND with silt, tan, fine-grained, poorly graded, damp
							RK		5 6 7 8 9 10	SHALE, dark gray, highly weathered, weakly fissile contains layers of black carbonaceous shale moderately weathered, massive relatively easy digging
									11 12	Total Depth 10 feet

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-9

Page 1 of 1

Project Name: NGWSP - Reach 27.9 Date Excavated: 8/5/2015
 Project Number: 152-2296 Latitude: 35.55822°
 Client: DePauli Engineering & Surveying Longitude: -108.76899°
 Site Location: McKinley County, New Mexico Elevation: Not Determined
 Rig Type: Case 580 Test Pit Location: Sta 83+50
 Excavation Method: 24" Bucket Groundwater Depth: None Encountered
 Sampling Method: Bulk sample Logged By: DB
 Hammer Weight: N/A Remarks: None
 Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	50	20	39			D	CL		1	SANDY LEAN CLAY, brown, very stiff, damp
									2	
									3	
									4	
									5	
									6	
							RK		7	SANDSTONE, tan to gray, fine-grained, highly weathered, highly fractured Less fractured and harder at 7 feet
									8	test pit terminated at 7 feet due to refusal on sandstone Total Depth 7 feet
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-10

Page 1 of 1

Project Name: NGWSP - Reach 27.9
Project Number: 152-2296
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 580
Excavation Method: 24" Bucket
Sampling Method: Bulk sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 8/5/2015
Latitude: 35.55535°
Longitude: -108.76897°
Elevation: Not Determined
Test Pit Location: Sta 94+00
Groundwater Depth: None Encountered
Logged By: DB
Remarks: None

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	32	12	3.2			D	SC		1	CLAYEY SAND, brown to tan, fine-grained, slightly damp
									2	
									3	
									4	
									5	
									6	
									7	test pit terminated at 6 feet due to practical refusal on hard clay Total Depth 6 feet
									8	
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample

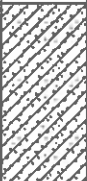


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Test Pit TP-11

Page 1 of 1

Project Name: NGWSP - Reach 27.9 Date Excavated: 8/7/2015
Project Number: 152-2296 Latitude: 35.55233°
Client: DePauli Engineering & Surveying Longitude: -108.76895°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 105+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	33	21	5.2			D	SC		1	CLAYEY SAND, brown to gray, fine-grained, damp
							RK		2	SANDSTONE, tan to gray, fine-grained, highly weathered, highly fractured, fractures into gravel/cobble size fragments
									3	Less fractured and harder at 3 feet
									4	test pit terminated at 3 feet due to refusal on sandstone Total Depth 3 feet
									5	
									6	
									7	
									8	
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-12

Page 1 of 1

Project Name: NGWSP - Reach 27.9
Project Number: 152-2296
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 580
Excavation Method: 24" Bucket
Sampling Method: Bulk sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 8/7/2015
Latitude: 35.54958°
Longitude: -108.76894°
Elevation: Not Determined
Test Pit Location: Sta 115+00
Groundwater Depth: None Encountered
Logged By: DB
Remarks: None

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	59	9	4.9			D			1	SANDY LEAN CLAY, brown to tan, very stiff, slightly damp
									2	
									3	
									4	
							CL		5	
									6	
									7	
									8	
									9	
									10	
									11	Total Depth 10 feet
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-13

Page 1 of 1

Project Name: NGWSP - Reach 27.9 Date Excavated: 8/7/2015
Project Number: 152-2296 Latitude: 35.54684°
Client: DePauli Engineering & Surveying Longitude: -108.76892°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 125+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	38	16	37			D			1	CLAYEY SAND, brown to tan, fine-grained, damp
									2	
									3	
									4	
							SC		5	
									6	hard slow, difficult digging below 6 feet
									7	
									8	
									9	
									10	
									11	Total Depth 10 feet
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample

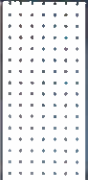


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Test Pit TP-14

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Project Name: NGWSP - Reach 27.9 Date Excavated: 8/7/2015
Project Number: 152-2296 Latitude: 35.54442°
Client: DePauli Engineering & Surveying Longitude: -108.76932°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 135+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: N/A Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
							SC		1	CLAYEY SAND, brown to tan, slightly damp, 4" to 6" thick
							RK		2	SANDSTONE, tan, fine-grained, highly weathered, highly fractured
									3	less fractured and harder below 2 feet
									4	test pit terminated at 2.5 feet due to refusal on sandstone
									5	Total Depth 2.5 feet
									6	
									7	
									8	
									9	
									10	
									11	
									12	

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Test Pit TP-15

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Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/5/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.54291°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.77061°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 145+00</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	36	16	2.5			D			1	CLAYEY SAND, brown to gray, fine-grained, slightly damp relatively easy digging
							SC		2	
									3	
									4	
									5	
									6	
									7	CLAYEY SAND with trace gravel, brown to gray, fine-grained, slightly damp
							SC		8	
									9	
									10	Total Depth 10 feet
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-16

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Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/5/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.54117°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.77120°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 580</u>	Test Pit Location: <u>Sta 154+00</u>
Excavation Method: <u>24" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	63	17	39			D			1	SANDY LEAN CLAY, brown to gray, very stiff, damp, massive
									2	
									3	
									4	
							CL		5	
									6	
									7	hard difficult digging below 7 feet
									8	
									9	test pit terminated at 9 feet due to practical refusal on hard clay
									10	
									11	Total Depth 9 feet
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample

TEST PIT 152-2296 GPJ 8/31/15



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Test Pit TP-17

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Project Name: NGWSP - Reach 27.9 Date Excavated: 8/5/2015
Project Number: 152-2296 Latitude: 35.53859°
Client: DePauli Engineering & Surveying Longitude: -108.77022°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 164+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	36	3	2.1			D	SM		1	SILTY SAND, brown to gray, fine-grained, slightly damp, weak cementation
							CL		2	
									3	SANDY LEAN CLAY, brown to gray, very stiff to hard, slightly damp
									4	
									5	
									6	test pit terminated at 5 feet due to practical refusal on hard clay Total Depth 5 feet
									7	
									8	
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-18

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Project Name: NGWSP - Reach 27.9
Project Number: 152-2296
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590
Excavation Method: 18" Bucket
Sampling Method: Bulk sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 8/4/2015
Latitude: 35.53602°
Longitude: -108.76929°
Elevation: Not Determined
Test Pit Location: Sta 174+00
Groundwater Depth: None Encountered
Logged By: DB
Remarks: None

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	55	2	3.1			D	ML		1	SANDY SILT with gravel, brown to tan, damp
									2	
									3	
									4	
									5	SANDY LEAN CLAY, dark brown to gray, very stiff, slightly damp, massive
									6	
						GRAE	CL		7	
									8	
									9	slow, difficult digging
									10	
									11	Total Depth 10 feet
									12	

TEST PIT 152-2296.GPJ 8/31/15

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-19

Page 1 of 1

Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/4/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.53334°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76859°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 590</u>	Test Pit Location: <u>Sta 184+00</u>
Excavation Method: <u>18" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	38	6	1.7			D	SC-SM		1	SILTY, CLAYEY SAND with gravel, gray to tan, fine-grained, damp (possible road embankment fill) contains occasional cobble-size sandstone fragments
									2	
									3	
									4	
									5	
									6	
							RK		7	SANDSTONE, tan, fine-grained, moderately weathered, hard Rock surface appears to be stair-stepped rather than flat
									8	test pit terminated at 7 feet due to refusal on sandstone Total Depth 7 feet
									9	
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-20

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Project Name: <u>NGWSP - Reach 27.9</u>	Date Excavated: <u>8/4/2015</u>
Project Number: <u>152-2296</u>	Latitude: <u>35.53134°</u>
Client: <u>DePauli Engineering & Surveying</u>	Longitude: <u>-108.76819°</u>
Site Location: <u>McKinley County, New Mexico</u>	Elevation: <u>Not Determined</u>
Rig Type: <u>Case 590</u>	Test Pit Location: <u>Sta 191+60</u>
Excavation Method: <u>18" Bucket</u>	Groundwater Depth: <u>None Encountered</u>
Sampling Method: <u>Bulk sample</u>	Logged By: <u>DB</u>
Hammer Weight: <u>N/A</u>	Remarks: <u>None</u>
Hammer Fall: <u>N/A</u>	

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	15	NP	08			D	SM		1	SILTY SAND, brown to gray, fine-grained, slightly damp, weak cementation
									2	
									3	trace gravel
									4	
							CL		5	SANDY LEAN CLAY, brown to gray, very stiff, damp, massive
									6	
									7	
									8	slow, moderately difficult digging
									9	
									10	Total Depth 10 feet
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-21

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Project Name: NGWSP - Reach 27.9 Date Excavated: 8/6/2015
Project Number: 152-2296 Latitude: 35.54946°
Client: DePauli Engineering & Surveying Longitude: -108.76363°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 16+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	52	22	33			D	CL		1	SANDY LEAN CLAY, brown, stiff, damp
									2	very stiff to hard, slightly damp, massive
									3	
									4	hard, slow digging
									5	
									6	occasional cobbles
									7	
							RK		8	SHALE, dark gray to green-gray, moderately weathered, weakly fissile
									9	hard digging
									10	Total Depth 10 feet
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample



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Test Pit TP-23

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Project Name: NGWSP - Reach 27.9 Date Excavated: 8/6/2015
Project Number: 152-2296 Latitude: 35.54952°
Client: DePauli Engineering & Surveying Longitude: -108.75758°
Site Location: McKinley County, New Mexico Elevation: Not Determined
Rig Type: Case 580 Test Pit Location: Sta 34+00
Excavation Method: 24" Bucket Groundwater Depth: None Encountered
Sampling Method: Bulk sample Logged By: DB
Hammer Weight: N/A Remarks: None
Hammer Fall: N/A

Laboratory Results				Field Dry Density (pcf)	Field Moisture Content (%)	Sample Type	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
	58	21	38			D			1	SANDY LEAN CLAY, brown to gray, stiff, damp to moist, massive
									2	
									3	
									4	
							CL		5	relatively easy digging
									6	
									7	
									8	
									9	Total Depth 10 feet
									10	
									11	
									12	

G = Grab Sample MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer D = Disturbed Bulk Sample

UNIFIED SOIL CLASSIFICATION SYSTEM							CONSISTENCY OR RELATIVE DENSITY CRITERIA								
Major Divisions				Group Symbols	Typical Names										
Coarse-Grained Soils	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines		Penetration Resistance, N (blows/ft.)	Relative Density	<u>Standard Penetration Test</u> Density of Granular Soils							
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines											
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures											
			GC	Clayey gravels, gravel-sand-clay mixtures											
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines											
			SP	Poorly graded sands and gravelly sands, little or no fines											
		Sands with Fines	SM	Silty sands, sand-silt mixtures											
			SC	Clayey sands, sand-clay mixtures											
												<u>Standard Penetration Test</u> Density of Granular Soils			
Fine-Grained Soils	Silts and Clays Liquid Limit 50 or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands		Penetration Resistance, N (blows/ft.)	Consistency	Unconfined Compressive Strength (Tons/ft ²)	<u>Standard Penetration Test</u> Density of Granular Soils						
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays											
			OL	Organic silts and organic silty clays of low plasticity											
	Silts and Clays Liquid Limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous free sands or silts, elastic silts											
			CH	Inorganic clays of high plasticity, fat clays											
			OH	Organic clays of medium to high plasticity											
	Highly Organic Soils			PT	Peat, muck & other highly organic soils										
	U.S. Standard Sieve Sizes														
>12"		12"	3"	3/4"	#4	#10	#40	#200							
Boulders		Cobbles		Gravel		Sand			Silt or Clay						
				coarse fine		coarse medium fine									

MOISTURE CONDITIONS

Dry	Absence of moist, dusty, dry to the touch
Slightly Damp	Below optimum moisture content for compaction
Moist	Near optimum moisture content, will moisten the hand
Very Moist	Above optimum moisture content
Wet	Visible free water, below water table

MATERIAL QUANTITY

trace	0-5%
few	5-10%
little	10-25%
some	25-45%
mostly	50-100%

OTHER SYMBOLS

R	Ring Sample
S	SPT Sample
B	Bulk Sample
▼	Ground Water

BASIC LOG FORMAT:

Group name, Group symbol, (grain size), color, moisture, consistency or relative density Additional comments: odor, presence of roots, mica, gypsum, coarse particles, etc.

EXAMPLE:

SILTY SAND w/trace silt (SM-SP). Brown, loose to med. Dense, fine to medium grained, damp

UNIFIED SOIL CLASSIFICATION SYSTEM

TEST DRILLING EQUIPMENT & PROCEDURES

Description of Subsurface Exploration Methods

Drilling Equipment – Truck-mounted drill rigs powered with gasoline or diesel engines are used in advancing test borings. Drilling through soil or softer rock is performed with hollow-stem auger or continuous flight auger. Carbide insert teeth are normally used on bits to penetrate soft rock or very strongly cemented soils which require blasting or very heavy equipment for excavation. Where refusal is experienced in auger drilling, the holes are sometimes advanced with tricone gear bits and NX rods using water or air as a drilling fluid.

Sampling Procedures - Dynamically driven tube samples are usually obtained at selected intervals in the borings by the ASTM D1586 test procedure. In most cases, 2" outside diameter, 1 3/8" inside diameter, samplers are used to obtain the standard penetration resistance. "Undisturbed" samples of firmer soils are often obtained with 3" outside diameter samplers lined with 2.42" inside diameter brass rings. The driving energy is generally recorded as the number of blows of a 140-pound, 30-inch free fall drop hammer required to advance the samplers in 6-inch increments. These values are expressed in blows per foot on the boring logs. However, in stratified soils, driving resistance is sometimes recorded in 2- or 3-inch increments so that soil changes and the presence of scattered gravel or cemented layers can be readily detected and the realistic penetration values obtained for consideration in design. "Undisturbed" sampling of softer soils is sometimes performed with thin-walled Shelby tubes (ASTM D1587). Tube samples are labeled and placed in watertight containers to maintain field moisture contents for testing. When necessary for testing, larger bulk samples are taken from auger cuttings. Where samples of rock are required, they are obtained by NX diamond core drilling (ASTM D2113).

Boring Records - Drilling operations are directed by our field engineer or geologist who examines soil recovery and prepares boring logs. Soils are visually classified in accordance with the Unified Soil Classification System (ASTM D2487), with appropriate group symbols being shown on the logs.

Appendix B

LAB NO.	TEST PIT NO.	STATION NO.	ASTM D698 PROCTOR		SIEVE ANALYSIS, CUMULATIVE PERCENT PASSING										ATTERBERG LIMITS			MOISTURE CONTENT AS RECEIVED (%)	USCS CLASSIFICATION		
			OPTIMUM MOISTURE (%)	DRY DENSITY (pcf)	3/4"	1/2"	3/8"	No. 4	No. 8	No. 10	No. 16	No. 30	No. 40	No. 50	No. 100	No. 200	LL			PL	PI
3065	TP-1	2+00	13.2	112.2	100	100	100	100	100	100	99	98	94	83	41	20	25	13	12	4.2	Clayey SAND (SC)
3066	TP-2	13+50	13.0	114.0	100	100	100	99	99	98	98	95	91	80	41	20	NLL	NPL	NP	2.5	Silty SAND (SM)
3067	TP-3	21+00	14.5	111.7	100	100	100	100	99	99	99	96	94	81	42	28	21	17	4	1.9	Silty, clayey SAND (SC-SM)
3068	TP-4	38+50	15.4	111.2	100	100	99	99	98	98	97	94	93	87	48	26	23	16	7	2.0	Silty, clayey SAND (SC-SM)
3069	TP-5	47+00	15.3	104.3	100	100	100	100	99	99	98	97	95	90	57	32	27	21	6	2.8	Silty, clayey SAND (SC-SM)
3070	TP-6	57+00	15.0	110.5	100	100	100	99	99	99	98	97	96	91	55	34	24	16	8	2.2	Clayey SAND (SC)
3071	TP-7	67+00	18.7	94.3	100	100	100	100	100	100	100	93	88	82	62	43	44	19	25	6.2	Clayey SAND (SC)
3072	TP-8	76+50	13.2	108.3	100	100	100	100	100	100	100	100	99	96	49	11	NLL	NPL	NP	1.0	Poorly graded SAND with silt (SP-SM)
3073	TP-9	83+50	17.5	102.7	100	100	100	100	100	100	100	96	92	87	68	50	36	16	20	3.9	Sandy Lean CLAY (CL)
3074	TP-10	94+00	15.7	106.9	100	100	100	100	100	100	100	97	94	88	57	32	29	17	12	3.2	Clayey SAND (SC)
3075	TP-11	105+00	19.4	97.4	100	100	100	100	100	100	100	93	87	79	53	33	42	21	21	5.2	Clayey SAND (SC)
3076	TP-12	115+00	12.4	108.5	100	100	100	99	99	98	98	97	96	92	77	59	26	17	9	4.9	Sandy Lean CLAY (CL)
3077	TP-13	125+00	14.7	106.8	100	100	100	100	99	99	99	96	93	88	64	38	30	14	16	3.7	Clayey SAND (SC)
3078	TP-15	145+00	13.2	109.5	100	100	100	100	99	99	99	96	94	88	61	36	30	14	16	2.5	Clayey SAND (SC)
3079	TP-16	154+00	15.2	105.1	100	100	100	100	100	100	99	98	97	95	79	63	30	13	17	3.9	Sandy Lean CLAY (CL)
3080	TP-17	164+00	14.2	110.8	100	100	100	100	99	99	99	97	96	93	65	36	20	17	3	2.1	Silty SAND (SM)
3081	TP-18	174+00	13.4	113.2	100	97	97	97	97	97	97	96	96	94	77	55	20	18	2	3.1	Sandy SILT (ML)
3082	TP-19	184+00	12.4	111.7	100	100	99	97	96	95	94	91	89	84	56	38	22	16	6	1.7	Silty, clayey SAND (SC-SM)
3083	TP-20	191+60	15.7	99.4	100	100	100	100	100	100	100	99	99	94	50	15	NLL	NPL	NP	0.8	Silty SAND (SM)
3084	TP-21	16+00	16.1	105.4	100	100	100	100	100	100	100	99	99	98	81	52	35	13	22	3.3	Sandy Lean CLAY (CL)
3086	TP-23	34+00	16.1	105.0	100	100	100	100	100	100	100	99	98	94	75	58	34	13	21	3.8	Sandy Lean CLAY (CL)
					SUMMARY OF SOIL TESTS										Project			Navajo Gallup Water Supply Project - Reach 27.9			
															Job No.			152-2296			
															Location			McKinley County, New Mexico			
															Dates of Exploration			August 3 - 7, 2015			

LABORATORY TESTING PROCEDURES

Consolidation Tests: One-dimensional consolidation tests are performed using “Floating-ring” type consolidometers. The test samples are approximately 2.5 inches in diameter and 1.0 inch high and are usually obtained from test borings using the dynamically-driven ring samplers. Test procedures are generally as outlined in ASTM D2435. Loads are applied in several increments to the upper surface of the test specimen and the resulting deformations are recorded at selected time intervals for each increment. Samples are normally loaded in the in-situ moisture conditions to loads which approximate the stresses which will be experienced by the soils after the project is completed. Samples are usually then submerged to determine the effect of increased moisture contents on the soils. Each load increment is applied until compression/expansion of the sample is essentially complete (normally movements of less than 0.0003 inches/hour). Porous stones are placed on the top and bottom surfaces of the samples to facilitate introduction of the moisture.

Expansion Tests: Tests are performed on either undisturbed or recompacted samples to evaluate the expansive potential of the soils. The test samples are approximately 2.5 inches in diameter and 1.0 inch high. Recompacted samples are typically remolded to densities and moisture contents that will simulate field compaction conditions. Surcharge loads normally simulate those which will be experienced by the soils in the field. Surcharge loads are maintained until the expansion is essentially complete.

Atterberg Limits/Maximum Density/Optimum Moisture Tests: These tests are performed in accordance with the prescribed ASTM test procedures.

Appendix C

RESULTS OF IN-SITU SOIL RESISTIVITY TESTING

Navajo Gallup Water Supply Project

GEOMAT Project No. 152-2296

Reach 27.9

Page 1 of 2

Electrode Spacing ⁽¹⁾ (ft)	Apparent Resistivity in Ohm-cm ⁽²⁾					
	Resistivity Test No. ⁽³⁾					
	R-1	R-2	R-3	R-4	R-5	R-6
3	6320	6320	14075	5400	2327	7469
6	7239	4251	12639	2758	2413	5400
9	7239	3447	10944	2499	2241	4136
12	7124	3217	7469	2068	1907	2987
15	7612	3016	3591	2154	1695	2384
18	7411	2895	4136	1965	1586	2034
24	7354	2712	3677	1746	1333	1701
30	8618	2470	3160	1494	1206	1609
36	6549	2206	1792	1448	1172	1310
45	5946	1896	1379	1120	1120	1206

NOTES:

¹Spacing in feet between each of four equally-spaced electrodes per ASTM G57 (Wenner 4-Pin Method)

²Apparent resistivity at each electrode spacing = (meter reading in ohms)(spacing in feet)(191.5)

³Test locations are shown on the Site Plan in Appendix A

RESULTS OF IN-SITU SOIL RESISTIVITY TESTING
Navajo Gallup Water Supply Project
GEOMAT Project No. 152-2296
Reach 27.9
Page 2 of 2

Electrode Spacing ⁽¹⁾ (ft)	Apparent Resistivity in Ohm-cm ⁽²⁾					
	Resistivity Test No. ⁽³⁾					
	R-7	R-8	R-9	R-10	R-11	R-12
3	2327	7756	5975	5056	5458	2987
6	2183	6607	3217	4366	1838	2873
9	2068	6291	2671	3533	1896	3447
12	1884	6205	2068	3217	1838	4136
15	1752	6320	1925	2873	1752	4883
18	1620	5515	2034	3033	1620	6205
24	1471	4596	1287	2528	1655	7583
30	1321	3907	1781	2126	1264	7756
36	827	4343	1792	2964	1034	7928
45	732	3102	1465	1982	517	6894

NOTES:

- ¹Spacing in feet between each of four equally-spaced electrodes per ASTM G57 (Wenner 4-Pin Method)
²Apparent resistivity at each electrode spacing = (meter reading in ohms)/(spacing in feet)(191.5)
³Test locations are shown on the Site Plan in Appendix A

Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you — should apply this report for any purpose or project except the one originally contemplated.*

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an

assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.*

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help

others recognize their own responsibilities and risks. *Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.*

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.



8811 Colesville Road/Suite G106, Silver Spring, MD 20910

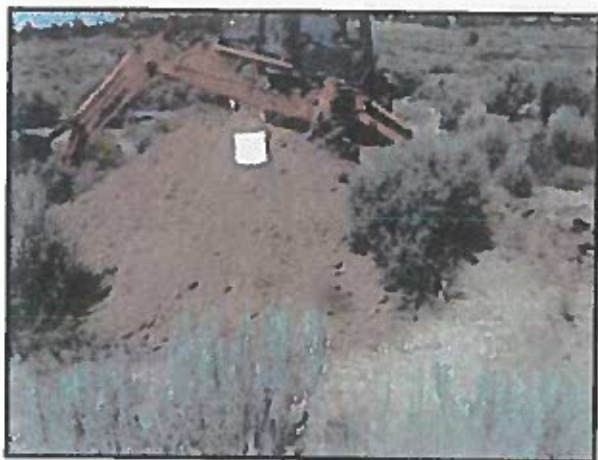
Telephone: 301/565-2733 Facsimile: 301/589-2017

e-mail: info@geoprofessional.org www.geoprofessional.org

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Appendix D

PHOTOGRAPHS OF TEST PITS – REACH 27.9



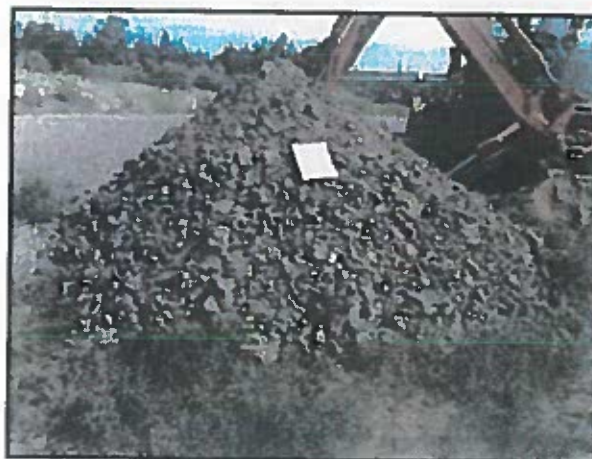
Test Pit TP-1



Test Pit TP-2



Test Pit TP-3



Test Pit TP-4



Test Pit TP-5



Test Pit TP-6

PHOTOGRAPHS OF TEST PITS – REACH 27.9



Test Pit TP-7



Test Pit TP-8



Test Pit TP-9



Test Pit TP-10



Test Pit TP-11



Test Pit TP-12

PHOTOGRAPHS OF TEST PITS – REACH 27.9



Test Pit TP-13



Test Pit TP-15



Test Pit TP-16



Test Pit TP-17



Test Pit TP-18



Test Pit TP-19

PHOTOGRAPHS OF TEST PITS – REACH 27.9



Test Pit TP-20



Test Pit TP-21



Test Pit TP-22



Test Pit TP-23

APPENDIX D

Highway Permits Work Permit



December 15th, 2017

City of Gallup
P.O. Box 1270
Gallup, NM, 87305
Attn: Dennis Romero

RE: Utility Permit # 17-6U-033
Subject: Authorization to Proceed: City of Gallup
Location: US 491 MM 1.5 (POSITIVE & NEGATIVE)
**** CROSSING , SUBSURFACE, JACK , BORE ****
**** 16" Ductline Iron Waterline in a 26" Steel Casing****

Dear Mr. Romero:

The District Six Traffic Section has reviewed the subject utility installation submitted by you and find it satisfies State utility regulations as proposed. This correspondence is your authority to proceed with the construction of your facility installation in accordance with the drawings provided to us by your company. This authorization applies only to fee owned State highway right of way; if other lands are involved (Indian, Federal, State, etc.) it is your responsibility to have secured their approval of your installation as well.

Please note that the fully executed utility permit will be returned to you as soon as we receive the required As-Built Plans and Electronic File. These items are required within 30-thirty days of completion of your installation.

You are required to notify Jeffrey Weeker via email: jeff.weeker@state.nm.us by completing the attached Traffic Control/ Roadway Work Permit Form at least five(5) days in advance of construction. Upon receipt of an approved Traffic Control Permit you will have permission to enter the NMDOT Right of Way.

Should you find it necessary to deviate from the proposed installation or approved TCP, any such deviation must have written approval by the District Six Office prior to proceeding with construction. All work performed must meet or exceed the NMDOT's Standard Specifications for Highway and Bridge Construction 2014 Edition. In addition to the above requirements:

1. The Traffic Control Plan and all traffic control devices used by the owner and Contractor must comply with Part VI of the Manual on Uniform Traffic Control Devices (MUTCD) 2009.
2. The utility owner and contractor shall abide by Section 12.0 through 12.5 of the NMSH&TD Utilities Manual under General Utility Construction Requirements.

Susana Martinez
Governor

Tom Church
Cabinet Secretary

Commissioners

Ronald Schmelts
Chairman
District 4

Dr. Kenneth White
Secretary
District 1

David Sepich
Commissioner
District 2

Keith Mortensen
Commissioner
District 3

Butch Mathews
Commissioner
District 5

Billy Moore
Commissioner
District 6



NEW MEXICO DEPARTMENT OF
TRANSPORTATION

3. All above-ground utilities shall be marked in accordance with Section 18.0 of The NMSH&TD Utilities Manual under General Utility Construction Requirements.
4. Should the roadside disturbance in conjunction with this permit application be less than one acre, a National Pollution Discharge Elimination System (NPDES) will not be required. If the roadside disturbance in conjunction with this permit application is greater than one acre, a National Pollution Discharge Elimination System (NPDES) will be required. The applicant shall maintain the required NPDES measures in accordance with the NMDOT's NPDES Specifications and/or the requirements listed in the NMDOT's Drainage Section's approval letter.

If you have any questions, please call the Traffic Office at (505) 285-3223 or you can reach me by email: jeff.weeker@state.nm.us

Sincerely,

Jeffrey Weeker
Traffic Control Technician

Enclosure

Cc: 46-58
Records
File

Susana Martinez
Governor

Tom Church
Cabinet Secretary

Commissioners

Ronald Schmeits
Chairman
District 4

Dr. Kenneth White
Secretary
District 1

David Sepich
Commissioner
District 2

Keith Mortensen
Commissioner
District 3

Butch Mathews
Commissioner
District 5

Billy Moore
Commissioner
District 6

APPLICATION FOR PERMIT TO INSTALL UTILITY FACILITIES
WITHIN PUBLIC RIGHT OF WAY

TO: NEW MEXICO DEPARTMENT OF TRANSPORTATION
P.O. BOX 1149
SANTA FE, NEW MEXICO 87504 - 1149

Permit No. _____
Renewal Permit _____
Relocation _____
Remain in place _____
☒ New Installation

1. Pursuant to New Mexico Statutes Annotated, 1978 Compilation, Sections 67-8-13 and 55-2-7, and 17.4.2 NMAC the undersigned
City of Gallup, New Mexico

Address: P.O. Box 1270, Gallup, NM 87305

herein makes application to use highway rights of way to install:

Size and Type of Facility 16" Ductile Iron Waterline in a 26" Steel Casina

in the following location: N.M. Project No. 1-040-1(44)21 & F-031-1(20), S.R. No. Highway 491,

Highway Station / and or GPS/MP 113+37 to Highway Station and/or
GPS/MP 1.5 mi N fr I-40/491 Intersector,

McKinley County, Section 9, Township 15N, Range 18W

2. For the purpose of this application "within" shall be construed as meaning "on, upon, over, under, across or along."
- "Engineer" shall be construed as meaning the District Engineer of the New Mexico Department of Transportation or the District Engineer's representative.
 - "Applicant" shall be construed as meaning the individual, firm, corporation, association, governmental subdivision, or other organization making application, or the successors of any of the above.
 - "Facility" shall be construed as meaning, but not limited to any publicly, privately, cooperatively, municipally or governmentally owned facility used for carriage, distribution or transmission of water, gas or electricity, oil and products derived therefrom, sewage, stream or other projects carried by means of pipelines, conduits, wires, culverts, ditches, conveyors or other methods.
 - If application is for a parallel installation, justification as to why private right may not be utilized must be furnished.
3. Applicant proposes to relocate, install or leave facility crossing feet within the right of way line. The proposed installation shall be:
- | | | |
|------------------------|--------------------------|-----------------------------------|
| <u>Crossing</u> | <u>Subsurface</u> | <u>Jack & Bore</u> |
| (Crossing or Parallel) | (Subsurface or Overhead) | (Boring, Jacking or Pavement Cut) |
- If Applicant requests installation by pavement cut, complete justification therefore shall be submitted by attachment.
 - Where application for pavement cut is justified, the application may be held in abeyance pending receipt of cash bond in an amount to be fixed by the Engineer.
4. There is attached hereto a diagrammatic dimensioned drawing showing the location of existing and/or proposed installation referenced to roadway and right of way, right of way lines, any access control lines, distance of proposed installation above, or below grade, highway stationing, identification of materials to be used and any other pertinent data. If application is for parallel installation, nature of adjacent land use must be shown. Proposed installations on or in bridges or other structures, or for the installation of any structures, shall require detailed structural drawings.
5. Applicant desires this permit to be in affect for 25 years. Permit shall not be issued for a period longer than 25 years, and must be renewed upon expiration. The burden of timely renewal is on the Applicant. The Applicant shall formally notify the engineer of actual commencement and completion of construction of the installation. The Applicant shall also formally notify the Engineer of removal or abandonment of the facility, or relinquishment of the permit.
6. This application shall be validated as a permit upon the signing of the application by the Engineer and returning it to the applicant. The granting of this permit shall not be construed as granting any easement or property right.
7. Servicing of facilities shall not be permitted within the access control lines on any controlled access project. Should an emergency occur, the Applicant shall notify the Engineer and shall provide such flagmen, flashers, warning or other safety devices as required by the Engineer. All routine maintenance shall be performed from outside any access control lines.
8. The relocation or installation of facilities within public right of way shall be in strict conformance with all applicable provisions of

regulations of the New Mexico Department of Transportation, 17.4.2 NMAC, all provisions of this application, drawing and the instructions for Utility Permits, as they may be modified by the Engineer, and no departure therefrom may be made without the written consent of the Engineer. All facilities shall be so placed that they will not interfere with or endanger any roadway features or other existing facilities. All construction of facilities shall be subject to the inspection and approval of the Engineer. All such work shall be performed so that danger, inconvenience and delay to the traveling public will be held to a minimum. Protection and handling of traffic during the installation are the responsibility of the Applicant and must be approved by the Engineer.

9. The Applicant shall, except as otherwise ordered by the Engineer, restore the public right of way, and all bridges or other structures thereon or adjacent thereto which have been altered or affected by facility installation performed hereunder, in accordance with sound construction practices and the Engineer's specifications, and shall cause the work to be done in a workmanlike manner. If any damage is caused to the highway right of way or to any bridge, structure or improvement thereon or adjacent thereto by reason of the design installation, maintenance, alteration or removal of such facilities or other appurtenances, the Applicant shall reimburse the Engineer the full amount thereof promptly upon demand by the Engineer provided, however, that the obligation imposed under this paragraph shall not apply in the event the damage resulted from causes beyond the control of the Applicant or its contractors or its consultants. All such facilities located within the right of way shall at all times be kept in such repair so as not to damage the highway, inconvenience or endanger the traveling public and shall be kept free from advertisement, posters and the like.
10. Should the Applicant at any time fail to promptly and fully perform any of the obligations imposed hereby and after thirty (30) days written notice thereof, the Engineer may, at his option (a) cause the obligations to be fully carried out and performed, and the Applicant shall promptly reimburse the Engineer for all costs and expenses incident thereto, or (b) summarily order the removal of such facility and if the Applicant fails to comply with that removal order within a reasonable time, the Engineer may direct the removal of the facility with all costs and expenses thereto to be borne by Applicant.
11. If by reason of any change in the location, construction, grade or by any other matter affecting the highway upon which any facility is located or because of changing traffic conditions or otherwise, it shall become advisable in the opinion of the Engineer that said facility be removed, relocated or otherwise modified, the Applicant, upon written notice from the Engineer, shall remove, relocate or modify such facility without undue delay in such manner as the Engineer may direct or approve, at the Applicant's expense and at no cost to the Engineer, the New Mexico Department of Transportation or the New Mexico State Transportation Commission. All facilities located on public right of way under the dual jurisdiction of the State and a subordinate governmental entity shall comply with all applicable rules and regulations of such entity properly and lawfully in force and including but not limited to provisions of local franchises not in conflict with the rules and regulations of the New Mexico Department of Transportation. The Engineer makes no express or implied as to the continued existence of any highway in any particular location and expressly assumes no obligation with regard to the facility upon change, vacation or abandonment of any highway or portions thereof.
12. Neither the making of this application nor anything herein contained shall constitute a waiver on the part of the Applicant of any rights or claims had or made by some with respect to the occupancy of the streets and highways under the Constitution and Laws of the State of New Mexico, nor shall anything herein contained in any prejudice or impair any rights or claims existing independent of this application with respect to the construction, operation and maintenance of the Applicant's facilities in the State of New Mexico.
13. The utility owner must indemnify and hold harmless the New Mexico Department of Transportation from loss due to any negligent act of the utility, the utility's employees, any agent acting on the utility's behalf, and anyone else engaged by the utility to work on the utility installations, maintenance or relocations of their facilities. Any contractor or subcontractor engaged by the utility to perform utility installations or relocations in conjunction with or prior to highway construction must also indemnify and hold harmless the New Mexico Department of Transportation from loss due to any negligent act of the utility's contractor or subcontractor.
14. Each copy of the application shall be signed by the Applicant as an individual owner or by any official designated to execute such documents.
15. Utility owners shall carry insurance in amounts not less than those below specified and as outlined in 17 NMAC 4.2 and the Standard Specifications for Highway and Bridge Construction, 1994 Edition, (hereinafter, "Specifications"), as may be updated from time to time. In the event of conflict between the specification, and the regulations, owner shall carry the larger amount of insurance. If a utility is self-insured, the utility shall provide an Owner's Protective Liability Insurance Policy, in favor of the Department, in the amounts below specified. Department as additional named insured: The utility, its contractor or subcontractor shall have the New Mexico State Highway and Transportation Department added as an additional named insured on the Comprehensive General Liability Form or Commercial General Liability Form furnished by the Utility.

This application is hereby granted subject to all provisions herein and including the following special provisions, changes or amendments:

The utility shall provide "as-built" horizontal and vertical location information in hard copy and electronic file (AutoCAD DWG (3D) or Microstation DGN (3D) format. The standard horizontal datum shall be North American Datum 1983 (NAD83) and the standard projections shall be the New Mexico State Plane

Coordinate System 1983 (NMSPCS83). The standard vertical datum shall be North American Vertical Datum 1988 (NAVD 1988). The preferred media in which this data must be submitted is CD ROM. The utility location information shall be tied to Department monuments and referenced to highway mileposts and/or to highway project construction stationing and certified by a New Mexico Registered Land Surveyor. Metadata or "data about the data" shall be submitted with each utility's as-built electronic file, preferably as a separate text file on the electronic submittal media, and shall include: 1. District Utility Permit Number. 2. Name, address and phone number of the responsible land surveyor. 3. Date of completion of survey. 4. Equipment used to conduct the Survey. 5. Horizontal and vertical control marks used to tie the survey to the NMSPC83 and NAVD88. 6. Ground to Grid combined scale factor used. 7. Elevations shall be provided every 500 feet and at all survey break points, including all high and low points.

Note: Highway projects are time sensitive therefore, permit information requested from Authorization to Engineer Letters must be returned by the date indicated within the Authorization to Engineer letter.

16. Pursuant to: MAP-21; <http://www.fhwa.dot.gov/construction/contracts/buyam-qa.cfm> and (23U.S.C313) Applicant/Utility Owner certifies we are in compliance with Buy America for said facility described in Section 1. of this permit document. Applicant agrees and understands nonadherence will void said permit.

Applicant Dennis Romero, City of Gallup

By [Signature]

Title Water & Sanitation Director

Approval of this permit is hereby given this _____ day of _____, 20____

NEW MEXICO DEPARTMENT of TRANSPORTATION

By _____

Approved:

[Signature]
District Six Traffic Engineer

12/15/17

REVIEWED

By Kasey Flavin at 3:35 pm, Nov 13, 2017

Phone: 505-863-5440 • Fax: 505-863-1919 • www.depauliengineering.com



& Surveying, LLC.

Civil Engineers and Land Surveyors

CULTURAL RESOURCE INVENTORY

NOT REQUIRED

NMDOT, ENVIRONMENTAL SECTION

November 2, 2017

Kasey Flavin
Environmental Scientist
CLA Coordinator
NMDOT Environmental Bureau
1120 Cerillos Rd.
Santa Fe, NM 87504

ENVIRONMENTAL SURVEY

NOT REQUIRED

NMDOT, ENVIRONMENTAL SECTION

**Re: Navajo Gallup Water Supply Project, Reach 27.9 – City of Gallup – Funded by US
Bureau of Reclamation Cooperative Agreement No. R11AC40002
Environmental and Cultural Resource Clearance**

Dear Kasey,

The following information is provided to obtain Environmental and Cultural Resource clearance in order to proceed with the application for utility permits.

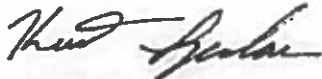
1. **Purpose and Nature:** The purpose is to install 16" waterline in a 26" steel casing (L=250') crossing Highway 491. Construction machinery to include excavators, loaders, water trucks, boring machine, and compaction equipment. 26" steel casing will begin and end outside of highway right of way in City of Gallup right of way.
2. **NMDOT Project ?:** No
3. **Funding Source:** Federal
4. **Land Status:** NMDOT Right of Way
5. **Permitting Agencies:** NMDOT
6. **County:** McKinley
7. **Highway Number:** Highway 491
8. **BOP and EOP:** Approximately 1.5 Miles north of the Intersection of Highway 491 and Interstate 40.
9. **Side of Road:** Crossing
10. **Length:** 250'

11. Legal Description: NW¼, Section 9, T15N, R18W, NMPM.

12. USGS Quad Map: Gallup West, NM

We are enclosing a location and vicinity map for proposed project. Please call if you have questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "Kurt Spolar".

Kurt Spolar, PE
KAS/dmta



Calculated By: Jeffrey Weeker
 Date: December 15, 2017
 Checked By: _____
 Date: _____

Maintenance Traffic Control Calculations

Input:

State Route: US 491
 CN: _____
 Contractor: _____

Road Type

- 1 - Urban (< 30 MPH)
- 2 - Urban (> 35 MPH)
- 3 - Rural
- 4 - Expressway / Freeway

3

Posted Speed Limit, "S"

55

Number of Lanes (one direction)

2 NB & 3 SB

Lane Width (FT), "W"

11

Shoulder Width (FT)

10

Output:

Advanced Warning Signs (Feet)

Distance Between Signs

A

B

C

500

500

500

Transition Area (Feet)

Taper Length, "L"

605

Shoulder Taper = 0.33L minimum

182

Shifting Taper = 0.5L minimum

303

Merging Taper = L

605

One Lane, Two-Way Traffic Taper

100 FT

Transition Area / Calming Zone

1320

Taper Length:

40 MPH >, USE $L = WS^2/60$

45 MPH <, USE $L = WS$

Activity Area (Feet)

Buffer Space, Length (Optional)

495

Work Space, Length

As Required

Termination Area (Feet)

Downstream Taper

50 to 100

Channelization Devices (Each)

Minimum Number of Devices

12

Along Taper

Along Tangent

Maximum Device Spacing, (FT)

55

110

Buffer Space or Distance to Flagger

Speed, MPH

Distance, Feet

55

495

Notes:

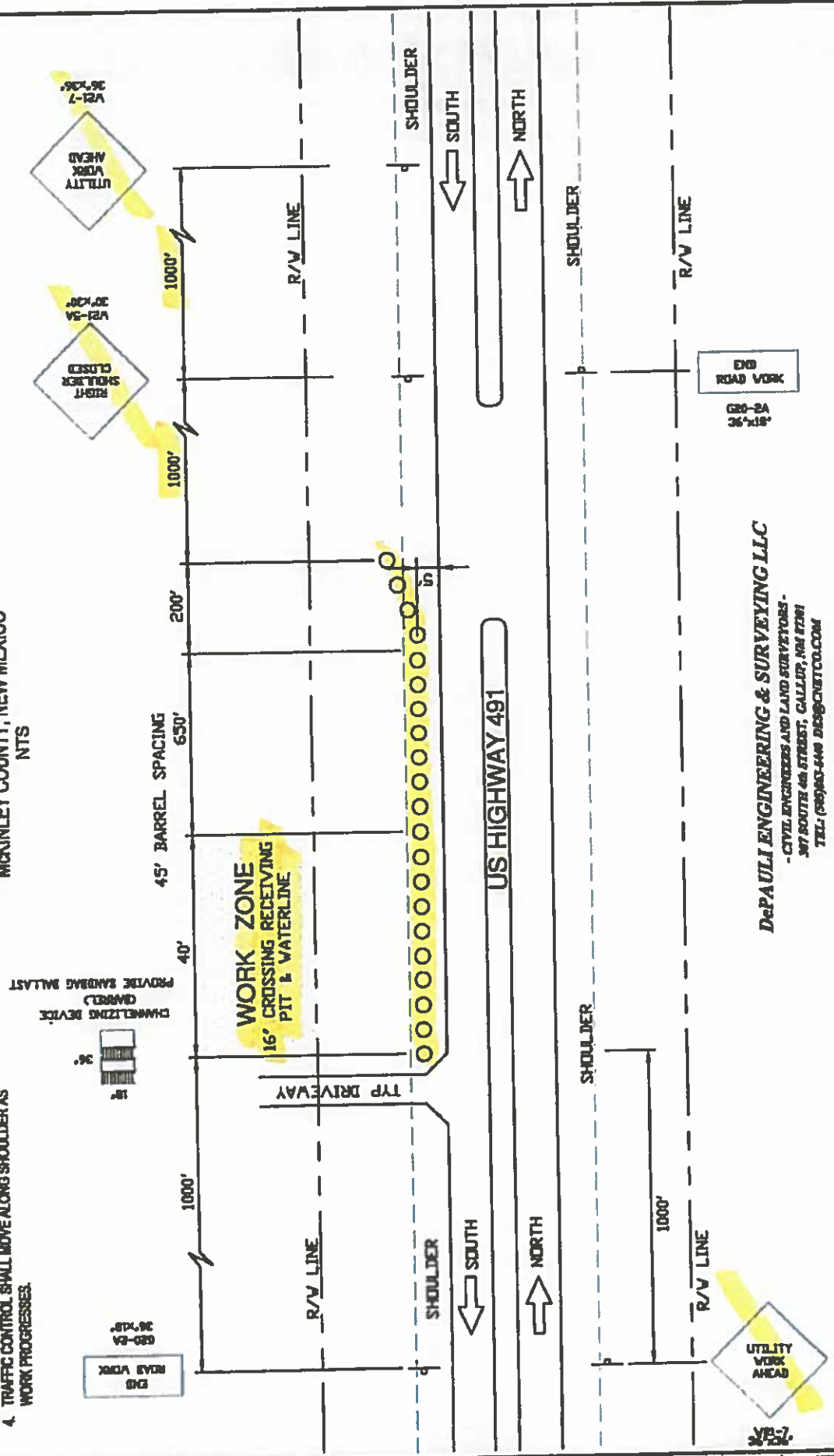
Traffic Control will be "SHOULDER WORK" only. No lane closures

PRELIMINARY TRAFFIC CONTROL PLAN **GALLUP-RURAL NAVAJO WATER SUPPLY PROJECT REACH 27.9**

16" WATERLINE CONSTRUCTION CROSSING
NMDOT PROJ. NO. 1-040-14421 & F-031-1(20)
STATION 113+37, MILE MARKER 1.5±

SECTION 9, T15N, R18W, N.M.P.M.;
 MCKINLEY COUNTY, NEW MEXICO
 NTS

- NOTES:**
1. PROVIDE FLASHER LIGHTS ON EVERY OTHER BARREL
 2. IF TRAFFIC CONTROL IS LEFT IN PLACE OVER NIGHT.
 3. TRAFFIC CONTROL DEVICES & SIGNS TO CONFORM TO MUTCD STANDARDS.
 4. DRIVEWAYS AND ACCESS ROADS SHALL BE KEPT OPEN AT ALL TIMES.
 5. TRAFFIC CONTROL SHALL MOVE ALONG SHOULDER AS WORK PROGRESSES.



DePAULI ENGINEERING & SURVEYING LLC
 - CIVIL ENGINEERS AND LAND SURVEYORS -
 307 SOUTH 4th STREET, GALLUP, NM 87301
 TEL: (505) 863-4448 DESS@CNET.COM

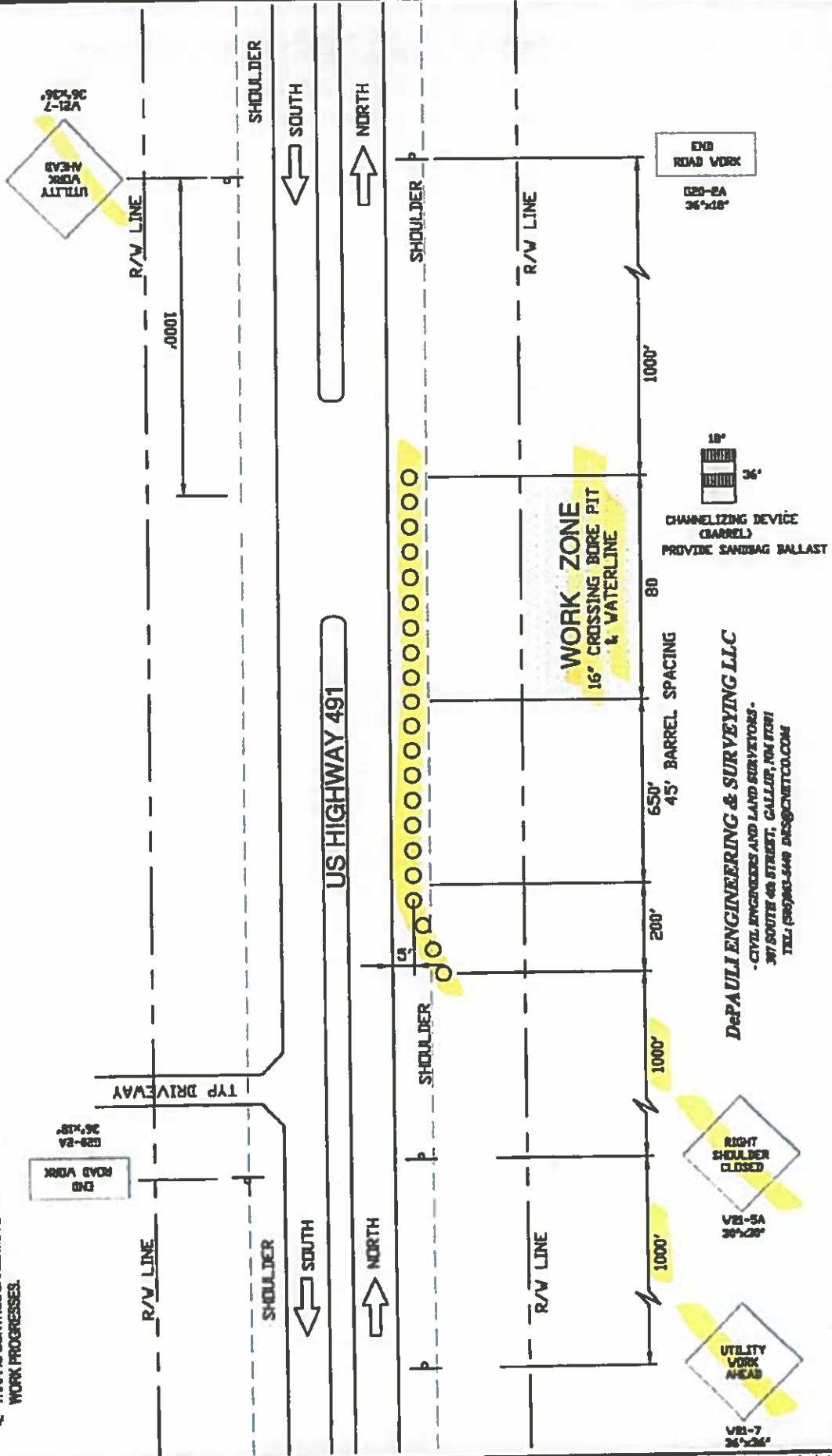
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NMDOT PROJ. NO. 1-040-14421 & F-031-1(20)
STATION 113+37, MILE MARKER 1.5±

SECTION 9, T15N, R18W, N.M.P.M.;
 MCKINLEY COUNTY, NEW MEXICO
 NTS

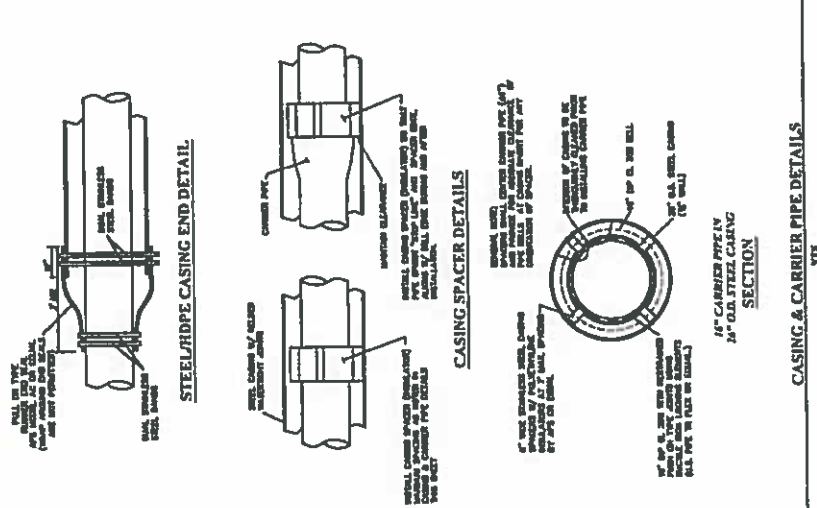
NOTES:

1. PROVIDE FLASHER LIGHTS ON EVERY OTHER BARREL.
IF TRAFFIC CONTROL IS LEFT IN PLACE OVER NIGHT.
2. TRAFFIC CONTROL DEVICES & SIGNS TO CONFORM TO MUTCD STANDARDS.
3. DRIVEWAYS AND ACCESS ROADS SHALL BE KEPT OPEN AT ALL TIMES.
4. TRAFFIC CONTROL SHALL MOVE ALONG SHOULDER AS WORK PROGRESSES.

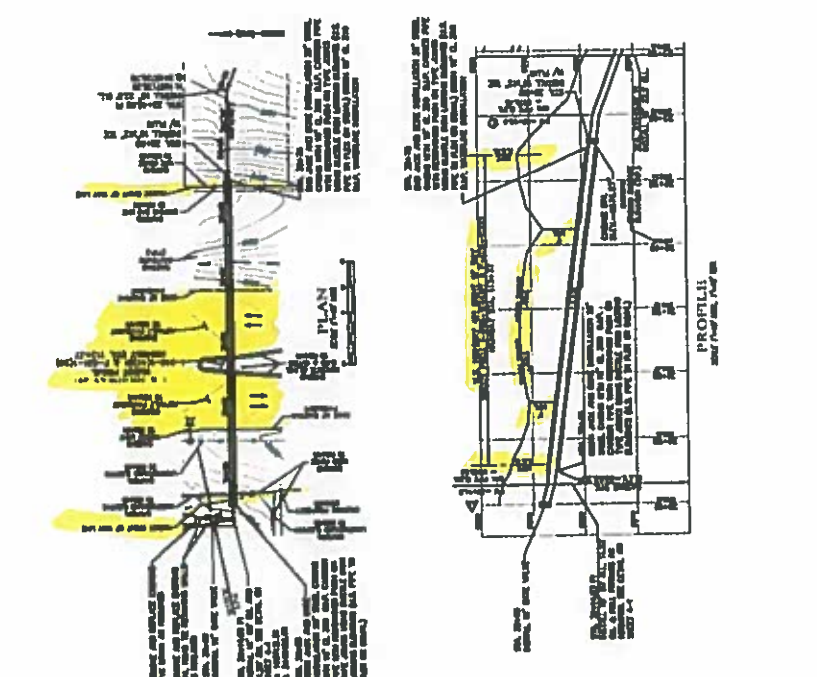


DePAULI ENGINEERING & SURVEYING LLC

- CIVIL ENGINEERS AND LAND SURVEYORS -
 301 SOUTH 400 STREET, GALLUP, NM 87301
 TEL: (505) 863-4449 DES@NETCO.COM



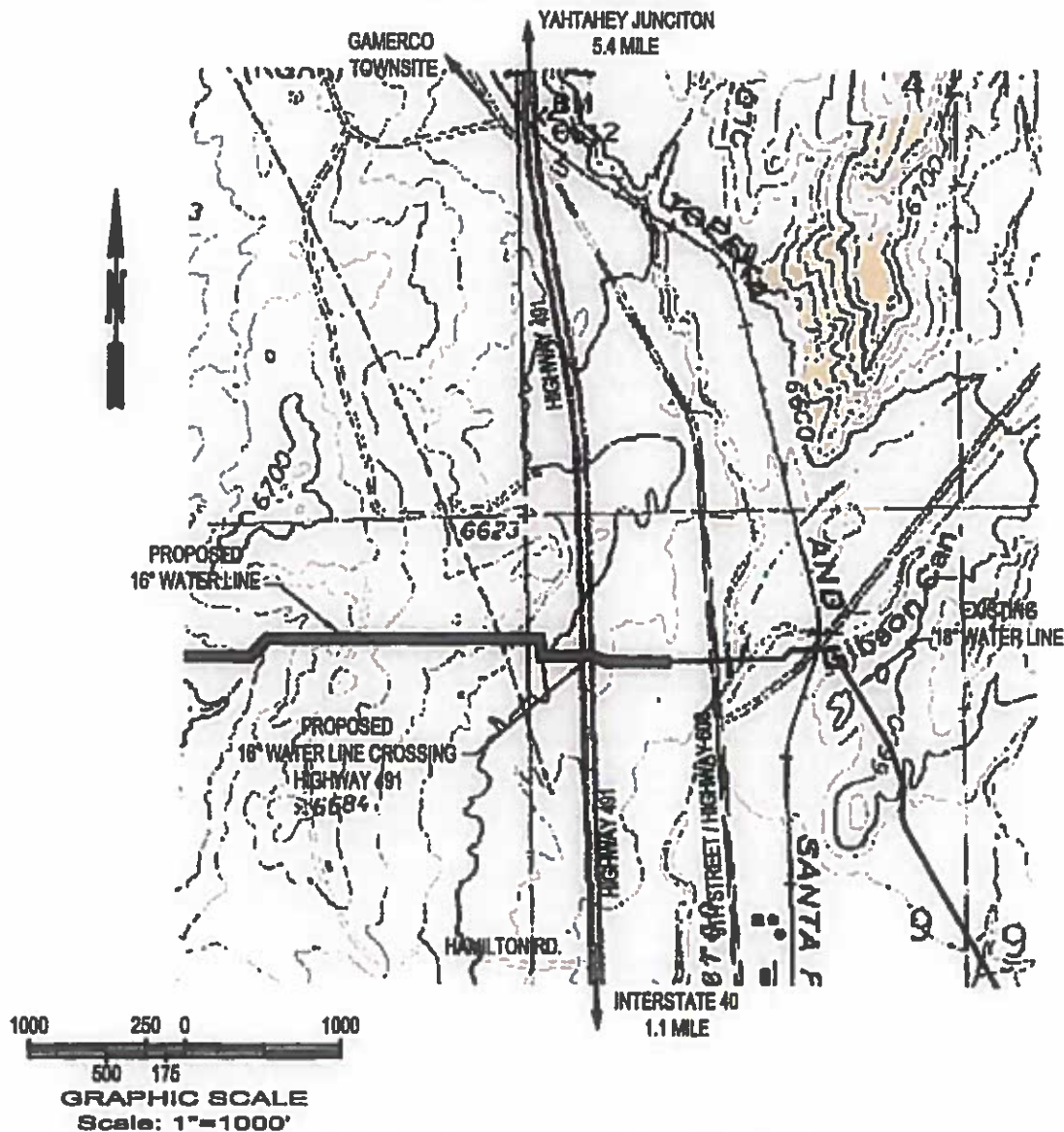
1. THE CASING SHALL BE MADE OF STEEL PIPE, 16" O.D., 1/2" WALL, AS SPECIFIED IN THE SPECIFICATIONS.
2. THE CASING SHALL BE MADE OF STEEL PIPE, 16" O.D., 1/2" WALL, AS SPECIFIED IN THE SPECIFICATIONS.
3. THE CASING SHALL BE MADE OF STEEL PIPE, 16" O.D., 1/2" WALL, AS SPECIFIED IN THE SPECIFICATIONS.
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9. THE CASING SHALL BE MADE OF STEEL PIPE, 16" O.D., 1/2" WALL, AS SPECIFIED IN THE SPECIFICATIONS.
10. THE CASING SHALL BE MADE OF STEEL PIPE, 16" O.D., 1/2" WALL, AS SPECIFIED IN THE SPECIFICATIONS.



CASING & CARRIER PIPE DETAILS

RAFAEL ENGINEERING & DESIGN, INC.
 1000 N. GALLUP AVENUE, SUITE 100
 GALLUP, NEW MEXICO 87301
 TEL: 505/873-1111 FAX: 505/873-1112
 WWW.RAEDESIGN.COM

LOCATION MAP
NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.9
US HIGHWAY 491 - 16" WATERLINE CROSSING
 SECTION 9, T15N, R18W
 MCKINLEY COUNTY, NEW MEXICO



NOTE:
 THIS LOCATION MAP WAS ADAPTED FROM THE U.S.G.S.
 TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES QUADRANGLE FOR:
 GALLUP WEST, NM

Prepared by:
DePauli Engineering & Surveying LLC
 - Civil Engineers and Land Surveyors -
 307 S. 4th Street, Gallup, New Mexico 87301
 Tel: (505) 863-5440
 Fax: (505) 863-1919





491

8th St

Google Earth

2017 Google





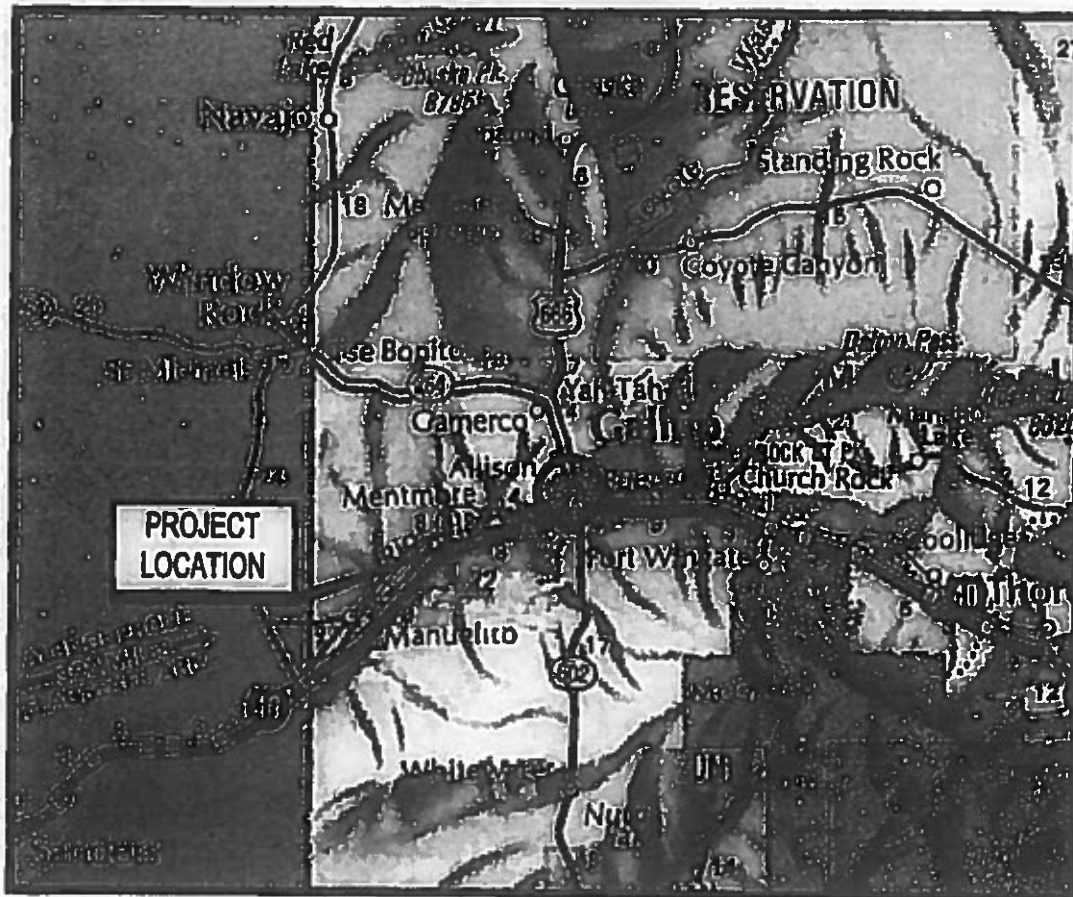
Google Earth

© 2007 Google

VICINITY MAP
NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.9
US HIGHWAY 491 - 16" WATERLINE CROSSING

SECTION 9, T15N, R18W
McKINLEY COUNTY, NEW MEXICO

NOT TO SCALE



NOTE:
THIS LOCATION MAP WAS ADAPTED FROM THE OFFICIAL HIGHWAY
MAP OF NEW MEXICO, ISSUED BY: NEW MEXICO STATE HIGHWAY
AND TRANSPORTATION DEPARTMENT AND NEW MEXICO
DEPARTMENT OF TOURISM

Prepared by:

DePauli Engineering & Surveying LLC
- Civil Engineers and Land Surveyors -
307 S. 4th Street Gallup, New Mexico 87301
Tel: (505) 883-5440





NMDOT District 6 - Work Permit Application Checklist

Work Permit process, please provide the following:

- ☐ **Traffic Control**: Show the following- (Signs, Shoulder Taper, Taper, Tangent, Buffer space, Work zone, Downstream Taper (all shown in feet), and Engineer's Stamp)
- ☐ **Insurance**: The amount is 1 million, to name "NMDOT" to be listed as additional insured and listed as the certificate holder.
- ☐ **Plan sets**: Any set of plans of Drawings or Blueprints.
- ☐ **Hold Harmless Agreement**: Hold Harmless Agreement form must be signed and notarized. Please make sure "**Begin and End Working Dates**" have both the same dates on the Hold Harmless Agreement Form and Work Permit Application before submitting paperwork for approval.
- ☐ **Location Map**: A picture image from Google Earth showing the work area.
- ☐ **Traffic Control Certification**: A copy of the traffic control supervisor's certificate.

If any questions, please call the Traffic Section:

<u>NMDOT D6- Traffic Engineer-</u>	Richard Ramoso (505) 285-3288 Email: Richard.Ramoso@state.nm.us
<u>Civil Engineer Basic-</u>	Stephanie Parra (505) 285-3255 Email: Stephanie.Parra@state.nm.us
<u>Traffic Control Technician O-</u>	Traci Rodriguez (505) 285- 3221 Email: Traci.Rodriguez@state.nm.us
<u>Traffic Control Technician A-</u>	Jeffrey Weeker (505) 285-3223 Email: Jeff.Weeker@state.nm.us



NEW MEXICO DEPARTMENT OF TRANSPORTATION
(NMDOT)



TRAFFIC CONTROL/ROADWAY WORK PERMIT

NMDOT Project Number (If applicable): _____ Control Number: _____

General Scope of work: _____

Contractor Name: _____

Contact Person: _____

Contact Telephone: () - _____ Fax: () - _____

Traffic Control Firm: _____

Certified Traffic Control Supervisor: _____

Contact Telephone: () - _____ Fax: () - _____

Work Zone Location Information:

Route: _____

Mile Post: From _____ To: _____

Or Intersection: _____ Intersection: _____

Direction (NB, SB, EB, WB, or both): _____

☐ 2 lane Road ☐ 4 lane Road ☐ 6 lane Road ☐ 8 Lane Road ☐ Divided ☐ Undivided

Existing Speed limit in area: _____ MPH or Ranges from _____ MPH to _____ MPH

Proposed Speed Limit reduction within work zone (If Applicable): _____ MPH

Working Duration:

Start Date: _____ End Date : _____

Daily Start Time _____ End Time: _____

Purpose of Permit: ☐ Roadway Construction/Rehab. ☐ Shoulder Work
☐ Signal and Lighting Work ☐ Utility work
☐ Drainage/Excavation work ☐ Soil Testing
☐ Signing and Striping Placement
☐ Other: _____

TCP Plan Enclosed _____ (TC Permit will not be processed without a TCP plan)

If no, describe why: _____

Approval is conditioned on the following terms that are deemed accepted by the Contractor upon submission of this Permit

1. Traffic Control for operations under this permit shall conform with the Manual on Uniform Traffic Control Devices (MUTCD).
2. The Contractor agrees to indemnify and hold harmless the NMDOT and its employees from liability, claims, damages losses or expenses due to any negligent act of the Contractor, the Contractor's employees, any agent acting on the Contractor's behalf, and anyone else engaged by the Contractor to work pursuant to this permit
3. The Contractor shall provide the NMDOT a certified copy of the its insurance policy and certificate of insurance and shall include on the certificate of insurance the NMDOT as an additional-named insured, with notice that the coverage is primary over any other valid insurance
4. Any additional conditions as attached and referenced below.

☐ Approved (see conditions below) ☐ **For Official Use:** Approved As Amended ☐ Not Approved
☐ Contractor/TCP firm **SHALL** contact the District Office and confirm the actual start dates.
☐ TCP Firm and Contractor must adhere to the attached notes.

Permit Number: _____

Approved By _____

NMDOT District Office – Traffic Section

Submitted to the District Public Information Officer By: _____ On: ____/____/____

NEW MEXICO DEPARTMENT OF TRANSPORTATION (NMDOT)

INDEMNIFICATION AND HOLD HARMLESS AGREEMENT

_____ acting through its authorized agent,
(entity)
_____ agrees to defend, protect, indemnify
(person authorized to sign on behalf of entity)
and hold harmless the New Mexico Department of Transportation (NMDOT) from all personal injury
or property damage suffered by the _____, its members and
(entity)
participants, the NMDOT, or by third parties resulting from the _____
(activity)
to be held on _____ at or from milepost(s) _____
(date of activity) (mileposts)
following route(s) _____. Additionally the above agrees to obtain liability
(route)
insurance covering the event in the policy amount of one million dollars (\$1,000,000.00) per occurrence,
which names the NMDOT as an additional insured. Sponsor shall provide NMDOT with a certificate of
insurance in a form satisfactory to NMDOT as evidence of the insurance coverage prior to the event.
Failure to timely provide a certificate of insurance shall be grounds for cancellation of NMDOT's
approval of the closing of a state highway for the roadway work permit.

Authorized Agent Signature _____

SUBSCRIBED AND SWORN to before me this _____ day of _____, 20 _____

Notary Public Signature _____

My Commission Expires _____

APPENDIX E

404 & 401 Permits

Department of the Army Albuquerque District, Corps of Engineers

- Action No. SPA-2012-00254-ABQ
USBR Navajo-Gallup Water
Supply Project, Reach 27.9 (404
Permit)



IN REPLY REFER TO
FCC0-232
PRJ-8.10

United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Region
Four Corners Construction Office
1235 La Plata Highway
Farmington, NM 87401

MAY 15 2018

Ms. Deanna Cummings
Regulatory Division
United States Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109-3435

Subject: Reach 27.9 - Section 404 Nationwide Permit 12 and 13 – Pre-Construction Notification (PCN) - Navajo-Gallup Water Supply Project (NGWSP) New Mexico

Dear Ms. Cummings:

The City of Gallup, under a Financial Assistance Agreement (FAA) with the Bureau of Reclamation, is proposing to construct Reach 27.9 of the NGWSP. In accordance with the United States Army Corps of Engineers policy on stream crossings within the NGWSP scope, a Section 404 Nationwide Permit (NWP) 12 and 13 PCN Form along with supplemental information. Proposed construction activities for NGWSP Reach 27.9 include installing approximately 23,074 linear feet of 24-inch and 16-inch waterlines within existing rights-of-way (ROW) and easements utilizing mainly open trench excavation. Construction activities would also include installation of pipeline appurtenances and horizontal jacking and boring under roadways. Open trench excavation is currently planned for construction areas associated with NWP 12 and NWP 13. Main features of Reach 27.9 include:

- 1) Installing approximately 19,322 feet of 24-inch Ductile Iron Pipeline ('D' Waterline)
- 2) Installing approximately 3,752 feet of 16-inch Ductile Iron Pipeline ('E' Waterline)
- 3) Installing four Gabion Grade Control Structures at wash crossings filled with four- to eight-inch angular to rounded feldspar or limestone, complying with ASTM Standard A974-97, and backfilled.

Installation will take place within the City of Gallup, McKinley County, New Mexico, Section 32 of Township 16 North, Range 18 West, and Sections 5, 8, 9, and 17 of Township 15 North, Range 18 West. The waterline will be constructed in existing easements and ROW on private lands. Once constructed, the City of Gallup will be the Owner and operator of Reach 27.9. There are a total of 18 crossings (waterbodies) confirmed within Reach 27.9, all of which were defined as ephemeral dry washes and unnamed tributaries that are designated as Waters of the United States, which will temporarily be impacted by the construction. Enclosures can be found on the attached CD with the following information: Section 404 Nationwide Permit 12 for Reach 27.9, Nationwide Permit 12 and 13 for Reach 27.9 Pre-Construction Notification (PCN) Form, Preliminary Jurisdictional

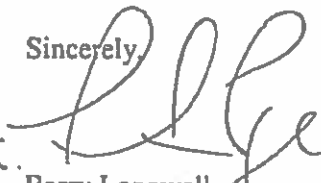
Subject: Reach 27.9 - Section 404 Nationwide Permit 12 and 13 -- Pre-Construction Notification

Determination Form, Vicinity, Topographic, and Aerial Project and Crossing (Waterbodies) Maps, PCN Sketches, 90% Design Plans (Excerpted sheets of the 90% Design Plans; PCN Sketches), Four Corners Biological Evaluation, Cultural Resources Consultation/Concurrence Letters, and Representative Photographs of Crossings.. Concurrently with this submittal, we are submitting an application for CWA Section 401 Water Quality Certifications to the New Mexico Environmental Department.

I look forward to hearing back from you regarding this project.

If you have any questions regarding this permit application submittal, please contact me at 505-324-5001, blongwell@usbr.gov, or Mr. Marc DePauli at 505-863-5440, mdepauli@depauliengineering.com.

Sincerely,


ACTING FOR: Barry Longwell,
Construction Engineer

Enclosure

cc: Mr. Allen Klatt
New Mexico Environment Department
Surface Water Quality Bureau Watershed Protection
P.O. Box 5469
Santa Fe NM 87502

Mr. Marc DePauli
DePauli Engineering and Surveying
307 South 4th Street
Gallup, NM 87301
(w/encl to ea)

New Mexico
Environment
Department – Surface
Water Quality Bureau

- Clean Water Act Section 401
Water Quality Certification
United States Army Corps of
Engineers 2012 Nationwide
Permits



SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Surface Water Quality Bureau

Harold Runnels Building, N2050
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, NM 87502-5469
Phone (505) 827-0187 Fax (505) 827-0160
www.nmenv.state.nm.us



DAVE MARTIN
Secretary

BUTCH TONGATE
Deputy Secretary

JAMES H. DAVIS, Ph D
Director
Resource Protection Division

April 13, 2012

CERTIFIED MAIL NO. 700801830 0003 4175 8463

Mr. Allan Steinle
U.S. Army Corps of Engineers
Albuquerque District, Regulatory Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3434

**Re: Clean Water Act Section 401 Water Quality Certification
United States Army Corps of Engineers 2012 Nationwide Permits**

Dear Mr. Steinle:

The New Mexico Environment Department (NMED) has examined both the February 21, 2012 final notice of the Reissuance of Nationwide Permits (NWP) under the Clean Water Act (CWA) §404, issued by the U.S. Army Corps of Engineers ("Corps") (*see* 77 FR 10184) and the February 23, 2012 Corps Albuquerque District public notice of the final NWP and NMED's intent to consider certification of those permits under the CWA §401 (Certification). Certification is required by CWA §401 to ensure that the NWP are consistent with state law, comply with the state Water Quality Standards (20.6.4 NMAC), the Water Quality Management Plan/Continuing Planning Process, including Total Maximum Daily Loads (TMDLs), and the Antidegradation Policy. Certification is also required to comply with General Condition 25 (Water Quality) and General Condition 27 (Regional and Case-By-Case Conditions) of the NWP.

The following conditions are necessary to assure compliance with the applicable provisions of the Clean Water Act §§301, 302, 303, 306, and 307 and with applicable requirements of State law. Compliance with the terms and conditions of the permit and this certification will provide reasonable assurance that the permitted activities will be conducted in a manner which will not violate applicable water quality standards and the water quality management plan and will be in compliance with the antidegradation policy. The State of New Mexico certifies that the discharge will comply with these provisions and requirements upon inclusion of the following conditions in the permit:

Conditional Section 401 Certification of NWP's:

1. Activities in intermittent and perennial surface waters of the state require notification to the NMED Surface Water Quality Bureau. The notification must include: 1) detailed construction plans (including proposed in-channel excavations and temporary diversions); 2) a description of potential adverse water quality impacts (including turbidity, which is a measurement of the amount of suspended material in water, as well as oil, grease, or hydraulic fluid, and all other potential contaminants); 3) a description of methods to be used to prevent water quality impacts (including detailed Best Management Practices, which must be designed to minimize sediment, oil, grease, and other pollutants from entering the water); 4) any surface water monitoring procedures; and 5) for any unavoidable surface water impacts, conceptual mitigation plans.
2. Fuel, oil, hydraulic fluid, lubricants, and other petrochemicals must not be stored within the 100-year floodplain and must have a secondary containment system capable of containing twice the volume of the product. Appropriate spill clean-up materials such as booms and absorbent pads must be available on-site at all times during construction.
3. All heavy equipment used in the project area must be pressure washed and/or steam cleaned before the start of the project and inspected daily for leaks. A written log of inspections and maintenance must be completed and maintained throughout the project period. Leaking equipment must not be used in or near surface water. Refuel equipment at least 100 feet from surface water.
4. Work in the stream channel should be limited to periods of no flow. Work during low-flow periods must have prior approval by the NMED. Requests for such approval must describe planned methods to minimize turbidity and to avoid spills. Releases from dams must be incorporated into the work schedule to avoid working in high water.
5. Temporary crossings should be restricted to a single location and perpendicular to and at a narrow point of the channel to minimize disturbance. Heavy equipment must be operated from the bank or work platforms and not enter surface water, unless otherwise approved in

approval of deviations must include descriptions of planned methods to minimize turbidity,

to avoid spills, and to provide a continuous zone of passage for aquatic life through or around the project area in which the water quality meets all applicable criteria including turbidity.

7. All asphalt, concrete, drilling fluids and muds, and other construction materials must be properly handled and contained to prevent releases to surface water. Poured concrete must be fully contained in mortar-tight forms and/or placed behind non-erodible cofferdams to prevent contact with surface or ground water. Appropriate measures must be used to prevent wastewater from concrete batching, vehicle wash-down, or aggregate processing entering the watercourse. Dumping of any waste materials in or near watercourses is prohibited.
8. Protective measures must be used to prevent blast, ripped or excavated soil or rock from entering surface water. Construction excavation dewatering discharges are to be uncontaminated and include all practicable erosion control measures and turbidity control techniques.
9. Work or the use of heavy equipment in wetlands must be avoided or minimized unless the impacts are to be mitigated. Construction activities in wetlands must be scheduled during low water or winter (frozen) conditions. Unless otherwise approved by NMED, wetland crossings must be restricted to a single location and constructed perpendicular to and at a narrow point of the wetland. Requests for such approval of deviations must include descriptions of planned methods to minimize turbidity and avoid spills. Wetland vegetation and excavated material (top soil) must be retained and reused to improve seeding success. Permeable fills should be designed and installed when practicable, and flows to wetlands must not be permanently disrupted. Fill materials must be clean and consist of coarse material with minimal fines. Ditches or culverts in wetlands must have properly designed, installed and maintained siltation or sedimentation structures at the outfall.
10. During repair, demolition, treatments, or cleaning activities of bridges or associated structures (e.g., deck, pier, abutment, and wing walls), materials must be kept out of the channel. Before removing a bridge or related structures, impermeable containment material (e.g., plastic sheet, canvas, tarpaulins or other catchment devices) must be secured under the bridge and on the banks to capture any debris that may fall into the stream channel. Sandblasting operations must include vacuum systems or the bridge and associated structures must be completely bagged to collect all lead paint and concrete debris. Any debris that falls onto the containment area or channel must be properly disposed in accordance with the New Mexico Solid Waste Regulations (20.9.1 NMAC). Applicable Material Safety Data Sheets of water repellants and surface finish treatments must be maintained at the project area.
11. Bridges, culverts and structures at stream crossings must be properly designed, installed and maintained to allow passage of sediment, bedload, and woody debris, and to prevent erosion

planned methods to minimize turbidity and avoid spills, as well as to stabilize modified hydraulic geometry.

12. Culverts at stream crossings must be designed and installed to prevent upstream headcutting, downstream channel incision, and erosion of the streambanks or the crossing. Culverts should be designed to pass 100-year flow events. Culvert design must allow for the passage of fish and other aquatic organisms. The road grade at culvert stream crossings must prevent the diversion of the stream from its channel in the event of culvert failure due to plugging or the exceedance of capacity. If the flow overtops the road, it must return to its natural channel instead of running down the road into a new channel.
13. Excavated trenches must be backfilled and compacted to match the bulk density and elevation of the adjacent undisturbed soil.
14. Unless otherwise approved by NMED, all areas adjacent to the watercourse that are disturbed because of the project, including temporary access roads, stockpiles and staging areas, must be restored to pre-project elevations. Disturbed areas outside the channel that are not otherwise physically protected from erosion must be reseeded or planted with native vegetation. Stabilization measures including vegetation are required at the earliest practicable date, but by the end of first full growing season following construction. Native woody riparian and/or wetland species must be used in areas that support such vegetation. Measures to prevent damage by beavers, wildlife, or livestock are required until trees are established. Plantings must be monitored and replaced for an overall survival rate of at least 80 percent by the end of the second growing season. Once established, native plants adapted to the site must be able to thrive with no supplemental water or treatment. Requests for approval of deviation from this condition must include descriptions of planned methods to minimize turbidity and avoid spills, as well as final grading plans.
15. A copy of this Certification must be kept at the project site during all phases of construction. All contractors involved in the project must be provided a copy of this certification and made aware of the conditions prior to starting construction.
16. The NMED must be notified at least five days before starting construction to allow time to schedule monitoring or inspections. The NMED must be notified immediately if the project results in an exceedance of applicable Standards.

Denial of Certification of NWP's

NMED denies Certification of NWP's for any activities in Outstanding National Resource Waters (ONRW) designated in 20.6.4.9 NMAC, and NWP 16 (Return Water From Upland Contained Disposal Areas). Although state WQS provide for temporary and short-term degradation of water quality in an ONRW under very limited circumstances if approved by the Water Quality Control Commission as specified at 20.6.4.8.A NMAC, the approval process required for these activities does not lend itself for use for projects covered under these NWP's. This condition is necessary to ensure that no degradation is allowed in ONRWs by requiring proposed discharges

Mr. Allan Steinle
April 13, 2012
Page 5

of dredged or fill material to be reviewed under the individual permit process. Also, in accordance with General Condition 25 of the Nationwide Permits, a project-specific Certification must be obtained (see 33 CFR 330.4(c)) for discharges authorized under NWP 16 prior to construction. The NMED requires a complete CWA §404 application prior to commencing the water quality certification review in these cases. This certification process will be conducted pursuant to NMAC 20.6.2.2002.

Please contact Neal Schaeffer of my staff at (505)476-3017 should you have any question.

Sincerely,



James P. Bearzi
Chief
Surface Water Quality Bureau

JPB: cns

xc: Tom Nystrom, Wetlands, Region 6, USEPA
Jill Wick, New Mexico Department of Game and Fish
U.S. Fish and Wildlife Service
401 Certification File 897

United States
Department of
Interior – Bureau of
Reclamation

- Notice to Proceed



United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Regional Office
125 South State Street, Room 8100
Salt Lake City, Utah 84138-1102

IN REPLY REFER TO

UC-823
AMD – 13.00

AUG 10, 2018

VIA ELECTRONIC MAIL ONLY

Dennis Romero
Water, Wastewater & Solid Waste Director
City of Gallup
110 W. Aztec Avenue
Gallup, NM 87301

Subject: Notice to Proceed (NTP) for Reach 27.9
Cooperative Agreement No. R11AC40002 Entitled, "Design, Construction, and Construction Oversight for the City of Gallup (COG) Regional System Reach 27 and Reach 13 of the Navajo Gallup Water Supply Project (NGWSP)"; New Mexico.

Dear Mr. Romero,

This letter serves as a "Notice to Proceed" (NTP) for pipeline construction activities on Reach 27.9. It is being issued in accordance with the terms of the Agreement (Section I, 7.6) stating; "No expenditure for any construction activity of obligated funds will be allowed until a written notice to proceed NTP is received from the Grants Officer. This clause is limited to expenditure of any and all funds related to construction of the Project. This is required to assure all precedent to construction activities have been satisfactorily performed".

In a letter dated August 1, 2018 from the City of Gallup, Reclamation received assurance that all precedent to construction activities (which include; right-of-way, cultural, environmental, and permitting) have been completed and approved as required. Reclamation personnel, who are responsible for the oversight of the resources involved, have confirmed completion of these activities. Furthermore, assurances have been made that during construction, the City of Gallup remains responsible to obtain necessary archaeological monitoring permits, and Reclamation's cultural resource contractor will obtain special mechanical excavation permits whenever deemed necessary.

Reclamation is hereby granting concurrence to proceed with the invitation-for-bid (per 100% design/spec review comments) for Reach 27.9. As your current project schedule shows, we anticipate construction activities to start on (or before) March 2019. Please note, a separate NTP shall be required and issued for; any other construction or utility contracts related to Reach 27.9, as well as, all other individual reach construction activities under the Cooperative Agreement.

If you have any questions regarding this letter, please feel free to contact Deborah Chorlton at 801-524-3734 or dchorlton@usbr.gov

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Chorlton', written over a horizontal line.

Deborah Chorlton
Grants Officer

cc: Maryann Ustick, City of Gallup
Stan Henderson, City of Gallup
Marc DePauli, DePauli Engineering
Pat Page, (ppage@usbr.gov) FCCO-110
Dianne Paxton, (dpaxton@usbr.gov) FCCO 151
Ernie Rheume, (erheume@usbr.gov) WCAO