SPECIFICATIONS
AND
CONTRACT DOCUMENTS
FOR

NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.6

CITY OF GALLUP, NEW MEXICO
Gallup Joint Utilities

FUNDED BY THE WATER TRUST BOARD THROUGH THE NEW MEXICO FINANCE AUTHORITY, WTB #283
And
U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002
And
CITY OF GALLUP

Formal Bid No. 1608

Mayor: Jackie McKinney

CITY COUNCIL

Fran Palochak Linda Garcia
Alan Landavazo Yogash Kumar



April, 2016

Prepared By:

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

Set No._____

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ADVERTISEMENT FOR BIDS

CITY OF GALLUP, NEW MEXICO

NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.6

FUNDED BY THE WATER TRUST BOARD THROUGH THE NEW MEXICO FINANCE AUTHORITY, GRANT NO. WTB #283
and
U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002

Formal Bid No. 1608

Notice is hereby given that the City of Gallup, New Mexico will receive sealed proposals for construction of NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.6 until the hour of 2:00 P.M., local time, May 3, 2016 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.

Project consists of the following main items:

18" TRANSMISSION LINES 6A & 6B, Northerly of and adjacent to the City of Gallup and I-40:

1. 28,000' (approximately) of 18" Ductile Iron Pipeline.
2. Highway 608 Bore & Crossing (219' of 28" Casing & 18" Carrier).
3. 495' of 18" Cl 250 GRP Restrained Pipe and Fittings
4. Pump Station with 2-125HP Pumps, 3 Pressure Reducing Valves, 2 Pump Control Valves, Surge Tanks, and Misc. Appurtenances.

12" TRANSMISSION LINE 6B, Northeasterly of and within the City of Gallup:

1. 2686' of 12" Ductile Iron and PVC Pipeline.
2. I-40 Highway & x-rd Bore and Crossings (431' of 24" Casing & 12" Carrier) and (100' of 24" Casing & 12" Carrier)
3. Highway 118 & BNSF RR Bore and Crossing (450' of 24" Casing & 12" Carrier)
4. Pressure Reducing Station.

8" & 14" CONNECTOR LINES, Within and Near To City of Gallup:

1. 400' of 8" SDR 35 PVC Sewer Line (Northeast Area).
2. 900' of 14" Ductile Iron Pipeline
3. 400' of 8" C900-07 PVC Pipeline
4. I-40 Highway Bore and Crossing (311' of 24" Casing & 14" Carrier).

12"MONTOYA WATER LINE, Within the City of Gallup (Adjacent to Montoya Blvd.):

1. 1800' of 12" C900-07 PVC Pipeline.

ABANDONED MINE REMEDIATION, Along Portions of Pipeline 6A Above:

1. Drill Holes, Video Camera Exploration, Grout Placement and Excavation/Backfill.

The project also includes installation of gate valves, construction of air release stations, manholes, trenching, backfilling, traffic control, and the removal and replacement of pavement and permitting.

Plans, Specifications and Bidding Documents may be examined at the office of the City of Gallup Water and Sanitation District. You can also find more information on the project at www.gallupnm.gov/bids.

A Pre-Bid viewing for all plan holders will begin April 12, 2016 at 9:00 A.M. Attendees to assemble at DePauli Engineering & Surveying, LLC for orientation 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

April 2, 2016

BIDDING REQUIREMENTS
INFORMATION FOR BIDDERS

1. LOCATION AND CHARACTER OF WORK: The project consists of the following main items:

18" TRANSMISSION LINES 6A & 6B, Northerly of and adjacent to the City of Gallup and I-40:

1. 28,000' (approximately) of 18" Ductile Iron Pipeline.
2. Highway 608 Bore & Crossing (219' of 28" Casing & 18"Carrier).
3. 495' of 18" Cl 250 GRP Restrained Pipe and Fittings.
4. Pump Station with 2-125HP Pumps, 3 Pressure Reducing Valves, 2 Pump Control Valves, Surge Tanks, and Misc. Appurtenances.

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3. 400' of 8" C900-07 PVC Pipeline
4. I-40 Highway Bore and Crossing (311' of 24" Casing & 14" Carrier).

12"MONTOYA WATER LINE, Within the City of Gallup (Adjacent to Montoya Blvd.):

1. 1800' of 12" C900-07 PVC Pipeline.

ABANDONED MINE REMEDIATION, Along Portions of Pipeline 6A Above:

1. Drill Holes, Video Camera Exploration, Grout Placement and Excavation/Backfill.

ACCESS: Access to Line 6A will, in general, originate from the northerly limit of 9th Street (HW 608) or Montoya Blvd in the City of Gallup. North trending streets and roads from Montoya Blvd can be used to access various points on the 6A alignment. Access via some of these routes prior to construction will be limited because of blocked gates or rough terrain. Permissible access routes will be shown during the Pre-Bid viewing.

Access to most of Line 6B will be along County Rd 43 (Hassler Valley Road) (I-40 Frontage Rd) as the alignment is immediately adjacent to the road. The terminus at the south end of Line 6B may be accessed to the south of Highway 118 near its crossing via City Streets and alleys.

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 May 3, 2016 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 Sanitation Department 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; 505-863-1235. 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 April 28, 2016 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 or 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 five hundred forty (540) 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 contact 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.

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 $42,115, 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. SEQUENCE OF WORK: The City of Gallup is currently dependent on an existing 12" cast iron line for moving water east of Marguerite Franco Street to the East Pump Station and zones in eastern Gallup. Certain portions of the project are to be completed first to remove dependence on the existing 12" line which is frequently plagued with breaks and leaks. The portion of the project with the higher priorities are listed below:

    1. 18" Line 6A
    2. Heaton Pump Station complete to the extent that 8" and 14" connector lines can operate.
    3. 8" and 14" Connector Water Lines.
    4. Montoya Water Line.

    6A Waterline construction with flushing and testing shall be completed from west to east with water source (existing) located at 0+00 on line 6A. All flushing and testing water shall meet New Mexico water quality standards before being discharged. Contractor shall provide all de-chlorination equipment and chemicals. De-chlorination shall be considered incidental to waterline testing. Contractor is responsible for obtaining 402 Permits of the Clean Water Act. This includes any dewatering disposal. Please note that permits may take up to six (6) months to obtain.

22. 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.

23. 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.

24. 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.

25. 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).

26. 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.

27. 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.

28. 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.

29. 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 all Federal, State and Local Laws and Ordinances regarding employment practices and the A.D.A. requirements.

30. 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.

31. 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.

32. 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.

33. 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.

34. 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. .

35. CODE COMPLIANCE: Complete installation must meet federal, state, and local laws, codes and regulations.

36. 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.

37. 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.

38. BUY AMERICAN PROVISIONS: Not Required.

39. PREFERENCES: Resident NM Contractor's Preference & NM Veterans Contractor Preference do not apply.

40. LABOR ENFORCEMENT FUND: (Detailed information on following pages)

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, Grant No. WTB #283 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

CITY OF GALLUP
NAVAJO GALLUP WATER SUPPLY PROJECT, REACH 27.6
FUNDED BY THE WATER TRUST BOARD THROUGH THE NEW MEXICO FINANCE AUTHORITY, GRANT NO. WTB #283 AND
U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002
FORMAL BID NO. 1608
APRIL, 2016

All:

The undersigned Bidder, in compliance with your invitation for bids for NAVAJO GALLUP WATER SUPPLY PROJECT - REACH 27.6, 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 therein, 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 five hundred forty (540) consecutive calendar days thereafter, including weather delays. The Bidder also agrees to meet other scheduling requirements of these contract documents.

LOT 1 WATERLINE CONSTRUCTION
Line 6A, 0+00 to 179+70 - Line 6B, 0+00 to 130+88

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For 18" Cl. 350 DIP waterline with granular bedding and rock free backfill complete and in place for the **Unit Price per Linear Foot of:**	26465 LF	$_____,__	$_____,__
2	For 18" Cl. 350 DIP waterline with granular bedding and granular backfill complete and in place for the **Unit Price per Linear Foot of:**	600 LF	$_____,__	$_____,__
3	For 12" AWWA C900-07 DR18 PVC waterline with granular bedding and rock free backfill complete and in place for the **Unit Price per Linear Foot of:**	1225 LF	$_____,__	$_____,__
4	For 12" AWWA C900-07 DR18 PVC with granular bedding and granular backfill complete and in place for the **Unit Price per Linear Foot of:**	685 LF	$_____,__	$_____,__
5	For 12" Cl. 350 DIP with granular bedding and rock free backfill complete and in place for the **Unit Price per Linear Foot of:**	150 LF	$_____,__	$_____,__
6	For Vertical 18" - 11 1/4°or 22 1/2° Ells as conditions require during construction, complete and in place for the **Unit Price per Each of:**	4 EA	$_____,__	$_____,__

LOT 1 WATERLINE CONSTRUCTION
Line 6A, 0+00 to 179+70 - Line 6B, 0+00 to 130+88

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
7	For Vertical 12" - 11 1/4° or 22 1/2° Ells as conditions require during construction, complete and in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
8	For 18" AWWA C515 resilient wedge gate valves and valve boxes complete and in place for the **Unit Price per Each of:**	1 EA	$_____,__	$_____,__
9	For 18" AWWA C515 resilient wedge gate valves (horizontal installation) with valve boxes complete and in place for the **Unit Price per Each of:**	16 EA	$_____,__	$_____,__
10	For 16" AWWA C515 resilient wedge gate valves with valve boxes complete and in place for the **Unit Price per Each of:**	1 EA	$_____,__	$_____,__
11	For 12" AWWA C509 resilient wedge gate valves with valve boxes complete and in place for the **Unit Price per Each of:**	14 EA	$_____,__	$_____,__
12	For 10" AWWA C509 resilient wedge gate valves with valve boxes complete and in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
13	For 8" AWWA C509 resilient wedge gate valves with valve boxes complete and in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
14	For Type 2 air release valve (2" size) assembly on 18" line and manhole complete and in place for the **Unit Price per Each of:**	18 EA	$_____,__	$_____,__
15	For Type 2 air release valve (2" size) assembly on 12" line and manhole complete and in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
16	For Type 'A' waterline rock excavation and disposal for **Unit Price per Cubic Yard of:**	1000 CY	$_____,__	$_____,__
17	For Type 'B' waterline rock excavation and disposal for **Unit Price per Cubic Yard of:**	5000 CY	$_____,__	$_____,__

LOT 1 WATERLINE CONSTRUCTION
Line 6A, 0+00 to 179+70 - Line 6B, 0+00 to 130+88

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
18	For tie-in to existing 10"AC pipe including AC remediation and disposal at Line 6B Sta. 130+88.07 including fittings and sleeves required, 8" concrete channel bottom (remove & replace) and all 10" pipe from Sta.130+48.95 but not valves, for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
19	For gabion grade control structure, all depths, complete and in place for the **Unit Price per Cubic Yard of:**	440 CY	$_____,__	$_____,__
20	For 18" pipe steep slope construction including Cl. 350 DIP, flowable fill, and backfill but not rip-rap or retainer blocks complete and in place for the **Unit Price per Linear Foot of:**	380 LF	$_____,__	$_____,__
21	For contour berms complete and in place at locations detailed or as directed for the **Unit Price per Linear Foot of:**	200 LF	$_____,__	$_____,__
22	For asphalt removal and patch for road crossings and parking lots (6" asphalt and 6" base) complete and in place for the **Unit Price per Square Yard of:**	600 SY	$_____,__	$_____,__
23	For wire enclosed rip-rap complete and in place for the **Unit Price per Square Yard of:**	700 SY	$_____,__	$_____,__
24	For 4" of NMDOT gravel (base course) placed and spread in locations as directed complete and in place for the **Unit Price per Square Yard of:**	800 SY	$_____,__	$_____,__
25	For Line 6A H/W 608 road crossing and bore Sta. 0+65 to 2+84.58 including 28" casing 219.58' and 18" Cl. 350 DIP complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
26	For Line 6B I-40 bore & crossing Sta. 100+53.60 to 104+84.97 including 24" casing 431.37' and 12" Cl. 350 DIP, gate valve not included complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

LOT 1 WATERLINE CONSTRUCTION
Line 6A, 0+00 to 179+70 - Line 6B, 0+00 to 130+88

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
27	For Line 6B x-rd bore & crossing Sta. 105+05.32 to 106+05.32 including 24" casing, length 100' and 12" Cl.235 DR 18 PVC Sta. 105+00.63 to 106+15.32 complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
28	For Line 6B H/W 118, BNSF RR and Puerco River bore and crossing Sta. 117+00.97 to 121+50.12 including 24" casing, length 449.15' and 12" Cl. 350 DIP complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
29	For concrete slope retainer blocks complete and in place for the **Unit Price per Each of:**	6 EA	$_____,__	$_____,__
30	For 18" x 12" or 16" x 12" flush piping assembly, not including gate valve complete and in place for the **Unit Price per Each of:**	10 EA	$_____,__	$_____,__
31	For 12" x 8" flush piping assembly not including gate valve complete and in place for the **Unit Price per Each of**:	2 EA	$_____,__	$_____,__
32	For 16" flush piping assembly, not including gate valve on 18" run of 18" x 16" tee Line 6A Sta. 0+00 complete and in place for the **Lump Sum Price of**:	LS	$_____,__	$_____,__
33	For 30" CMP near Line 6B Sta. 62+60 including earthwork concrete structures, guard rail extension and appurtenences but not rip-rap complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
34	For materials testing by independent lab for soil, concrete base course, etc. This amount to be used for totaling bid. Actual amount to be based on approved invoice.	LS	$32,000.00	$32,000.00
35	For traffic control. Partial payments to be made in accordance with percent of waterline complete and in place for the **Lump Sum Price of**:	LS	$_____,__	$_____,__
36	For downtime caused by unexpected encounters with historical, archaeological and environmental items for the **Unit Price per Hour of**:	60 HRS	$_____,__	$_____,__

LOT 1 WATERLINE CONSTRUCTION
Line 6A, 0+00 to 179+70 - Line 6B, 0+00 to 130+88

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
37	For curb & gutter or header curb, remove and replace complete and in place for the **Unit Price per Linear Foot of:**	100 LF	$_____,__	$_____,__
38	For 4" thick concrete sidewalk, remove and replace, complete and in place for the **Unit Price per Square Yard of:**	15 SY	$_____,__	$_____,__
39	For type 1 air release valve at Line 6B Sta. 127+62.65 complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
40	For 18" Cl 250 AWWA C950 GRP restrained pipe and restrained fittings, Line 6A Sta. 6+65 to 9+03.46 with granular bedding and rock free backfill complete and in place for the **Unit Price per Linear Foot of:**	240 LF	$_____,__	$_____,__
41	For 18" Cl 250 AWWA C950 GRP restrained pipe and restrained fittings, Line 6B Sta. 57+87 to 60+42 with granular bedding and rock free backfill complete and in place for the **Unit Price per Linear Foot of:**	255 LF	$_____,__	$_____,__
42	For construction surveying and staking under the supervision of a licensed surveyor as required for this lot complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
43	For archaeological and historical site temporary fencing complete and in place for the **Unit Price per Linear Foot of:**	4262 LF	$_____,__	$_____,__

Lot 1 Subtotal $_____,__

LOT 2 CONNECTOR LINES
14" Rehoboth Line, 8" Water Line Connector, Pump Station Sewer Connector

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For 8" SDR35 sewer line with granular bedding and backfill, 0' to 4'-8' depth complete and in place for the **Unit Price per Linear Foot of:**	320 LF	$_____,__	$_____,__
2	For 8" SDR 35 sewer line with granular bedding and backfill, 0' to 8'-12' depth complete and in place for the **Unit Price per Linear Foot of:**	100 LF	$_____,__	$_____,__

LOT 2 CONNECTOR LINES

14" Rehoboth Line, 8" Water Line Connector, Pump Station Sewer Connector

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
3	For Type 'C', 4'-0" diameter sewer manhole, 0' to 4'-8' depth complete & in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
4	For 14" Cl. 350 DIP Rehoboth Connector waterline with granular bedding and rock free backfill complete and in place for the **Unit Price per Linear Foot of:**	900 LF	$_____,__	$_____,__
5	For 14" AWWA C515 resilient wedge gate valves and valve boxes complete and in place for the **Unit Price per Each of:**	6 EA	$_____,__	$_____,__
6	For Rehoboth Connector tie-in 'A' into existing 14" water line including fittings, sleeves and short pipes but not gate valves for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
7	For Rehoboth Connector line I-40 by jack and bore including 24" casing, length 310.92' and 14" Cl. 350 DIP complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
8	For 8" C900-07 DR18 PVC connector waterline parallel to 18" Line 6A, approximately Sta. 175+77 to 179+70.33, with granular bedding and backfill complete and in place for the **Unit Price per Linear Foot of**:	420 LF	$_____,__	$_____,__
9	For 8" AWWA C509 resilient wedge gate valves and valve boxes complete and in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
10	For 8" connector tie-in to existing 8" line near 18" Line 6A Sta. 175+77 including fittings and sleeves required but not valves, complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
11	For materials testing by independent lab for soil, concrete, base course, etc. This amount to be used for totaling bid. Actual amount to be used based on approved invoice.	LS	$5,000.00	$5,000.00

LOT 2 CONNECTOR LINES

14" Rehoboth Line, 8" Water Line Connector, Pump Station Sewer Connector

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
12	For traffic control. Partial payments to be made in accordance with percent of waterline completed for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
13	For abandoned leach field mitigation along 14" waterline connector including lime stabilization, removal of material and transport to sludge injection field near the City's Waste Water Treatment Plant for the **Unit Price per Cubic Yard of:**	75 CY	$_____,__	$_____,__
14	For construction surveying and staking under the supervision of a licensed surveyor as required for this lot complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

Lot 2 Subtotal: $_____,__

LOT 3 MONTOYA LINE

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For 12" C900-07 DR18 PVC with granular bedding and native backfill complete and in place for the **Unit Price per Linear Foot of:**	1120 LF	$_____,__	$_____,__
2	For 12" C900-07 DR18 PVC with granular bedding and granular backfill complete and in place for the **Unit Price per Linear Foot of:**	675 LF	$_____,__	$_____,__
3	For vertical 12"-11 ¼° Ells as conditions require during construction, complete and in place for the **Unit Price per Each of:**	2 EA	$_____,__	$_____,__
4	For 12" AWWA C509 resilient wedge gate valve with valve box complete and in place for the **Unit Price per Each of:**	3 EA	$_____,__	$_____,__
5	For 8" AWWA C509 resilient wedge gate valve with valve box complete and in place for the **Unit Price per Each of:**	3 EA	$_____,__	$_____,__

LOT 3 MONTOYA LINE

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
6	For Type 2 air release valve 2" size assembly on 12" line and manhole complete and in place for the **Unit Price per Each of:**	1 EA	$_____,__	$_____,__
7	For Type 1 air release valve assembly with all appurtenances complete and in place for the **Unit Price per Each of:**	1 EA	$_____,__	$_____,__
8	For Type 'A' waterline rock excavation and disposal for the **Unit Price per Cubic Yard of:**	66 CY	$_____,__	$_____,__
9	For Type 'B' waterline, rock excavation and disposal for the **Unit Price per Cubic Yard of:**	100 CY	$_____,__	$_____,__
10	For Tie-in to existing 14" DIP line, Detail 'A' including fittings and sleeves required but not valves for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
11	For Tie-in to existing 8" AC line, Detail 'B' including pipe, AC remediation, fittings and sleeves required but not valves for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
12	For Tie-in to existing 8" PVC line, Detail 'C' including all 8" pipe, fittings and sleeves required but not valves for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
13	For asphaltic patch, 6" asphalt and 6" base complete and in place for the **Unit Price per Square Yard of:**	150 SY	$_____,__	$_____,__
14	For asphaltic patch, 3" asphalt and 6" base complete and in place for the **Unit Price per Square Yard of:**	360 SY	$_____,__	$_____,__
15	For concrete, curb, and gutter of all sizes, remove and replace complete and in place for the **Unit Price per Linear Foot of:**	120 LF	$_____,__	$_____,__
16	For 4" sidewalk, remove and replace, including 4" granular pad, complete and in place for the **Unit Price per Square Yard of:**	20 SY	$_____,__	$_____,__

LOT 3 MONTOYA LINE

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
17	For work and materials as required in abandoning existing 12" C.I. lines, all locations for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
18	For materials testing by independent lab for soil, concrete, base course, ect. This amount to be used for totaling bid. Actual amount to be based on approved invoice.	LS	$4,000.00	$4,000.00
19	For traffic control. Partial payments to be made in accordance with percent of waterline complete an in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
20	For construction surveying and staking under the supervision of a licensed surveyor as required for this lot complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

Lot 3 Subtotal: $_____,__

LOT 4 ABANDONED MINE REMEDIATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For drill holes as required for video camera exploration, grouting or verification of grout replacement for the **Unit Price per Linear Foot of:**	5000 LF	$_____,__	$_____,__
2	For mine remediation grout complete and in place for the **Unit Price per Cubic Yard of:**	1200 CY	$_____,__	$_____,__
3	For video camera recording time for exploration, grouting or verification of remediation results for the **Unit Price per Hour of:**	80 HRS	$_____,__	$_____,__
4	For excavation and backfill method for mine remediation and exploration less than 12' depth along pipeline for the **Unit Price per Cubic Yard of:**	600 CY	$_____,__	$_____,__
5	For excavation and backfill method for mine remediation and exploration greater than 12' depth, up to 24' depth along pipeline for the **Unit Price per Cubic Yard of:**	1600 CY	$_____,__	$_____,__

LOT 4 ABANDONED MINE REMEDIATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
6	For mobilization/demobilization for drilling and grouting equipment for mine remediation for the **Unit Price per Each Occurrence:**	2 EA	$_____,__	$_____,__
7	For materials testing by independent lab for soil, grout, concrete, base course, etc. This amount to be used for totaling bid. Actual Amount to be based on approved invoice.	LS	$10,000.00	$10,000.00
8	For construction surveying and staking under the supervision of a licensed surveyor as required for this lot complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

Lot 4 Subtotal: $_____,__

LOT 5 HOGBACK PRESSURE REDUCING STATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For earthwork, grading, imported fill, exterior concrete and reserve pit remediation as shown on the project drawings, complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
2	For yard piping to within 5' of building complete and in place with all appurtenances including valves, fittings, granular bedding, and granular backfill for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
3	For 4" gravel surfacing complete and in place for the **Unit Price per Square Yard of:**	650 SY	$_____,__	$_____,__
4	For station building structure complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
5	For PRV's, flow meter, valves, major piping, minor piping and drain lines to a point 5' outside of building complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
6	For station electrical including heating, lighting control wiring, communication wiring and secondary entrance conduit, conductors and riser required by the City complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

LOT 5 HOGBACK PRESSURE REDUCING STATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
7	For single phase primary electrical line extension and transformer in the vicinity of Hogback PRV Station. This amount to be used in totaling bid. The actual amount to be based on City invoice for the **Lump Sum Price of:**	LS	$8,515.13	$8,515.13
8	For chain link fencing including personnel and vehicle gates as detailed complete and in place for the **Unit Price per Linear Foot of:**	460 LF	$_____,__	$_____,__
9	For materials testing by independent lab for soil, concrete, base course, etc. This amount to be used for totaling bid. Actual amount to be based on approved invoice.	LS	$2,500.00	$2,500.00
10	For construction surveying and staking under the supervision of a licensed surveyor as required for this lot complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

Lot 5 Subtotal: $_____,__

LOT 6 HEATON PUMP STATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For clearing, grubbing, earthwork, and grading, as shown on project drawings complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
2	For yard piping to within 5' of building including pipe including pipe, valves, fittings, appurtenances, granular bedding and granular backfill complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
3	For 4" gravel surfacing with non woven fabric for station complete and in place for the **Unit Price per Square Yard of:**	1450 SY	$_____,__	$_____,__
4	For station building complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

LOT 6 HEATON PUMP STATION

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
5	For pumps, motors, PRV's, flow, meters, valves, major piping, minor piping and piping and drain lines to a point 5' outside of building complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
6	For 2½ ton station bridge crane unit complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
7	For station electrical complete (SCADA systems equipment and programming not included) including switch gear, cabinets, lighting, heating, control wiring, communication wiring, secondary conduit, primary conduit, secondary conductors, transformer pad and entrance works required by the City complete and in place for the **Lump Sum Price of:**	LS	$_____,__	$_____,__
8	For 3 phase primary electrical extension and transformer work by the City of Gallup, This amount is an allowance for totaling bid. Actual amount will be based on City invoice for the **Lump Sum Price of:**	LS	$12,516.21	$12,516.21
9	For chain link fencing including personnel and vehicle gate as detailed complete and in place for the **Unit Price per Linear Foot of:**	350 LF	$_____,__	$_____,__
10	For materials testing by independent lab for soil, concrete, base course, etc. This amount to be used for totaling bid. Actual amount to be based on approved invoice.	LS	$9,000.00	$9,000.00
11	For construction surveying and staking under the supervision of a licensed surveyor as required for this lot complete for the **Lump Sum Price of:**	LS	$_____,__	$_____,__

Lot 6 Subtotal: $_____,__

LOT 7 SCADA ADDITIONS AND REVISIONS

ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT PRICE	AMOUNT
1	For furnishing equipment and programming by SKM Inc. as required to make new or revised facilities (at Heaton Pump Station) functional and compatible part of the City's SCADA system for a predetermined price from the City supplier of:	LS	$30,100.00	$30,100.00
2	For furnishing equipment and programming by SKM Inc. as required to make new or revised facilities (at Hogback PRV Station) functional and compatible part of the City's SCADA system for a predetermined price from the City supplier of:	LS	$16,940.00	$16,940.00

Lot 7 Subtotal: $47,040.00

Total lots 1 through 7 $_____,__

Tax @ 8.3125% $_____,__

NGWSP Reach 27.6 Construction Cost $_____,__

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 above set forth, as liquidated damages for the delay and expense incurred by the Owner

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

_____

RESPECTFULLY SUBMITTED:

_____

By:

_____

Title:

_____

e-mail address

Business Address:

_____

_____

City State Zip Code

CONTRACTOR'S LICENSE NO. & CLASSIFICATION _____

NEW MEXICO CONTRACTOR'S RESIDENT BIDDER'S PREFERENCE NO. _____

NEW MEXICO DEPARTMENT OF WORKFORCE SOLUTIONS NO. _____

CITY OF GALLUP

SUBCONTRACTOR LISTING

NAVAJO GALLUP WATER SUPPLY PROJECT, REACHES 27.6

FUNDED BY THE WATER TRUST BOARD THROUGH THE NEW MEXICO FINANCE AUTHORITY, GRANT NO WTB #283 and

U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002

Formal Bid No. 1608

The Subcontractor Listing Threshold For This Project Is $42,115, 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. _____

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

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

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

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

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

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

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

-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: _____, 2013

BID BOND

KNOW ALL MEN BY THESE 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 stipulates 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 _____, 20__, 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 27.6 FUNDED BY THE WATER TRUST BOARD THROUGH THE NEW MEXICO FINANCE AUTHORITY, WTB #283 & U.S. BUREAU OF RECLAMATION COOPERATIVE AGREEMENT NO. R11AC40002. FORMAL BID NO. 1608

hereinafter called the project, for the sum of:

_____

AND /100 DOLLARS ($_____) and all extra work in connection therewith, 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 **FIVE HUNDRED FORTY (540)** consecutive calendar days thereafter. The CONTRACTOR further agrees to pay, as liquidated damages, the sum of **TWO THOUSAND DOLLARS ($2000.00)** 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 OF GALLUP

City Purchasing Division
Ronald M. Caviggia, Director

NOTICE OF AWARD

Dated: _____

TO: _____
(BIDDER)

ADDRESS: _____

_____

Contract: Navajo Gallup Water Supply Project, Reach 27.6
(Insert name of Contract as it appears in the Bidding Documents)

Project: Navajo Gallup Water Supply Project, Reach 27.6

OWNER's Contract No. City of Gallup, Formal Bid No. 1608

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 27.6. Funded by the Water Trust Board

Through the New Mexico Finance Authority, WTB #283 and U.S. Bureau of Reclamation Cooperative Agreement No. R11AC40002 and City of Gallup.
(Indicate total Work, alternates or sections or 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)

ADDRESS[1]: _____

_____

_____

Contract: Navajo Gallup Water Supply Project, Reach 27.6
(Insert name of Contract as it appears in the Bidding Documents)

Project: Navajo Gallup Water Supply Project, Reach 27.6, Funded by the Water Trust Board through the New Mexico Finance Authority, WTB #283 and U.S. Bureau of Reclamation Cooperative Agreement No. R11AC40002 and City of Gallup

OWNER's Contract No. Formal Bid No. 1608

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

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 or 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.

2. THE CONTRACTOR: It is understood and agreed that the Contractor has, by careful examination, satisfied himself 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 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 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 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 his subcontractor shall not commence work under this contract until he or his 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* the Owner before the policy is canceled 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 employees engaged in work under this contract; and if any portion of the work is sublet, the subcontractor shall carry similar coverage for all its 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	Statutory
Employer's Liability	$1,000,000.00

b. Comprehensive General Liability Insurance: The Contractor and his 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 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 to defend, indemnify and save harmless the Owner, his 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 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.

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 Paragraph13 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 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 work, during its progress, a competent superintendent and any necessary assistants, all satisfactory to the Engineer. The superintendent shall represent the Contractor in his absence, and directions given to him shall be as binding as if given to the Contractor.

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 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 effect 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 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 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 shall be entitled to no claim for damages for anticipated profits on any portion of the work that may be omitted.

Change orders will be submitted to NMFA, NMED-Construction Programs Bureau, & RECLAMATION for review and approval.

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 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 45 days of receipt of an undisputed amount of any pay request based on work completed as per 57-28-5 NMSA 1978.**

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 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 plan, dust control and submittal of monthly progress schedule.

    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 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 and laws and 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 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 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. A monthly construction schedule shall be submitted with each Pay Estimate Application.

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 subcontractors, the Owner may serve written notice upon the Contractor and the surety of his 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 Surety shall be liable to the Owner for any excess cost occasioned 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 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 Contractors 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. (See also SC-26).

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 filling or waterline testing shall be taken from a city fire hydrant designated by the City or from a designated line feeding new construction provided proper cross connection prevention apparatus is in place. Water for all other construction shall be taken from the east plant water loading station. Contact City of Gallup Water and Sanitation Department 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 five hundred forty five (540) calendar days thereafter. The bidder must agree, also to pay as liquidated damages, the sum of two thousand dollars ($2,000.00) 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 so as 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 CONSTRUCTION STAKING: The Contractor will be responsible for all construction survey staking as supervised by a licensed surveyor with random checks by the Engineer. The Contractor shall demonstrate that he or she has the equipment and the experience to properly maintain accurate control of the project installation utilizing the data provided. The Engineer will provide random basic control points with ground co-ordinates and elevations in the near proximity of the pipeline at approximate 2000 ft. intervals for use by the Contractor. Existing City control points as shown on the project drawings are also available. The Contractor will be responsible for notifying the Engineer when valves, fittings and specials are in place so that 'As Built' surveys by the Engineer can be conducted prior to backfill.

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 808 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:

Sieve Size	Percent Passing
1"	100
No. 4	40-100
No. 200	less than 30

Acceptable sources on past projects include the following locations:

1. Crusher fines from local aggregate companies

2. Puerco River 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 on the project drawings. The use of "water flooding" or "water jetting" to achieve compaction of pipe bedding and trench backfill will not be permitted. Backfill to stay within 100' of pipe laying at all times and to end of pipe at completion of work day.

SC-21 SEQUENCE OF CONSTRUCTION: Work shall progress according to the sequence of construction provided within project drawings.

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 SECTION 404/401 PERMITS: This project entails work within or across ten (10) drainages identified in the project drawings, which are subject to U.S. Army Corps of Engineers Nationwide Permits NWP 12 and NWP 13. The Contractor shall ensure that all permit requirements are satisfied prior to and upon completion of all work within the identified drainages. The permits have been included in Appendix "F" of these project documents.

SC-26 PERMITS: The Contractor shall inform himself of all permits required to complete all items of work and the requirements of the City obtained NMDOT Utility permits and BNSF Pipeline License.

The NMDOT Utility Permit requirements include but are not limited to, Contractor obtained NMDOT utility work complete with insurance required by NMDOT to work within right of way. Contained in Appendix E.

The BNSF Pipeline license requirements include but are not limited to all Contractor and/or Subcontractor personnel working on pipeline installation within BNSF right of way complete the BNSF Safety Training Program. Contained in Appendix G.

SC-27 PAYMENT FOR MATERIALS STORED: The City shall allow the contractor to purchase certain items of materials and/or equipment in advance of the time required for the supply and/or installation of the said materials by the contractor under his contract on the project indicated, and to submit requisitions to the City in payment therefor. In consideration of the provisions of the contract and/or this agreement, it is mutually agreed and certified by the contractor as follows:

- Cost of the material is in excess of $25,000.00 and that the amount requesting to be paid does not exceed 60% of the bid price for which that item is to be used.
- The Contractor and/or his supplier have agreed to and certify to the bill of sale for the listed materials and equipment and has provided the Engineer with the paid bill of sale or invoice for the materials and a fully executed Release of Liens for the material.
- The property so transferred has been designated by a tag or other appropriate written notice affixed thereto, stating: "Property of the City of Gallup." Materials shall be stored in a fenced area with limited access to the City and the Contractor. In addition, the Contractor shall post a sign at the location clearly identifying, in large print, that the materials are "Property of the City of Gallup".
- The said property must be properly stored in a warehouse or other appropriate place as approved by the Engineer. Material shall be stored off the ground on wooden pallets and covered to protect the material from weather.
- All property listed shall become the sole property of the City, but nothing in these provisions shall be construed as relieving the Contractor from sole responsibility for the care, custody and protection of the said property, or as a waiver of the right of the City to require fulfillment of all terms and conditions of the aforesaid contract between the parties. No payment, however, final or otherwise shall operate to relieve the Contractor or his sureties from any obligations under the aforesaid contract or the performance and payment bond issued to the City.

- The Contractor certifies that the material and/or equipment is fully insured for the total value thereof, against the perils of fire, theft, extended coverage, vandalism and malicious mischief.
- The City reserves the right to inspect the materials wherever stored, at its convenience, during normal working hours.
- The cost and expense, if any, involved in the storage and/or delivery to the construction site will be borne by the Contractor.
- The Contractor certifies that he has submitted and received approved shop drawings on the stored materials and/or equipment where and if required by the contract documents.
- The contractor shall provide a materials breakdown describing the item to be stored, the Lot/item the materials is to be used, the quantity of the item(s) and the total value of the item(s).
- Payment for materials does not constitute approval or acceptance of the materials or work. If materials paid for are damaged, stolen, or proven to be unacceptable, the City has the right to recover the costs from the Contractor. The Department will not make payment for plant materials until they are planted or installed.

SC-28 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 – WATERLINE CONSTRUCTION

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

ITEMS 1,2,3,4 & 5: These items of work consist of installing water pipe of the diameter and material, specified, including horizontal and vertical main line fittings designated on the project drawings including specials, trenching, bedding and backfill, but does not include pavement removal and replacement or rock excavation. Restrained joints where called for and poly wrap 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 not shown on project drawings that are required because of conditions encountered during construction will be paid for under a separate item. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. Payment will be for the linear feet of pipe installed, complete and in place at the **Contract Unit Price Bid per Linear Foot**.

LOT 1 – WATERLINE CONSTRUCTION:

ITEMS 6 & 7: These items of work consist of installing 11¼° or 22½° vertical ells including restraints and thrust blocking as required during construction, but not designated on the project drawings. Payment will be made for each ell installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 8: This item of work consists of furnishing and installing 18" AWWA C515 resilient wedge, epoxy coated gate valves as specified including valved bypass, concrete support, and cast iron valve boxes with concrete collars as shown on the project drawings. Payment will be for actual number of valves installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 9: This item of work consists of furnishing and installing 18" AWWA C515 resilient wedge, epoxy coated gate valves for horizontal installation as specified including bevel gear, valved bypass, concrete support and cast iron valve boxes with concrete collars as shown on the project drawings. Payment will be for the actual number of valve assemblies installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 10: This item of work consists of furnishing and installing 16" AWWA C515 resilient wedge, epoxy coated gate valves as specified including concrete support and cast iron valve boxes with concrete collars as shown on the project drawings. Payment will be for actual number of valves installed, complete and in place at the **Contract Unit Price Bid per Each.**

ITEMS 11,12, & 13: These items of work consist of furnishing and installing AWWA C509 resilient wedge, epoxy coated gate valves for buried service as specified including concrete support and cast iron valve boxes with concrete collars as shown on project drawings. Payment will be for actual number of valves installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEMS 14&15: These items are for Type 2 air release stations of the sizes designated including vaults, vent piping, air and vacuum devices, protection bollards, excavation and backfill but not mainline pipe or tee. Payment will be made for the actual number of Type 2 air release stations installed, complete and in place at the **Contract Unit Price per Each Assembly**.

ITEM 16: This item of work is for the excavation of Type "A" rock for waterline construction. Removal and disposal of rock is included in this item. Measurement for rock shall be by the Engineer with the Contractors' representative present when trench is open. 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. Payment for this item will be made at the **Contract Unit Price Bid per Cubic Yard.**

ITEM 17: This item of work is for the excavation of Type 'B' rock for waterline construction. Removal and disposal of rock is included in this item. Measurement for rock shall be by the Engineer with the Contractors' representative present when trench is open. 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. Payment for this item will be made at the **Contract Unit Price Bid per Cubic Yard.**

ITEM 18: This item of work consists of furnishing all materials, plant, equipment and labor required in tying-in existing water line to new water main at the designated location Line 6B, Sta. 130+88.07. The connections shall include AC pipe remediation and disposal, fittings, reducer, sleeves, concrete channel bottom removed and replaced with 8" thick concrete, 10" AWWA C-900 Cl. 235 DR 18 PVC pipe from Line 6B Station 130+48, and up to fifteen feet of 10" AWWA C-900 Cl. 235 DR 18 PVC pipe between valve and fittings but not valves. "Megalug" restraining glands (or equal) shall be provided for the M.J. fittings and shall be considered incidental to the tie-ins. All coordination required with the City, other utilities and notification of areas affected by outage shall be included. Payment will be made for the tie-in complete and in place at the **Contract Lump Sum Price Bid.**

ITEM 19: This item is for furnishing material and constructing rock filled, gabion basket erosion control structures complete including excavation and backfill. Payment will be made at the **Contract Unit Price Bid per Cubic Yard** of filled basket complete and in place, all depths.

ITEM 20: This item is for 18" Cl. 350 DIP steep slope construction including trenching, bedding, flowable fill and backfill. Rip-rap and concrete slope retainer blocks are not included in this item. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. Payment will be made for the linear feet of steep slope construction installed, complete and in place at the **Contract Unit Price Bid per Linear Foot.**

ITEM 21: This item is for contour berms as required to divert surface flow from pipeline installation. Berms to be constructed at locations shown on the drawings or as directed by the Engineer. Payment will be made for the contour berms installed, complete and in place at the **Contract Unit Price Bid per Linear Foot.**

LOT 1 – WATERLINE CONSTRUCTION:

ITEM 22: This item is for asphalt removal and patch for roads or parking lots, 6" asphalt in two layers and 6" base course, as detailed on the project drawings. Payment will be made for asphalt patch installed, complete and in place at the **Contract Unit Price Bid per Square Yard**.

ITEM 23: This item is for wire enclosed rip-rap as detailed on the project drawings. Measurement will be based on surface dimensions, along the slope. Payment will be made for wire enclosed rip-rap installed, complete and in place at the **Contract Unit Price Bid per Square Yard**.

ITEM 24: This item is for 4" of NMDOT base course (gravel) placed, spread, watered, rolled and compacted for roads or driveways in locations as directed. Payment will be made for 4" gravel installed, complete and in place at the **Contract Unit Price Bid per Square Yard.**

ITEM 25: This item is for Line 6A crossing of Highway 608 by jack and bore method, Station 0+65 to 2+84.58, including 28" dia., 0.375" wall, steel casing, casing spacers, end seals and 18" Cl. 350 DIP with restrained push-on type joints using ductile iron locking elements installed, complete and in place with all appurtenances. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 26: This item is for Line 6B crossing of Interstate 40 by jack and bore method, Station 100+53.60 to 104+84.97, including 24" dia., 0.375" wall, steel casing, casing spacers, end seals, and 12" Cl. 350 DIP with restrained push-on type joints using ductile iron locking elements installed, complete and in place with all appurtenances. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 27: This item is for Line 6B x-rd crossing by jack and bore method, Station 105+05.32 to 106+05.32 including 24" dia., 0.375" wall, steel casing, casing spacers, end seals and 12" Cl. 350 DIP with restrained push-on type joints using ductile iron locking elements installed, complete and in place with all appurtenances. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 28: This item is for Line 6B crossing of Highway 118, BNSF Railroad and the Puerco River by jack and bore method, Station 117+00.97 to 121+50.12, including 24" dia., 0.5" wall, steel casing, casing spacers, end seals and 12" Cl. 350 DIP with restrained push-on type joints using ductile iron locking elements, installed, complete and in place with all appurtenances. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 29: This item is for concrete slope retainer blocks as detailed on the project drawings for steep slope pipe construction. Payment will be made for the

actual concrete slope retainer blocks installed, complete and in place at the **Contract Unit Price Bid per Each in Place**.

ITEMS 30 & 31: These items of work are for the installation of flushing apparatus and subsequent removal of ells, discharge piping and installation of permanent stubout. This item does not include main line fittings or valves. Payment will be made at the **Contract Unit Price Bid per Each** apparatus installed, complete and in place at designated locations only. Other locations, as may be desired by the Contractor will be incidental to the project.

ITEM 32: This item is for the installation of 16" flushing apparatus at Line 6A Station 0+00 and subsequent removal of ells, discharge piping and installation of permanent stubout complete and in place. This item does not include main line fittings or valves. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 33: This item is for 30" CMP (corrugated metal pipe) installation near Line 6B Station 62+60 including earthwork, concrete inlet and outlet structures, guard rail extension and appurtenances, installed, complete and in place as shown on the contract drawings, rip-rap is not included with this item. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 34: This item of work is for materials testing for 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 time, per diem, and mileage will not be reimbursable. **Payment will be made on an approved invoice charge**.

ITEM 35: This item of work is for traffic control and safety including temporary fencing, signs, the alteration of signs, and sign maintenance, 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 36: This item is for significant down time caused by unexpected encounters with historical, archaeological and environmental items. The down time begins after the encounter and when the Archaeologist or Biologist (Government or Engineer) 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 and/or Biologist, Engineer and Contractor. Notice to resume work to be verbal, followed by written. The

LOT 1 – WATERLINE CONSTRUCTION:

Contractor is to be aware that certain auxiliary operations may continue after shut down such as backfilling, imported material hauling, water hauling, backfill processing, and other related operations. The Contractor is to consider the net effect of all of 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 per Hour of Shutdown**.

ITEM 37: This item is for concrete curb and gutter or header curb, removal & replacement to match existing, installed, complete and in place. Payment will be made at the **Contract Unit Price Bid per Linear Foot of:**

ITEM 38: This item is for 4" thick concrete sidewalk removal & replacement complete and in place. Payment will be made at the **Contract Unit Price Bid per Square Yard:**

ITEM 39: This item is for type 1 air release valve at Line 6B Station 127+62.65 complete and in place including air discharge piping and all appurtenances behind curb. Payment will be made at the **Contract Lump Sum Amount Bid**.

ITEM 40: This item is for 18" Cl 250 AWWA C950 GRP (glass reinforced plastic) pipe and restrained fittings at Line 6A Station 6+65 to 9+03.46 with granular bedding and rock free backfill. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. Payment will be made for the linear feet of pipe installed, complete and in place at the **Contract Unit Price Bid per Linear Foot.**

ITEM 41: This item is for 18" Cl 250 AWWA C950 GRP (glass reinforced plastic) pipe and restrained fittings at Line 6B Station 57+87 to 60+42 with granular bedding and rock free backfill. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. Payment will be made for the linear feet of pipe installed, complete and in place at the **Contract Unit Price Bid per Linear Foot:**

ITEM 42: This item is for construction surveying and staking as required for this lot. Payment will be made at the **Contract Lump Sum Price Bid.** Partial payments will be made based on the percentage of work completed for the lot.

LOT 1 – WATERLINE CONSTRUCTION:

ITEM 43: This item is for archaeological and historical site temporary fencing complete and in place. Temporary fencing shall be orange plastic, 3ft. height with posts spaced every 12 feet maximum. Installation location shall be as shown on plans or as directed by the Archaeological Monitor. Payment will be made for the temporary fencing installed at the **Contract Unit Price Bid per Linear Foot**.

LOT 2 – CONNECTOR LINE CONSTRUCTION

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

ITEMS 1&2: These items are for 8" SDR 35 PVC sewer lines complete in place including granular bedding and backfill compacted as specified. Installation does not include pavement removal and replacement. Measurement shall be along centerline of pipe, through manholes with no correction for slope. Payment will be made for the linear feet of pipe installed, complete and in place at the **Contract Unit Price Bid per Linear Foot**.

ITEM 3: This item is for 4'-0" diameter sewer manholes including all appurtenances, 0' to 4' – 8' depth. Rock excavation and pavement removal and replacement are not included in this item. Payment will be made for the actual number of manholes installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 4: This item of work consists of installing water pipe of the diameter and material, specified, including horizontal and vertical main line fittings designated on the project drawings, specials, trenching, bedding and backfill, but does not include pavement removal and replacement or rock excavation. Restrained joints and poly wrap 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 not shown on project drawings that are required because of conditions encountered during construction will be paid for under a separate item. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. Payment will be for the linear feet of pipe installed, complete and in place at the **Contract Unit Price Bid per Linear Foot**.

ITEM 5: This item of work consists of furnishing and installing AWWA C515 resilient wedge, epoxy coated gate valves as specified including concrete supports and cast iron valve boxes with concrete collars as shown on project drawings.

LOT 2 – CONNECTOR LINE CONSTRUCTION:

Payment will be for the actual number of valve assemblies installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 6: This item of work consists of furnishing all materials, plant, equipment and labor required in tying-in existing water lines to new water main at the designated locations. The connections shall include up to 8' of piping, fittings, specials, concrete blocking and trenching and backfilling, but 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. Payment will be made at the Contract Unit Price Bid for Each tie-in location without regard to the actual number of pipes connected. Plugging of existing lines (for abandonment) shall be considered incidental to tie-ins. All coordination required with the City, other utilities and notification of areas affected by outage shall be included. Payment will be made for the tie-in complete and in place at the **Contract Lump Sum Price Bid**.

ITEM 7: This item is for the Rehoboth Connector Line crossing of Interstate 40 by jack and bore method, length is 310.92', including 24" dia. 0.375" wall, steel casing, casing spacers, end seals and 18" Cl. 350 DIP installed, complete and in place with appurtenances. Payment will be made at the **Contract Lump Sum Price Bid.**

ITEM 8: This item of work consists of installing water pipe of the diameter and material, specified, complete including horizontal and vertical main line fittings designated on the project drawings including specials, trenching, bedding and backfill, but does not include pavement removal and replacement or rock excavation. Restrained joints and poly wrap 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 not shown on project drawings that are required because of conditions encountered during construction will be paid for under a separate item. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. Payment will be for the linear feet of pipe installed at the **Contract Unit Price Bid per Linear Foot**.

ITEM 9: This item of work consists of furnishing and installing AWWA C515 resilient wedge, epoxy coated gate valves as specified complete with concrete supports and cast iron valve boxes with concrete collars as shown on project drawings. Payment will be for the actual number of valve assemblies installed at the **Contract Unit Price Bid per Each**.

LOT 2 – CONNECTOR LINE CONSTRUCTION:

ITEM 10: This item of work consists of furnishing all materials, plant, equipment and labor required in tying-in existing water lines to new water main at the designated locations. The connections shall include up to 8' of piping, fittings, specials, concrete blocking and trenching and backfilling, but 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. Payment will be made at the Contract Unit Price Bid for Each tie-in location without regard to the actual number of pipes connected. Plugging of existing lines (for abandonment) shall be considered incidental to tie-ins. All coordination required with the City, other utilities and notification of areas affected by outage shall be included. Payment will be made for the tie-in complete and in place at the **Contract Lump Sum Price Bid.**

ITEM 11: This item of work is for materials testing for 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 time, per diem, and mileage will not be reimbursable. **Payment will be made on an approved invoice charge**.

ITEM 12: This item of work is for traffic control and safety including temporary fencing, signs, the alteration of signs, and sign maintenance, 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 in place. Payment for this item will be made per the **Contract Lump Sum Price Bid**.

ITEM 13: This item is for mitigation (removal as detailed) of abandoned leach fields along 14" waterline connector including lime stabilization, transporting excavated material to the City of Gallup's sludge injection field near the Waste Water Treatment Plant, (7 mi). Excavated material (except bedding) to be replaced with rock free backfill. Payment will be made at the **Contract Unit Price Bid per Cubic Yard** of material removed and transported.

ITEM 14: This item is for construction surveying and staking as required for this lot. Payment will be made at the **Contract Lump Sum Price Bid.** Partial payments will be made based on the percentage of work completed for the lot.

LOT 3 – MONTOYA LINE CONSTRUCTION:

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

ITEMS 1&2: These items of work consist of installing 12" C900-07 DR18 PVC waterline including horizontal and vertical main line fittings designated on the project drawings including specials, trenching, bedding and backfill, but does not include pavement removal and replacement or rock excavation. Restrained joints where called for and poly wrap 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 not shown on project drawings that are required because of conditions encountered during construction will be paid for under a separate item. Measurement will be by the linear foot along the centerline of the pipe through valves, manholes, and fittings without correction for slope. 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 3: This item of work consists of installing 11¼° vertical ells including restraints and thrust blocking as required during construction, but not designated on the project drawings. Payment will be made for each ell installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEMS 4&5: These items of work consist of furnishing and installing AWWA C509 resilient wedge, epoxy coated gate valves for buried service as specified complete including concrete support and cast iron valve boxes with concrete collars as shown on project drawings. Payment will be made for the actual number of valves installed, complete and in place at the **Contract Unit Price Bid per Each**.

ITEM 6: This item is for Type 2 air release station of the size designated, including vaults, vent piping, air and vacuum devices, protection bollards, excavation and backfill but not mainline pipe or tee. Payment will be made for the actual number of Type 2 air release stations installed, complete and in place at the **Contract Unit Price Bid per each assembly**.

ITEM 7: This item is for Type 1 air release as shown on the project drawings including enclosure, vent, piping, air release device, concrete slab, line tap, excavation and backfill installed, complete and in place. Payment will be made at the **Contract Unit Price Bid per Each**.

LOT 3 – MONTOYA LINE CONSTRUCTION:

ITEM 8&9: These items of work are for the excavation of Type "A" and "B" rock for waterline construction. Removal and disposal of rock is included in this item. Measurement for rock shall be by the Engineer with the Contractors' representative present when trench is open. 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. Payment for this item will be made at the **Contract Unit Price Bid per Cubic Yard.**

ITEM 10: This item of work consists of furnishing all materials, plant, equipment and labor required in tying-in existing water line to new water main at the designated location. The connections shall include up to 10 ft. of 14" DIP waterline including fittings, specials, concrete blocking and trenching and backfilling, but 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. Payment for detail 'A' will be made at the Contract Lump Sum Price Bid. Plugging of existing lines (for abandonment) are not included. All coordination required with the City, other utilities and notification of areas affected by outage shall be included. Payment will be made at the **Contract Lump Sum Price Bid.**

ITEM 11: This item of work consists of furnishing all materials, plant, equipment and labor required in tying-in existing water lines to new water main at the designated location. The connections shall include piping, (other than main line) fittings, specials, concrete blocking and trenching and backfilling, but 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-in. Plugging of existing lines (for abandonment) and AC remediation shall be considered incidental to tie-in. All coordination required with the City, other utilities and notification of areas affected by outage shall be included. Payment for detail 'B' will be made at the **Contract Lump Sum Price Bid**.

ITEM 12: This item of work consists of furnishing all materials, plant, equipment and labor required in tying-in existing water line to new water main at the designated location. The connections shall include up to 10 ft. of 8" C-900 DR18 PVC waterline including fittings, specials, concrete blocking and trenching and backfilling, but 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-in. Payment will be made at the Contract Unit Price Bid for Each tie-in location without regard to the actual number of pipes connected. Plugging of existing lines (for abandonment) shall be considered incidental to tie-in. All coordination required with the City,

LOT 3 – MONTOYA LINE CONSTRUCTION:

other utilities and notification of areas affected by outage shall be included. Payment for detail 'C' will be made at the **Contract Lump Sum Price Bid**.

ITEMS 13&14: These items are for asphalt removal and patch for roads or parking lots, 6" asphalt in two layers or 3" asphalt as called for and 6" base course as detailed on the project drawings. Saw cuts are included in this item. Payment will be made for asphalt patch installed, complete and in place at the **Contract Unit Price Bid per Square Yard**.

ITEM 15: This item is for concrete curb and gutter of all sizes, removal and replacement to match existing complete and in place. Payment will be made at the **Contract Unit Price Bid per Linear Foot.**

ITEM 16: This item is for 4" concrete sidewalk removal and replacement, including 4" granular pad installed, complete and in place. Payment will be made at the **Contract Unit Price Bid per Square Yard**.

ITEM 17: This item is for abandoning existing 12" cast iron line including removing valve and plugging near Station 0+00 and cap and plug in three other locations, as shown on the project drawings; 1) South of Montoya Boulevard in landscaped area. 2) South of Community Pantry. 3) West of existing East Pump Station. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 18: This item of work is for materials testing for 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 time, per diem, and mileage will not be reimbursable. **Payment will be made on an approved invoice charge**.

ITEM 19: This item of work is for traffic control and safety including temporary fencing, signs, the alteration of signs, and sign maintenance, as required throughout the project. Traffic control plans shall conform to MUTCD standard 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 20: This item is for construction surveying and staking as required for this lot. Payment will be made at the **Contract Lump Sum Price Bid.** Partial payments will be made based on the percentage of work completed for the lot.

LOT 4 - ABANDONED MINE REMEDIATION:

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

ITEM 1: This item is for drill holes as required for video camera exploration, grouting or verification of grout placement. Drill depths and drill locations to be determined by the Engineer while consulting with the Contractor. Clean out of existing holes of similar diameter is not included in this item, provided however, that the deepening of existing drill holes is included. Payment will be made at the **Contract Unit Price Bid per Linear Foot**.

ITEM 2: This item is for grout material pumped in voids beneath proposed pipeline alignment. Conventional grout material quantities to be measured by batch bin dimensions or other approved methods. Materials that expand to a foam-like state after placement will require demonstration tests, with the appropriate variables involved to correlate initial placement volumes with final expanded volumes. Payment will be made at the **Contract Unit Price Bid per In Place Cubic Yard of Final Volume installed.**

ITEM 3: This item is for video viewing and recording of down-hole conditions along proposed pipeline alignment prior to remediation, during grouting and after grouting as may be required. Video recordings shall accurately display recording time. Camera travel rates going down or coming up the drill holes to be adequate for proper viewing but not prolonged. Video recording equipment to have handy means for transferring recordings to computers of the Engineer. Payment will be made at the **Contract Unit Price bid per Hour**.

ITEMS 4&5: These items are for excavation and backfill methods for abandoned mine remediation, to the depths listed. Measurement to be made in accordance with pay dimensions as directed by the Engineer. Payment will be made at the **Contract Unit Price Bid per Cubic Yard** for excavation along the pipeline alignment. Pay widths to normally be 8'-0" but may be adjusted accordingly when directed by the Engineer. Item 4 is for depths less than 12'-0". Item 5 is for depths greater than 12'-0" (24' max). The volume of the typical trench installation is to be neglected in the volume calculations.

ITEM 6: This item is for mobilization and demobilization of drilling and grouting equipment as required for mine remediation. This item is to be considered as a one-time mobilization/demobilization occurrence to complete the work depicted on the project drawings. Payment for additional mobilization/demobilization will be warranted if unforeseen mine conditions are encountered that require additional remediation after equipment has been removed from the area. Payment will be made at the **Contract Unit Price Bid per Each Occurrence**, 70% for mobilization and 30% for demobilization.

LOT 4 - ABANDONED MINE REMEDIATION:

ITEM 7: This item of work is for materials testing for PMBP, soils, base course, grout 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 time is reimbursable. **Payment will be made on an approved invoice charge**.

ITEM 8: This item is for construction surveying and staking as required for this lot. Payment will be made at the **Contract Lump Sum Price Bid.** Partial payments will be made based on the percentage of work completed for the lot.

LOT 5 - HOGBACK PRESSURE REDUCING STATION:

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

ITEM 1: This item is for clearing, grubbing, earthwork, and grading, including excavation and removal of native material up to 12 ft. below the finished floor elevation and backfill with imported granular material, to 5ft. beyond building, reserve pit remediation and site pad embankment as shown on the project drawings complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 2: This item is for yard piping to within 5' of building including valves, fittings, granular bedding, granular backfill and appurtenances as shown on the contract drawings complete and in place. Payment will be made at the **Contract Lump Sum Price Bid.**

ITEM 3: This item is for 4" of NMDOT base course (gravel) site surfacing complete, watered, rolled and compacted complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 4: This item is for station building including concrete foundation, slab, slab drain, walls, doors, roof, vents, interior trim, insulation and appurtenances as shown on the contract drawings complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 5: This item is for station piping including PRV's, flow meter, valves, major piping, minor piping and drain lines to a point 5' outside of building, and appurtenances as shown on the contract drawings complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

LOT 5 - HOGBACK PRESSURE REDUCING STATION:

ITEM 6: This item is for station electrical including heating, lighting, venting, fans, wiring, SCADA conduit and control wiring, SCADA equipment installation, entrance work on building as required by the City and appurtenances as shown on the contract drawings complete and in place. Coordination with City SCADA Contractor is required. See Appendix C for areas of responsibility for SKM Inc. and Contractor of this project. (Note: Furnishing and programming of SCADA equipment are not included in this item) Installation of conduit, conductor and GRC riser for secondary service line is included in this item. Contractor to furnish the total riser and install the first 10' above ground with remaining conduit installed by the City. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 7: This item is for single phase primary electrical service extension and transformer for the station by the City of Gallup and appurtenances complete and in place. This amount is to be used for totaling bid. **The actual amount to be paid will be based on approved invoice from the City as routed through the Contractor**.

ITEM 8: This item is for furnishing and installing chain link fencing with security wires, bracing, top rails, tension wires, personnel gates, vehicle gates and appurtenances as shown on the contract drawings complete and in place. Payment will be made at the **Contract Unit Price Bid per Linear Foot for actual linear feet of chain link.**

ITEM 9: This item of work is for materials testing for PMBP, soils, base course, grout 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 time is reimbursable. **Payment will be made on an approved invoice charge**.

ITEM 10: This item is for construction surveying and staking as required for this lot. Payment will be made at the **Contract Lump Sum Price Bid.** Partial payments will be made based on the percentage of work completed for the lot.

LOT 6 - HEATON PUMP STATION:

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

ITEM 1: This item is for clearing, grubbing, earthwork, and grading, including excavation and removal of native material up to 12 ft. below the finished floor elevation and backfill with imported granular material to 5 ft. beyond building

LOT 6 - HEATON PUMP STATION:

and site pad embankment as shown on the project drawings complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 2: This item is for yard piping to within 5' of building including waterlines, sewer lines, drain lines, valves, fittings, appurtenances, granular bedding and granular backfill complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 3: This item is for 4" of NMDOT base course (gravel) site surfacing complete, watered, rolled and compacted complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 4: This item is for station building including concrete foundation, floor, floor trench, drains, walls, doors, roof, furnished office, furnished bathroom, pipe supports, work benches, stairs, bollards, sidewalks, concrete pads, vents, trim insulation and all appurtenances as shown on the contract drawings complete and in place. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 5: This item is for station piping including major piping, minor piping, coatings, PRV's, flow meter, valves, surge tanks, pump control valves, pressure relief valve, motors, pumps, and appurtenances as shown on the contract drawings complete and in place. Piping to extend to 5' outside of building. Payment will be made at the **Contract Lump Sum Price Bid.**

ITEM 6: This item is for 2½ ton bridge crane unit including end trucks, crane girders, rails, columns, bridge, trolley and hoist as shown on the contract drawing complete and in place. Payment will be at the **Contract Lump Sum Price Bid**.

ITEM 7: This item is for station electrical including heating, lighting, fans, AC unit, venting, motor control cabinets, wiring, SCADA conduit, control wiring, SCADA equipment installation, entrance work on building as required by the City and appurtenances complete and in place as shown on the contract drawings. Coordination with City SCADA Contractor is required. See Appendix C for areas of responsibility for SKM Inc. and Contractor of this project. (Note: Furnishing and programming of SCADA equipment are not included in this item, however coordination with the City's SCADA Contractor will be required) Installation of primary and secondary yard conduit, secondary conductors and transformer pad are included in this item. Contractor to furnish all primary conduit and risers, and install the first 10 feet of riser above the ground with the remaining conduit installed by the City. Payment will be made at the **Contract Lump Sum Price Bid**.

ITEM 8: This item is for 3 phase primary electrical installation entrance work by the City of Gallup including furnishing and pulling conductors, furnishing and

LOT 6 - HEATON PUMP STATION:

installing pad mount transformer and other operations as required to connect service drop entrance and approved appurtenances complete and in place. The amount listed to be used for totaling bid. **Payment will be based on approved invoice amount** from the City routed through the Contractor.

ITEM 9: This item is for chain link fencing including personnel and vehicle gates as detailed on the project drawings complete and in place. Payment will be made at the **Contract Unit Price Bid per Linear Foot**.

ITEM 10: This item of work is for materials testing for PMBP, soils, base course, grout 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 time is reimbursable. **Payment will be made on an approved invoice charge.**

ITEM 11: This item is for construction surveying and staking as required for this lot. Payment will be made at the **Contract Lump Sum Price Bid.** Partial payments will be made based on the percentage of work completed for the lot.

LOT 7 – SCADA ADDITIONS AND REVISIONS:

Note: Items for this lot consists of furnishing all materials, plant, equipment, and programming to perform required SCADA operations.

ITEM 1: This item of work is for furnishing equipment and programming by City Contractor, SKM Inc., as required to incorporate the new facilities of this project into the City SCADA system. The new facilities include the Heaton Pump Station and the Hogback pressure reducing station. The SCADA system shall be such as to accommodate additions required for future projects.

This item includes furnishing SCADA equipment (including antennae's) and making final connections at or within SCADA equipment. This installation of associated control wiring runs is not included in this item. Coordination with electricians and General Contractor is included. **Payment will be at the predetermined price listed on the Bid Proposal.**

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101 SUBMITTAL PROCEDURES

101.1 DESCRIPTION

101.1.1 Submittal: Shop drawings, product data, samples, operation and maintenance data shall be presented for review and approval in accordance with General Conditions Paragraph 23, Submittals, Shop and Erection Drawings. Contract General Condition Paragraph 10, Workmanship and Superintendence shall apply to all submittals.

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

Shop drawings: As used in this section, 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.

Product data: Preprinted material such as illustrations, standard schedules, performance charts, instructions, brochures, diagrams, manufacturer's descriptive literature, catalog data, and other data to illustrate portion of work, but not prepared exclusively for this contract.

Samples: Physical examples of products, materials, equipment, assemblies, or workmanship that are physically identical to portion of work, illustrating portion of work or establishing standards for evaluating appearance of finished work or both.

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.

Progress Schedule: Shall be in accordance with Section 102 of the Technical Specifications.

Traffic Control Plan: Shall be in accordance with Section 802 of the Technical Specifications.

Storm Water Pollution Prevention Plan (SWPPP): Shall be in accordance with Section 808 of the Technical Specifications.

Pipeline Layout: Shop drawings and schedule of pipeline layout (plan and profile) including horizontal station, elevation, grades, fittings, joint restraints, valves, specials, joint length and appurtenances to show how Contractor, or Subcontractor intends on performing the work contained herein.

101.2 SUBMITTAL IDENTIFICATION

Preconstruction Submittals

List of proposed products
Construction Progress Schedule
Submittal register
Environmental protection plan

Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the 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.

Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials or equipment for all portions of the work. Samples of warranty language when the contract requires extended product warranties.

Samples

Physical examples of materials, equipment 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 ensuring 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.

Design Data

Calculations, mix designs, analyses or other data pertaining to a part of work.

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 must have been within three 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. Investigation reports Daily checklists Final acceptance test and operational test procedure

Certificates

Statements signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project. Document required of Contractor, or of a supplier, installer or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications. Confined space entry permits.

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.

Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions. Factory test reports.

Operation and Maintenance 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.

101.3 FORMAT OF SUBMITTALS

101.3.1 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 entitled "Identifying Submittals." Process transmittal forms to record actions regarding sample panels and sample installations.

101.3.2 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:

a. Project title and location.

b. Construction contract number.

c. Section number of the specification section by which submittal is required.

d. Submittal description of each component of submittal.

e. When a resubmission is required add alphabetic suffix on submittal section, for example,

Section 2A, to indicate resubmission.

f. Name, address, and telephone number of subcontractor, supplier, manufacturer and any other second tier contractor associated with submittal.

g. Product identification and location in project.

101.3.3 Format for Shop Drawings:

a. Shop drawings shall not be less than 8 1/2 by 11 inches nor more than 24 x 36 inches.

b. Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

c. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled "Identifying Submittals."

d. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Shop drawing dimensions shall be the same unit of measure as indicated on the contract drawings. Identify materials and products for work shown.

101.3.4 Format of Product Data:

a. Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

b. Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

c. Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed

101.3.5 Format of Operation and Maintenance (O&M) Data: O&M Data format shall comply with the requirements specified in the paragraph entitled Operation and Maintenance Data found in each required specification section.

101.4 QUANTITY OF SUBMITTALS

101.4.1 Number of Copies of Shop Drawings: Submit 5 copies of submittals of shop drawings requiring review and approval.

101.4.2 Number of Copies of Product Data: Submit product data in compliance with quantity requirements specified for shop drawings.

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

101.5 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 design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal. 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.

101.6 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. 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.

101.7 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. Units of weights and measures used on all submittals shall be the same as those used in the contract drawings. 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. Submittals shall include items such as: Manhole barrel, cone and ring schedules; Traffic control plans for minor operations; Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Engineer approval shall be scheduled and made prior to the acquisition of the material or equipment covered thereby. Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

101.8 SUBMITTAL PROCEDURES

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

101.9 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made before the Contractor is scheduled to install materials allowing ample time for review and delivery of the approved material.

102 PROGESS SCHEDULE– INDEX

102.1 DESCRIPTION

102.1.1 CONSTRUCTION PROGRESS CHART

102.1.2 SCHEDULE SOFTWARE

102 PROGESS SCHEDULE

102.1 DESCRIPTION

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. The contractor shall submit a copy of this 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. The contractor shall prepare the chart with the following considerations:

A. The contract work shall be divided into definable contract features.

B. As a minimum, the contractor shall address each specification bid item as a principal contract feature.

C. The weighted value (WT.) column should indicate the percentage of the contract for which each principle contract feature accounts.

D. The vertical lines shall be identified by specific time frames, (i.e.,weekly, bi-weekly, monthly) with one space accounting for no more than one month.

E. Identify the date when Notice to Proceed is acknowledged on the chart.

F. Identify the contract completion date on the chart.

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

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

Note: The progress chart shall reflect the construction sequencing required to maintain water production by the City throughout the project.

102.1.2 Schedule Software: The schedule software shall run on a Windows platform operating system. The software shall meet the minimum requirements set forth above. A copy of the schedule software shall be provided to the City or the Engineer for their use in tracking the project progress.

CONSTRUCTION PROGRESS CHART

REPORTS CONTROL SYMBOL

1. CONTRACTOR	3. PROJECT	5. CONTRACT DESCRIPTION	6. SUBMITTED FOR APPROVAL	DATE
			7. APPROVAL RECOMMENDED	DATE
2. CONTRACT NUMBER	4. LOCATION		8. APPROVED	DATE

LEGEND

BARS: 0 · 5 · 10

Scheduled progress to date of report

Actual progress

CURVES:

Scheduled progress _____ Actual progress _____

PRINCIPAL CONTRACT FEATURE	LINE ITEM	WT.	ESTIMATED COST	
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL
				SCHED.
				ACTUAL

100
90
80
70
60
50
40
30
20
10
0

201 GENERAL EARTHWORK – INDEX

201.1 DESCRIPTION

201.2 SUBMITALS

201.3 MATERIALS
- 201.3.1 BACKFILL
- 201.3.2 TIMBER

201.4 PREPARATION
- 201.4.1 TEST PITS
- 201.4.2 DEWATERING AND DRAINAGE SYSTEMS

201.5 GENERAL EXCAVATION
- 201.5.1 ROCK EXCAVATION

201.6 EXCAVATION SUPPORT
- 201.6.1 BRACING AND SHEETING

201.7 BACKFILL PROCEDURES

201.8 DISPOSAL OF SURPLUS MATERIAL

201.9 MEASUREMENT AND PAYMENT

201 GENERAL EARTHWORK

201.1 DESCRIPTION

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.

201.2 SUBMITTALS

Imported material, gradation, unit weight, proctor and PI sample results shall be approved before bedding or backfilling begins.

201.3 MATERIALS

201.3.1 Backfill: Backfill materials designed for use under this section shall be as specified in Section 204 Granular Fill Material or as otherwise called for.

201.3.2 Timber: Timber used for excavation support system shall be pressure treated.

201.4 PREPARATION

201.4.1 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.

201.4.2 Dewatering and Drainage Systems: Temporary dewatering and drainage systems shall be in place prior to beginning excavation.

201.5 GENERAL 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. 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.

201.5.1 Rock Excavation: Rock excavation shall be broken into two categories 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:

Drilling and blasting

Drilling and splitting with expandable chemical compound.

Jack hammering.

Adjacent excavation and removal with large earth/rock moving equipment.

Use of any of these methods does not necessarily mean that the rock is 'Type A.'

Type "B" rock - is not as 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. The samples may be used to settle questions anyone may have in regard to the type of rock being excavated.

201.6 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.

201.6.1 Bracing and Sheeting: In congested areas where narrowness or right-of-ways, 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.

201.7 BACKFILL PROCEDURES

Backfilling operations shall commence after concrete has cured for approximately 72 hours. Materials for backfill shall conform to those described in Section 203.

Backfill shall be brought up evenly in maximum 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 State Highway Department 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.

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 excavation settlement or other construction activities within a period of one (1) year after final acceptance of the project by the City.

201.8 DISPOSAL OF SURPLUS MATERIAL

Excavated material may be stockpiled without excessive surcharge on the trench bank, unsuitable waste and surplus excavated material shall be removed and disposed of offsite in accordance with applicable regulations. 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.

201.9 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

202.1 DESCRIPTION

202.2 GENERAL

202.3 REMOVAL AND DISPOSAL OF MATERIAL

202.4 MEASUREMENT AND PAYMENT

202 CLEARING AND GRUBBING

202.1 DESCRIPTION

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.

202.2 GENERAL

Contractor shall establish right of way lines, property lines and construction lines based on project drawings and Engineer's stakes to determine which trees, shrubs, plants and other items to remain. The Contractor shall preserve all 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 on designated demolition limits to remain.

202.3 REMOVAL AND DISPOSAL OF MATERIAL

Materials which cannot be safely or adequately buried, may be removed from the limits of the right of way and disposed of off-site at an approved location. Contractor shall arrange for and obtain permission from the property owner on whose property material is to be disposed of.

Burning of material is strictly prohibited.

The roadway 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 DESCRIPTION

203.2 SUBMITTALS

203.3 TRENCHING FOR PIPE

203.4 ROCK EXCAVATION

203.5 BRACING AND SHEETING

203.6 EXCAVATION FOR APPURTENANCES

203.7 BACKFILLING
203.7.1 CONVENTIONAL BACKFILL

203.8 GRANULAR MATERIAL
203.8.1 FLOWABLE BACKFILL

203.9 PAVEMENT CUT AND PATCHES

203.10 EXISTING UTILITIES

203.11 DEWATERING

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

202.13 MEASUREMENT AND PAYMENT

203 TRENCHING, EXCAVATION, AND BACKFILLING

203.1 DESCRIPTION

This item of work shall consist of trenching, excavation, backfilling, restoration of site and miscellaneous operations pertaining to installation of pipe lines, 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, and measurement and payment methods contained therein, or the Special Conditions shall apply.

203.2 SUBMITTALS

203.3 TRENCHING FOR PIPE

Trenching for pipe installation shall commence at such points on the line as approved by the Engineer and in the case of trenching for gravity flow, lines shall progress up-stream. The Contractor shall perform all operations necessary to excavate all substances encountered to the proper installation of the pie with due regard for type of pipe joint used. Normally, trenches shall be excavated with vertical walls opposite the pipe with min. widths as required by pipe manufacturer or 24" wider than pipe O.D. or as required to permit lateral tamping of backfill. Trenches shall have sloping banks above the pipe to meet safety requirements, provided, however, that trench walls may be dug to accommodate a trench box if one is being used. Open pits around manholes or bore pits shall be shored or sloped for safety.

Unless otherwise specified in the Project Technical Specifications or Drawings, all pipe shall be installed on a minimum depth of 4" of the best of excavated material, adequately compacted. The material shall extend to top of the pipe and shall be tamped into place. The material shall be placed over a firm unyielding trench bottom and shall provide uniform support.

Should over-digging occur, the Contractor shall bring the trench bottom back to grade by adding and compacting suitable materials and acceptable work methods. Should wet or otherwise unsuitable soil, incapable of properly supporting the pipe, be encountered in the trench bottom, such soil shall be removed to the depth required and the trench backfilled to invert grade with suitable granular material approved by the Engineer. No extra payment will be allowed for work 6" or less in depth required in placing material except as provided for in the bid proposal.

All excess material from excavation or material deemed unsuitable for backfill by the Engineer shall be removed from the site and disposed of by the Contractor.

Trenching shall be done only far enough in advance of pipe laying as required to expedite the work. Trenching or exploratory digging shall be done far enough in advance of pipe laying to permit the Engineer to make grade changes required by interference with existing utilities.

Preliminary utility locating shall also be done, as indicated on the project drawings and as required prior to tie-ins so that existing pipe diameters and materials can be verified.

Type A - Type A rock is extremely hard rock and is defined as rock which cannot be excavated from trenches by means other than those listed below:

1. Drilling and blasting
2. Drilling and splitting with expandable chemical compound
3. Jack-hammering
4. Adjacent excavation and removal with large earth/rock moving equipment
   *Use of any of these methods does not necessarily mean that the rock is type 'A'.

Type B - Type B rock is not as difficult to excavate as Type A rock. Type B rock can be excavated by any of the methods described above or by large backhoes with rock teeth and experienced operators.

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

All stone or boulders less than 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 minimum of 4" below all pipe elevations and backfilled to trench invert grade with suitable granular material approved by the Engineer.

203.4 BRACING AND SHEETING

In congested areas where narrowness of right-of-ways, 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 a minimum 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 feet (4') below the ground.

203.5 EXCAVATION FOR APPURTENANCES

Excavation for structures and appurtenances related to the pipe line shall provide safety between outer surfaces and the embankment. Faces of excavation or piling may be used as the outside form of concrete structures, if in the opinion of the Engineer, the excavated faces are satisfactory as to line and grade and satisfactory construction can be obtained utilizing this method.

203.6 BACKFILLING

Backfilling operations shall 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.

203.6.1 Conventional Backfill: Bedding material for backfilling from beneath pipe to a point 12" over top of pipe shall be friable, granular, moist material, free of rock, clods or debris. Material lateral to pipe shall be tamped by hand tools in such a manner as to not dislodge the pipe.

Material for completing the trench backfill shall be moist earth free of debris or rocks larger than 6" in diameter. All backfill material shall be compacted to the density called for on the drawings. When native material is judged unsuitable by the Project Engineer, suitable imported material shall be provided. If compaction tests indicate that specified densities are not being achieved, then construction methods shall be altered accordingly. Compaction efforts shall be consistent and performed in workmanlike manner. Density tests shall be performed at all depths with assistance in digging provided by the Contractor. The Contractor shall also assist in scheduling times suitable for performing tests.

203.7 GRANULAR MATERIAL

Granular material, where specified, in these specifications shall meet the following general listed gradation requirements:

Sieve Size	Percent Passing
1 inch	100
No.4	40-100
No. 200	30 or less

The plasticity index (ASTM 4318) of the material shall be 12 or less, provided however, that sandy material from approved areas or crusher fines may be used if approved by the Engineer.

In areas where the natural material encountered in the trench bottom meets the above gradation requirements, over excavation and placing of select 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. Such areas will be relatively scarce and will require test pits and testing to prove acceptable prior to construction.

203.7.1 Flowable Backfill: 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. Test methods to conform to NMDOT 516.2.10..

Cement shall be low alkali type I or II.

Fine aggregate shall provide a uniform mixture and have the following gradation characteristics:

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

Water shall be potable water from municipal or other approved sources. Fly ash shall be either Class F or Class C.

Flowable Fill Mix Design shall be established in accordance with the following limits:

Cement	50 - 94 lb/CY (except that in some cases additional cement may be requested to accelerate or increase strength)
Fly Ash	150 - 300 lbs/CY
Slump	8" - 10"
Compressive Strength	50 PSI

203.8 PAVEMENT CUT AND PATCHES

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

203.9 EXISTING UTILITIES

The Contractor shall call for utility "locates" by the utility companies prior to any construction activities. The Contractor should advise 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-ins problems for the proposed facilities.

The Contractor shall exercise due care to insure 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 place 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.

203.10 DE-WATERING

The Contractor shall at his cost furnish all equipment and perform all operations required to remove all water from trenches or other parts of the work and fully protect the work from slides or cave-ins by installation, shoring or other restraining devices. 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.

203.11 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 R/WS 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.

203.12 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 DESCRIPTION

204.2 SUBMITTALS

204.3 GRANULAR FILL

204.4 NATIVE ROCK FREE FILL

204.5 FLOWABLE FILL MIX DESIGN
- 204.5.1 CEMENT
- 204.5.2 FLOWABLE FILL AGGREGATE

204.6 NATIVE ROCK UTILIZATION
- 204.6.1 SLOPE COVER
- 204.6.2 ROCK FILL

204.7 PLACING FLOWABLE FILL

204.8 PLACING SLOPE COVER ROCK

204.9 PLACING ROCK FOR FILL

204.10 MEASUREMENT AND PAYMENT

204 FILL MATERIALS

204.1 DESCRIPTION

This section of work shall consist of fill material used for embankment, backfill, and imported fill material.

204.2 SUBMITTALS

Certification: Engineer's Approval

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

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.

Test Reports: Engineer's Approval

Flowable Fill Mix Design

Filter Aggregate

204.3 GRANULAR FILL

Granular fill material shall be unfrozen gravel, sandy gravel or 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 following gradation limits:

Sieve Size	Percent Passing
1 inch	100
No. 4	40-100
No. 200	30

204.4 NATIVE ROCK FREE FILL

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

Sieve Size	Percent Passing
No. 200	15-70

204.5 FLOWABLE FILL MIX DESIGN

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:

Strength	50 – 150 psi as described above per ASTM D4832 (except that in some cases additional strength may be requested to accelerate or increase strength.)
Cement	50 - 94 lb/CY as required to meet strength requirement above (except that in some cases additional cement may be requested to accelerate or increase strength.
Fly Ash	Class F fly ash shall be at least 15% of the total cementitous material by weight.
Aggregate	1500 - 3000 lbs/CY
Slump	5" - 8"
Water	Water shall be potable water from municipal or other approved source

204.5.1 Cement: Cement shall comply with Section 10, Cast in Place Concrete and shall be low alkali type I or II.

204.5.2 Flowable Fill Aggregate: Flowable aggregate shall conform to the following requirements:

Fine aggregate shall provide a uniform mixture and have the following gradation characteristics.

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

204.6 NATIVE ROCK UTILIZATION

204.6.1 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

to be the more competent of the rock encountered. Rock dust and fines to be held to a minimum. Rock size to range from 6" to 24". Trees to remain amongst the rock placement to the extent possible.

204.6.2 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.

204.7 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 6". 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 presence of Engineer.

204.8 PLACING SLOPE COVER ROCK

Rock to be placed by hand and machine to a depth not to exceed 24" or as specified. Finished slope cover to have the appearance of having been "placed," rather than dumped.

204.9 PLACING ROCK FOR FILL

Excavated rock to be used in areas approved for fill to be placed in uniform layers not to exceed 24" 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 to be suitable for dressing to site grading requirements.

204.10 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 WIRE ENCLOSED RIP-RAP – INDEX

205.1 DESCRIPTION

205.2 SUBMITTALS
- 205.2.1 SAMPLES
- 205.2.2 CERTIFICATIONS

205.3 MATERIALS
- 205.3.1 STONE FOR RIP-RAP
- 205.3.2 WIRE
- 205.3.3 STAKES
- 205.3.4 DRAINAGE GEOTEXTILE

205.4 EXECUTION
- 205.4.1 SITE PREPARATION
- 205.4.2 FABRIC PLACEMENT
- 205.4.3 RIP-RAP PLACEMENT

205.5 MEASUREMENT AND PAYMENT

205 WIRE ENCLOSED RIP-RAP

205.1 DESCRIPTION

This section of work shall consist of wire enclosed rip rap.

205.2 SUBMITTALS

205.2.1 Samples:

Rip-Rap: (Class A wire enclosed) as per NMSHTD Section 602: Engineers Approval
Sample of stone for rip-rap shall be submitted prior to delivery

Stakes: Engineers approval. Description of stake to be used shall be submitted prior to delivery.

205.2.2 Certifications:
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.

Geotextile Fabric: Engineer approval. Contractor to provide certified test reports made by an independent testing laboratory indicating that material meets or exceeds the requirements of these specifications.

205.3 MATERIALS

205.3.1 Stone for Rip-Rap: Stone used for rip-rap shall be rocks or rough quarry stone with a percent wear of not more than sixty (60) as determined by AASHTO T96 and a soundness loss of not more than twenty one (21) 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.

205.3.2 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 determined in accordance with ASTM A90. Wire shall be 11 ¼ gauge or larger. Wire mesh openings shall be uniform in size with opening size no more than 4 ¾ inches in the largest dimension, but must have at least one dimension of 3 ¼ inches or less.

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

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

205.3.4 Drainage Geotextile: Geotextile fabric, including threads, shall be resistant to chemical attack, mildew, rot, acids, and alkalines within the PH range of three (3) to thirteen (13) and shall be non-biogradable. Fabric shall be woven or non-woven produced by heat bonding, by use of external adhesives or by needle-punching. Geotextile fabric material will be considered in accordance with ASTM D4759. Fabric construction shall consist of long chain synthetic polymers, composed of at least 35 percent by weight of polypropylene, polyvinylidene chloride, nylon or polyester. Materials are to conform to the following:

Property	Required Value	Test Method
Tensile strength, lbs., min.	200	ASTM D4632
Puncture strength, lbs., min.	75	ASTM D4833
Trapezoid tear, lbs., min.	75	ASTM D4533
Apparent opening size, min.	70	ASTM D4751
Permittivity, gal/min/sf min.	30	ASTM D4491
Ultraviolet degradation retained strength @ 150 hrs. min	70	ASTM D4355

205.4 EXECUTION

205.4.1 Site Preparation: Area to receive fabric shall be cleared and graded as required within the contract drawings. 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.

205.4.2 Fabric Placement: Fabric shall be placed as smooth as possible on the prepared subgrade. Fabric may be held in place by utilizing pins, staples or rocks. On curves, the fabric may be folded or cut to conform to the curve. The fold or overlap shall be in the direction of construction. Fabric shall be overlapped a minimum of 30 inches.

205.4.3 Rip-Rap Placement: The stones in Class A (wire enclosed) rip-rap shall be enclosed on all sides with wire mesh and shall be constructed in accordance with the details shown in the Contract Documents. 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 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 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 ½ 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 2 feet on center each way and

205.5 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.

301 CAST-IN-PLACE CONCRETE – INDEX

301.1 DESCRIPTION

301.2 SUBMITTALS
- 301.2.1 CERTIFICATIONS
- 301.2.2 TEST REPORTS
- 301.2.3 PRODUCT DATA

301.3 MATERIALS
- 301.3.1 CEMENT
- 301.3.2 AIR-ENTRAINED ADMIXTURE FOR CONCRETE
- 301.3.3 CHEMICAL ADMIXTURE
- 301.3.4 SHEET CURING MATERIAL FOR CURING CONCRETE
- 301.3.5 LIQUID CURING COMPOUND FOR CURING CONCRETE
- 301.3.6 WATER
- 301.3.7 AGGREGATES
- 301.3.8 FINE AGGREGATE
- 301.3.9 COURSE AGGREGATE
- 301.3.10 FLY ASH
- 301.3.11 CONCRETE MIX

301.4 FORMWORK INSTALLATION

301.5 CONCRETE PLACEMENT

301.6 CONSOLIDATION

301.7 COLD WEATHER REQUIREMENTS

301.8 HOT WEATHER PLACEMENT

301.9 EXPANSION AND CONTRACTION JOINTS

301.10 FINISHES
- 301.10.1 FINISHING FORMED SURFACES
  - 301.10.1.1 RUBBED SURFACE
- 301.10.2 FINISHING SLAB SURFACES
  - 301.10.2.1 FLOAT FINISH
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  - 301.10.2.3 SMOOTH TROWLED FINISH

301.11 CURING AND PROTECTION

301.12 MEASUREMENT AND PAYMENT

301 CAST-IN-PLACE CONCRETE

301.1 DESCRIPTION

This section of work shall cover cast in place concrete.

301.2 SUBMITTALS

301.2.1 Certifications: Certify admixtures used in the same concrete mix are compatible with each other and the aggregates.

301.2.2 Test Reports: The following test reports shall be less than twelve (12) months old.

- Fine Aggregates - sieve analysis, physical properties, ASR resistance and deleterious substances.
- Coarse aggregates - sieve analysis, physical properties, ASR resistance and deleterious substances.
- Cements - chemical analysis and physical properties.
- Fly Ash - chemical analysis and physical properties.
- 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) 6-inch cylinders at seven (7). Fourteen (14) and 28 days shall be provided upon request.

301.2.3 Product Data:

- Sources of cement, fly ash and aggregates
- Material safety data sheets (MSDS) for all concrete components and admixtures.
- Air Entrainment Admixture. Product data including catalogue cuts, technical data, storage requirements, product life, recommended dosage, temperature considerations and conformity to ASTM standards.
- 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.
- 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 7 and 14 day tests if available.
- Sheet curing material. Product data including catalogue cuts, technical data.
- Liquid curing compound. Product data including catalogue cuts, technical data, storage requirements, product life, application rate.

301.3 MATERIALS

301.3.1 Cement: shall comply with ASTM C150. Cement is to be low-alkali type I or II.

301.3.2 Air-entrained admixture for concrete: shall conform to the requirements of AASHTO M154.

301.3.3 Chemical admixture: shall conform to the requirements of AASHTO M194.

301.3.4 Sheet curing material for curing concrete: shall meet the requirements of AASHTO M171, except that only white reflective type shall be permitted.

301.3.5 Liquid curing compound for curing concrete: shall conform to the requirements of Type 1 or Type 2, AASHTO M148.

301.3.6 Water: shall be potable water meeting ASTM C 1602, including Table 2, from a municipal or other approved source.

301.3.7 Aggregates: The following items are required for concrete aggregate.

1. Assure aggregates are not deleteriously alkali-silica reactive (ASR).
2. Test for potential of deleterious alkali-silica reaction of coarse and fine aggregate shall be made in accordance with ASTM C 1260.
    a. If expansion at 16-days does not exceed 0.10 percent, the coarse or fine aggregates will be acceptable.
    b. 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.
        i. Otherwise, test specimens according to ASTM C 1567 using all components (e.g. coarse aggregate, fine aggregate, cementious materials, and/or specific reactivity reducing chemicals) in the proportions proposed for the mixture design and retest.
        ii. For mixtures using lithium admixtures, use test procedure CRD-C662.
        iii. Expansion of the proposed mixture design test specimens, tested in accordance with ASTM C1567 does not exceed 0.10 percent at 16-days from casting, the aggregates will be acceptable.
        iv. Expansion of the proposed mixture design test specimens is greater than 0.10 percent at 16-days, the aggregates will not be acceptable unless adjustments to the mixture design can reduce the expansion to less than 0.10 percent at 16-days, or new aggregates shall be evaluated and tested, or testing by ASTM C 1293 indicates the aggregates will not experience deleterious expansion.
    c. 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 C 1567.

d. Substitution of ASTM C 1293 test results for ASTM C 1260 test results is acceptable; however, the average concrete prism expansion shall be less than 0.04 percent at one (1) year.

301.3.8 Fine aggregate: shall consist of natural sand or other inert materials with similar characteristics conforming to the following gradation:

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

301.3.9 Coarse aggregate: shall consist of crushed stone, crushed gravel or natural washed gravel conforming to the following gradation:

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

301.3.10 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.

1. ASTM C 618, Class F, except;
   a. Sulfur trioxide; maximum of 4.0 percent.
   b. Calcium oxide; maximum of 8.0 percent.
   c. Loss on ignition; maximum of 2.5 percent.
   d. Test for effectiveness in controlling alkali-silica reaction under supplementary optional physical requirements in Table three (3) of ASTM C 618. Use low-alkali cement for test.
   e. 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.

301.3.11 Concrete Mix: Concrete mix shall produce a compressive strength, fc', of a minimum 4500 PSI at 28-days with 4.5% - 7.5% entrained air. The maximum allowable slump shall not be in excess of 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 consecutive test results equals or exceeds the specified compressive strength, fc', and no individual test result falls below the specified strength, fc', by more than 500 PSI. Correcting/replacing of deficient concrete will be done at contractor's expense.

301.4 FORMWORK INSTALLATION

Forms shall be properly aligned, adequately supported and mortar tight. The form surface shall be smooth and free from irregularities, dents, sags, or holes when used for permanently exposed faces. All exposed joints and edges shall be chamfered, unless otherwise indicated.

301.5 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, 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 City of Gallup'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.

Concrete Placement shall not be permitted when weather conditions prevent proper placement and consolidation when concrete is mixed and/or delivered by a truck mixer. The concrete shall be delivered to the site of the work and discharge shall be completed within 1½ hours when temperatures are less than 90°. Discharge shall be completed in one hour when temperatures are above 90°. 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. The placement shall be carried on at such a rate that the formation of cold joints will be prevented.

301.6 CONSOLIDATION

Each layer of concrete shall be consolidated by internal vibrating equipment. 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 be approximately 1.5 times the radius of action of the vibrator and overlay the adjacent, just vibrated area by approximately a few inches. The vibrator shall penetrate rapidly to the bottom of the layer and at least 6 inches into the layer below, if such a layer exists. It should be held stationary until the concrete is consolidated and then withdrawn slowly at a rate of about 3 inches per second.

301.7 COLD WEATHER REQUIREMENTS

No concrete placement shall be made when the ambient temperature is below 35 degrees F or if the ambient temperature is below 40 degrees F and falling. Suitable covering and other means as approved shall be provided for maintaining the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing and at a temperature above freezing for the remainder of the curing period. Cold weather concrete to be placed in accordance with ACI 306.1 as appropriate.Any concrete damaged by freezing shall be removed and replaced at the expense of the Contractor.

301.8 HOT WEATHER PLACEMENT

When the rate of evaporation of surface moisture, as determined by use of figure 1 of ACI 38, 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. 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 306.1 as appropriate.

301.9 EXPANSION AND CONTRACTION JOINTS

Expansion and contraction joints shall be in accordance with the details shown or as otherwise specified provided ½ inch thick transverse expansion joint where new work abuts existing concrete.

301.10 FINISHES

No finishing or repair will be done when either the concrete or the ambient temperature is below 40 degrees F.

301.10.1 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 ½ inch in diameter and hole left by removal of tie rods and other surfaces not to receive additional concrete shall be reemed 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.

301.10.1.1 Rubbed Surface: Provide a "rubbed" surface finish when called for. 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.

301.10.2 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 min. ¾" depth. Edges to be rounded with a small radius tool. Slab surfaces shall be finished to a tolerance of 1/8" inches for a float finish as determined by a 10 foot straightedge 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.

301.10.2.1 Float Finish: Surfaces to be float finished shall be screeded or hand floated and bullfloated to eliminate the ridges and to fill in the voids left by the screed. In addition, the bullfloat 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.

301.10.2.2 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.

301.10.2.3 Smooth Troweled Finish: Interior building slabs to have a smooth troweled finish unless otherwise noted.

301.11 CURING AND PROTECTION

Beginning immediately after placement and continuing for 7 days, all concrete shall be cured and protected from the elements. 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. 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.

301.12 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 DESCRIPTION

302.2 SUBMITTALS

302.3 MATERIALS

- 302.3.1 FORMS
  - 302.3.1.1 WALL FORMS
  - 302.3.1.2 FORM RELEASE AGENT
  - 302.3.1.3 FORM TIES

302.4 EXECUTION OF FORMS

302.5 FORM TOLERANCES
- 302.5.1 FORMED SURFACES EXPOSED TO VIEW
- 302.5.2 FORM PREPARATION

302.6 INSPECTION

302.7 MEASUREMENT AND PAYMENT

302 CONCRETE FORMWORK

302.1 DESCRIPTION

This section of work shall cover concrete form work.

302.2 SUBMITTALS

Forming material: Engineer approved

Manufacturer's data including literature describing form materials, accessories and form releasing agent.

Form release agents: Engineer approved

Manufacturer's recommendation on method and rate of application of form release agents.
Certification for the design of the formwork

Design analysis and calculations for form design and methodology used in design.
Sequence of concrete placement. Indicate locations of form joints, panel sizes and patterns.

NOTE: 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.

302.3 MATERIALS

302.3.1 FORMS

Forms for cast-in-place concrete shall be made of wood, metal, or other approved materials. 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 knotholes and loose knots. Where used for exposed surfaces, dress and match boards, and fit adjacent panels with tight joints. 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.

302.3.1.1 Wall Forms: Forms for all concrete walls shall be in good condition. Exterior grade plywood panels manufactured in compliance with the APA and bearing the trademark of that group, or equal acceptable to the Engineer. Provide B grade or better veneer on all faces to be placed against concrete during forming. The class of material and grades of interior plies shall be of sufficient strength and stiffness to provide 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 the joint will remain watertight and will not bulge outward under pressure or create surface patterns.

302.3.1.2 Form Release Agent: Coat all forming surfaces in contact with concrete using an effective, non-shrinking, non-residual, water based, bond breaking, form coating unless otherwise noted.

302.3.1.3 Form Ties: Form ties encased in concrete shall have no metal within 1½ inch of the face of the concrete after eyelet has been removed. The part of the tie to be removed shall be at least ½ inch in diameter and be provided with a plastic cone at least ½ in. in diameter and 1½ in. long.

302.4 EXECUTION OF FORMS

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. Chamfer strips shall be provided on all exposed concrete edges and shall produce a ¾ in chamfer. Forms are to be sufficiently rigid to withstand construction loads and vibration and to prevent displacement or sagging between supports. During form removal, contractor shall insure 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. All protrusions shall be removed and forms to be smoothed prior to reuse.

302.5 FORM TOLERANCES

302.5.1 Formed Surfaces Exposed to View: Edges of all form panels in contact with concrete shall be flush within 1/8 in. in 5 ft. The maximum deviation of the finish wall surface at any point shall not exceed ¼ in. from the intended surface as shown on the drawings.

302.5.2 Form Preparation: 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.

302.6 INSPECTION

The Engineer shall be notified 24 hrs. 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.

302.7 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.

303 CURB & GUTTER, SIDEWALKS, DRIVE PAD, AND CONCRETE PAVEMENT CONSTRUCTION – INDEX

303.1 DESCRIPTION

303.2 SUBMITTALS

303.3 CONCRETE

303.4 CURB AND GUTTER

303.5 SIDEWALKS AND DRIVE PADS

303.6 CONCRETE PAVEMENT

303.7 SUBGRADE PREPARATION

303.8 CONCRETE CUTS

303.9 MEASUREMENT AND PAYMENT

303 CURB & GUTTER, SIDEWALKS, DRIVE PAD, AND CONCRETE PAVEMENT CONSTRUCTION

303.1 DESCRIPTION

This section of the specifications covers concrete materials and construction methods for curb & gutter, sidewalks, drive pads and other concrete construction.

303.2 SUBMITTALS

Shall comply with Section 101 of technical specifications.

303.3 CONCRETE

Provisions of Section 608 of SSHBC specifications shall apply with the modifications contained herein.

Concrete shall be 4500 PSI (28 day) with 4½% - 7½% entrained air poured with max. 4" slump. Limited excess water shall be added to facilitate finishing. Contractor shall consider the effects of hot weather in planning the amount of concrete to be poured at one time. Contractor shall pour in early morning hours to the extent possible if hot weather is a problem. Concrete slabs shall be cured with liberal coatings of curing compound or covered with plastic. Concrete that has been rained on or walked on will not be accepted. The Contractor will be responsible for posting guards around concrete that has not firmly set. Test cylinder sets shall be taken at random, as approved by the Engineer. Minimum strength shall be 4500 psi at 28 days under lab curing conditions. Class F fly ash shall be in the range of 15 – 25 percent of the total cementitous material by weight.

303.4 CURB AND GUTTER

Curb and gutter shall conform to the dimensions shown on the project drawings and shall be placed by workmen practiced in their trade. Stones shall be max. 10 ft. length with expansion joints at a max. of 50 ft. Joints shall coincide with template locations. In locations where scored or sawed joints are required and there are no templates, the depth of joint shall be a min. of 2¼". Curb and gutter shall be given a light broom finish. Curing compound shall be applied to flat surfaces and formed areas when the forms are removed.

Curb and gutter forms and/or string lines shall be accurately set and sighted to prevent ponding or uneven grades.

303.5 SIDEWALKS AND DRIVEPADS

These items shall conform to dimensions shown on the project drawings and shall be placed by a skilled workman. Expansion joints shall be placed at a max. 50 ft. intervals and dummy joints at 5 ft. intervals on sidewalk and as directed on drive pads. Sidewalk and drive pad joints to match

C & G joints where possible. Dummy joints in sidewalks shall be scored to a min. depth of 1" and dummy joints in drive pads to be scored a min. depth of 2". Sidewalks and drive pads shall be given a light broom finish and shall be edged all around prior to brooming. Reinforcement shall be discontinued at expansion and contraction joints or as called for.

303.6 CONCRETE PAVEMENT

Concrete pavement for trench patch shall be 4500 PSI (28 day) with 4½% to 7½% entrained air. concrete placed at the thickness called for. Joint pattern is to match existing pavement. Pavement is to be finished by transverse brooming with a coarse broom.

Silicone joint sealer will not be required between curb and sidewalk or in sidewalk joints.

303.7 SUBGRADE PREPARATION

Areas over trench construction shall not be formed for concrete construction until density tests indicate compaction is adequate. Subgrade shall be accurately graded and tamped prior to setting forms. No backfilling shall be performed after forms are set. All loose dirt shall be removed prior to pouring. Subgrade preparation shall also conform to Section 203 of these specifications.

Subgrade composed of rock chunks or clay that cannot be adequately tamped or graded shall be replaced with granular fill.

303.8 CONCRETE CUTS

Saw cuts shall be provided where partial concrete removal is required in existing slabs with no nearby joints. Cuts shall be of adequate depth to produce a clean vertical break with no undercut.

303.9 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.

304 CONCRETE REINFORCING STEEL - INDEX

304.1 DESCRIPTION

304.2 SUBMITTALS

304.3 DEFORMED REINFORCING STEEL

304.4 REINFORCING STEEL PLACEMENT

304.5 REINFORCING STEEL COVER

304.6 REINFORCING BAR BENDING

304.7 REINFORCING BAR CLEANING

304.8 REINFORCING BAR STORAGE

304.9 BUNDLING AND TAGGING

304.10 MEASUREMENT AND PAYMENT

304 CONCRETE REINFORCING STEEL

304.1 DESCRIPTION

This section of work shall cover concrete reinforcing steel.

304.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications.

304.3 REFORMED REINFORCING STEEL

Reinforcing steel to conform to provisions of ASTM A615, Grades 40 or 60 as designated.

304.4 REINFORCING STEEL PLACEMENT

Steel placement to conform to NM SSHBC (07) 540.3.1.4.1 and 540.3.1.4.2.

304.5 REINFORCING STEEL COVER

Steel cover to conform to ACI 318-08 7.7.

304.6 REINFORCING BAR BENDING

Bar bending to conform to NM SSHBC (07) Table 540.3.1.2:1

304.7 REINFORCING BAR CLEANING

Cleaning of reinforcing bars to conform to NM SSHBC (07) Section 540.3.1.5.

304.8 REINFORCING BAR STORAGE

Bars shall not be stored on the ground – NM SSHBC (07) 540.3.1.

304.9 BUNDLING AND TAGGING

Tag and marks reinforcing bars in accordance with CSRI's Code of Standard Practice.

304.10 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.

401 ASPHALT STREET PATCH – INDEX

401.1 DESCRIPTION

402.2 SUBMITTALS

401.3 PAVEMENT CUT

401.4 SUBGRADE PREPARATION

401.5 BASE COURSE

401.6 ASPHALT TREATED BASE COURSE

401.7 ASPHALTIC SURFACE COURSE

401.8 EDGE PREPARATION

401.9 PATCH SCHEDULING

401.10 MEASUREMENT AND PAYMENT

401 ASPHALT STREET PATCH

401.1 DESCRIPTION

This item of work shall consist of furnishing all materials, supplies, plat and labor required for removal of existing asphalt and construction of new asphalt patch over utility trenches and other excavated areas in accordance with applicable provisions of these specifications and the project drawings.

401.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications.

401.3 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 or more times and that substantial pavement thicknesses could be encountered. Cuts in pavement of substantial thickness shall be deep enough to insure a proper edge upon pavement removal without lifting adjacent paving.

401.4 SUBGRADE PREPARATION

Trench backfill (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.

Flowable fill surfaces shall meet the requirements for grade uniformity described above.

401.5 BASE COURSE

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:

Sieve Size	Percent Passing Type 1	Percent Passing Type II
1 inch	100	100
¾ inch	80-100	85-95
No. 4	30-60	40-70
No. 10	20-45	30-55
No. 200	3-10	6-15

L.A. Abrasion to be 50 or less.

Base course shall be placed at or near optimum moisture content to achieve densities of 92% 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.

401.6 ASPHALT TREATED BASE COURSE

The treated base aggregate shall be crushed and shall conform to the gradation requirements in 401.4 above. Asphalt content shall range from 4 - 6%. In some cases, such as with a patch, it may be more expedient to use asphaltic surface course in lieu of the asphalt treated base. In either case, the treated base shall be laid uniformly and rolled with the proper combination of vibratory steel roller and pneumatic roller to produce densities of 92% to 97% of Maximum Theoretical Density. Thicknesses shall be constantly checked to insure conformance to project drawings.

401.7 ASPHALTIC SURFACE COURSE

Aggregate for asphaltic surface course shall conform to NMSHTD Specifications and one of the following gradation requirements as called for.

Sieve Size	Percent Passing Type B	Percent Passing Type C
¾ inch	100	
½ inch	75-95	100
¼ inch	65-85	70-100
No. 4	45-60	45-70
No. 10	32-45	30-50
No. 40	10-22	15-25
No. 200	3-8	4-8

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:

Stability:	1640 lbs. plus
Flow:	16 or less
Sand Equivalent	40 or more

Note: Lime shall be added in accordance with NMSHTD Specs.

Note: When HMA Superpave is designated or permitted, mix design to conform to NMDOT 423 Specifications for SP-111 or SP-IV gradation.

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 tack 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% of max. theoretical density. Asphalt mix which falls below density requirements shall be subject to payment reductions in accordance with NMSHTD Specs. Normally, thicknesses shall be checked constantly so that the finished surface is 3/8"± 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°F).

401.8 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.

401.9 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.

401.10 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.

402 GRAVEL ROADS AND DRIVEWAYS – INDEX

402.1 DESCRIPTION

402.2 SUBMITTALS

402.3 MATERIALS

402.4 MEASUREMENT AND PAYMENT

402 GRAVEL ROADS AND DRIVEWAYS

402.1 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.

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% Modified Proctor. The final gravel surface shall be smooth and uniform with accurate lateral and vertical dimensions called for.

402.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications.

402.3 MATERIALS

Gravel provided shall meet requirements for NMSHTD base course with gradation characteristics as listed below:

Sieve Size	Percent Passing
1 inch	100
¾ inch	85-95
No. 4	40-70
No. 10	30-55
No. 200	6-15

402.4 MEASUREMENT AND PAYMENT

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

501 WATER LINES AND APPURTENANCES – INDEX

501.1 DESCRIPTION

501.2 SUBMITTALS

501.3 MATERIALS

- 501.3.1 PIPE AND FITTINGS
  - 501.3.1.1 DUCTILE IRON PIPE
  - 501.3.1.2 FITTINGS FOR PIPE
  - 501.3.1.3 GLASS REINFORCED POLYMER PIPE (GRP)
  - 501.3.1.4 GRP FITTINGS
  - 501.3.1.5 PVC WATER PIPE
  - 501.3.1.6 POLYETHYLENE PIPE
  - 501.3.1.7 SLEEVES
  - 501.3.1.8 PLASTIC ENCASEMENT
  - 501.3.1.9 STEEL PIPE
- 501.3.2 GATE VALVES
- 501.3.3 AIR VACUUM VALVES
- 501.3.4 FIRE HYDRANT ASSEMBLY
- 501.3.5 SANITARY FREEZE PROOF YARD HYDRANTS
- 501.3.6 METERS
- 501.3.7 BUTTERFLY VALVES
- 501.3.8 FLAP VALVE

501.4 INSTALLATION OF PIPE, VALVES, FITTINGS, AND SPECIALS

- 501.4.1 GENERAL
- 501.4.2 POLYETHYLENE ENCASEMENT OF DUCTILE IRON PIPE

501.5 TESTING OF PIPE LINES

501.6 DISINFECTION OF WATER LINES

501.7 TIE-INS, MAINTAINING EXISTING SERVICE, AND SCHEDULING OF WORK

501.8 PRECAST MANHOLES AND VAULTS

501.8.1 DESCRIPTION
501.8.2 MANHOLES AND VAULTS
501.8.3 MATERIALS
501.8.4 CONSTRUCTION

501.9 HYDRAULIC VALVE OPERATOR

501.9.1 DESCRIPTION
501.9.2 ELECTRONIC TURN COUNTER
501.9.3 TORQUE CONTROL
501.9.4 HYDRAULIC HOSE PIGTAILS
501.9.5 OR EQUAL PRODUCT

501.10 MEASUREMENT AND PAYMENT

501 WATER LINES AND APPURTENANCES

501.1 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.

502.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications.

501.3 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.

501.3.1 Pipe and Fittings: Pipe for water mains shall be of material called for on the project drawings and shall meet specifications below:

501.3.1.1 Ductile Iron Pipe: for water lines unless otherwise specified shall be Class 350. 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 mechanical joint as called for on the drawings. Mechanical joint ductile iron pipe called for on project drawings and restrained pipe joints called for in bore casing shall have push on joints with ductile iron locking elements independent of gasket. Manufacturer: US pipe TR flex or equal.

501.3.1.2 Ductile Iron Fittings for Pipe: shall be cement lined ductile iron with mechanical joint or flanged joint as called for conforming to the requirements of AWWA Specifications C104 and C110, provided however, that ductile iron mechanical joint fittings as U.S. Pipe Trim Tyte conforming to AWWA C153 (in sizes available) or equal are acceptable. Mechanical joint glands shall be Megalug or equal suited for pipe material used.

501.3.1.3 Glass Reinforced Polymer Pipe (GRP): Glass reinforced polymer pipe shall be installed at locations designated on the project drawings. GRP pipe to conform to requirements of AWWA C950 and ASTM D3517 with a pressure rating of 250 psi. Pipe stiffness to be as called for or as required to exceed long term (50 year) deflection requirements. Unrestrained joints to consist of glass reinforced plastic sleeve couplings that utilize elastomeric sealing gaskets to maintain water tightness meeting performance requirements of ASTM D4161. GRP pipe O.D.S. to be equal to that of cast iron pipe.

Restrained joints to utilize glass reinforced plastic sleeves with elastomeric sealing gaskets (per ASTM D4161). The coupling and spigot ends shall have matching grooves for installing a locking, non-metallic, shear restraint rod to complete the connection.

GRP pipe to be as manufactured by "US Composite Pipe South" or approved equal.

501.3.1.4 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 and shall be grooved to accept non-metallic locking rods. Fittings to be restrained type rated for 250 psi.

501.3.1.5 PVC Water Pipe: 4" through 12" diameter, shall meet the requirements of AWWA C900, "Standard for Polyvinyl Chloride Pressure Pipe" and shall be furnished with outside diameters equivalent to C.I. pipe with rubber gasket joints as listed in above standard. PVC pipe shall be furnished in the pressure class and DR designation per 2007 definitions as listed on the project drawings. PVC water pipe 14" dia. and larger shall conform to AWWA C-905 specifications.

PVC Pipe of IPS sizes 1.5" to 3.0" with "slip-on" connections to conform to ASTM D2241 with the DR (dimension ratio) called for.

501.3.1.6 Polyethylene Pipe: Pipe to be HDPE conforming to AWWA C901/C906 specifications

501.3.1.7 Sleeves: used to facilitate tie-ins, for leakage repair or for transition (or to adapt) shall be heavy duty MJ ductile iron, wrought iron, or stainless steel. Painted or galvanized carbon steel components including nuts, bolts and washers are not permitted.

Sleeves for CI size coupling to be AWWA heavy duty ductile iron (long body when called for) MJ type.

501.3.1.8 Plastic Encasement: shall be polyethylene plastic conforming to AWWA C105. Two layers shall be installed on all ductile iron pipe and fittings for buried service. Consisting of a single layer of V-Bio followed by 8 mil plastic with staggered joints

501.3.1.9 Steel Pipe: shall be min. schedule as called for with min. yield strength of 35 KSI. Pipe to be coated as called for. Fittings to be weld neck type beveled for welding.

501.3.2 Gate Valves: Buried Gate valves 2 inches and larger shall be NRS resilient wedge type conforming to AWWA C509 (and AWWA C515 when larger than 12") with 10 mil. min. 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 to have a 2" AWWA operating nut while station valves are equipped with operator hand wheels. Buried gate valves to be furnished with (1) operating wrench with "T" handle and socket to fit 2" square wrench nut for every 8 buried valves installed. The "T" wrench length shall be 8 ft. 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 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 to be clockwise to close.

Note: See section 504.2.4 for additional information on Station Gate Valves.

Buried gate valves to be installed in the horizontal position when so designated. Valves 16" and larger in size to have bypass lines with valves equipped with 2" operating nuts. Bypass lines and valves to 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 to be operated with bevel gearing. Valve boxes with appurtenances as detailed to be installed for all buried valves.

Valve boxes to be approved, two piece adjustable screw type of ductile iron construction with minimum 5¼ inch diameter inside shaft. Valve boxes shall be suitable for finished bury without full extension.

501.3.3 Air Vacuum Valves:

Basic Air Vacuum Valves:

Valvmatic or equal Models VM-101 through VM-101 as called for.

Air Release Valves:

Valvmatic or equal Models 22.9 through 50 as called for.

Combination Air Valves (Single Body Type):

Valvmatic or equal Models 201 C.2 through 204 C.2 as called for.

Combination Air Valves (Dual Body Type):

Valvmatic or equal Model 104/38.

Valve and appurtenances to be rated for 250 PSI working pressure provided however that valves with 125lb. flanged inlets are to be rated for 150 PSI working pressure.

Hooded valves to be equipped with stainless steel inlet screens.

501.3.4 Fire Hydrant Assembly: Fire hydrants shall have a 6 inch diameter inlet with mechanical joint connection. The hydrant shall be designed for 250 psi max working pressure and shall be equipped with two 2½ inch standard hose connections and one 4½ inch pumper connection. Hydrants shall be dry-barrel type conforming to AWWA Specification C502 and shall have a minimum 5¼ inch valve opening. Normally, hydrants shall be for 3.5' 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 to 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 Centurion A423. Fire Hydrants to be Super Centurion for 250 psi working pressure.

501.3.5 Sanitary Freeze Proof Yard Hydrants: Hydrants to 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 ¾" hose bib nozzle with no resultant soil contact.

501.3.6 Meters:

- 2 Inch Meters 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.

- 3 Inch Meters and Larger:
  Meters shall be AWWA C701 turbine type meters with a magnetic drive, low torque register and have a bronze case. Meter shall register in cubic feet, be Automatic Meter Reading (AMR) capable and be easily upgradeable from direct read registers to an absolute encoder register. Meters shall be Neptune High Performance Turbine Meter with R900i pit interface units complete with lithium ion batteries. Meter must be proven compatible with the City's Neptune meter reading system.
- Magnetic Flow Meters as Called For:
  The meters shall be electromagnetic flow type meters, based on Faraday's law of induction, accurate to ±1.0% 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 32 bit signal processor with digital and analog outputs for SCADA system. Meter shall be powered by 120 VAC. Display shall have a large, four line by 20 character LCD remote display with backlight. Meter interior and exterior coatings shall meet Section 504.3 of this specification. Meters shall be Badger M-Series Meter with Remote M2000 amplifier/Display and cable as required or equal.

501.3.7 Butterfly Valves: Butterfly valves shall conform to ANSI/AWWA C504 standard as Mueller or approved equal. Valves to be class 150 with actuator for buried service and 2" standard AWWA nut, clockwise to close. Fasteners to be 304/316 stainless steel.

501.3.8 Flap Valves: Valves to be cast iron body and cover with 10° slope. Seal and disc ring to be machined bronze or brass. Hinge pin and cotter pins to be stainless steel. Valves to be by Troy, M&H, Clow or approved equal.

501.4 INSTALLATION OF PIPE, VALVES, FITTINGS, AND SPECIALS

501.4.1 General: Trenching and backfilling for water lines and accessories shall be in accordance with provisions of Section 203 of these specifications. Select sand bedding shall be provided in areas of rock excavation and where called for.

The Contractor shall exercise care in unloading and stacking pipe to avoid damage. Each length of pipe shall be carefully cleaned and inspected for cracks or damaged bells before lowering into the trench. Damaged or otherwise unsuitable pipe shall be immediately removed from the job site and replaced with new pipe. Pipe shall be laid with bell end in direction of laying and care taken in excavating bell holes so that the pipe is supported on firm bedding throughout its full length. Spigot ends shall be inserted so that the "Stop Line" is at the edge of bell. Care shall be taken to insure that the insertion depth is not exceeded on previous joints when making up a particular joint. Joint deflections to accommodate vertical or horizontal change in directions shall not exceed the allowable recommended by the pipe manufacturer. Fittings shall be used in making direction changes requiring joint deflections greater than that recommended by the pipe manufacturer. Concrete "thrust blocks" shall be provided at all pipe direction changes in excess of 11¼ degrees. See project drawings for additional requirements for vertical direction changes. "Thrust Blocks" shall be 4500 psi. min. concrete poured against undisturbed trench banks to provide positive restraint for the water line and fittings at the operating pressure plus water hammer. Workmen 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 days work.

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.

Valves and valve boxes shall be installed plumb and to the depth specified, as detailed on the project drawings. 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.

All nuts, bolts and washers below grade or components in the new system that are not stainless steel or brass shall be neatly wrapped in 8 mil. plastic in such a manner to prevent contact with subsequent backfill.

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.

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 insure that the wall of the main is fully penetrated and that the tab is retrieved. The Contractor shall flush 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.

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.

Tracer wire for direct bury and warning tape shall be installed along with pipe when called for on the project drawings. Splices shall be suitable for direct bury and shall be held to a minimum. Contractor to provide apparatus as required for continuity verification after installation.

501.4.2 Polyethylene Encasement of Ductile Iron Pipe: Installation of two layers of polyethylene encasement, (layer 1 to be V-Bio) in accordance with provisions of methods A, B, and C, AWWA C105, the manufacturers recommendations and with modifications as contained here-in.

- Plastic material to 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 to be free of water.
- Equipment used for lifting or inserting pipe shall be of a material that will not damage the encasement material. Chains are not permitted.
- Layer 1 to utilize tubular plastic as described in methods A or B with required overlaps (min. 1 ft.) and taping of joints with polyethylene adhesive tape. Longitudinal tube overlaps to be taped at the ¼ points. Layer 1 to be snug free of loose, bunched up areas, closed and taped prior to proceeding to layer Z.
- Layer 2 to utilize sheet plastic as described in Method C. Plastic to be in place on trench floor prior to lowering or partially lowering pipe with layer 1 intact. Plastic to be lapped along longitudinal dreams, at the top portion of pipe and at the ends which are offset (staggered) from layer 1 laps. Layer 2 to be snug with taped joints.
- 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 lesser the protruding effect. Plastic around special shapes to be well taped.
- 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).

- Workmanship – Installation of the polyethylene, 2 layer system is crucial to the life of the pipeline. Workmen shall have been trained and/or shall be trained 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 foremen, the Engineer, and his field personnel. The techniques used to enhance quality and production are to be refined during this period. Workmen and laborers that are not trained shall not be allowed to work in the encasement operation.
- Techniques for backfilling and compacting bedding material around encased pipe shall be such as not to disturb or damage the plastic.

501.5 TESTING OF PIPE LINES

Pipe lines 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 2 hour hydrostatic pressure test.

The test pressure at the lower end of each test segment of the new system shall be 200 psig for Montoya Line and 250 psig for 27.6 A&B lines. The Contractor shall be responsible for setting up all equipment for the test 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 $NDP \cdot {}^{5}/_{7400}$ gallons/hr where N=number of joints, D=pipe diameter in inches and P=test pressure in psi.

501.6 DISINFECTION OF WATER LINES

All water mains installed under this project shall be disinfected, thoroughly flushed and tested before being placed into service.

Chlorine solution pumped into the line in a manner to prevent air from trapping in the line. Contractor shall provide filling, sampling 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 25 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 1 PPM. The line shall then be left to set for 48 hours (full of water). After completion of the 48 hr 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. Test results that indicate unacceptable coliform levels will require additional disinfection and successful testing before placing main into service.

A copy of the bacteriological (coliform) test results shall be delivered to the Project Engineer and the City prior to tie-ins.

501.7 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 program to maintain continuous service to water users to 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 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.

501.8 PRECAST MANHOLES AND VAULTS

501.8.1 Description

This item of work shall consist of furnishing all material, supplies, plant and labor required for construction of manholes, wet wells, and appurtenances complete in accordance with applicable provisions of these specifications and project drawings.

501.8.2 Manholes and Vaults

Standard manholes or vaults shall be built at the locations shown on the drawings or at the location designated by the engineer. Manholes shall be of the size and type shown or required by job conditions.

The exterior surface of present manholes and vaults shall receive 2 coats of NSF potable water approval, ASTM D-4479 Type I bituminous material damproofing as Henry HE794 or approved equal. Material to be applied after grouting of horizontal joints and areas around penetrations.

501.8.3 Materials: Standard manholes and vaults shall be constructed of precast units when called for manufactured in accordance with ASTM C478 Specifications. Bottom slab thickness shall be as designated on project drawings. Top section shall be eccentric cone or flat reinforced slab as designated. All barrel joints between sections shall be tongue and grooved.

Manhole frames and covers shall be traffic model unit conforming to ASTM A48 36C Specifications with or without vent holes as designated. Covers shall have a suitable pattern, recessed lifting bars, and appropriate word for the utility cast in three inch letters. Manhole covers shall be Neenah Foundry or equal.

Seal tongue and groove joints of precast manhole sections with preformed flexible sealant or a rubber "O" ring gasket. Rubber gasket shall conform to ASTM C443. Preformed flexible sealant shall be Ram Nek as manufactured by K.T. Snyder Company or equal.

Step rungs shall be aluminum or steel reinforced polyethylene installed as shown on the project drawings. Steps shall not be installed unless specifically called for on the project drawings.

Pipe connections to manhole shall be as described on the project drawings. If no methods are so described, the following shall apply. For steel or ductile iron pipe, grout pipe in place. Grout shall be non-shrink and water proof as manufactured by Embeco, Waterplug, or equal. For PVC pipe, a tight fitting neoprene gasket shall be placed on the PVC where it will center in the manhole wall to prevent seepage from the manhole along the pipe.

Special aluminum or stainless steel lids with hinged opening shall be provided when designated on the project drawings. Hinged doors to be Halliday or equal rated for H20 loading.

Reinforced concrete manholes and vaults to be as designated on the project drawings and shall conform to Sections 301 and 302 of these Specifications.

501.8.4 Construction: Manhole bases shall be constructed of firm, compacted, or neat cut subgrade. 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 ¼ 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 filled with non-shrink grout and/or silicon seal.

Step rungs shall be installed by grouting rungs into preformed holes in riser and cone sections. Rungs to be set at 12 inch centers. Holes shall be 1 1/8 inch diameter and minimum 3 ½ inches deep. Fill space around rung penetrations with a non-shrink grout. Drilling holes for rungs may be used to accommodate field conditions when approved by the Engineer. All rung installations methods shall withstand a pull out resistance of 1500 pounds.

Manhole frames and covers shall be set in a full mortar bed or cast into top slabs as detailed. Utilize precast concrete grade rings on cone sections (12 in. maximum), to ensure frame and

cover are set to 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.

501.9 HYDRAULIC VALVE OPERATOR

501.9.1 Description: Hydraulic Valve Operator to be suitable for one man or two man operation. Operator to be capable of generating up to 350 foot pounds of torque. Operator to have key shaft sections, when connected, capable of reaching 2" operating nut at depths of 4ft. below ground level with handles for operating personnel at waist level.

Hydraulic system to be capable of operating with flows of 3.5-10gpm at 1750 to 2250 psi. Operator to be capable of being used as a manual wrench with appropriate locking devices.

501.9.2 Electronic Turn Counter: LCD counter to give numeric display of turns to open with reverse count for turns to close. Counter to be self-contained with 7 year lithium battery.

501.9.3 Torque Control: Torque control knob and display to allow for torque adjustment from ZERO at no torque to maximum allowed by system hydraulic pressure.

501.9.4 Hydraulic Hose Pigtails: Hydraulic connects to be quick disconnect male and female, 3/8" flush face.

501.9.5 Or Equal Product: Hydraulic Valve Operator to be the EXERCISER by Transmate, a division of Romac Industries Inc. or equal

501.10 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.

502 SANITARY SEWER – INDEX

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502 SANITARY SEWER AND DRAIN LINES

502.1 DESCRIPTION

This item of work shall consist of furnishing all material, supplies, plant and labor required for construction of sanitary sewer lines, manholes, and appurtenances complete in accordance with applicable provisions of these specifications and project drawings.

502.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications.

502.3 MATERIALS

Sewer lines shall be of the size as shown on the drawings and unless otherwise modified herein shall be constructed in accordance with the following provisions:

502.3.1 Sewer Lines: All pipe for sanitary sewer mains and laterals shall be either vitrified clay, PVC pipe, or HDPE pipe as called for on the drawings and in the Bid Proposal. Joints for sewer mains and laterals shall be of the compressed rubber gasket type or fusion weld. Use of other materials only if approved by the City.

502.3.2 PVC Gravity Sewer Pipe: shall meet or exceed all of the requirements of ASTM Specification D3034 with a pipe SDR of 35. All pipe shall be suitable for use as a gravity sewer conduit. Pipe joint connections shall be bell-spigot with rubber ring. All joints shall be water tight at 15 psi hydrostatic head. The bell shall consist of an integral wall section stiffened with two (2) PVC retainer rings which securely lock the solid cross section rubber ring into position. Standard lengths shall be 20'.

Pipe shall be designed to pass all tests at 73°F (±3°F). Minimum "pipe stiffness", ($F/\Delta y$) at 5% deflection, shall be 46 for all sizes when tested in accordance with ASTM Designation D-4412, External Loading.

502.3.3 Polyethylene Pipe: Pipe to be HDPE conforming to AWWA C901/C906 specifications

502.3.4 Vitrified Clay Pipe: Pipe to conform to ASTM C-700 with PVC plain and coupling in accordance with ASTM D and ASTM C-425. Pipe to be standard or extra strength as called for.

502.3.5 Manholes: Precast riser sections, transition top sections, flat slab tops and grade rings shall be manufactured in accordance with ASTM C478. Bottom slab thickness to be minimum 6". Top section shall be eccentric cone where cover over pipe exceeds 4 feet unless otherwise called for. If cover over pipe is less than 4 feet, top section shall be a flat slab. All joints between sections shall be tongue and grooved.

502.3.6 Manhole Frame and Cover: Manhole frames and covers shall be traffic grade with the cast iron conforming to ASTM A48, Class 30. Manhole frame and covers shall be Neenah Foundry or equal. Frame to be placed in concrete collar as shown on project drawings.

502.3.7 Jointing Precast Manhole Sections: Seal tongue and groove joints of precast manhole sections with preformed flexible sealant of a rubber "O" ring gasket. Rubber gasket shall conform to ASTM C443. Preformed flexible sealant shall be Ram-Nek as manufactured by K.T. Snyder Company or equal.

502.3.8 Manhole Rungs: Rungs shall be either cast aluminum or steel reinforced copolymer polypropylene. Cast aluminum shall be an aluminum alloy 6061-T6 and have a drop front design, 16 inches wide with an abrasive step surface. Steel reinforced copolymer polypropylene hall be 16 inches wide as manufactured by M.A. Industries, Inc., P.F. Series or equal. Steel reinforcing shall be grade 60 and continuous throughout rung.

502.3.9 Pipe Connection to Manhole: Connections shall be as described. For steel pipe or ductile iron pipe, grout pipe in place. Grout shall be non-shrink and waterproof as manufactured by Embeco, Waterplug or equal. For PVC pipe, a tight fitting neoprene gasket shall be placed on the PVC pipe where it will center in the manhole wall to prevent seepage from the manhole along the pipe.

502.3.10 Installation General: The pipe shall be laid only on a solid firm soil that will prevent subsequent misalignment, separation or damage to the pipe. Preparation of the trench bottom and backfilling around pipe shall be carried out in strict accordance with provisions of Section 203, Trenching, Excavation and Backfill, pipe manufacturers' recommendations and project drawings. All pipe trenches shall be free of water during pipe laying operations.

Contractor shall have utility company markings in place and grade checks made before construction staking by the Engineer. Alignment shown on the project drawings is center line construction. Contractor shall be prepared to make adjustments as required to accommodate unknown conditions as the job progresses.

New mains may be located to one side of existing mains especially where substantial flows are involved. Some mains may need to be replaced in the same location and will require a temporary line for gravity or pumped flow. Contractor shall be fully equipped and prepared to plug existing lines and pump flows around work areas as required when this type of construction is deemed necessary. Pumps of adequate capacity, in good working order, with standby units and sufficient lengths of discharge and suction piping shall be required.

Contractor shall be prepared to make "wet" tie-ins in some locations, during low flow periods, which will probably not be during normal working hours.

All pipe shall be protected during handling against damage by impact by equipment and debris. The pipe shall be cleaned of all dirt and debris and carefully inspected for cracks, chips or other damage before lowering into the trench. Laying of pipe shall begin at the downstream end of the line and proceed upstream with the pipe bells pointed in the direction of travel. Joint gaskets

shall be properly lubricated, placed and centered on the pipe ends for uniform compression when properly "seated" in the bell of the next pipe.

No part of the joint gasket or sealer shall protrude beyond the inside of the pipe. Small diameter pipe may be "seated" by use of a push bar; suitable mechanical means shall be provided for making up joints or large diameter pipe. Method and equipment used shall be subject to approval of the Engineer.

The furnished line shall be water tight, true to line and grade, with uniform smooth invert and when "lamped" between manholes shall show at least 90% for lengths fewer than 300 ft. and greater than 200 ft. The cross sectional area visible for lengths smaller than 200 ft. shall be 100%.

The light source for lamping shall be sunlight or light from a strong spot light as reflected from a white surface.

Contractor shall have good inventory of pipe, fittings and adaptors for typical Water and Sewer services so that outage time during repairs or tie-ins can be held to a minimum.

502.3.10.1 Installation - PVC or HDPE Pipe: The approved best of excavated material or granular material as described in these specifications shall be used to bed and provide haunch and adjacent support for PVC pipe. Backfill in lateral areas, haunch areas and 1'-0" above pipe shall be hand compacted at near optimum moisture content, using care not to disturb pipe. Heavy compaction equipment shall not be used on initial bedding directly above pipe. Contractor should be prepared to demonstrate that finished pipeline deflections are not above recommended limits (5%) by pulling a gauge of proper size through the line.

Pipe that is encased with concrete or flowable fill shall be held firmly in place during placement of the encasement material.

502.3.10.2 Installation - VC Pipe: VC pipe is to be installed under Class D or better conditions as defined under ASTM C12 Specifications. Pipe is to be laid on firm soil accurately graded for uniform longitudinal support. Bedding in lateral areas of pipe shall be thoroughly hand tamped at or near optimum moisture content. Excavation for couplings or bells shall be provided.

502.4 SERVICE CONNECTS

Service line connections to main shall utilize molded PVC main line wyes or tees with proper sized laterals or molded wye or tee saddles. Saddles shall be gasketed at the connection to the main and shall be held in place by two stainless steel bands. Connections to the main shall be in the top quadrant of the main where lateral grade permits. Lateral drops or direction change to meet main wyes shall utilize 45° or 22½° ells.

New lateral service line segments shall be Schedule 40 PVC which will require an adaptor to most service saddles. Connections to existing clay service laterals shall be elastomeric Fernco connections. Extreme caution should be used to insure that the soil is compacted under all service laterals so that subsequent backfill will not displace the new service line and connections. Service line connections are to be inspected prior to backfill. Evidence that would indicate that required compaction under laterals is not being achieved will mean that stiff, flowable fill or mortar will have to be placed under service lines and achieve set prior to backfill.

The lower portion of holes tapped in the main for service saddles shall not protrude into the service flow line and shall be filed smooth so that material does not hang-up on the tapped edge. Workmen shall check each tap to assure this has been done.

Service taps may be done as main construction progresses when hydrostatic testing of the main is not required. When such testing is required, laterals shall remain tied to old mains, taps shall not be made until testing is over or taps shall be made and plugged until testing is over.

502.5 HYDROSTATIC (EXFILTRATION) TESTING

502.5.1Sewer Lines: The Contractor shall furnish all equipment and material required to perform hydrostatic testing on each segment or new sewer line. The line shall be tested without the manhole unless the manhole has been previously tested and been found to be essentially water-tight. One gallon or less lost per 2 hour period with a minimum of 4 ft. of head on the line will be considered acceptable. A greater loss will require locating and repairing the leak and additional testing. Contractor to utilize treated effluent form the City Wastewater Plant for test water.

502.5.2 Manholes: The Contractor shall furnish all equipment and materials required to perform hydrostatic testing on completed manholes. Each manhole shall be tested separately utilizing line plugs inside the manholes. The manhole shall be tested to the top of manhole ring. The maximum loss permitted during a 2 hour period shall be 5 gallons. Leakage in excess of this amount will mean that the leak must be found, repaired and the manhole retested. Pre-soaking the manhole will be permitted.

Contractor is to utilize treated effluent from the City Wastewater Plant for manhole testing.

502.6 ROAD BORES AND BRIDGES

Road crossings will require boring and jacking with steel casing at locations shown on the project drawings. The casing or bridge pipe shall be placed as near as possible to the grade and alignment shown. The PVC or polyethylene pipe sewer line is to be installed in an accurately placed casing by sliding polyethylene insulator spacers on the casing invert. Weld joints on casing interior shall be smooth to prevent abrasion on carrier pipe. The annulus between sewer pipe and casing at each end shall be sealed with acceptable commercial end seals. Misalignment of bored casings in which the sewer line grade cannot be corrected shall be abandoned, filled with flowable fill and a new bore placed at another location.

502.7 GRADE CONTROL

Bidders are advised that diligent care is to be used in the installation of sewer pipe to insure that proper grade is maintained throughout. Individual pipe joints shall be checked to see that slope is maintained and that slope is in the proper direction. Lasers and levels shall be checked to show they are properly calibrated. Portions of sewer line trench that are over-excavated shall be brought to proper grade and compacted to prevent subsequent settlement. Trench bottoms shall be accurately graded for uniform support the entire length of each pipe segment. (Note: Lasers shall be used for basic grade control this project)

502.8 QUALITY CONTROL

Bidders are advised that hydrostatic testing, Mandrel Pulling pressure testing and other quality assurance testing called for on the project drawings and in the project specifications will be adhered to. In addition, the installed sewer line will be video-taped by the City of Gallup to determine if there are ponding areas, improper joints, goose-egged pipe, deflected joints or other problems with the installed pipe.

The Contractor may wish to schedule the City to make the video check on certain portions of deep sewer line installation before the full depth of backfill is placed at his cost. The City will video-tape for final inspection only at their cost. The Contractor shall be responsible for making such arrangements with adequate lead time in each instance.

502.9 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.

503 CORRUGATED METAL PIPE – INDEX

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503.3.1 CORRUGATED METAL PIPE
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503.4 INSTALLATION

503.4.1 PIPE INSTALLATION
503.4.2 JOINTS

503.5 MEASUREMENT AND PAYMENT

503 CORRUGATED METAL PIPE

503.1 DESCRIPTION

This section of work covers corrugated metal pipe.

503.2 SUBMITTALS

503.2.1 CERTIFICATION

503.2.1.1 Corrugated metal pipe: Engineer Approved. Provide technical data and catalogue cut from proposed manufacturer.

503.2.1.2 Coupling Band: Engineer Approval. Provide technical data and catalogue cuts from same manufacturer of corrugated metal pipe.

503.3 MATERIALS

503.3.1 Corrugated Metal Pipe: shall be plain galvanized conforming to the requirements of AASHTO -M36. Pipe to be of the gauge and diameter called for.

503.3.2 Coupling Bands: are to be from the same manufacturer as the corrugated metal pipe. Coupling bands to be hugger type with gasket compatible with pipe ends.

503.3.3 End Sections: To be 16 gauge galvanized metal by Contech or equal.

503.4 INSTALLATION

503.4.1 Pipe Installation: Pipe shall be placed on firm graded base conforming to alignment and elevation shown on the drawings. Backfilling around pipe shall be tamped in uniform layers in 10 inch loose lifts. Compaction shall be as called for at near optimum moisture. Native material above bedding may be used for backfill provided it is free from organic material, trash, snow, ice, frozen soil or other objectionable materials which may hinder proper compaction. In addition, native backfill shall not contain granite blocks, broken concrete, masonry rubble, asphalt pavement, or any material larger than 6 inches in any dimension.

503.4.2 Joints: Before the connecting band is placed around the pipe, the ends of the pipe shall be coated with bituminous mastic to provide for a watertight joint. The band shall be tightened evenly keeping equal tension on the bolts. Contractor shall ensure that prior to covering the joint that the nuts are tested for tightness. Prior to backfilling around joints, the bolts, lugs and nuts shall be given a coating of bituminous mastic.

503.5 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.

504 STATION VALVES, PIPING, APPURTENANCES, AND ASSOCIATED PAINTING –INDEX

504.1 DESCRIPTION

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504.3 MATERIALS

- 504.3.1 MATERIALS IN GENERAL
- 504.3.2 GATE VALVES 2 INCHES IN DIAMETER AND SMALLER
- 504.3.3 BALL VALVES ½ TO 2 INCHES IN DIAMETER
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- 504.3.5 PRESSURE REDUCING VALVE 3 INCH VALVE AND LARGER
- 504.3.6 PRESSURE REDUCING VALVE 2 ½ INCH VALVE AND SMALLER
- 504.3.7 PRESSURE REDUCING VALVE WITH LOW FLOW BY-PASS
- 504.3.8 PUMP CONTROL VALVE
- 504.3.9 PRESSURE REDUCING & SOLENOID SHUT-OFF VALVE
- 504.3.10 PRESSURE RELIEF VALVE
- 504.3.11 FLOW METERS
- 504.3.12 MISCELLANEOUS VALVES FOR POTABLE AND PROCESS SYSTEMS
- 504.3.13 PRESSURE GAGES
- 504.3.14 DUCTILE IRON PIPE AND FITTINGS
- 504.3.15 STEEL PIPE
- 504.3.16 COPPER PIPE

504.4 PAINTING

504.5 TWO INCH AND SMALLER PIPE FASTENING SYSTEM

504.6 MEASUREMENT AND PAYMENT

504 STATION VALVES, PIPING, APPURTENANCES, AND ASSOCIATED PAINTING

504.1 DESCRIPTION

The Contractor shall provide all labor, materials, equipment and incidentals required to furnish and install all valves, piping and appurtenances for the lift station. Pipe, valve and pump painting is included with this section. The Work includes, but is not necessarily limited to, all types of valves required for buried and exposed piping.

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

- Section 203, Trenching, Excavation, and Backfilling;
- Section 303, Curb & Gutter, Sidewalks, Drive Pad and Concrete Pavement Construction;
- Section 501, Water Lines and Appurtenances
- Section 602, Station Buildings
- Section 701, Electrical

504.2 SUBMITTALS

504.2.1 Manufacture's Qualifications: Manufacturer shall have a minimum of 5 years of experience in the production of substantially similar equipment, and shall show evidence of satisfactory service in at least 5 installations.

Each type of valve shall be the product of one manufacturer.

504.2.2 Shop Drawings: Submit for approval the following:

- Manufacturer's literature, illustrations, specifications, detailed drawings, data and descriptive literature on all valves and appurtenances.
- Deviations from Drawings and Specifications.
- Engineering data including dimensions, materials, size and weight.
- Fabrication, assembly and installation diagrams.

504.2.3 Operation and Maintenance Data: Submit complete manuals including: Copies of all Shop Drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.

504.2.4 Product Delivery, Storage and Handling:

- Handle all valves, piping and appurtenances very carefully. Valves which are cracked, dented or otherwise damaged or dropped will not be acceptable. Damaged pipe will not be accepted.

- Store materials to permit easy access for inspection and identification. Keep steel members off the ground, using pallets, platforms or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- Store all mechanical equipment in covered storage off the ground and prevent condensation.

504.3 MATERIALS

504.3.1 Materials in General:

1. Conform to the requirements of the project drawings and Bid Proposal.
2. Valves shall have manufacturer's name and working pressure cast in raised letters on valve body.
3. Manual valve operators shall turn clockwise to close unless otherwise specified. Valves shall indicate the direction of operation.
4. Buried valves shall be provided with adjustable two-piece valve boxes and covers as shown.
5. All bolts, nuts, and studs on or required to connect buried valves for fire hydrant assemblies shall be Type 304 stainless steel.
6. All bolts, nuts and studs shall, unless otherwise approved, conform to ASTM A307, Grade B; or ASTM A354.
7. Gasket material shall be of the type recommended by the manufacturers of valves and other appurtenances for installation.

504.3.2 Gate Valves 2 Inches in Diameter and Smaller: Unless otherwise called for, valves shall be bronze threaded ends, solid wedge, non-rising stem, rubber seated screwed bonnet type suitable for 250 psi service. Conforming to AWWA Specifications C500.

- Exposed, manually operated gate valve shall be equipped with hand wheels.
- Product and Manufacturer: Provide one of the following:
  a) Crane Company
  b) Or equal.

504.3.3 Ball Valves ½ to 2 Inches in Diameter: When called for, ball valves to be steel body with stainless steel bore ball as Jamesbury valve – line or equal.

504.3.4 Resilient Wedge Gate Valves 2 Inches in Diameter and Larger: Gate valves shall be iron body, bronze mounted, non- rising stem and in conformance with AWWA C509 & C515.

- The sealing mechanism shall consist of a cast iron or ductile iron gate with a resilient wedge 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 not allow any leakage at 250 psi or less, working pressure with line flow in either direction.
- Valve operator shall be handwheel, clockwise to close.
- Valves shall be furnished with an epoxy coating conforming to Section 504.3 of this Specification.
- Manufacturer: Provide gate valves of one of the following: a) Mueller Company, b) Clow Company, or equal

- Station valves to be flanged except where designated otherwise on project drawings.
- Wheel Operator for exposed valves.

504.3.5 Pressure Reducing Valve 3" Valve and Larger: provide reduced pressure reducing valve as follows:

- Valve body and cover shall be Ductile ASTM A-536. With connections as called for on plans
- Valve shall be rated for a minimum of 250 psi working pressure.
- Main valve trim: Bronze ASTM B-62
- Valve shall be hydraulically operated and pilot controlled
- Pilot control: Bronze ASTM B-62.
- Pilot trim: stainless steel Type 303.
- Manufacturer: Cla-Val Co., Model 90-01or equal
- Interior and exterior coatings shall be per Section 504.3 of this Specification.

504.3.6 Pressure Reducing Valve 2½" Valve and Smaller: provide reduced pressure reducing valve as follows:

- Valve body and cover shall be Bronze ASTM B-62.
- Valve shall be rated for a minimum of 250 psi working pressure.
- Main valve trim: 416 Stainless Steel.
- Strainer: stainless steel Type 416.
- Manufacturer: Cla-Val Co., 990 pressure reducing valve, or equal with adjusting wrenches and dual union tailpieces (NPT Threaded). Adjustment range to be 87 to 145 PSI.

504.3.7 Pressure Reducing Valve with Low Flow By-Pass: provide pressure reducing valve with mounted low flow by-pass as follows:

- Valve body and cover shall be Ductile ASTM A-536. With connections as called for on plans
- Valve shall be rated for a minimum of 250 psi working pressure.
- Main valve trim: Bronze ASTM B-62
- Valve shall be hydraulically operated and pilot controlled
- Pilot control: Bronze ASTM B-62.
- Pilot trim: stainless steel Type 303.
- Manufacturer: Cla-Val Co., Model 90-48 or equal
- Interior and exterior coatings shall be epoxy coated per Section 504.3 of this Specification.
- Options to include - 'Y' strainer, isolation valves (2), and CV Flow Control (opening & closing).
- Pressure range 30 to 300 psi.

504.3.8 Pump Control Valves:

- **General** - The pump starts against a closed valve. When the pump is started, the solenoid control is energized and the valve begins to open slowly, gradually increasing line pressure to full pumping head. When the pump is signaled to shut-off, the solenoid

control is de-energized and the valve begins to close slowly, gradually reducing flow while the pump continues to run. When the valve is closed, a limit switch assembly, which serves as an electrical interlock between the valve and the pump, releases the pump starter and the pump stops. Should a power failure occur, a built-in lift-type check valve closes the moment flow stops, preventing reverse flow regardless of solenoid or diaphragm assembly position. A check valve shall be provided within which closes when flow stops to prevent reverse flow.

- Valve body and cover shall be Ductile ASTM A-536. With connections as called for on plans
- Valve shall be rated for a minimum of 250 psi working pressure.
- Main valve trim: Bronze ASTM B-62
- Valve shall be hydraulically operated and pilot controlled by solenoid.
- Pilot control: Bronze ASTM B-62.
- Pilot trim: stainless steel Type 303.
- Manufacturer: Cla-Val Co., Model 60-08 or equal
- Interior and exterior coatings shall be epoxy coated per Section 504.3 of this Specification.
- Control solenoid to operate at 120V AC, within aluminum body and stainless steel trim.
- Control solenoid and limit switch to be mounted as part of the valve unit by the manufacturer. Contractor to insure that additional relays, switches and controls required for valve to operate as described above and elsewhere are provided and installed.
- Options to include- 'Y' type strainers (2) and isolation valves on pilot lines (4).

504.3.9 Pressure Reducing & Solenoid Shut-Off Valve:

- **General:** Valve to be a pilot-operated regulator capable of holding downstream pressure to a pre-determined delivery pressure. When downstream pressure exceeds the pressure setting of the control pilot, the pilot valve and main valve close drip-tight. A solenoid control is to be provided to intercept the operation of the pressure reducing control and close the main valve.
- Valve body and cover shall be Ductile ASTM A-536. With connections as called for on plans
- Valve shall be rated for a minimum of 250 psi working pressure.
- Main valve trim: Bronze ASTM B-62
- Valve shall be hydraulically operated, pilot controlled and on/off by solenoid.
- Pilot control: Bronze ASTM B-62.
- Pilot trim: stainless steel Type 303.
- Manufacturer: Cla-Val Co., Model 93-01 or equal
- Interior and exterior coatings shall be epoxy coated per Section 504.3 of this Specification.
- Control solenoid to operate at 120 VAC. Valve to be de-energized to open.
- Pressure Range to be from 15 to 75 psi.
- Options to include - 'Y' type strainer (1), isolation valves on pilot lines (2) and CV control for opening and closing.
- A mounted limit switch is to be provided to permit pump control circuit to operate when the PRV is closed.

504.3.10 Pressure Relief Valve:

- **General-** Valve to be a hydraulically operated, pilot controlled valve designed to relieve pressure at an adjustable set point in the event of a closed system.
- Valve body and cover shall be Ductile ASTM A-536. With connections as called for on plans
- Valve shall be rated for a minimum of 250 psi working pressure.
- Main valve trim: Bronze ASTM B-62
- Valve shall be hydraulically operated and pilot controlled.
- Pilot control: Bronze ASTM B-62.
- Pilot trim: stainless steel Type 303.
- Manufacturer: Cla-Val Co., Model 50-01 or equal
- Interior and exterior coatings shall be epoxy coated per Section 504.3 of this Specification.
- Pressure range to be 20-200 psi.
- Options to include - pilot lines isolation valves (2), and CV speed control (opening).
- A limit switch is to be provided to begin pump shutdown sequence when valve is opened due to high pressure.

504.3.11 Flow Meters: Provide magnetic flow meters as follows:

- Pressure Rating: 250 PSI
- Accuracy: ± 1.0%
- Connection: Flanged
- Manufacturer: Badger Meter M-Series with remote M2000 amplifier and display (with cable as required) or equal.
- Amplifier: 32 bit signal processor, digital and analog outputs.
- Display: Large, four-line by 20 character LCD display with backlight suitable for local and remote display with SCADA.
- Interior and exterior coatings shall be per Section 504.3 of this Specification.
- Voltage – 120 VAC

504.3.12 Miscellaneous Valves for Potable and Process Systems: Provide the following valves as required for potable and process systems: a) Ball valves, b) Hose bibs, c) Needle valve, d) Check valve

- Body: Cat Red Bronze ASTM B-584 Alloy 845
- Threaded ends
- Pressure rating: 250 psi
- Seats: TFE for resilient seating
- Ball and needle valves shall have stainless steel ball or needle and stems

504.3.13 Pressure Gages: Pressure gages shall have a white face with black numerals, enclosed in a flangeless aluminum case. Gages shall be accurate to 1 percent of scale.

- Gages shall be installed with an on - off valve (ball type).
- Gages shall be glycerine filled or Mineral Oil
- Gages on shall have 3 ½ inch diameter cases
- Ranges shall be as shown, or if not shown as selected by engineer

- Manufacturer: Helicoid Series 900 by Bristol Babcock, or equal

504.3.14 Ductile Iron Pipe and Fittings: Flanged pipe: Fabricate in accordance with requirements of AWWA C115. Pipe thickness will be Class 350 minimum.

- Flanged pipe to be class 350 fabricated in accordance with AWWA C115
- Flanged fittings shall conform to AWWA C110
- Pressure rating to be 250 PSI min.
- Flange gaskets to be 1/8' min. full faced rubber conforming to AWWA C111.
- Coating shall conform to Section 504.3 of this specification

504.3.15 Steel Pipe: shall be ASTM A53 and be furnished with threaded ends, or beveled for welding or plain end.

- Fittings shall be fabricated of the same material as the pipe line of which they are a part
- Galvanized steel pipe shall conform to ASTM A120
- Coating shall conform to Section 504.3 of this specification

504.3.16 Copper Pipe: Copper pipe and solder joints shall be used where designated.

- Copper piping shall be Type K hard temper with solder joint pressure fittings. Type K copper pipe shall conform to ASTM B88. Fittings shall conform to ANSI B16.22.
- All connections at valves shall be threaded with joint compound or teflon tape.

504.4 PAINTING

Contractor shall provide all labor, materials, equipment and incidentals as required to paint and finish piping, fittings, and appurtenances as listed below unless otherwise noted on the project drawings. Painting and finishing includes all coating materials, pretreatments, surface preparation, primers, sealers, and finish coats.

- Factory Coated Valves, Meters and Specials: Items that are factory coated shall have a three coat epoxy coating or a single coat fusion bonded epoxy system with minimum dry film thickness (DFT) of 10 mills. Coatings shall be touched up using factory supplied touch-up paint and materials. Touch up work shall be done according to the manufacturer's recommendations. Coating system shall meet AWWA C550 and be approved by NSF-61.
- Ductile Iron Pipe and Fittings:
    - Interior Lining and Coating: Cement-Mortar Lining with asphaltic coating in accordance with ANSI/AWWA C104/A21.4.
    - Exterior Coating
        - Option A
            - Clean and prep exterior pipe surface to primer manufacturers' recommendations. Surface preparation may be completed at the factory.
            - Apply lead and chromate free red phenolic alkyd primer, Tnemec Series 37h – Chem-Prime HS or equal. (2.5 to 3.5 mills DFT) Primer shall be factory applied.

        - Apply two (2) coats of alkyd paint, Tnemec Series 2H – Hi-Build Tnemec Gloss or equal. (2.5 to 3.5 mills DFT per coat). Color to be selected by City.
    - Option B
        - Clean and prep exterior pipe surface to primer manufacturers' recommendations. Surface preparation may be completed at the factory.
        - Apply lead and chromate free red phenolic alkyd primer, Tnemec Series 37h – Chem-Prime HS or equal. (2.5 to 3.5 mills DFT) Primer shall be factory applied.
        - Apply two (2) coats of epoxy paint, Tnemec Series 66 – Hi-Build Epoxoline or equal. (2.5 to 3.5 mills DFT per coat). Color to be selected by City.
- Steel Pipe and Fittings:
    - Interior Coating
        - Surface Preparation shall be by commercial blast cleaned complying with SSPC-SP10. Surface preparation may be completed at the factory or fabrication shop.
        - Apply NSF 61 approved zinc rich primer, Tnemec Series 91 – H_2O Hydro-Zinc Primer or equal. (2.5 to 3.5 mills DFT) Primer may be factory or shop applied.
        - Apply two (2) coats of NSF 61 approved epoxy paint, Tnemec Series N140 – Pota-Pox Plus or equal. (4 to 4 mills DFT per coat). Coating may be factory or shop applied.
    - Exterior Coating
        - Surface preparation shall be by commercial blast cleaned complying with SSPC-SP10. Surface preparation may be completed at the factory or fabrication shop.
            - Option A
                - Apply NSF 61 approved zinc rich primer, Tnemec Series 91 - H_2O Hydro-Zinc Primer or equal. (2.5 to 3.5 mills DFT) Primer may be factory or shop applied.
                - Apply two (2) coats of NSF 61 approved epoxy paint, Tnemec Series N140 – Pota-Pox Plus or equal. (3 to 4 mills DFT per coat). Coating may be factory or shop applied. Color to be selected by the City.
            - Option B
                - Fusion bonded epoxy at 6 to 8 mil DFT.
- Exterior and Interior Wood Surfaces: Wood surfaces shall be primed with an oil-based primer and painted with two (2) coats of latex or oil based paint by Sherman Williams or equal.
- Masonry Surfaces: Masonry surfaces shall be coated with a Pro-Mar Block Filler followed by two (2) coats of latex paint by Sherman Williams or equal.

504.5 TWO INCH AND SMALLER PIPE FASTENING SYSTEM

Piping mounts and supports shall be provided to securely fasten 2 in. and smaller piping to the interior walls of the station. All hardware shall be pre-painted or stainless steel. Flange or pipe connectors to mount and support piping shall be provided by Contractor.

- Manufacturer – Unistruct (Cush-A-Clamp) or approved equal.

504.6 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

506 REACH 27.6 HEATON PUMP STATION SINGLE STAGE, DOUBLE SUCTION HORIZONTAL SPLIT CASE PUMPING UNITS

506.1 DESCRIPTION

- 506.1.1 RELATED WORK
- 506.1.2 CODES AND STANDARDS

506.2 SUBMITTALS

- 506.2.1 QUALITY ASSURANCE
- 506.2.2 O & M MANUALS

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506.4 HYDRAULIC DESIGN CRITERIA

506.5 DETAILS OF CONSTRUCTION

- 506.5.1 PUMP CASING
- 506.5.2 IMPELLER
- 506.5.3 WEAR RINGS
- 506.5.4 PUMP SHAFT
- 506.5.5 STUFFING BOXES
- 506.5.6 BEARINGS
- 506.5.7 PUMP BASE
- 506.5.8 COUPLINGS
- 506.5.9 MOTORS

506.6 FACTORY TESTING

506.7 WARRANTY

506.8 INSTALLATION

506.9 FIELD TEST

506.10 FACTORY FIELD SERVICE

506.11 MEASUREMENT & PAYMENT

506 REACH 27.6 HEATON PUMP STATION SINGLE STAGE, DOUBLE SUCTION HORIZONTAL SPLIT CASE PUMPING UNITS

506.1 DESCRIPTION

The contractor shall furnish and install two **12 x 10** single-stage, double suction, horizontal split case pumping units of opposite rotation as specified herein and shown on the contract drawings. Basis of design is a Patterson Pump # 12x10 MAD-A, and is locally represented by TP Pump in Albuquerque, NM, at 505.247.4036. Engineered pre-approved equal products are acceptable. Note all requirements below.

The term "pumping unit" or "units" shall be defined as a pump complete with base plate, coupling, coupling guard, and motor.

The pump manufacturer shall be responsible for supplying the complete pumping unit as defined above and shall assume complete system responsibility.

506.1.1 RELATED WORK

Refer to Technical Specification Part 700 for related general electrical requirements. Refer to Bid Lot 6 drawings for general construction and specific electrical details.

506.1.2 CODES AND STANDARDS

HI (Hydraulic Institute)

ANSI (American National Standards Institute)

ASTM (American Society of Testing and Materials)

ISO 9001 (International Organization for Standardization)

AFBMA (Antifriction Bearing Manufacturer's Association)

506.2 SUBMITTALS

See Technical Specifications Part 100 for general submittal requirements. Submittal data to include pump curves (with numerical point data) and dimensioned drawings specific to this project.

506.2.1 QUALITY ASSURANCE

To ensure unity of responsibility, the complete pump unit shall be supplied, tested, and warranted by the pump manufacturer.

The equipment specified under this section is to be standard pumping equipment manufactured by a company with no less than fifteen years experience in the manufacture of such equipment. Upon request by the engineer, the manufacturer shall provide proof of such experience by providing installation lists, brochures, catalog cuts, etc.

The manufacturer of the pump units shall have a quality management system in place and shall be ISO 9001 certified.

506.2.2 OPERATION AND MAINTENANCE MANUALS

Submit complete manuals including: Copies of all shop drawings, test reports, maintenance data and schedules, description of operation, and spare parts information.

506.3 MATERIALS

506.3.1 The pumping units provided under this section shall be supplied by one manufacturer. Pumping units shall be manufactured by Patterson Pump Company or approved equal.

506.3.2 Each pumping unit shall be provided with a stainless steel nameplate, which shall contain the following information:

- Manufacturer's name, address, and telephone number
- Model number
- Serial number
- Head, capacity and rpm at rated condition
- Motor horsepower, rpm and frame size

506.3.3 Pumping units within each type of service shall be identical in every respect with all parts being interchangeable except for rotation.

506.3.4 Pump rotating assemblies shall be balanced in accordance with the requirements of ANSI S2.19, G6.3.

506.3.5 Vibration, when measured at the pump bearing housing shall not exceed the limitations specified by the Hydraulic Institute Standards.

506.4 HYDRAULIC DESIGN CRITERIA

506.4.1 Rated Condition (Efficiency at Design Point must be Within Specified Min. Efficiency Point:

- Capacity (Design Point) = 3750 GPM
- Head in Feet = 100 TDH
- Minimum Efficiency = 87.5 %
- Maximum NPSHr = 24 Feet

506.4.2 Secondary Condition

- Capacity = 4500 GPM
- Head in Feet = 78.1 TDH
- Minimum Efficiency = 83.0 %
- Maximum NPSHr = 31 Feet

506.4.3 Operating Characteristics

- Shut-off Head (Shall not exceed) = 148 Feet
- Maximum Brake Horsepower= 109 BHP
- Maximum Operating Speed = 1770 RPM
- Pump rotation to be such as to produce flow-in the direction indicated in the piping configuration.

506.5 DETAILS OF CONSTRUCTION

506.5.1 **Pump Casing**

- Pump casing shall be of close grain cast iron type ASTM A48, class 40, designed for heavy-duty service. The casing shall be horizontally split; single volute type with the suction and discharge flanges cast integrally with the lower half in order that the upper part may be removed for inspection of the rotating element without disturbing pipe connections or pump alignment. Pump mounting feet are to be cast integrally into the lower half casing with the mounting surface completely machined. The joint between halves of the casing shall be heavily flanged and bolted, and provided with dowel pins to insure accurate alignment.

The upper half-casing flange shall have tapped holes for jackscrews. The interior shall be smooth and free from surface defects.

- Thickness, diameter and drilling dimensions of suction flanges shall be Class (125) ANSI standard. Discharge flanges shall be Class (125) ANSI standard. Pump casings shall have a minimum 12" suction and a 10" discharge. Flanges to be rated for 250 PSI service. Casings shall be drilled and tapped for vertical priming, gauge, and drain connections. Suitable lifting lugs or eyebolts shall be provided.

506.5.2 **Impeller**

- Impeller shall be of the double suction enclosed type made entirely of ASTM B584-836 bronze finish smooth all over and of ample strength and stiffness for maintaining the maximum capacity of the unit.

- It shall be statically and dynamically balanced and shall be keyed to the shaft and securely held in axial position on the shaft by means of **316 Stainless Steel Sleeves** extended through the stuffing box. Rotation of the shaft sleeves shall be prevented by the impeller key, which shall extend beyond the impeller hub and into the shaft sleeve on both sides of the impeller. Shaft sleeves shall be held in position by a locking shaft sleeve nut located outside of the stuffing box and shall have an O-ring seal between the sleeve and the nut to prevent entrance of air or liquid between the shaft and sleeve. Sleeves, which are threaded on to the pump shaft, are not acceptable. **NO EXCEPTIONS** granted on this requirement, threaded shaft sleeves shall **NOT** be allowed.

506.5.3 **Wear Rings**

- At the running joint between the suction and discharge chambers, there shall be provided wear rings on both the casing and impeller.

- The casing rings shall be of ASTM B505-927 bronze, positioned in the casing and locked against rotation by the upper half of the case.

- Impeller rings shall be of ASTM B505-932 bronze, so fastened that they cannot rotate or become loose when the pump is subjected to reversed rotation. The rings shall be made to limit gauges, so that they may be renewed without fitting.

506.5.4 **Pump Shaft**

- The shaft shall be of AISI 1141 and of such dimensions that the maximum combined stress due to bending and torsion shall not exceed 8,000 pounds per square inch under the most severe conditions of operation.

- The shaft shall be accurately machined over its entire length. The first critical speed of the rotating assembly shall occur at not less than 150% of the rated speed.

- Threads on the pump shaft shall be located outside of the stuffing box.

506.5.5 **Stuffing Boxes**

- Each stuffing box shall be equipped with a throat bushing machined from 316 S.S. that on initial flooding of the pump, releases entrapped air from the seal chamber through an integral, self cleaning air vent in the top of the bushing. The throat bushing shall create fluid exchange inside the seal chamber to reduce frictional heat accumulation around the mechanical seal. The throat bushing shall position particulate for removal by conveying them from the bore of the stuffing box to the shaft by means of an integrally machined spiral and remove this particulate from the seal chamber. **NO EXCEPTIONS**, granted on this requirement.

- Each stuffing box shall be equipped with a split mechanical seal. Repair or replacement of these seals shall not require disassembly of the pump. The seals shall be mechanically loaded with multiple springs which shall be isolated from the pumped product. The mechanical seal shall be of the stationary, hydraulically balanced, o-ring design to reduce heat generation, face wear and minimize horsepower consumption.

- Mechanical seal springs shall not be of the coil design.

- The rotary and the stationary seal faces shall be solid silicon carbide. The gland and rotary holder shall be 316 SS with Elgiloy springs and viton elastomers.

- The mechanical seal shall be rated for a working pressure of 400 PSIG and capable of sealing against a vacuum up to 28 inches of mercury.

- All o-rings shall be of the ball and socket design and shall not require adhesives of any kind.

506.5.6 **Bearings**

- Bearings shall be of the anti-friction type grease lubricated ball.

- The bearing configuration shall consist of one single row deep grooved anti-friction bearing on the inboard side and two single row deep grooved anti-friction bearings mounted back to back on the outboard side. The inboard bearing shall be designed to take the radial thrust loads. The outboard bearings shall be designed to take a combination of loads, both radial and axial; and hold the rotor in axial alignment.

- Bearings shall have a minimum rated service life of 40,000 hours in accordance with the standards of the Bearings Manufacturers Association through out the specified operating range. Bearings shall be mounted in dust tight housings shall be rigidly supported by suitable brackets, which shall be cast with integrally with the lower half or the pump casing. Bearing housings or bearing housing supports, which are bolted to the side of the pump casing, are not acceptable.

- A deflector made of Aluminum shall be provided on the inboard and outboard ends of the pump shaft to prevent product from entering either bearing housing.

506.5.7 **Pump Base**

- The pump and motor shall be mounted on a common base of fabricated ASTM A36 steel. Bent metal or formed bases are not acceptable.

- The base shall be provided with a coupling guard, and ample grout holes. (Drip lip rim required)

- All mounting surfaces shall have a machined finish.

506.5.8 **Couplings**

- The coupling shall be Martin Quadra-flex or approved equal with type S flanges and elastomeric sleeves of Hytrel, EPDM or similar material.

- Sized to transmit the maximum required horsepower with a 1.5 service factor.

506.5.9 **Motors**

- Motors for use on pumping units referenced in this specification shall be selected to be fully suited to the application and shall be in accordance with the most current NEMA MG-1 requirements. Any clarifications or conflicts between this specification and the NEMA requirements shall be brought to the attention of the specifying engineer for clarification. The Engineer will determine which requirement is applicable.

- Pump motors shall be NEMA Premium efficiency rated, or better, and have a NEMA Design B torque characteristic suitable for continuous duty applications.

- Motor enclosure shall be of the open-drip proof type (ODP) for use in an indoor pump house facility.

- Base rated speed shall be 1760 RPM, rated voltage shall be 480 VAC, 60 Hz.

- Motor shall have Class F rated insulation and include a minimum of 6 (six) embedded stator winding RTDs (resistance temperature devices) with leads brought out to a suitable terminal block and enclosure located adjacent to the main power enclosure and connections. RTD sensors shall be three wire type, rated for 100 ohms at 0 degrees Celsius. RTDs shall be arranged for two RTDs per stator phase.

- Motor horse power shall be 125 hp and include a 1.15 service factor based on sine wave power.

- Motors shall be fully rated for specified horsepower at an altitude of 7000 feet above sea level and for a maximum ambient temperature of 104 degrees Fahrenheit. Rated nameplate horse power shall be non-overloading throughout the entirety of the pump performance curve and service ratings shall not be relied on to meet the designated current or future design operating conditions.

- Motor windings shall be equipped with normally-closed thermostats, wired in series with the motor windings, which open at a factory set temperature to prevent the motor from overheating.

- Motors shall be suitably insulated for use with variable frequency drive (VFD) controller applications.

- Motor conduit termination enclosure locations, mounting orientation and shaft rotation shall be as designated in the mechanical specifications and or the mechanical drawing packages for the particular pumping unit referenced.

506.6 FACTORY TESTING

506.6.1 Each pump shall undergo a certified hydrostatic test at 150% of the pressure developed at shut-off head.

506.6.2 A certified performance test shall be performed on each unit utilizing its specified drive.

506.6.3 All tests shall be performed in accordance with the Hydraulic Institute Test Standards for Centrifugal Pumps - 1.6 (1988).

506.6.4 Six evenly spaced test points shall be taken and shall include conditions at shut-off (zero flow) and the operating points specified herein. Preliminary test data must be submitted to the owner seven days prior to the actual test date.

506.6.5 The engineer and/or a representative of the owner shall be given sufficient notice of the testing dates and shall have the opportunity to witness these test.

506.7 WARRANTY

506.7.1 The manufacturer of the pumping units shall provide a written warranty covering the entire pumping unit.

506.7.2 The warranty shall be in effect for a period of one year after final project acceptance by the City.

506.8 INSTALLATION

There is to be communication between the installing Contractor, pump unit supplier, Engineer and pump unit manufacturers with exchange of information as required to insure a proper installation.

506.9 FIELD TEST

Pump unit performance to be verified by field tests once adequate facilities are completed to gather measurements of head, flow, energy consumption and other required data. (Information on motor efficiencies to be provided). Trained personnel shall be provided to gather data and determine performance parameters.

506.10 FACTORY FIELD SERVICE

506.10.1 The manufacturer of the pumping unit shall provide, at no additional cost to the owner, the services of a field service representative for a period of two (2) full days.

506.10.2 The time specified shall require at least two trips to the project site. One trip for supervision during the installation of the units and one trip for operator training shall be provided.

506.11 MEASUREMENT & PAYMENT

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

507 SLAB TRENCH DRAINS - INDEX

507.1 DESCRIPTION

507.2 SUBMITTALS

507.3 MATERIALS

- 507.3.1 TRENCH BODY
- 507.3.2 END CAPS
- 507.3.3 FRAME
- 507.3.4 GRATES
- 507.3.5 MANUFACTURER

507.4 INSTALLATION

507.5 MEASUREMENT AND PAYMENT

507 SLAB TRENCH DRAINS

507.1 DESCRIPTION

This item of work consists of furnishing all material, supplies, plant and labor required to construct cast-in-place slab trench drains and appurtenances in accordance with these specifications and project drawings.

507.2 SUBMITTALS

Shall comply with Section 101 of the Technical Specifications.

507.3 MATERIALS

507.3.1 Trench Body: Trench body to be composed of a semi-rigid material such as UV stabilized talc-filled polypropylene, HDPE or composite polymer material. Trench body to be 'U' shaped with reinforcing ribs on the exterior and a means for connecting trench segments to form a water-tight joint. Trench segments to graduate in depth to produce an invert slope of approximately 0.65%. The beginning depth of trench from top of slab to trench invert to be approximately 5½" to 6½". Trench throat dimension to be 4".

507.3.2 End Caps: High end cap to be blank and extend from invert (or below) to top of slab forming a water-tight seal. Outlet end cap to have a no-hub 3" dia. extension suitable for connecting to 3" schedule 40 PVC pipe. End cap to seal water-tight against trench body and extend to slab level.

507.3.3 Frame: Trench drain to incorporate a rigid frame at the top of trench body to provide for a good structural and wear resistant edge at slab top, additional strength for lateral pressure on trench body, a means for attaching grating to the trench and appurtenances for stabilizing the unit while embedding in concrete. Frame to be ductile iron or other approved material.

507.3.4 Grates: Grates to be ductile iron or polypropylene or as a combination of each as designated on the project drawings. Grates shall be provided with a suitable means for secure attachment to trench frames. Polypropylene load rating to be Class 'A'. Ductile iron load rating to be Class 'C'. All types of grating to be flush with slab floor.

507.3.5 Manufacturer: Slab trench drains and appurtenances to be as manufactured by WATTS or equal.

507.4 INSTALLATION

Installation to be performed in accordance with manufacturers recommendations and as may be required on the project drawings.

507.5 MEASUREMENT AND PAYMENT

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

509 HYDROPNEUMATIC SURGE CONTROL SYSTEM SPECIFICATION - INDEX

509.1 DESCRIPTION

509.1.1 GENERAL REQUIREMENTS

509.1.1.1 ACCEPTED MANUFACTURER
509.1.1.2 SUPPLIER
509.1.1.3 SURGE ANALYSIS
509.1.1.4 SURGE CONTROL
509.1.1.5 PERSONNEL

509.1.2 REFERENCE SPECIFICATIONS CODES AND STANDARDS

509.1.2.1 PRESSURE VESSELS
509.1.2.2 PLUMBING CODES
509.1.2.3 INTERNATIONAL BUILDING CODE
509.1.2.4 NATIONAL ELECTRIC CODE

509.2 SUBMITTALS

509.2.1 DESIGN AND PERFORMANCE REQUIREMENTS

509.2.2 SURGE ANALYSIS VERIFICATION

509.2.2.1 MANUFACTURER ANALYSIS
509.2.2.2 SURGE ANALYSIS
509.2.2.3 SURGE TANKS
509.2.2.4 OUTFLOW CONDITIONS
509.2.2.5 RESULTS

509.2.3 OPERATION AND MAINTENANCE MANUAL

509.3 MATERIALS

509.3.1 SURGE TANKS
509.3.2 LEVEL CONTROL SYSTEM

509.3.2.1 UNIT CONTROL PANEL
509.3.2.2 LEVEL TRANSMITTER/LEVEL PROBE(S)
509.3.2.3 SOLENOID VALVES
509.3.2.4 AIR COMPRESSOR

509.3.3 MISCELLANEOUS COMPONENTS

509.4 PERFORMANCE GUARANTEE

509.5 INSTALLATION AND TESTING

509.6 UNIT RESPONSIBILITY

509.7 MEASUREMENT AND PAYMENT

509 HYDROPNEUMATIC SURGE CONTROL SYSTEM SPECIFICATION

509.1 DESCRIPTION

This specification describes the requirements for two (2) Hydropneumatic Surge Control Systems. The purpose of the systems is to minimize transient pressures from shock waves due to pump shutdown and startup on both suction and discharge sides of pump.

509.1.1 General Requirements

509.1.1.1 Accepted Manufacturer: The Hydropneumatic Surge Control System shall be as designed and manufactured by PULSCO of Irvine CA or an approved equal.

509.1.1.2 Supplier: The supplier must have a minimum of five years experience, designing, supplying and start up of Hydropneumatic Surge Control Systems.

509.1.1.3 Surge Analysis: The supplier must submit a surge analysis for the Engineer's approval or verify analysis performed by others.

509.1.1.4 Surge Control: The Hydropneumatic Surge Control Systems shall include Surge Tanks and automatic level control systems. See system schematic at end of his specification.

509.1.1.5 Personnel: Personnel representing the surge control system supplier are required to check the installation and instruct the owner's personnel in the operation of the surge control system. A field surge test may be performed in conjunction with this site visit.

509.1.2 Reference Specifications, Codes and Standards:

509.1.2.1 Pressure Vessels: Pressure vessels shall be in accordance with the latest revision of the American Society of Mechanical Engineers (ASME) Code for the Unfired Pressure Vessels, Section VIII, Division 1.

509.1.2.2 Plumbing Codes: All local plumbing codes shall be met.

509.1.2.3 International Building Code: The system and anchorage of the Surge Tanks shall conform to the International Building Code (IBC).

509.1.2.4 National Electric Code: The National Electric Code (NEC) shall be used for all wiring.

509.2 SUBMITTALS

Submittals shall be in accordance with project specifications, Section 100 including detailed surge tank fabrication drawings, system assembly, installation drawings, and specifications for

system components, accessories and protective coatings. Electrical diagrams shall be included.

509.2.1 Design and Performance Requirements: The pressure transients in the pipeline following pump shutdown/startup from design operating conditions must not cause cavitation or water column separation at any point in the pipeline and must not exceed the pressure rating of the piping at any point in the pipeline.

509.2.2 Surge Analysis Verification:

509.2.2.1 Manufacturer Analysis: The manufacturer shall verify analysis performed by others, utilizing the data supplied by the owner.

509.2.2.2 Surge Analysis: The surge analysis must show pipeline profile, initial flow rate, initial and maximum expanded air volume and envelope of maximum and minimum line pressure throughout the pipeline. In addition, a predicated pressure-time history at the pump station and at other critical points in the pipeline will also be required.

509.2.2.3 Surge Tanks: The surge tanks must be designed to match the dynamics of the pumping station.

509.2.2.4 Outflow Conditions: There shall be no less than ten percent reserve water in the surge tank at the maximum outflow conditions (water seal volume).

509.2.2.5 Results: Results of the surge analysis shall clearly indicate that the design and size of the surge tanks provided will adequately protect the system from excessive pressure surges, and shall show the Hydropneumatic Surge Control System will meet the performance guarantees in Section 509.1.1.3.

509.2.3 Operation and Maintenance Manual (5 Copies to be submitted for approval): Manual to include instructions on installation, operation and maintenance of supplied components. A copy of ASME Pressure Vessel Code Form U-1A to be included.

509.3 MATERIALS

509.3.1 Surge Tanks: One tank to contain 384CF of volume with a dia. of 84 inches and height of 10ft. One tank to contain 157CF of volume with a dia. of 60" and height of 8'. The dimension of tanks above the floor as shown on project drawings shall be adhered to. The surge tank must have no moving parts, vanes or elastomers and shall contain a vortex breaker and differential nozzle *(if required as determined from surge analysis verifications)*

The surge tanks shall be constructed of carbon steel for a Maximum Allowable Working Pressure (MAWP) of 200 psig in accordance with the ASME Pressure Vessel Code, Section VIII, Division 1. The minimum wall thickness shall be ¼ inch. The surge tanks shall be provided with flanged line connections, adequate supports (four legs), lifting lugs and couplings for drain, safety reliefvalve and level control system. The 384CF tank to have an 8" flg.

connection with a 6" differential orifice. Orifice to have 3:1 ratio (kin/kout). The 175 CF tank to have a 8" flg. connection with 6" orifice. The surge tank shall be provided with an elliptical manway, minimum 14'x18".

Hydrostatic test the surge tank in accordance with ASME Code for Unfired Pressure Vessels. Form U-1A "Manufacturers' Data Report for Unfired Pressure Vessels" shall be provided by the surge tank manufacturer to certify that the surge tank was built in accordance with ASME Code Rules for the construction of Unfired pressure vessels and inspected by a certified inspector. Copies of this form shall be supplied with the surge tank and included in the Operation and Maintenance Manual.

The internal surface of the surge tank shall be sandblasted to SSPC-SP-10 and apply two (2) coats of NSF Standard 61 approved epoxy coating, such as Sherwin Williams Macropoxy 646 or equivalent, 5-10 mils per coat, 10 to 20 mils total DFT.

The external surface of the surge tank shall be sandblasted to SSPC-SP-6 and apply one coat of shop primer. Finish coat shall be applied in the field by Contractor with selection by the City.

509.3.2 Level Control System: The purpose of the level control system is to control the air volume in the surge tank. This is accomplished by maintaining the water level within a designed operating range.

When water level is above the normal operating range, air shall be added to the surge tank from the air compressor, through the add air solenoid valve. When water is below the normal operating range, air shall be vented from the surge tank through the vent air solenoid valve. High and low alarm signals shall be generated when the water level is out of range. Time delays shall be used to prevent false alarms and avoid adding or venting air during start up and shutdown or during minor fluctuations.

The automatic level control system to include unit control panel, level transmitter/level probe(s), solenoid valves and air compressor.

509.3.2.1 Unit Control Panel: Shall house all electrical components including level switches (*can be PLC, current switch or induction relay),* control relays, time delay relays, alarm contacts and indicating lights. Indicating lights shall be LED press-to-test. The panel enclosure shall be wall mounted, NEMA 4X (304 Stainless Steel) UL listed and operate on 120 volt, 60 Hz, 20 amp electrical service. Panel shall be factory wired and components shall be labeled.

509.3.2.2 Level Transmitter/Level Probe(s): Level transmitter provides a 4-20 mA signal and can be a differential pressure transmitter or R.F. Capacitance probe. Level can also be determined using conductance type level probes (probe holder with five ¼" diameter stainless steel PVC coated electrodes).

509.3.2.3 Solenoid Valves: ¾", ASCO model EF8210B26 or equal. One solenoid valve for adding air (lowering water level) and one solenoid valve for venting (raising water level).

509.3.2.4 Air Compressor: The air compressor package shall be a Simplex (*one air-cooled, two-stage, oil lubricated reciprocating type air compressor mounted on one air receiver)* or a Duplex (*two air-cooled, two-stage, oil lubricated reciprocated type air compressors mounted on one air receiver).* Air compressor(s) shall include all necessary piping (tubing) for connection to the air receiver and all components wired to the air compressor control panel. The air compressor package shall be the standard product of a manufacturer such as Ingersoll-Rand or approved equal, who is regularly engaged in the design and construction of fully automatic air compressor systems. The air compressor system shall include the following items.

A Totally Enclosed Fan Cooled (TEFC) motor shall drive the compressor and shall be adequate to drive the compressor continuously at full-rated output. Motor shall be at least 5hp. Power supply shall be 230/460 volts, 3 phase and 60 hertz.

Compressor unit shall include a totally enclosed crankcase of cast iron, separate detachable deep finned cylinders, matched balanced pistons, separately removable valve housing, low oil switch and a direct reading pressure gauge. The low oil switch shall shut down the compressor if the oil level is too low. The switch shall not reset without adding oil.

The air compressor control panel shall be provided with a power on light, Hand-Off-Automatic (HOA) switch, run light, motor thermal overload alarm light and low oil level alarm light. The panel shall contain combination magnetic motor starter and circuit breaker. Lights shall be LED, press-to-test.

The air compressor shall start and stop based on pressure in the air receiver. Dry contacts shall be provided in the panel for remote indication of running conditions for the compressor. The compressor shall be shutdown by motor thermal overload, or low oil level. An alarm condition shall energize a local alarm light.

The compressor shall start automatically, provided its HOA switch is in the AUTO position. The compressor shall run continuously if its HOA switch is in the HAND position and shall shut down if its HOA switch is in the OFF position.

The Hydropneumatic Surge Control System supplier shall select the compressor volumetric capacity and discharge pressure. The capacity and discharge pressure selected shall be sufficient for the application.

The air receiver shall be a minimum of 80-gallon capacity.

The air compressor package shall be coated with the standard factory coating.

509.3.3 Miscellaneous Components- Tank to be equipped with the following:

a) ¾" Safety Relief Valve. The surge tank shall have a safety valve sized in accordance with the ASME code to prevent over pressurizing the surge tank above its design pressure. Safety relief valve setpoint shall be set to the maximum allowable working pressure of the surge tank.

b) ¾" check valve for air line.

c) ½" and ¾" ball valves for isolation and bypass of solenoid valves, isolation and drain of the probe well and drain isolation of the air piping.

d) ¾"Sight Glass Assembly- the sight glass shall be mounted on the probe well for visually checking surge tank water level. The sight glass connection shall have isolation valves with ball check. Glass shall extend from approximately 6" below and 6" above the designed operating range. Guard rods shall be included.

e) Air muffler for reducing the noise generated from the venting of air from the surge tank.

f) Pressure gauge for indicating pressure in surge tank, 4 ½" diameter dial, ¼" bottom connection

g) Probe well, 4" pipe, 304 stainless steel with couplings for connection to surge tank and installation of level transmitter/level probes, sight glass and drain valve.

h) General Purpose (GP) and high efficiency filters for Air Compressors.

509.4 PERFORMANCE GUARANTEE

509.4.1 Manufacturer shall provide a guarantee of performance and workmanship certifying that the system will meet all provisions of these specifications.

509.4.2 Such performance may be verified by the following:

a) Functional test of the level control system.

b) Performance of field surge test (simulated power failure of pump(s)).

509.5 INSTALLATION AND TESTING

1. The supplier shall provide all components and assembly instructions to the Contractor for installation.

2. Testing shall be performed by the Contractor in the presence of the Engineer and a representative of the supplier. Testing shall consist of functional test of the level control system and may include a simulated power failure when pump(s) are running at maximum operating flow conditions.

3. System supplier shall provide start up support (one trip, two days) to test and instruct project personnel on the supplied components.

509.6 UNIT RESPONSIBILITY

1. The Hydropneumatic Surge Control System shall be designed and supplied by a single manufacturer.

2. Installation shall be the responsibility of the General Contractor.

509.7 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.

510 PIPE BONDING AND CORROSION MONITORING SYSTEM - INDEX

510.1 DESCRIPTION

510.2 SUBMITTALS

510.3 NACE CERTIFIED CATHODIC PROTECTION SPECIALIST

510.4 BONDING (PIPE TO PIPE AND PIPE TO FITTINGS)

510.5 TEST STATIONS

510.6 ISOLATING JOINT KITS

510.7 GALVANIC ANODES

510.8 PERMANENT REFERENCE ELECTRODE (CSE)

510.9 MEASUREMENT AND PAYMENT

510 PIPE BONDING AND CORROSION MONITORING SYSTEM

510.1 DESCRIPTION

This section is for providing personnel, labor, equipment, and materials as required to construct pipeline bonding and test stations for corrosion monitoring. The materials and construction shall be suitable for a possible future conversion to an impressed cathodic protection system, some items covered in this section may not apply to initial system design but are included in xase the need for such becomes evident during construction.

510.2 SUBMITTALS

Shall comply with Section 101 of the Technical Specifications.

510.3 NACE CERTIFIED CATHODIC PROTECTION SPECIALIST:

- A NACE Certified Specialist shall supervise and direct installation of facilities for this project so that quality control is assured. The specialist shall provide as part of the submittal process, his or her qualifying certificate and a plan indicating, what phases of construction and when specialist will be present to supervise, train personnel and provide inspection. Specialist shall demonstrate as construction progresses and/or after construction is complete, the following:

    a) Electrical continuity within the pipeline
    b) Leads are intact as indicated by resistance values
    c) Current measurement in the pipeline
    d) Structure to Soil Potentials utilizing portable copper/copper sulfate electrode

    Note: Five readings shall be taken on each side of each test station up to 500ft. distance.

- Specialist to furnish all equipment, conductors and electrical meters required to accomplish the items above. A minimum of 500 ft. of conductor of adequate gauge shall be provided for the appropriate tests.

  Test values and readings to be neatly tabulated and presented to the Engineer. Locations of the various tests along with drawings of lead layout and configuration for each test station shall be included. Test station layout, relation to easement lines and access roads to be accomplished by the Engineer, NACE Specialist and Contractor. NACE Specialist to plan and coordinate works on the monitoring system with the Contractor.

- Eleven months after the initial monitoring system tests, the NACE Specialist and Contractor shall return and repeat the four tests above in the same locations. Test values and readings to be tabulated as before and presented to the Engineer.

510.4 BONDING (PIPE TO PIPE AND PIPE TO FITTINGS)

- There shall be 2 bonding cables per joint or some owner crossings unless otherwise noted.

  Cable: No. 2 AWG cable to be stranded, plain, annealed copper with HMWPE (0.100 min. thickness) black insulation cable to be rated for 600 volt direct or immersed burial.

- Exothermic Metallugical Bond: by Thermweld of Tulsa, OK or equal. System to utilize alloy which provides minimum heat effect on substrate and pipe interior lining. Current capacity to be equal to or better than cable.

- Dielectric Coating Material to be Royston Handy Cap by Royston Labs Inc. of Pittsburgh PA or equal coating to be applied per manufacturers recommendations.

510.5 TEST STATIONS

- Cables: Structure cables to be min. #6 with black HMWPE insulation. Test lead cables to be min #12 with black HMWPE insulation. Foreign structure cables to be #6 and #12 with blue or white HMWPE insulation. Anode cables to be min #12 with red HMWPE insulation. Cables to have ring terminals and identifying labels.

- Test Station Enclosures: Enclosures to be Beg Fink by Cott Manufacturing of Glendale, CA or equal. Enclosures to be above ground, post type with a minimum of 5 terminals.

- Test Stations for Galvanic Anodes: to be equipped with 0.01 ohm shunts (and variable resisters if necessary) for current adjustment.

- Locations: Approximate test station locations are as listed below provided however, that the final exact locations are to be selected by the NACE Specialist. The general spacing for corrosion test stations (CTS) is to be 1000ft with additional upon conditions encountered during construction.

  Station Corrosion Test Stations (CTS)

- Test Station Barrier Fencing: Fencing to be chain link type with personnel gate where called for as shown on the project drawings.

- Cable Installation: Cables to be surrounded on all sides by min. 6" granular material. Granular material to be 24" below finished grade. Warning type (3" wide, red with black letters) to be placed 12" above cables.

510.6 ISOLATING JOINT KITS

Flange joint isolating kits shall be provided for the size pipe called for. Kits to provide for complete electrical isolation across joint utilizing dielectric flange gaskets, bolt sleeves and washers. Isolation kits to be by PSI or equal, NSF approved for potable water service.

510.7 GALVANIC ANODES

Galvanic Anodes to be 20D2 or larger Ultra Mag High Potential Magnesium Anode by Farwest Corrosion Control Co. of Gardena, CA or equal Anode material shall meet or exceed the requirements of ASTM B 843 having a minimum potential of – 1.700 volts referenced to a copper/copper sulfate reference electrode (CSE).

510.8 PERMANENT REFERENCE ELECTRODE (CSE)

Electrode to be Copper/Copper Sulfate Permacell Plus, manufactured by CorrPro Canada or equal.

510.9 MEASUREMENT AND PAYMENT

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

601 FENCING - INDEX

601.1 DESCRIPTION

601.2 SUBMITTALS

601.3 MATERIALS AND INSTALLATION

601.4 APPLICABLE REFERENCES

601.5 MEASUREMENT AND PAYMENT

601 FENCING

601.1 DESCRIPTION

The work covered by 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.

601.2 SUBMITTALS

Shall comply with Section 101 of the Technical Specifications.

601.3 MATERIALS AND INSTALLATION

- Fencing shall be 6' high with 3 strands of security barbed wire above fence fabric and gates.
- Wire fabric for fence and gates shall be 2" mesh #9 gauge open hearth steel, hot dipped galvanized after fabrication.
- Line posts shall be 1 7/8" O.D. galvanized structural steel pipe, min. Schd. 40.
- Corner posts shall be 3" O.D. galvanized structural steel pipe, min. Schd. 40.
- Gate post for gate openings of less than 4' width shall be 3" O.D. and for openings over 4' and less than 16' width shall be 4" O.D. galvanized structural steel pipe, min. Schd. 40.
- Gates shall be constructed of 2" O.D. galvanized pipe frames covered with fabric same as that specified for fencing.
- Fittings shall be galvanized malleable iron.
- Barbed wire shall be composed of two strands of 12½ gauge galvanized wire with barbs.
- All fence and gate posts shall be set in concrete to a depth recommended by the manufacturer, but not less than 30". Posts shall be set plumb and tops graded to present smooth, pleasing lines. Fabric shall be pulled tight and attached to post, top rail and tension wire with galvanized wire or wire clips. Gates shall have provisions for padlocking and open-close stops. Post spacing shall not exceed 10'. Line posts that are in a circular layout may need to be increased in size and depth of setting to prevent inward leaning when fence fabric is tensioned.
- Top rails to be nominal 1 5/8" O.D.
- Concrete to conform to applicable provisions of Section 301 of these Specifications.

601.4 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.

601.5 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.

602 STATION BUILDINGS - INDEX

602.1 DESCRIPTION

602.2 SUBMITTALS

602.3 WALL CONSTRUCTION

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- 602.4.1 WOOD STRUCTURE
- 602.4.2 STEEL STRUCTURE
  - 602.4.2.1 ROOF DECK
  - 602.4.2.2 INSULATION BOARD
  - 602.4.2.3 METAL ROOF
  - 602.4.2.4 ROOF JOISTS
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602.5 SLAB

602.6 PERSONNEL DOORS
- 602.6.1 GENERAL
- 602.6.2 DOOR HARDWARE GENERAL
- 602.6.3 HINGES
- 602.6.4 MORTISE LOCKS AND LATCHES
- 602.6.5 EXIT DEVICES
- 602.6.6 EXIT LOCKS WITH ALARMS
- 602.6.7 KEYING SYSTEM
- 602.6.8 LOCK TRIM
- 602.6.9 KNOBS AND ROSES
- 602.6.10 LEVER HANDLES
- 602.6.11 KEYS
- 602.6.12 DOOR BOLTS
- 602.6.13 CLOSERS
- 602.6.14 OVERHEAD HOLDERS
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- 602.6.17 DOOR STOPS AND SILENCERS
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- 602.6.21 SPRING TENSION TYPE
- 602.6.22 RAIN DRIPS
- 602.6.23 DOOR RAIN DRIPS
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- 602.6.25 FASTENERS
- 602.6.26 FINISHES

602.7 GARAGE DOORS
- 602.7.1 CURTAIN
- 602.7.2 MOUNTING AND GUIDE ANGLES
- 602.7.3 HOOD AND ATTACHMENTS
- 602.7.4 SPRING COUNTERBALANCE
- 602.7.5 BOTTOM OF CURTAIN
- 602.7.6 DOOR OPERATION
- 602.7.7 TESTING AND DEMONSTRATION

602.8 PAINT

602.9 MEASUREMENT AND PAYMENT

602 STATION BUILDINGS

602.1 DESCRIPTION

This item of work shall consist of furnishing all materials, supplies, plant and labor required for construction of Pressure Reducing Station, and Pump Station Building and accessories complete in accordance with applicable provisions of the International Building Code, these specifications and the project drawings.

602.2 SUBMITTALS

The Contractor shall submit shop drawings and other information as required to verify compliance with the specifications for fabricated and manufactured items for the Station Buildings.

602.3 WALL CONSTRUCTION

Building to be of concrete block construction conforming to applicable provisions of ASTM C33, ASTM C90 and to details shown on the project drawings. Block to be stuccoed or have architectural features on exterior walls as designated. Concrete block courses to be reinforced every other course with "Dura-Wall" or equal with proper lap. Joint reinforcement to conform to ASTM A951 with Class III mill galvanizing and 9 ga. side and cross rods (8" size). All exposed mortar joints to be "tooled". All block voids to be filled with concrete. Reinforced concrete columns and beams shall be as shown on the project drawings. Anchor bolts or weld plates as designated to be installed as shown in cap beam around top of building walls.

Reinforcing steel for dowels, walls, beams and columns shall be at locations shown with a minimum lap of 40 bar diameters or as shown. Reinforcing steel to conform to provisions of ASTM A615, Grades 60. Concrete for wall voids, columns and bond beams shall be 4500 PSI at 28 days as cured in laboratory conditions. Mortar to conform to ASTM C270, Type N. Masonry Cement to conform to ASTM C91. Sand to be clean and washed, ASTM C144. Applicable provisions of ACI 530.1 in regard to Field Observation and Inspection, tolerances, workmanship, quality control and construction are made a part of this specification.

The Contractor shall coordinate and plan as required to insure that wall openings in masonry units are of proper size for doors, exhaust fans, pipe sleeves and other appurtenances.

Wall exteriors shall be stuccoed, when called for, with a scratch coat, brown coat and sand texture finish color coat when so designated on the project drawings. Stucco netting (of galvanized 17gage) to be installed for the scratch coat. The color for the final coat shall be selected by the City.

Exterior walls to be split faced block when so designated on the project drawings. Both interior and exterior joints shall be tooled. Some areas within a split face finish may require smooth face on both sides of CMU units to accommodate concrete forms or openings for windows, louvers or

exhaust fans. All other appurtenances of this section apply. Block color shall be selected by the city. Exposed concrete to be given a 'rubbed' finish.

Gable ends to be of metal stud construction with CDX plywood sheathing, water restrictive barrier and stucco or metal panel cladding as called for. Metal panels to be by the manufacturer of the metal roof panels. Metal panels of the roof type or "Classic Omega" by Firestone or approved equal as called for on project drawings.

602.4 ROOF SYSTEM

602.4.1 Wood Structure:

The roof structural system shall be composed of 2" x 12" or 2" x 10" as designated fir-hemlock beams (rafters) on 16" centers unless otherwise noted. Outside framing or facia members shall be quality grade pine. Each rafter to be secured at each end with galvanized framing brackets, nailed to wall plates. Framing brackets and panel sheathing clips to be Simpson products or equal. Station ceiling to consist of ½" exterior plywood. Ceiling joints to be trimmed with screen door molding strips. Roof sheeting to the 5/8" CDX plywood with approved underlayment for metal roof panels.

Reference: APA- American Plywood Association, ASTM D24 – Grades and Properties,
NDS- National Design Specification for Wood Construction, Nailed Connections (25.35).

Note: Rafters to be No. 1 or better by visual grading per the National Forest Products Association (NFPA)

R-19 Fiberglass Batts shall be placed between rafters as shown on the project drawings. ½" min. plywood with continuous insect screen ventilation strip shall be used for soffit construction.

602.4.2 Steel Structure:

602.4.2.1 Structural Roof Deck: "Verco Decking" or equal shall be attached to roof joists by puddle welds as required for dead, wind and snow loads. Deck to be min. 22 gage, 1½" deep, suitable for allowable stress and L/240 deflection loads of 77 PSF.

602.4.2.2 Insulation Board: Board to be ½" HD ISO GARD by Firestone or equal. Board fasteners to be per manufacturer's recommendation. Board to be covered with 40 mil self-adhering 'clad gard' or equal, (double thickness at eave, rake and ridge).

602.4.2.3 Metal Roof: Metal roof to be 22-gauge steel, standing seam type. Roof and gable trim shall generally conform to the shapes shown on the project drawings and shall be from the same manufacturer as the roof panels. Gutter and downspouts shall also be provided by the manufacturer. Panels to conform to the following:

- Panel Width 17.75"

- Seam Height — 1.75"
- Uplift Resistance — UL 580 Class 90
- Structural Performance — ASTM 330 & E1592
- Fire Rating — UL Class A Rated Assemblies, UL 263 and UL 790
- Hail Impact Rating — Class 4, UL 2218
- Coating — Kynor 500/Hylar 5000 on Galvanized
- Color — Selection by City of Gallup
- Fasteners — As recommended by Manufacturer with Nylon Washers
- Warranty — 25 Year

Metal roof to be UNA-CLAD UC14 by Firestone or approved equal.

602.4.2.4 Roof Joists: Roof joists to be scissor type conforming to dimensions shown on the project drawings. Joists to be open web simple span conforming to applicable provisions of ANSI/AISI, ASTM, AWS and SJI specifications with bridging as recommended by the manufacturers. Joists to be capable of carrying the following loads:

Dead Loads per the total roof configuration
Snow 30 PSF
Wind 20 PSF Lateral Pressure

Sloping top chords to have attachments for resting on horizontal support plates suitable for welding. The joist body shall be capable of resisting forces from vertical joist deflection, temperature change, uplift force and total horizontal force caused by any of the lateral loads above. Stress analysis to utilize ASD methods with a minimum safety factor of 2.

Roof joists to be shop coated in accordance with SSPC Alkyd Paint System No. 2.00 including commercial blast cleaning and 3 coat system, (primer, intermediate and finish) for a total dry film thickness of 4.5 mils. Finish color to be selected by the City. Welds and adjacent areas to be cleaned by grinding or wire brushing, and coated with a similar system. Joists to be manufactured by companies with a minimum of 5 years experience in the design and construction of roof joists of this type. Joists to be by Vulcraft or approved equal.

602.4.2.5 Ceiling Insulation: Insulation to be applied by spraying liquid form onto the underside of ceiling decking (except overhang) and gable ends (metal studs and plywood). Insulation shall also be applied to closure areas at top of walls between joist chords and interior gable ends to seal cracks and openings around the total building perimeter. Insulation product to expand at 100:1 ratio to form a flexible foam blanket with a resultant finish thickness of 5". Insulation product to be Icynene or approved equal.

602.5 SLAB

The ground level slab shall be reinforced concrete (4500 PSI in 28 days) as shown on the project drawings. Equipment pads, floor drains, conduit and pump bases shall be accurately located or placed prior to pouring. Weld plates and anchor bolts shall be placed in the slab during the pour

at locations called for. All exposed edges shall be chamfered ¾" or edged as directed. The Contractor shall coordinate and plan for the location of sleeves in or below the slab as required for passage of electrical and control conduit. The number, location and size of these sleeves shall be determined and approved prior to pouring.

The exposed edges of the floor slab shall be given a rubbed finish. The slab shall be given a smooth trowel finish.

Concrete to conform to applicable provisions of ACI 318-08. Reinforcing steel to conform to ASTM A615, grade 60.

602.6 PERSONNEL DOORS

602.6.1 General: Doors shall be heavy duty doors meeting the dimensional and operational requirements as shown on the project drawings. Doors shall be designated as Level 2, Physical Performance Level B, Model 1 with an insulated core per SDI/DOOR A250.8. Insulated core shall have a U-factor of 0.48 in accordance with SDI/DOOR 113. For pairs of exterior steel doors provide an overlapping steel astragal with the doors.

Frames shall meet the dimensional and operational requirements as shown on the project drawing and conform to SDI/DOOR A250.8. Frame faces shall be continuously welded at corner joints and have mechanical interlock or continuously welded stops and rabbits. Frames shall be welded in accordance with the Structural Welding Code Section 1 to 6, AWS D1.1/D1.1M and in accordance the practice specified by the producer of the metal being welded. Anchors to secure frame to adjoining construction shall be provided. Anchors shall be steel, zinc-coated or painted with rust inhibitive paint, and be no lighter than 18 gage. A minimum of three anchors shall be provide for each jamb. Frames higher than 7.5 feet shall require an additional anchor at each jamb for every additional 2.5 feet or fraction thereof. Frames attached to masonry construction shall be fully grouted and anchored with corrugated or perforated steel straps.

Provide minimum hardware reinforcing gages as specified in SDI/DOOR A250.6. Prepare doors and frames for hardware in accordance with the applicable requirements of SDO/DOOR A250.8 and SDI/DOOR A250.6. Hardware shall be located in accordance with the requirements of SDI/DOOR A250.8, as applicable. Drill and tap for surface-applied hardware onsite. Additional reinforcing for surface-applied hardware shall be built into the door at the factory. Door frames shall be punched to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer at the head of each leaf of double doors.

All surfaces of doors and frames shall be thoroughly cleaned, chemically treated and factory primed with a rust inhibiting coating as specified in SDI/DOOR A250.8. Where coating is removed by welding, apply a touchup of factory primer.

Frames shall be installed in accordance with SDI/DOOR A250.11. Plumb, align, and brace frames securely until permanent anchors are set. Bottoms of frames shall be anchored with expansion bolts or powder-actuated fasteners. Build in or secure anchors to adjoining

construction. Frames shall be backfilled with mortar and the interiors shall be coated with corrosion inhibiting bituminous material.

Doors shall be installed in accordance with SDI/DOOR A250.8. After erection clean and adjust hardware.

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed welded or soldered joints smooth. Door frame sections shall be designed for use with wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable. On wrap around frames provide a throat opening 1/8 inch larger than the actual masonry thickness. Design frames for exposed masonry walls to allow sufficient space between the inside back or trim and masonry to receive caulking compound.

602.6.2 Door Hardware General: Promptly furnish template information or templates to door and frame manufacturers. Conform to BHMA A 156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

Clearly and permanently mark with manufacturer's name or trademark, hinges, pivots, locks, latches, exit devices, bolts and closers where the identifying mark will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

602.6.3 Hinges: Hinges shall conform to BHMA A156.1, and be 4 ½ by 4 ½ inch unless otherwise indicated. Construct loose pin hinges for exterior doors so that pins will be non-removable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

602.6.4 Mortise Locks and Latches: Mortise locks and latches shall conform to BHMA A156.13, and be Series 1000, Operational Grade 1, Security Grade 2. Provide mortise locks with escutcheons not less than 7 by 2 1/4 inch with bushing at least 1/4 inch long. Cut escutcheons to suit cylinders and provide trim items with straight, beveled, or smoothly rounded sides, corners, and edges. Install knobs and roses of mortise locks with screwless shanks and no exposed screws.

602.6.5 Exit Devices: Exit devices shall conform to BHMA A156.3, and be Grade 1. Provide adjustable strikes for rim type and vertical rod devices. Provide open back strikes for pairs of doors with mortise and vertical rod devices. Provide escutcheons, not less than 7 by 2 1/4 inch.

602.6.6 Exit Locks with Alarms: Exit locks with Alarm shall conform to BHMA A156.5, and be Type E0431 with full-width horizontal actuating bar for single doors; Type E0431 with actuating bar or E0471 with actuating bar and top and bottom bolts, both leaves active for pairs of doors, unless otherwise specified. Provide terminals for connection to remote indicating pane.

602.6.7 Keying System: Provide a great master keying system, as directed to match other water department locks.

602.6.8 Lock Trim: Lock trim shall be cast, forged, or heavy wrought construction and commercial plain design.

602.6.9 Knobs and Roses: Shall conform to the minimum test requirements of BHMA A156.2 and BHMA A156.13 for knobs, roses, and escutcheons. For reinforced knobs, roses, and escutcheons, provide outer shell of 0.035 inch thickness, and combined thickness of 0.070 inch, except for knob shanks, which are 0.060 inch thick.

602.6.10 Lever Handles: Provide lever handles in lieu of knobs where indicated. Conform to the minimum requirements of BHMA A156.13 for mortise locks of lever handles for exit devices. Provide lever handle locks with a breakaway feature (such as a weakened spindle or a shear key) to prevent irreparable damage to the lock when force in excess of that specified in BHMA A 156.13 is applied to the lever handle. Provide lever handles return to within ½ inch of the door face.

602.6.11 Keys: Furnish one file key, on duplicate key, and one working key for each key change and for each master keying system. Furnish one additional working key for each lock of each keyed-alike group. Stamp each key with appropriate key control symbol and "Do Not Duplicate." Door shall be keyed as directed to match other water department locks.

602.6.12 Door Bolts: Door bolts shall conform to BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds. Automatic latching flush bolts: BHMA A156.3, Type 25

602.6.13 Closers: Closers shall conform to BHMA A156.4, and be Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations. Provide manufacture's 10 year warranty

Engrave each closer with manufacturer's name or trademark, date of manufacture, and manufacturer's size designation located to be visible after installation.

602.6.14 Overhead Holders: Overhead holders shall conform to BHMA A 156.8.

602.6.15 Closer Holder-Release Devices: Closer Holder-Release Devices shall conform to BHMA A156.15.

602.6.16 Door Protection Plates: Door Protection Plates shall conform to BHMA A156.6.

Kick Plates shall be 2 inch less than door width for single doors; on inch less than door width for pairs of doors. Provide 10 inch kick plates for flush doors.

602.6.17 Door Stops and Silencers: Door Stops and Silencers shall meet BHMA A156.16, and be Silencers Type L03011. Provide three silencers for each single door, two for each pair.

602.6.18 Padlocks: Padlocks shall conform to ASTM F883.

602.6.19 Thresholds: Thresholds shall conform to BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out unless specified otherwise.

602.6.20 Weather Stripping Gasketing: Weather Stripping Gasketing shall meet BHMA A156.22. Provide a set to include head and jamb seals, sweep strips, and for pairs of doors, astragals. Air leakage of weather stripped doors not to exceed 1025 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E283. Provide weather stripping with on of the following.

Extruded aluminum retainers not less than 0.050 inch wall thickness with vinyl, neoprene, silicone rubber, or polyurethane inserts. Provide clear (natural anodized aluminum.

602.6.21 Spring Tension Type: Springs shall be stainless steel not less than 0.008 inch thick.

602.6.22 Rain Drips: Rain Drips shall be Extruded aluminum, not less than 0.08 inch thick, clear anodized. Set drips in sealant and fasten with stainless steel screws.

602.6.23 Door Rain Drips: Door rain drips shall be approximately 1 ½ inch high by 5/8 inch projection. Align bottom with bottom edge of door.

Overhead Rain Drips shall be approximately 1 ½ inch high by 2 ½ inch projection, with length equal to overall width of door frame. Align bottom with door frame rabbet.

602.6.24 Special Tools: Provide special tools, such as spanner and socket wrenches, required to service and adjust hardware items.

602.6.25 Fasteners: Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Provide stainless steel or nonferrous metal fasteners that are exposed to weather. Provide fasteners of type necessary to accomplish a permanent installation.

602.6.26 Finishes: Finishes shall conform to BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise. Provide items not manufactured in stainless steel in BHMA 626 finish (satin chromium plated) over brass or bronze, except BHMA 652 finish (satin chromium plated) for steel hinges. Proved hinges for exterior doors in stainless steel with BHMA 630 finish or chromium plated brass or bronze with BHMA 626 finish. Furnish exit devices in BHMA 626 finish in lieu of BHMA 630 finish. Match exposed parts of concealed closers to lock and door trim.

Install hardware in accordance with manufacturers' printed installation instructions. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

602.7 GARAGE DOOR

A rollup type garage door for the 12'-0" wide by 10'-0" high opening in the pump station shall be furnished and installed in accordance with the paragraphs below. The door is to be by Alpine of Satauket, NY, Raynor of Dixon Illinois or approved equal.

602.7.1 Curtain: To be insulated, interlocking, cold formed from commercial quality hot dipped galvanized min. 22 gauge Steel per ASTM A-653. Foam insulation to extend the full length of the slat. Steel finish to be powder coated or baked enamel with color selection by the City. End locks to be based on wind loads of 20 PSF.

602.7.2 Mounting and Guide Angles: To be min. $^{3}/_{16}$"structural steel with powder or baked enamel coating. Fasteners for wall attachment to extend into void concrete for full strength development with no dependence on block strength. Locking to be slide bolt type with padlock keyed per City Water Department and accessible only from station interior. Fasteners to be plated for corrosion resistance.

602.7.3 Hood and Attachments: To attach to concrete door header (bond beam) as required. Hood to be constructed of minimum 22-gauge galvanized steel with powder or baked enamel coating and City selected color.

602.7.4 Spring Counterbalance: To be housed in structural steel shaft of sufficient design to limit deflection to .03" per foot of door width. Springs to be of the helical torsion type packed in lubricant with end ball bearings and means of adjustment outside of shaft.

602.7.5 Bottom of Curtain: To be reinforced with galvanized structural steel (coated as curtain elements) with neoprene floor seal. Curtain to also be furnished with guide and lintel seals.

602.7.6 Door Operation: To be by 120V, 1Ph., 60 cycle motor sized so there is no infringement on the service factor. Operation to be by three button push button 'OPEN-CLOSE-STOP' in NEMA 1 enclosure, surface mounted.

602.7.7 Testing and Demonstration: Door company to demonstrate operation of the door upon completion of installation in the presence of the Contractor, the Engineer and City Water Department employees.

602.8 PAINT

All wood shall be primed with oil based paint and then painted with 2 coats of quality exterior alkyd enamel.

All steel (except galvanized) shall be primed in the shop. Field welds shall be thoroughly brushed and primed. Primed steel items to receive 2 coats of gloss enamel alkyd paint as Bar-Ox 452 by Devoe or approved equal. Many manufactured products such as electrical cabinets, air compressors and motors may not need painting if suitable in color and if approved by the

Engineer. If touch-up of these items is required, it shall be with paint furnished by the manufacturer.

Interior CMU's shall be sealed with Sherman Williams Pro Mar Block Filler or equal and painted with two coats of quality exterior latex paint.

All painting shall be done by experienced workmen to produce a professional looking finished station. The Contractor shall furnish color charts for color selection by the City.

602.9 MEASUREMENT AND PAYMENT

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

603 BRIDGE CRANE - INDEX

603.1 DESCRIPTION

603.2 SUBMITTALS

603.3 STRUCTURAL FRAME

603.4 HOIST

603.5 TROLLEY

603.6 END TRUCKS

603.7 RAIL

603.8 MEASUREMENT AND PAYMENT

603 BRIDGE CRANE

603.1 DESCRIPTION: Pump station to be equipped with a bridge crane configuration for lifting and moving station components as required for maintenance, replacement and associated operations. Bridge crane hoist to be capable of picking and moving a minimum of 2½ tons.

603.2 SUBMITTALS: Shall comply with Section 101 of the technical specifications

603.3 STRUCTURAL FRAME: Crane girders, columns, bridge and other attachments to conform to the weights, dimensions and configurations shown on the project drawings. Frame numbers to be shop coated in accordance with SSPC Alkyd Paint System No. 2.00 including commercial blast cleaning and 3 coat system, (primer, intermediate and finish) for a total dry film thickness of 4.5 mils. Finish color to be selected by the City. Welds and adjacent areas to be cleaned by grinding or wire brushing, and coated with a similar system.

603.4 HOIST: Hoist hooks to be drop forged, heat treated with spring type latch. Hooks to rotate 360°. Hoist to have a mechanical load brake that will hold a capacity load stationary at any position. The pull to lift load for 2½ ton lift not to exceed 77 pounds.

The hook to hook dimension not to exceed 20" in a fully retracted position and with the operating chain at 5½ feet above the floor. Chain length to be such as to have pick capability from the retracted position to 8.0 feet below.

Hoist to be ACCOLIFT or approved equal.

603.5 TROLLEY: Trolley to be the plain type with adjustable features to enable a fit to bridge beam specified. Trolley wheels to have lifetime lubricated ball bearings. Trolley to be rated for min. 2½ tons as ACCOLIFT or approved equal.

603.6 END TRUCKS: End trucks to be 'push' type top running suitable for operating on 40lb rail. End trucks to be ACCO/WRIGHT series 430 or equal with maximum truck load capacity of 11,000 lbs. Instruction and parts manual to be provided (5 Copies).

603.7 RAIL: Truck rails to be ASCE 40lb attached to crane girders. Truck stops to be provided.

603.8 MEASUREMENT AND PAYMENT: Measurement and payment shall be in accordance with provisions of the Special Conditions.

604 MISCELLANEOUS STATION FURNISHINGS - INDEX

604.1 DESCRIPTION

604.2 SUBMITTALS

604.3 PUMP STATION BATHROOM
- 604.3.1 VANITY
- 604.3.2 WATER HEATER
- 604.3.3 TOILET
- 604.3.4 MISCELLANEOUS ITEMS

604.4 PUMP STATION WORKSPACE
- 604.4.1 WORK BENCH

604.5 PUMP STATION OFFICE
- 604.5.1 WORK STATION

604.6 MEASUREMENT & PAYMENT

604 MISCELLANEOUS STATION FURNISHINGS

604.1 DESCRIPTION

These items are to be furnished with appurtenances required, installed and made functional in the locations called for.

604.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications.

604.3 PUMP STATION BATHROOM

604.3.1 Vanity: Vanity to be of stainless steel construction with dimensions of approximately 24"W x 18"D x 32"H. vanity to come with ceramic counter top with integral sink, single hole faucet and lavatory grid drain. Vanity to be 24" 'CROSS TOWN' with HNO faucet by Signature Hardware or approved equal.

604.3.2 Water Heater: Heater to be instantaneous type mounted near or within vanity cabinet. Heater to operate at 120V and max 20A as EEMAX Model SP2412 or approved equal.

604.3.3 Toilet: Toilet to be CIMARRON Model K-3589 by KOHLER or approved equal, featuring elongated bowl and comfort height. Unit to be 28¾" long with bowl height of 16½". Toilet to be furnished and installed with bowl, tank, tank cover, trip lever and all appurtenances required for a functional fixture. Toilet seat to be heavy duty plastic as BEMIS Model 1955CT or approved equal.

604.3.4 Miscellaneous Items: Bathroom to be furnished with the following quality constructed items:

- Toilet Paper Holder
- Stainless Steel Paper Towel Dispenser
- Wall Hung Mirror (12' x 16" minimum size)
- Trash Container (approximately 12"W x 10"D x 14"H)

604.4 PUMP STATION WORK SPACE

604.4.1 Work Bench: Work bench to be provided as shown on the project drawings. Work bench to be comprised of two (2) 60"W x 30"H units with 16" x 16" drawers and lower half shelf each. Benches to be of 12 gauge welded steel with tubular legs. Finish to be powder coated gray. Benches to be by L.K. Goodwin Co. or approved equal.

604.5 PUMP STATION OFFICE

604.5.1 Work Station: Work station table to be 72"L x 30"D x 30"-36"H (adjustable) constructed of plastic laminate. Table to include 6" x 12" drawers, swing drawer locker and 18" high riser shelf. Table to be Model 'O' by L.K. Goodwin or approved equal.

604.6 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.

701 ELECTRICAL

701.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General Special Conditions and the General Requirements, apply to the work specified in this section.

701.2 DESCRIPTION OF WORK

A. Furnish all service tools, equipment, etc., which are required for the complete installation of all Electrical Work, as indicated on the Drawings and specified herein. Electrical work indicated on the Drawings and/or specifications covering other trades shall conform to pertinent sections of these Specifications.

B. Work or equipment not indicated or specified, which is necessary for the complete and proper operation of the Electrical systems, shall be accomplished without additional cost to the Owner.

C. Furnish all labor and materials required for electrical service and control connections to all the various items of equipment requiring electric or wiring service throughout the project shown on the Contract Drawings (even if not shown on the Electrical Drawings). Coordinate with other trades for the installation of required connections and service.

701.3 ELECTRICAL DIVISION INDEX

701.0500	GENERAL ELECTRICAL PROVISIONS
701.0519	LOW VOLTAGE CONDUCTORS
701.0526	GROUNDING
701.0533	RACEWAYS, BOXES AND FITTINGS
701.0200	LOW VOLTAGE TRANSFORMERS
701.0416	PANELBOARDS
701.0716	CABINETS
701.0726	WIRING DEVICES AND PLATES
701.0800	MOTOR AND CIRCUIT DISCONNECTS
701.0813	FUSES
701.0900	MOTOR STARTERS
701.0000	LIGHTING EQUIPMENT

701.4 - MEASUREMENT & PAYMENT



701.0500 GENERAL ELECTRICAL PROVISIONS

701.0500.1 GENERAL

701.0500.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General Special Conditions and the General Requirements, apply to the work specified in this section.

701.0500.1.2 REQUIREMENTS OF REGULATORY AGENCIES AND STANDARDS

A. Regulatory Agencies: Installation, materials, equipment and workmanship shall conform to the applicable provisions of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), Occupational Safety and Health Act (OSHA) all local, state and national codes, ordinances and regulations governing the particular class of work involved and the terms and conditions of the electrical utility and other authorities having lawful jurisdiction pertaining to the work required. All modifications required by these codes, rules, regulations and authorities shall be made by the Contractor without additional charge to the Owner. The Contractor shall secure all permits and licenses required for his work and shall pay all fees in connection with such permits and licenses.

B. On completion of the various parts of the work, the installation shall be tested by the constituted authorities and approved; and, on completion of the work, the Contractor shall obtain and deliver to the Owner, final certificates of acceptance. The Contractor shall furnish copies of each certificate to the Architect/Engineer.

C. Underwriter's Laboratories (UL): All materials, appliances, equipment or devices shall conform to the applicable standards of Underwriter's Laboratories, Inc. where such standards have been established.

D. Standards: The current edition of the following specifications and standards shall form a part of these specifications:

1. National Fire Protection Association Standards
2. National Electrical Code, NFPA 70 (NEC)
3. Life Safety Code, NFPA 101
4. NFPA 72
5. Occupational Safety and Health Act (OSHA)
6. National Electrical Safety Code (NESC)
7. Underwriter's Laboratories, Inc. (Standards)
8. American National Standards Institute (ANSI)
9. American Society of Testing and Materials (ASTM)
10. Institute of Electrical and Electronic Engineers (IEEE)

11. Insulated Cable Engineer's Association (ICEA)
12. National Electrical Manufacturer's Association (NEMA)
13. Americans with disabilities Act Accessibility Guidelines (ADA)

701.0500.1.3 DRAWINGS

A. The electrical drawings show the general arrangement of all conduit, outlets, equipment, etc. and shall be followed as closely as actual building construction and the work of other trades will permit. The architectural and structural drawings shall be considered as a part of the work insofar as these drawings furnish the Contractor with information relating to the design and construction of the building. Architectural drawings shall take precedence over electrical drawings. Because of the small scale of the electrical drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, elbow, pullboxes, and accessories as may be required to meet such conditions.

B. The Contractor shall verify the dimensions governing the electrical work at the building. No extra compensation shall be claimed or allowed because of differences between actual dimensions and those indicated on the drawings.

C. Drawings and specifications shall be considered as complementary. Work or materials called for by one and not mentioned in other shall be provided as though treated by both.

D. In the case of conflict between drawings and specifications, the greater or more restrictive requirement shall apply.

E. Any question as to the intent of the drawings or specifications shall be referred to the Architect/Engineer, whose decision shall be final and conclusive.

F. Should the Contractor observe any conflict or variation in the plans and specifications, he shall notify the Architect/Engineer in writing no later than seven (7) days prior to date of bid opening. Failure to clarify such variations will result in the Contractor bearing all costs arising from electrical work necessary to resolve the conflict or variation.

701.0500.1.4 SERVICES

A. General: Requirements of the serving power and telephone utilities and availability of services have been determined as accurately as possible. The Contractor shall verify availability of services and determine actual details pertaining to the exact locations and requirements of utilities before submitting bid. No consideration for extra cost will be given resulting from failure to comply with these requirements by the Contractor. Contractor shall immediately notify

the serving utilities that he has the job, and also furnish information as to the total lighting and power loads for the job. He shall also furnish, at the same time, information as to the established completion date of the job.

B. Telephone: Contractor shall immediately notify the serving utility of the estimated date when service will be desired.

701.0500.1.5 AS-BUILT DRAWINGS

A. During progress of the work, the contractor shall maintain an accurate record of the installation of the system, locating each outlet, and note all circuiting deviations from the contract drawings. Upon completion of the installation, the contractor shall transfer all record data to a single neat and legible set of blue line prints of the original drawings.

701.0500.1.6 OPERATING INSTRUCTIONS AND MANUALS

A. Instructions: Without additional charge to the Owner, furnish competent instruction to the Owner in the care, adjustment and operation of all parts of the electrical equipment and systems.

B. Manuals: Upon completion of the work, prepare and deliver to the Owner two (2) sets of complete operating and maintenance manuals for the systems and major equipment installed, suitably bound in book form and must be originals. Include catalog data, shop drawings, wiring diagrams, performance curves and rating data, spare parts lists and manufacturer's operating and maintenance data.

C. Other: The above requirements are in addition to specific instructions and manuals specified for individual systems or equipment.

701.0500.1.7 SITE VISIT

A. The Contractor shall visit the site prior to bidding and satisfy himself as to the conditions under which the systems are to be installed. No subsequent allowance shall be made in his behalf for failure to make such a visit.

701.0500.1.8 FIELD MEASUREMENTS

A. The Contractor shall verify the dimensions covering the work. No extra compensation shall be claimed or allowed due to difference between actual dimensions and those indicated on the drawings. No waiver of responsibility for defective work shall be claimed or allowed due to failure to report unfavorable work conditions affecting the work.

701.0500.1.9 PERFORMANCE TESTS

A. Thoroughly test all fixtures, batteries, services and all circuits for proper operating condition, required durations and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances and devices shall be operated under load conditions.

B. After the interior wiring system installation is complete and at such time as the Architect/Engineer may direct, conduct operating tests for approval. When requested, test all the wire, cable, devices and equipment after installation, to assure that all material continues to possess all the original characteristics as required by governing codes and standards listed in these specifications.

C. After occupancy of the building has taken place and nominal building power loads established, make voltage readings at all panelboards. Based on these readings, make final adjustments of taps on all transformers in the building as directed.

D. Perform such other tests as required by other sections of these specifications or as requested to prove acceptability.

E. Furnish all instruments and labor for testing.

701.0500.1.10 REMODELING WORK

A. Where remodeling work is indicated, the Contractor shall be responsible for all electrical work associated with changes in, or removals of existing walls, ceilings or floors. This work shall include rerouting of conduits, relocation of fixtures, devices and conduits as well as provision for circuit continuity for circuits in remodeled areas. The cost of all of this work shall be included in the Contractor's price with no additional compensation allowed for failure to include this work.

701.0500.1.11 MISCELLANEOUS ITEMS

A. Miscellaneous items not covered in these specifications shall be as indicated on the drawings, installed and connected in the proper manner and as recommended by the manufacturer.

701.0500.1.12 GUARANTEE

A. All equipment and workmanship to be furnished under this contract shall be guaranteed for a period of one year from the date of final acceptance thereof against defective materials, design and workmanship. Upon receipt of notice from the Owner of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be replaced promptly with new parts by and at the expense of the Contractor. The labor incident to the installation of these replacements shall be furnished by the Contractor.

701.0500.1.13 STANDARDS OF MATERIAL AND WORKMANSHIP

A. All material shall be new and shall bear the label of the Underwriter's Laboratories, Inc., or be listed under re-examination service. All material shall be of the best grade and latest pattern of manufacture as specified. All work shall be performed in a neat, workmanlike manner and shall present a neat mechanical appearance when completed.

701.0500.2 - PRODUCTS

701.0500.2.1 EQUIPMENT REQUIREMENTS

G. The electrical requirements for equipment specified or indicated on the drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than indicated on the electrical drawings, the Contractor shall make all adjustments to wire and conduit size, controls, overcurrent protection and installation as required to accommodate the equipment supplied, without additional charge to the Owner. The complete responsibility and costs for such adjustments shall be assigned to the respective section of this specification under which the equipment is furnished.

701.0500.2.2 MATERIALS

A. When the product of a specific manufacturer is indicated on the drawings or specified herein by catalog number or trade name, it has been done for convenience in fixing the standard for workmanship, finish, design and the guaranteed performance. Any material, apparatus or appliance which the Contractor desires to substitute for those mentioned herein shall also conform to these standards or exceed them and shall follow the procedure as outlined under substitutions and specified herein.

H. All similar materials and equipment shall be the product of the same manufacturer.

I. Where no specific material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be used, providing it conforms to the contract requirements and meets the approval of the Architect/Engineer.

J. Materials and equipment shall be the standard products of manufacturers regularly engaged in the production of such material and shall be the manufacturer's current and standard design.

K. Altitude: Equipment affected by altitude shall perform satisfactorily for the function intended at the altitude of the project site.

701.0500.2.3 NAMEPLATES

A. All items of mechanical and electrical equipment shall be identified by the attachment of engraved nameplates, constructed from laminated phenolic plastic, at least 1/16" thick, three-ply, black surface and white core. Plates shall be attached by the use of stainless plate screws unless indicated otherwise. Nomenclature on the label shall include the name of the item and feeder circuit number. Equipment to be labeled shall include, but not be limited to, the following:

1. Air Conditioning Control
2. Contactors
3. Panels and Switches
4. Time Switches
5. Relays
6. Disconnect Switches
7. Starters
8. Transformers
9. Miscellaneous
10. Similar and/or related items

701.0500.2.4 IDENTIFICATION AND SIGNS

A. Label each individual motor controller, disconnect switch, transformer and remote control device to identify each item and its respective service.

B. Provide nameplates with engraved lettering not less than 3/8 inch high where specified or noted. In general, use white core laminated plastic, attached with screws. Embossed plastic adhesive tape is not acceptable. Flush mounted devices may have identification engraved in the device plate.

C. Provide warning signs on all equipment or devices operating at 300 volts or more, reading "DANGER - 480 VOLTS" (insert respective voltage) etc., with white letters on red background of standard code size. Signs may be decals, stencils or nameplates.

D. Identify panelboards and cabinets by nameplates with descriptions indicated on the drawings together with voltage and phase. Install on outside of hinged doors of panelboards and cabinets.

701.0500.2.5 CHANGES

A. No changes shall be made in the electrical work as shown and herein specified, unless such changes are authorized in writing by the Architect/Engineer and such authorization shall contain a statement covering the amount of the charges involved in the change.

701.0500.2.6 SUBSTITUTIONS

A. On all material, substitutions will be considered only if requested by letter from the Contractor to the Architect/Engineer. Letters must be in the engineer's office no later than 10 days prior to the bid date and shall be considered as authorized only upon written confirmation from the Architect/Engineer. Where materials are proposed to be substituted in lieu of the items specified, substitutions shall be equal in quality, workmanship and design. The burden of proof of equality of materials shall be placed upon the Contractor. Samples of all materials proposed for substitution shall be submitted to the Architect/Engineer, when requested, for examination.

701.0500.2.7 SHOP DRAWINGS

A. Shop drawings shall be furnished for all equipment and materials. They shall be furnished by the Contractor as required in the Submittal Section. Where equipment will be furnished "as specified," a statement to that effect is sufficient. Where substitutions are proposed, complete data must be furnished showing performance, quality and dimensions.

B. The Contractor shall submit to the Architect/Engineer for checking a complete descriptive and technical data list for all items of material furnished under this contract. Complete outlines, dimensions, electrical services, control diagrams, electrical characteristics of special nature or critical to the installation and pertinent data required for installation shall be shown. Fixture submittals shall include scale drawings showing metal gauges and finish together with complete photometric distribution curves and coefficient of utilization tables. Glare factor curves shall also be submitted for each fixture. Failure to submit this information can be the basis for disapproval.

C. All descriptive and technical data and shop drawings shall bear signed certification that they have been carefully examined and found to be correct with respect to dimension, space available, non-interference with other trades and that the equipment complies with all the requirements of these specifications. Submittals that have not been checked for compliance will not be considered by the Engineer.

D. Only complete submittals will be considered, partial submittals will not be reviewed.

701.0500.2.8 SUBMITTALS

A. Submittals shall be complete; bound booklets with an index of all items submitted including associated catalog/part numbers. The Contractor shall make submittals on all the following equipment (in addition to any special items indicated elsewhere in the plans or specifications):

1. Lighting Fixtures
2. Wiring devices
3. Conduit
4. Wire
5. Panelboards
6. Switchgear
7. Fuses
8. Metering equipment
9. Transformers
10. Starters
11. Contactors
12. Disconnect switches
13. Motor Control Centers
14. Lamps
15. Dimming systems
16. Special Systems equipment (Fire Alarm, Intrusion Alarm, Sound, TV, Lightning Protection, etc.).

B. Electrical System Controls: Refer to Section 101 for additional submittal requirements.

C. After receiving approval on the make and the type of materials, the Contractor shall order such materials in sufficient time to prevent any delay or changes on the job.

701.0500.3 - EXECUTION

701.0500.3.1 GENERAL

A. Fabrication, erection and installation of the complete electrical system shall be done in a first class workmanlike manner by qualified personnel experienced in such work and shall proceed in an orderly manner so as not to hold up the progress of the project. The Contractor shall check all areas and surfaces where electrical equipment material is to be installed, removed or relocated and report any unsatisfactory conditions before starting work. Commencement of work signifies the Contractor's acceptance of existing conditions. In the acceptance or rejection of the finished installation, no allowance will be made for lack of skill on the part of workmen.

701.0500.3.2 EQUIPMENT

A. Equipment and materials furnished by the Contractor shall fit the spaces allocated for them. Should the equipment which the Contractor proposes to install, require space conditions other than indicated on the drawings, it shall be the Contractor's responsibility to reconcile the available space with the equipment and make any

changes required to accommodate the equipment. All required changes shall be made at the Contractor's expense.

B. All equipment, both the Contractor and Owner furnished, shall be installed in accordance with the manufacturer's recommendations.

701.0500.3.3 COORDINATION

A. The Electrical Plans are diagrammatic, but shall be followed as closely as actual construction and the work of other trades will allow. Such minor changes as are necessary to make the electrical work conform to the work of other trades and to the building shall be made without cost to the Owner.

701.0500.3.4 CIRCUITS AND FEEDERS

A. Circuits and feeders shall be as shown and no deviations from the indicated outlet-circuit grouping will be permitted, except by permission of the Architect/Engineer. Branch circuit numbers are mandatory and shall be changed only on written permission from the Architect/Engineer. Any changes in layout or circuit numbering shall be accurately recorded on the "As-Built" drawings.

701.0500.3.5 CONDUITS

A. In all spaces such as ceiling spaces and equipment rooms, all conduits shall be run to a continuous grade and square to the building.

B. The plans do not give exact details as to the elevations of conduits, exact locations, etc., and do not show all off-sets, bends, junction boxes and other installation details. The Contractor shall carefully lay out his work at the site to conform to details of installation.

701.0500.3.6 LOCATION OF EQUIPMENT AND OUTLETS

A. The approximate locations of cabinets, panelboards, wiring gutters, switches, light outlets, power outlets, etc., are indicated on the drawings; however, they are not intended to give complete and exact information. Determine the exact location after thoroughly examining the general building plans and by actual measurements during construction, subject to the approval of the Architect/Engineer.

B. Verify with Architect/Engineer, prior to installation, all locations of conduit, boxes, etc. stubbed or in the floor.

701.0500.3.7 PROTECTION OF MATERIALS AND EQUIPMENT

A. The Contractor shall be responsible for the protection of all materials and equipment under this section of the work whether incorporated into the building or not.

B. The Contractor shall provide protection for all work where necessary and will be responsible for all damage done to property during the construction. The above protection shall be maintained while the work is in progress. In no case shall dirt, grit, etc., be ground into the floor finish or coverings.

C. The Contractor shall provide space for storage of materials and equipment at ground level.

701.0500.3.8 CUTTING AND REPAIRING

A. Cutting and repairing shall be the responsibility of the Contractor. Coordinate to prevent unnecessary cutting and repairing. Lay out and locate equipment, openings and chases. Install sleeves, inserts and supports.

701.0500.3.9 EXCAVATION AND BACKFILLING

A. The Contractor shall do all necessary excavation and backfill for the installation of the systems as may be required. Curb cuts, asphalt and concrete patching, etc., shall be part of the Contractor's responsibility. Any required trenching will be done by hand and all existing utilities avoided. Damage done to existing utilities will be repaired by the Contractor with no additional payment for the work. In addition to the above, trenches shall be backfilled with dirt, free from debris, rocks and other foreign matter. Backfill shall be replaced in the trenches in 6" layers and each 6" layer shall be processed and properly tamped. Remove surplus dirt and leave premises clean. Perform excavation, backfilling and repaving required for work under this Division in accordance with Section 203, Trenching & Excavation. In general, backfill and tamp with compaction at least equal to that of the surrounding area.

701.0500.3.10 WARRANTY

A. Deliver originals of all guarantees and warranties on this portion of the work to Owner. Warrant all equipment, materials and workmanship for one year in accordance with the terms of this Contract.

701.0500.3.11 PRODUCT HANDLING

A. Use all means necessary to protect electrical materials and equipment before, during and after installation and to protect the installed work of other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner and at no extra cost to him.

701.0519 LOW VOLTAGE CONDUCTORS

701.0519.1 - GENERAL

701.0519.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0519.1.2 DESCRIPTION OF WORK

A. Furnish and install all conductors as required for the complete installation and operation of all electrically serviced and/or operated equipment, devices and systems throughout the project.

701.0519.1.3 RELATED WORK IN OTHER SECTIONS

A. Conduit, feeders, wiring devices and plates, equipment connections, panelboards, transformers, lighting equipment and lamps.

701.0519.2 - PRODUCTS

701.0519.2.1 WIRES AND CABLES (600 VOLTS)

L. Type: Conform to the applicable UL and ICEA Standards for the use intended. Copper conductors with 600 volt insulation unless otherwise specified or noted on the drawings. Stranded conductors for No. 6 and larger except where elsewhere specified or noted on the drawings.

M. Use of aluminum conductors will not be permitted.

N. Insulation: Type THWN, 75 degree C. insulation unless otherwise specified or noted on the drawings. 90 degrees C. minimum insulation within fixture wireways of fluorescent fixtures. Where 90 degree C. insulation is specified, the termination points for this conductor shall be rated for 90 degree C.

O. Size: No. 12 minimum unless otherwise specified or noted on the drawings. In the case of "homeruns", no conductor smaller than #10 shall be used for runs over 100 feet in length on 120 volt circuits. Not less than NEC requirements for the system to be installed. If the equipment to be installed requires larger conductor and conduit sizes than indicated on the drawings, the required changes shall be made without additional charge. Remote control wires, other than Class 2 remote control and signal circuits, shall be no smaller than #14.

P. Color Coding: Phase, neutral and equipment ground conductors color-coded. Connect all conductors of the same color to the same phase conductor. Color coding shall be A-black, B-red, C-blue, N-white, for 250 volts or less. A-yellow,

B-orange, C-brown, N-off white or grey, for 251-600 volts, with green for all equipment ground conductors. Conductors No. 12 and 10 shall be solid color compounded for the entire length. Conductor sizes larger than No. 10 may be color coded at each termination and in each box or enclosure with six inches of half-lapped 3/4 inch pressure sensitive, plastic tape of respective colors in lieu of solid color compound. The equipment grounding conductor shall be bonded to the outlet box grounding screw with taps to receptacles and equipment. Isolated ground conductors shall be green in color with a yellow trace.

701.0519.2.2 CONTROL CONDUCTORS

A. Copper, minimum size No. 14 with 19/35 stranding, color coded filled cross linked polyethylene 75 degree C. 600 volt insulation and neoprene or equal outer jacket. Multi conductor control cables shall be provided where more than three control conductors are installed in the same conduit between common terminations. Provide two spare conductors minimum in each control cable.

701.0519.2.3 DATA/COMMUNICATION AND ELECTRONIC CABLE

A. As required or specified in the section of these specifications specifying the equipment. Splices shall be twisted and soldered or shall use an approved connector.

B. All Cat. 3 and Cat 5 cabling shall be tested in accordance with EIA/TIA performance standards. Refer to 16740 for more detailed information.

701.0519.2.4 VERTICAL CABLE SUPPORTS

A. Split wedge type supports which clamp each individual conductor and tightens due to weight of the cable shall be used for cables without metallic sheath. Basket weave type supports shall be used for cables with metallic sheath.

701.0519.2.5 CONNECTORS AND LUGS

A. For Copper Conductors No. 6 and Smaller: 3M Scotch-Lok or T & B Sta-Kon compression or indent type connectors with integral or separate insulating caps.

B. For Copper Conductors Larger Than No. 6: Solderless, indent, hex screw or bolt type pressure connectors, properly taped or insulated.

701.0519.2.6 TAPE

A. Plastic tape, 8.5 mils minimum thickness, 1,000,000 megohms minimum insulation resistance, oil resistant vinyl backing, oil resistant acrylic adhesive, incapable of supporting combustion per ASTM D-568 Test Method B.

701.0519.3 - EXECUTION

701.0519.3.1 CONDUIT SYSTEMS

A. A complete system of conductors shall be installed in the raceway systems. Control wires shall be run in separate conduits from conductors of other systems. All conductors of all systems shall be installed in raceway or conduit.

B. Lighting fixtures shall not be used as raceways for circuits other than parallel wiring of fixtures. Wiring in fixtures shall be rated for that purpose.

C. When leaving a metal raceway or conduit in a cabinet, box, switch, enclosure, control enclosure or any other like member, conductors shall be protected by means of insulated bushings or end fittings. These protectors shall be "O.Z." type or similar.

D. Conductors may be run in multiple sizes #1/0 to 500 kcmil inclusive provided all multiple conductors are the same size, length and type of insulation. Multiple runs are to be in separate conduits. Each conduit to include one set of phase conductors, neutral and grounding conductors. All to conform to NEC 300-20.

E. No splices or taps shall be made in any conductors except in outlet boxes, pull boxes, junction boxes, panelboard boxes, manholes or splice boxes. All taps and splices shall be made with solderless connectors and insulated in such a manner that provides an effective insulation equal to that of the adjoining wire. Any splice or tap shall be made only on conductors which are a component part of a single circuit properly protected by approved methods.

Q. Before any wire is pulled into any conduit, the conduit shall be thoroughly swabbed in such a manner as to remove all foreign material and to permit the wire itself to be pulled in a clean, dry conduit. The Contractor shall use only approved wire pulling lubricants for pulling any wire. All conductors shall be pulled into their respective conduits by hand, except where written permission of the Engineer is secured to the contrary.

701.0519.3.2 WIRE AND CABLE TESTS (600 Volts)

A. Measure the insulating resistance of service entrance conductors, feeder circuit conductors and service ground. Measurements shall be taken between conductors and between conductors and ground. Resistance shall be 1,000,000 ohms or more when tested at 500 volts by megger without branch circuit loads. Tests and procedures shall meet the approval of the Architect/Engineer and shall be in accordance with the applicable IPCEA standards for the wires and cables to be installed. Furnish all instruments, equipment and personnel required for testing and conduct tests in the presence of the Architect/Engineer. Submit written reports of the tests and results when requested.

701.0519.3.3 PULL WIRES

A. In each empty conduit, except underground conduits, install a No.14 galvanized steel pull wire or a plastic line having a tensile strength of not less than 200 pounds. In each empty underground conduit, install a No. 10 AWG bare, hard drawn copper or copper clad pull wire or a plastic line having a tensile strength of no less than 200 pounds.

701.0519.3.4 IN RACEWAYS

A. Install conductors in rigid conduit, EMT or flexible metallic conduit, unless otherwise specified or noted on the drawings.

701.0519.3.5 CABLE BENDS

A. Radius of bends not less than 10 times the outer diameter of the cable.

701.0519.3.6 BUNDLING

A. In cabinets conductors No. 10 and smaller shall be neatly and securely bundled and conductors larger than No. 10 shall be neatly and securely cabled in individual circuits, utilizing marlin twine, two ply lacing or nylon straps.

701.0519.3.7 CONDUCTOR PULL

A. Conductors shall not be pulled into conduits until after all plastering or concrete work is completed and all conduits in which moisture has collected have been swabbed out.

701.0519.3.8 FEEDER IDENTIFICATION

A. Tag feeder circuits in each enclosure with wrap around circuit designation labels where more than one feeder passes through or terminates in the enclosure.

701.0519.3.9 CONNECTORS AND LUGS

A. Install with manufacturer's recommended tools and with the type and quantity of deformations recommended by manufacturer.

B. Contractor shall review one-line and other Drawings to assure that proper lugs are provided in termination equipment such as switches, panels, switchboards, mechanical equipment, etc. Due to voltage drop conductor sizes and/or numbers may not be accommodated by the equipment affected. If manufacturer cannot provide the proper number and size of lugs within their equipment the Contractor shall provide enclosures and properly sized terminals to convert the oversized cable, number and size that is compatible to the equipment affected.

701.0526 GROUNDING

701.0526.1 - GENERAL

701.0526.1.2 RELATED WORK IN OTHER SECTIONS

701.0500	General Provisions
701.0533	Raceways, Boxes and Fittings
701.0519	Low Voltage Conductors
701.0716	Cabinets
701.0726	Wiring Devices and Plates
701.0416	Panelboards
701.0800	Motor and Circuit Disconnects.

701.0526.2 - PRODUCTS

701.0526.2.1 MATERIALS

A. Materials, equipment and devices related to the grounding system are specified under other sections of these specifications.

701.0526.3 - EXECUTION

701.0526.3.1 GENERAL

A. Install two separate grounding systems, a service grounding system and an equipment grounding system. The service equipment, conduit systems, supports, cabinets, equipment, and neutral conductor shall be grounded in accordance with the minimum code requirements and as further indicated on the drawings or specified. Connect the two grounding systems together only at the main service equipment and at the secondary terminals of transformers creating separately derived distribution systems such as dry-type transformers.

701.0526.3.2 SERVICE GROUNDING SYSTEM

A. General: The service grounding system is provided for the AC service neutral ground. Current return conductors, such as neutrals of the service entrance, feeder circuits and branch circuits, shall not be used for equipment grounding. Care must be exercised to insure that neutral bars are not bonded to the enclosures of panelboards, etc., which are not part of the main service equipment. Except for separately derived systems, the neutral conductors shall be grounded only in the main service equipment.

B. Common Ground Point: Establish one common ground point in the main service equipment by interconnecting the insulated neutral bus (or bar), the uninsulated equipment ground bus (or bar), and service grounding electrode conductor.

C. Neutral Disconnecting Means: Install a neutral disconnecting means in the main service equipment for disconnecting and isolating the neutral bus from the common ground. The disconnecting means may be disconnecting links in the interconnection between the insulated neutral and uninsulated equipment ground.

D. Neutral Bars: Provide an insulated neutral bar, separate from the uninsulated equipment ground bar, in all panelboards, transformers, starters, disconnect switches, cabinets, etc. which have neutral connections.

701.0526.3.3 EQUIPMENT GROUNDING SYSTEM

A. General: Provide a complete equipment grounding system in accordance with the minimum code requirements and as further indicated on the drawings or specified. The equipment ground (green conductor) consists of metallic connections to ground of non-current carrying metal parts of the wiring system or apparatus connected to the system. The primary purpose of equipment grounding is to provide greater safety by limiting the electrical potential between non-current carrying parts of the system and to provide a low impedance path to ground for possible ground fault currents.

B. Common Ground Point: Establish one common ground point as specified elsewhere in this section of the specifications for interconnection of the equipment grounding system and the service grounding electrode conductor.

C. Service Equipment Enclosure: Bond the enclosure of the main service equipment to the uninsulated equipment ground bus (or bar) with a conductor or bar sized for 25% of the largest service overcurrent device.

D. Ground Bar: Provide an uninsulated equipment ground bar, separate from any insulated neutral bar, in all switchboards, panelboards, transformers, motor control centers, starters, disconnect switches, cabinets, etc. for grounding the enclosure and for connecting other equipment ground conductors. The ground bar shall be an integrally mounted and braced bus bar in switchboards or a separately mounted bar adequately braced or bolted to the enclosure of other types of equipment. The ground bar shall be adequately braced or bolted to the enclosure after thoroughly cleaning both surfaces to assure good contact. Provide solderless pressure connectors for all conductor terminations. Number and size of pressure connectors on equipment grounding bars as required for the termination of equipment grounding conductors. In addition to the active circuits, provide pressure connectors for all three-phase spares and spaces.

E. Conduits: Where metallic conduits terminate without mechanical connection to a metallic housing of electrical equipment by means of lock nut and bushings, provide ground bushing connected with a bare copper conductor to the ground bar in the electrical equipment. Metallic conduits containing ground wiring only shall be bonded to the ground wire at both conduit entrance and exit. Install grounding

conductor in each nonmetallic conduit or duct except those used for telephone, sound, or low-voltage signals and in all flexible conduit that does not have a built-in ground conductor. Bond the conductor at both ends to the equipment grounding system.

F. Feeders and Branch Circuits: Provide a separate green insulated equipment grounding conductor for each single or three-phase feeder and each branch circuit with a three-phase protective device. Provide a separate green insulated equipment grounding conductor for single phase branch circuits unless otherwise indicated. Install the required grounding conductor in the common conduit or raceway with the related phase and/or neutral conductors and connect to the box or cabinet grounding terminal. Where there are parallel feeders installed in more than one raceway each raceway shall have a green insulated equipment ground conductor.

G. Devices: Install a minimum No. 12 green insulated equipment bonding conductor from a grounding terminal in the respective outlet or junction box to the green ground terminal of all receptacles and through flexible conduit to all light fixture housings.

H. Motors: Install a separate green insulated equipment grounding conductor from the equipment ground bar in the motor control center of separate starter through the conduit and flexible conduit to the ground terminal in the connection box mounted on the motor. Install the grounding conductor in the common conduit or raceway with the related motor circuit conductors.

701.0526.3.4 SEPARATELY DERIVED SYSTEMS

A. Transformers creating separately derived distribution systems, such as dry-type transformers, shall utilize the equipment ground bars in the transformer enclosure for both secondary equipment ground and secondary neutral ground with separate grounding conductor extended to an approved ground electrode.

701.0526.3.5 GROUNDING ELECTRODE SYSTEM

A. A minimum of two service ground electrodes shall be utilized. One shall be a made electrode consisting of not less than twenty feet of bare copper conductor encased along the bottom of a concrete foundation footing which is in direct contact with the earth (NEC 250-81c). The other grounding electrode (building steel, ground counterpoise, cold water metallic piping, etc.) shall be bonded to the grounding electrode system where utilized. The grounding electrode for separately derived systems shall be approved for the application.

701.0526.3.6 GROUNDING CONDUCTORS

A. The grounding electrode conductors for the service grounding electrode system shall be insulated or bare copper, sized in accordance with NEC 250-94 (a), including the conductor for the supplemental electrodes. The conductors shall be continuous without joint or splice and shall be installed in conduit with the conduit bonded to the conductor at each end. Install the conductor to permit the shortest and most direct path and terminate in the main service equipment on the common ground point. Equipment grounding conductors shall be green insulated conductors equivalent to the insulation on the associated phase conductor, but not less than Type TW. The equipment grounding conductor or straps shall be sized in accordance with NEC. Where one feeder serves a series of panelboards or transformers, the equipment grounding conductor shall be continuous without splices. Grounding conductors shall not be installed through metal-sheathed holes. All connections shall be available for inspection and maintenance.

701.0526.3.7 GROUND CONNECTIONS

A. Clean surfaces thoroughly before applying ground lugs or clamps. If surface is coated the coating must be removed down to the bare metal. After the coating has been removed apply a non-corrosive approved compound to cleaned surface and install lugs or clamps. Where galvanizing is removed from metal it shall be painted or touched up with "Galvanox", or equal.

B. All grounding connections to bare stranded wire, ground rods, etc. shall be BURNDY HY-GROUND™ or approved equivalent or approved exothermic connection method. All connectors shall meet the requirements of IEEE STD 837 (Latest Revision), "IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding". All connectors must be listed by Underwriters Laboratories for direct burial in earth or embedment in concrete applications according to ANSI/UL-467 (latest revision), "Standard for Grounding and Bonding Equipment." Connectors must be suitable for lightning protection applications. Listing to UL-96 "Lightning Protection Components" preferred on applicable items.

701.0526.3.8 TESTS

A. Test the completed grounding system with a megger at the service ground bar and submit a written report to the Architect/Engineer for approval. The service shall not be energized if the test shows more than 5 ohms, unless approved by the Architect/Engineer.

701.0533 RACEWAYS, BOXES AND FITTINGS

701.0533.1 - GENERAL

701.0533.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0533.1.2 DESCRIPTION OF WORK

A. Furnish and install complete conduit systems for the various electrical systems required for this project. Systems shall be complete with supports, mounting devices, pull boxes, etc., as required for installation of wiring systems and terminal devices.

701.0533.1.3 RELATED WORK IN OTHER SECTIONS

A. Site work, wiring devices and plates, feeders, panelboards, lighting equipment and lamps, telephone system, transformers and services.

701.0533.2 - PRODUCTS

701.0533.2.1 CONDUITS

R. Steel Conduit: Rigid, threaded, thick wall, hot dipped galvanized.

S. Electrical Metallic Tubing (EMT): Mild steel, zinc coated on the outside and either zinc coated or coated with an approved corrosion resistant coating on the inside. Maximum size 2 inch electrical trade size unless noted on the drawings or specifically approved.

T. Intermediate Metal Conduit (IMC): Rigid, threaded, lightweight steel, zinc-coated on the outside and either zinc-coated or coated with an approved corrosion resistant coating on the inside.

U. Flexible Conduit: Commercial "Greenfield," galvanized steel, with a separate grounding bond wire installed in the conduit in addition to other wires.

V. Liquid Tight Flexible Conduit: Flexible galvanized steel tubing with extruded liquid tight PVC outer jacket and a continuous copper bonding conductor wound spirally between the convolutions. Where a separate grounding conductor is installed in the conduit, bonding conductor in the convolutions may be omitted.

W. Plastic coated rigid steel conduit shall be hot dipped galvanized steel conduit with a coating of polyvinyl chloride, minimum 15 mills (0.015), on the exterior

surfaces, shall have an approved corrosion resistant coat inside. To be Pittsburgh, J & L, Republic or approved equal.

X. Rigid Non-Metallic Conduit: Schedule 40, high impact PVC with 7,000 psi tensile strength at 73.4 degree F., 11,000 psi flexural strength, 8,600 psi compression strength, approved for 90 degree C. conductors. Carlon or approved equal. PVC conduits shall include a ground wire sized as noted or as required by NEC (whichever is larger). No bends shall be made in PVC. Rigid galvanized steel conduit shall be utilized for all elbows, risers and bends.

Y. Aluminum Conduit: Shall not be used unless specifically indicated on the drawings for specialized purposes.

Z. Conduit Size: Minimum conduit size, 1/2 inch except where specifically approved for equipment connections. Sizes not noted on drawings shall be as required by the NEC. All homeruns to panels shall be 3/4 inch minimum. Conduits for #12 THWN wire shall be sized the same as for #12 THW wire.

701.0533.2.2 CONDUIT FITTINGS

A. Connectors and Couplings: Compression type threadless fittings for rigid steel conduit or IMC not permitted. EMT couplings and connectors either steel or malleable iron only, "Concrete Tight" or "Raintight" and either the gland and ring compression type or the stainless steel multiple point locking type. Connectors to have insulated throats. EMT fittings using set screws or indentations as a means of attachment are not permitted.

B. All conduits shall terminate in bushings or connectors which are insulated type, designed to prevent abrasion of wires without impairing the continuity of the conduit grounding system.

C. Rigid Steel Conduit, IMC and EMT Fittings: Iron or steel only.

D. Liquid Tight Flexible Conduit Fittings: With threaded grounding cone, a steel, nylon or equal plastic compression ring and a gland for tightening. Either steel or malleable iron only with insulated throats and male thread and locknut or male bushing with or without "O" ring seat. Each connector shall provide a low resistance ground connection between the flexible conduit and the outlet box, conduit or other equipment to which it is connected.

E. Rigid Aluminum Conduit Fittings: Malleable iron, steel or aluminum alloy. Ferrous fittings zinc coated or cadmium plated. Aluminum alloy fittings shall conform with the characteristics defined by UL for aluminum rigid metallic conduit and shall not contain more than 0.04 percent copper.

F. Flexible Conduit Fittings (Commercial Greenfield): Either steel or malleable iron only, with insulated throats and shall be one of the following types:

1. Wedge and screw type with angular wedge fitting between the convolutions of the conduit.
2. Squeeze or clamp type with bearing surface contoured to wrap around the conduit and clamped by one or more screws.
3. Steel, multiple point type, for threading into internal wall of the conduit convolutions.

G. Expansion Fittings: Each conduit that is buried in or rigidly secured to the building construction on opposite sides of a building expansion joint and each long run of exposed conduit that may be subject to excessive stresses shall be provided with an expansion fitting. Expansion fittings shall be hot dipped galvanized malleable iron with factory installed packing and a grounding ring.

H. Sealing Fittings: Threaded, zinc or cadmium plated, cast or malleable iron type for steel conduits and threaded cast aluminum type for aluminum conduits. Fittings used to prevent passage of water vapor shall be of the continuous drain type.

I. Fittings for PVC Coated Rigid Steel Conduit: Ells and couplings used with PVC coated rigid steel conduit shall have a factory applied coating of polyvinyl chloride, minimum 15 mills (0.015) on exterior surfaces and shall have a PVC sleeve extruded a minimum of 2" from one end of the fitting.

701.0533.2.3 WIREWAYS

A. Square-D Company Square-Duct "lay-in" type without knockouts with lengths and fittings hinged to provide an unobstructed wireway to "lay-in" conductors. Use standard lengths. Field cuts permitted where absolutely necessary. Rust inhibiting phosphatizing coating on sheet metal parts. Blue gray baked enamel finish. Hardware plated to prevent corrosion. Provide all accessories, including tee fittings, junction boxes, cross fittings, transposition section, gusset brackets, nipples, pull boxes, reducer fittings, wall flanges, panel or cabinet flanges, elbows, ceiling and wall support brackets and supporting hardware, etc.

701.0533.2.4 BUSSED GUTTER

A. Bussed gutter shall be amperage, voltage, and phase configuration as noted on the drawings, with a 50% ground bus. Provide lugs on bus bars as indicated on the drawings. All bus bars shall be copper. Use of aluminum bus bars will not be permitted.

701.0533.2.5 OUTLET BOXES

A. Construction: Zinc coated or cadmium plated steel boxes of a class to satisfy the condition at each outlet except where unilet or condulet bodies are required. Knockout type with knockouts removed only where necessary to accommodate

the conduit entering. Square cornered, straight sided gang boxes, 4 inch octagon concrete rings and 4 inch octagon hung ceiling boxes with bars may be folded type. One piece deep drawn type for all other boxes.

B. Size: To accommodate the required number and sizes of conduits, wires and splices in accordance with NEC requirements, but not smaller than size shown or specified. Standard concrete type boxes not to exceed 6 inches deep except where necessary to permit entrance of conduits into side of boxes without interference with reinforcing bars. Special purpose boxes shall be sized for the device or application indicated.

C. Fixture Studs: 3/8 inch malleable iron fixture stud in outlet boxes for ceiling lighting fixtures and interior bracket lighting fixtures, other than lamp receptacles and drop cords.

D. Exposed: Screw joint type, with gasketed weatherproof covers in locations exposed to the weather. Shall be of the continuous drain type. Where required to be "Raintite."

E. Tile Boxes: Rectangular in shape with square corners and straight sides for receptacles and switches mounted in furniture cabinets or in glazed tile, concrete block, marble, brick, stone or wood walls. Install without plaster rings.

F. Wall Mounted Switch, Receptacle and Signal Boxes: Unless otherwise noted or specified, not less than 4 inches square by 1-1/2 inches deep for single devices, 4-11/16 inches by 1-1/2 inches deep for two devices and multi gang boxes for more than two devices. Boxes for switches and receptacles on unfinished walls may be screw joint type with covers to fit the devices. Provide plaster rings, as required, to provide proper opening for device.

G. Wall Mounted Telephone Outlet Boxes: 4-11/16 inches square by 2-1/8 inches deep, unless otherwise noted on the drawings.

H. Light Fixture Boxes: 4 inch diameter by 1.5 inch deep minimum for ceiling and interior bracket fixtures with concealed conduits. Plaster covers for bracket fixtures to have 3 inch diameter openings. Screw joint boxes with canopy seat for ceiling and interior bracket fixtures with exposed conduits.

I. Grounding Terminal: Provide a grounding terminal in each box with circuits serving motor driven equipment or receptacles for grounding to a green equipment ground conductor. Grounding terminal shall be green colored washer-in-head machine screw.

701.0533.2.6 PULLBOXES

A. Minimum NEC requirements unless larger box is noted. As specified for outlet boxes with blank cover for pullboxes with internal volume not more than 150

cubic inches. As specified for cabinets for pullboxes with internal volume over 150 cubic inches, except covers to have same thickness as box with corrosion resistant screw or bolt attachment.

701.0533.2.7 FLOOR BOXES

A. Heavy duty, cast, adjustable type, suitable for the device or application indicated, unless noted. Provide carpet flanges in carpet areas.

701.0533.3 - EXECUTION

701.0533.3.1 CONDUIT INSTALLATION

A. Conduit Systems: Conduit shall be provided for all wiring circuits. Material shall be exposed or concealed as required by the Drawings. Rigid Steel conduit, IMC, EMT or Rigid Non-Metallic conduit unless noted. Install rigid steel conduits for underground runs, when specifically noted on the drawings, runs in concrete, feeder circuits and where required by the NEC for mechanical protection, etc. Use flexible conduit only for equipment connections and then only to the extent of minimum lengths required for connections (Typically 1'-0", maximum length 4'-0"). Install flexible conduit connections at all resilient mounted equipment. Provide liquid tight flexible conduit in exterior, wet or damp locations and for connections to all motors, dry type transformers and wet pipe mechanical systems. Aluminum conduit may be used only if specifically called for. Conduit and tubing shall be kept at least 6 inches from parallel runs of hot water or steam pipes. PVC conduit may be used only for runs below grade or in slab. Concrete encasement is required under all paved areas. Rigid steel, galvanized elbows shall be used for all bends and risers. No PVC shall be extended above grade or slab. Ground wires, sized in accordance with NEC, shall be installed in all conduit runs, except where used for telephone conductors.

B. Conduit Installation: Install concealed conduit and EMT in as direct lines as possible. Install exposed conduits and EMT parallel to or at right angles to the lines of the building. Right angle bends in exposed conduit and EMT runs shall be made with standard elbows, screw jointed conduit fittings or conduit bent to radii no less than those of standard elbows. Exposed conduits below the five (5) foot level shall be galvanized rigid conduit.

C. Concealed Conduits: Install conduit systems concealed where possible unless otherwise noted. Conduit systems may be exposed in unfinished utility areas, ceiling cavities and where specifically approved by the Engineer. No conduit shall be run on roof or exposed face of building unless specifically shown on plans or approved by Engineer.

D. Conduit in Concrete: Conduits shall not be installed in floor slabs poured on grade. Conduits under slab shall be installed a minimum 6" below slab, covered

with earth. PVC coated rigid steel conduit may be embedded in above grade concrete providing the outside diameter does not exceed 1/3 thickness of concrete slab, wall or beam, is located entirely within the center third of the member and lateral spacing of conduit is not less than 3 diameters.

E. Conduit in Ground: PVC schedule 40 non-metallic conduit may be utilized for all underground runs unless noted otherwise on the drawings. Installation and use of PVC shall comply with Article 347 of NEC. All conduit sizes, shown on the plans, shall be increased to accommodate the installation of the equipment grounding conductor. All joints shall be made with solvent cement per manufacturer's recommendations and shall be watertight. Plastic conduit runs stubbing up to above grade junction boxes or conduit runs shall be converted to PVC plastoid coated rigid steel conduit by installing a female adapter, 90 degree PVC coated rigid steel elbow and a PVC coated rigid steel nipple of length as required to stub conduit up. No plastic conduit shall be installed above grade. Plastic conduit shall be used for straight runs only. PVC coated rigid steel conduit shall be used for all bends, ells and offsets. Where rigid galvanized steel conduit is in contact with dirt, soil, fill or earth, conduits shall be field wrapped with one layer of 3M Scotch 50 plastic tape with a 50% overlap, including all joints or couplings, or shall be coated with a bonded, 20 mil minimum thickness PVC, permanently fused at the factory, Pittsburgh Standard Co. "PlastiBond," or approved equal. All fittings, couplings, ells, etc., used with PVC coated conduit shall have same factory applied PVC coating. An equipment grounding conductor, in accordance with NEC, shall be installed in all conduits. Minimum burial depth of conduits or ducts shall be as follows:

Power: Primary (above 600v.), 42"
Secondary (below 600v.), 36"
Telephone: 24"

F. Conduit Bends: In any conduit or EMT run, the number of quarter bends or equivalent between termination's at cabinets or boxes shall not exceed four bends. Conduit runs between cabinets or boxes shall not exceed 200 feet for straight runs nor 100 feet for runs with maximum number of bends. Bends in telephone and data conduits shall be long sweeping bends.

G. Conduit Openings: Protect all vertical runs of conduits or EMT terminating in the bottoms of boxes or cabinets, etc., from the entrance of foreign material prior to installation of conductors.

H. Roof Penetrations: All roof penetrations shall be sealed as called for in the architectural plans and specifications.

I. Pull Cords: The Contractor shall furnish and install a full length, 3/32" nylon pull cord in every "empty" conduit installed hereunder to facilitate the future

installation of wires. Identify each terminus of pull wire with linen tags with complete information as to service and location of the terminus of the cord.

J. Sealing Fittings: Install where required by the NEC, where conduits pass from warm to cold locations and where otherwise indicated.

K. Sleeves for Conduit: Install sleeves for conduit where shown or as required. Conduit sleeves not used shall be plugged with recessed type plugs. Sleeve all conduit passing through walls. Sleeves that are used shall be caulked tight with lead yarn.

L. Identification: Identify all exposed raceways according to the system carried. Identify exposed conduits 3/4 inch or larger in diameter by means of painted-on stencils, and conduits less than 3/4 inch in diameter with enameled-on metal tags. Provide legible lettering in contrasting colors. Abbreviate only when approved. Identification shall be placed at maximum intervals of twenty feet on straight conduit runs, close to all terminations, adjacent to all change in directions and where conduits pass through walls or floors. In general, use yellow color.

701.0533.3.2 CONDUIT SUPPORTS

A. Supports: Provide supports for horizontal conduits and EMT not more than 8 feet apart with not less than two supports for each 10 foot straight length and one support near each elbow or bend including runs above suspended ceilings and within 3 feet of all junction boxes, switches, fittings, etc.

B. Straps: Install one hole pipe straps on conduits 1.5 inch or smaller. Install individual pipe hangers for conduits larger than 1.5 inch. Spring steel fasteners with hanger rods may be used in dry locations in lieu of pipe straps.

C. Trapezes: Install multiple (trapeze) pipe hangers where two or more horizontal conduits or EMT run parallel and at the same elevation. Secure each conduit or EMT to the horizontal hanger member by a U-bolt, one hole strap or other specially designed and approved fastener.

D. Hanger Rods: Install 1/4 inch diameter or larger galvanized steel rods for trapezes, spring steel fasteners, clips and clamps. Wire or perforated strapping shall not be used for the support of any conduit or EMT.

E. Fastening: Fasten pipe straps and hanger rods to concrete by means of inserts or expansion bolts to brickwork by means of expansion bolts and to hollow masonry by means of toggle bolts. Wooden plugs and shield shall not be used. Power driven fasteners may be used to attach pipe straps and hanger rods to concrete only where approved by the Engineer.

F. All conduits not embedded in concrete shall be firmly secured by means of pipe clamps, hangers, etc., equal to Caddy fasteners of ERICO Products, Inc. Wire wrapped around conduits and supporting members will not be accepted.

G. On Roof: All conduits laid on roof shall be supported on 4" redwood blocks, mopped into roof and spaced at 5'-0" on center.

H. Lay-in Ceiling: Conduits routed above acoustical "lay-in" ceilings shall be anchored to the building structure and not laid on the ceiling. Wire shall not be used to anchor boxes to structure. If ceiling support system is adequate, one 3/4" maximum conduit may be supported by a Caddy Clip to hanger wire. Multiple runs of conduit shall be racked on trapeze hanger. All support materials shall be rustproof. Perforated tape or soft iron wire shall not be used.

701.0533.3.3 CONDUIT STUB-UPS

A. Conduits run under floor shall be stubbed up to a coupling set flush with floor. This excludes conduits stubbed up in walls and feeder conduits. Install flush plug until after floor is finished, then complete connections to boxes or equipment.

701.0533.3.4 OUTLET BOXES

A. Outlet Boxes: Outlet boxes, covers and fittings, according to the particular use for which they are required, shall be provided in the locations marked on the drawings by symbols, and/or for use to facilitate the installation of the electrical systems. When necessary, outlets shall be relocated so that when fixtures of other fittings are installed they will be symmetrically located according to the room layout and will not interfere with other work or equipment required by the drawings and/or specifications.

B. Installation: Unless otherwise specified or shown on the drawings, outlet boxes shall be flush mounted and the front edges of the boxes or plaster covers shall be flush with the finished wall or ceiling line or if installed in walls and ceilings of incombustible construction, not more than 1/4 inch back of same. Mount boxes with the long axes of devices vertical, unless otherwise specified. Boxes in plastered walls and ceilings shall be provided with plastic covers. A multiple of box extensions and/or covers will not be permitted. Install in a rigid and satisfactory manner with suitable metal bar hangers, box cleats, adjustable box hangers, etc. Use wood screws on wood, expansion shields on masonry and machine screws on steel work.

C. Mounting Heights: The mounting height of a wall mounted outlet box shall be construed to mean the height from the finished floor to the horizontal center line of the cover plate. On exposed tile, block or brick construction, mount outlet boxes at the nearest bed joint to the mounting height indicated. Wall Mounted Switch, Receptacle and Signal Outlets: On columns, pilasters, etc., mount so the

centers of the columns are clear for future installation of partitions. Install outlet boxes near doors or windows close to trim. Install outlet boxes near the doors on the lock sides (see architectural drawings for correct door swings).

D. Identification: Identify all exposed junction boxes according to the system carried by means of painted-on stencils or labels with legible letters and contrasting colors and without abbreviations. In general, use yellow color.

701.0533.3.5 PULLBOXES

A. Provide additional pullboxes wherever necessary to meet requirements for maximum length of conduit runs and maximum numbers of bends.

701.0533.3.6. FLOOR BOXES

A. Install level with top covers adjusted flush with finished floor or floor tile.

701.0533.3.7 FIXTURE CONNECTIONS

A. Recessed or surface light fixtures in lay-in or accessible ceilings shall be connected with minimum 1/2 inch flexible metallic conduit, 4 to 6 feet long with grounding provisions.

701.0533.3.8 CLOSING OF OPENINGS

A. Wherever slots, sleeves or other openings are provided in floors or walls for the passage of conduits or other forms of raceway, such openings, if unused, or the spaces left in such openings, shall be filled or closed in an approved manner.

701.0533.3.9 IDENTIFICATION

A. Refer to Section 260500 - General Electrical Provisions for identification requirements for raceways and boxes.

701.0200 LOW VOLTAGE TRANSFORMERS

701.0200.1 - GENERAL

701.0200.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0200.1.2. DESCRIPTION OF WORK

A. Furnish and install transformers complete with all necessary appurtenances to perform the voltage transformation as required.

701.0200.1.3 SUBMITTALS

A. Submit complete shop drawings with outline dimensions, wiring diagrams, catalog cuts and descriptive literature, including no load loss, total loss, regulation at 100% and 80% power factor, and net weight. If requested by the Engineer, submit production line impulse test reports.

701.0200.1.4 RELATED WORK IN OTHER SECTIONS

A. Site work, services.

701.0200.2 - PRODUCTS

701.0200.2.1 DRY TYPE TRANSFORMERS

A. General: Sizes and characteristics as shown on drawings. Unless otherwise specified, the design, manufacture and testing of dry type transformers and the methods of conducting tests and preparing reports shall be in accordance with NEMA Standard Publication for Specialty Transformers, No. ST1-4 (USASI-089). Provide separate primary and secondary windings for each phase (except where buck-boost auto transformers are indicated on the drawings) with industry standard voltage taps. All windings shall be copper. Provide with a suitable terminal compartment. The terminal compartment temperature shall not exceed 75 degree C. when the transformer is operating continuously at rated load with ambient temperature of 40 degree C.

B. Insulation: Class H insulation shall be rated for continuous operation of KVA with a temperature rise of not over 115 degree C. above a 40 degree C. ambient and with a maximum hot spot temperature of 220 degree C.

C. Enclosures: Ventilated for air cooling. Single phase transformers larger than 25 KVA and three phase transformers larger than 15 KVA shall be in a heavy gauge, sheet steel enclosures. Ventilation openings shall be of the mechanical maze type designed to prevent direct access to live parts in accordance with U.L., NEMA and National Electrical Code requirements for ventilated enclosures. Transformers smaller than the above shall be fully enclosed, in steel enclosures, with or without compound fill, or shall have exposed cores, impregnated windings and steel enclosures enclosing all live parts.

D. Sound Rating: Noise levels, determined in accordance with NEMA standards for Specialty Transformers, shall not exceed the following: 40db less than 50 KVa, 45db 51-150 KVA, 50db 151-300 KVA.

E. Manufacturers: General Electric, Hevi-Duty, Westinghouse or Sorgel. If requested, the transformer manufacturer shall furnish written certification that all dry type transformers furnished are constructed and tested in accordance with the standards referenced herein.

F. Mounting: Unless otherwise indicated on the drawings, dry type transformers having ratings not exceeding 45 KVA shall be suitable for wall mounting. Shop drawings of wall brackets and platforms for transformers having ratings exceeding 30 KVA shall be submitted for approval. All floor mounted transformers shall be provided with a 4" high 3000 psi concrete housekeeping pad.

G. Noise Suppression: Mount on approved vibration and noise vibration and noise isolating and damping supports. Conduit connections to transformers shall be made with sealtite flexible metal conduit, not less than 18 inches nor more than 36 inches in length.

701.0200.2.2 GROUNDING

A. The materials, equipment, and devices related to the grounding system are specified under other sections of these specifications.

701.0200.3 - EXECUTION

701.0200.3.1 SEPARATELY DERIVED SYSTEMS

A. Transformers creating separately derived distribution systems such as dry type transformers shall utilize the equipment ground bars in the transformer enclosure for both secondary equipment ground and secondary neutral ground. The size of grounding conductor from the transformer to the main equipment ground shall be determined by considering the transformer secondary as a service.

701.0200.3.2 TESTING

A. The Contractor shall test the complete grounding system with a megger at the service ground bar and shall submit a written report to the Engineer for approval. The service shall not be energized if the test shows more than 5 ohms, unless approved by the Architect.

701.0200.3.3 GROUNDING CONNECTIONS

A. Clean surfaces thoroughly before applying ground lugs or clamps. If the surface is coated, the paint, enamel or lacquer must be removed. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox."

701.0200.3.4 IDENTIFICATION

A. Provide an engraved micarta label on front of the tank indicating the transformer power source and the panel fed by the transformer.

701.0416 PANELBOARDS

701.0416.1 - GENERAL

701.0416.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0416.1.2 DESCRIPTION OF WORK

A. Furnish and install complete, all panelboards.

701.0416.1.3 RELATED WORK IN OTHER SECTIONS

A. Cabinets; Motor & Circuit Disconnects; Fuses; Service and Distribution; Grounding; Conductors, Raceways, Boxes and Fittings.

701.0416.1.4 SUBMITTALS

A. Submit complete shop drawings with outline dimensions, descriptive literature and complete descriptions of the frame size, trip setting, class and interrupting rating of all overcurrent devices. Identify available spaces. Complete description of physical layout of panelboards showing conformance with drawings.

701.0416.2 - PRODUCTS

701.0416.2 .1 GENERAL

A. Dead front, safety type, with voltage and amperage ratings as scheduled. Panelboards shall be of the type required for the short circuit and duty ratings indicated on the drawings or specified. All panelboards shall have a neutral bus and an insulated ground bus. Panelboards shall be as manufactured by General Electric, Cutler-Hammer or Square D and shall be as scheduled.

701.0416.2.2 CABINETS

A. Each panelboard shall be enclosed in a sheet metal cabinet with front doors, catches, locks, etc., as specified in Section 262716, Cabinets.

B. Door-in-Door: Both surface and flush panels shall be door-in-door. The door over the interior of the panel shall be provided with hinges and combined lock and

latch. The outside door over the panel gutters shall be provided with hinge(s) on one side and combined lock and latch. Machine screws into threaded holes in the panelboard cabinet, in lieu of combined lock and latch, to secure the outside door are not acceptable.

701.0416.2.3 FUSIBLE PANELBOARD

A. Fusible panelboards shall be factory assembled, Each fused switch shall have an etched micarta nameplate secured by two cadmium plated screws. The panelboard shall have a neutral bus and a ground bus connected with a removable link.

General Electric	"QMR" up to 1200 amps
Square D	"QMB" up to 1200 amps

B. Quick-make, quick-break fusible switch units to be of type with external operating handle suitable for padlocking in OFF position. Provide interlock to prevent opening cover when switch is in ON position unless interlock release is operated. Provide frame and fuse clip ratings as indicated in the panelboard schedules. Switch and fuse holder shall be rated for 200,000 amp interrupting capacity. Fuse holders shall be provided with Class R rejection feature.

C. Fuses shall be provided for all switches. Fuses for switches serving motors shall be Bussman Fusetrons, sized for heavy service motor running protection. Fuses for other services shall be as designated on the drawings. Proper fuse amp ratings shall be indicated on inside of switch cover, through the use of "Tapewriter" and should read “Use Fusetrons Only” (indicate amperage size as shown on plans).

D. Space Only: Where "space only" in noted on the drawings, provide necessary connectors, mounting brackets, etc., for the future insertion of an overcurrent device. Spaces shall be sized 200 amps unless noted otherwise.

701.0416.2.4 CIRCUIT BREAKER PANELBOARDS

A. Panelboard interiors shall be constructed on pre-drilled and tapped channel rails. Main busses shall be pre-drilled and tapped to accommodate any combination of circuit breaker units without further modification. All panelboards shall be complete with doors. Units shall be complete with combination latch and cylinder locks. All locks shall be keyed alike. All bussing shall be of the "sequence type". All connections shall be bolted.

B. Circuit breakers shall be molded case type (minimum 10,000 amp interrupting capacity, larger as required). All multi-pole breakers shall have a common trip and all breakers shall be interchangeable in any combination of poles with the same frame size. All branch circuit straps shall have the capacity of the

maximum breaker size in the frame space (i.e. 100 amp strap for 100 amp frame). Minimum 100 amp straps will be accepted.

C. All main and branch breakers shall be of the size and have the interrupting rating scheduled on the Drawings. All incoming and outgoing terminals shall have solderless lugs. Provide, where required, lug landing to accommodate number and size conductors shown on the Power Riser. Panelboards shall be factory assembled.

D. Single pole circuit breakers shall be suitable for switching duty and marked "SWD".

E. Bolted Type: Circuit breaker current carrying connections to the bus shall be of the bolted type, factory assembled. Stab in type not permitted. Provide bus bars for three phase panelboards of the sequence phased type connection and arranged for 3 phase, 4 wire mains, unless otherwise indicated on the drawings.

F. Space Only: Where "space only" is noted on the drawings, provide necessary connectors, mounting brackets, etc., for the future insertion of an overcurrent device. Provide blank cover for each space.

G. Directories: Provide typewritten circuit descriptions referencing permanent room numbering assigned in lieu of the room numbering shown on the drawings.

H. Spare Conduit: Provide three spare 1" conduits for each panel. Extend empty conduit with pullwire into accessible ceiling space and stub-out for future use.

701.0416.2.5 NAMEPLATE

A. Labels for identifying the breakers shall be engraved laminated plastic strips attached by screws (see "Nameplates" Specifications in Section 260500) or labels supplied by Panel Manufacturer.

B. Nameplates on Panelboards shall give voltage characteristics phase and number of wires. Example: Panel A, 120/208V, 3 phase, 4W.

C. Individual circuit breakers or switches, panelboards, disconnect means and motor starters shall have nameplate showing the load served.

D. Blank name plates shall be mounted on each "spare" unit or on "space" in distribution panels.

701.0416.2.6 SKIRTS

A. Where noted on the drawings panelboards shall be skirted with complete metal enclosures and barriers separating the panel interior.

701.0416.2.7 BUS BARS

A. All bus bars shall be copper. Use of aluminum bus bars will not be permitted.

701.0416.2.8 CONNECTORS AND LUGS

A. Contractor shall review one-line and other Drawings to assure that proper lugs are provided in termination equipment such as switches, panels, switchboards, mechanical equipment, etc. Due to voltage drop conductor sizes and/or numbers may not be accommodated by the equipment affected. If manufacturer cannot provide the proper number and size of lugs within their equipment the Contractor shall provide enclosures and properly sized terminals to convert the oversized cable, number and size that is compatible to the equipment affected.

701.0416.3 - EXECUTION

701.0416.3.1 PANELBOARDS

A. Panelboards shall be located where indicated on the drawings. Panelboards shall have neatly typed circuit directories behind clear plastic. Identify circuits by area designations and use. "Spare" and "Space" shall be indicated with erasable pencil, not typed.

B. Circuiting of all branch circuits shall be as designated on the drawings. Breaker and switch arrangement in panels shall be exactly as specified and all circuits will terminate in the positions indicated.

701.0416.3.2 PHASE ROTATION

A. Phase A, left bus; phase B, center bus; phase C, right bus (front viewing).

701.0716 CABINETS

701.0716.1 - GENERAL

701.0716.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and General Requirements, apply to the work specified in this section.

701.0716.1.2 DESCRIPTION OF WORK

A. Furnish and install cabinets for panelboards, telephone, and communication systems as required.

701.0716.1.3 RELATED WORK IN OTHER SECTIONS

A. Panelboards, sound systems, telephone systems.

701.0716.2 - PRODUCTS

701.0716.2.1 GENERAL

A. Sheet steel code gauge, galvanized cabinets with painted fronts and trim. Those exposed to wet or rain conditions shall be "raintight" unless otherwise noted. Cabinets without through feeder wiring shall be arranged to provide a wiring gutter not less than 4 inches wide for branch circuit panelboards served by feeders up to 4/0. Panelboards served by feeders in excess of 4/0, up to and including 750 kcmil, shall be provided with top, bottom and side gutters 8 inches wide. Cabinets shall be of standard make and shall bear the Underwriters Laboratories label. All outside surfaces of trim and doors shall be given a factory finish coat of No. 61 ANSI gray paint, or approved manufacturer's standard. Cabinets for telephone and communications systems shall have 5/8 inch exterior grade, one-face B-grade or equal flame proofed plywood backboard inside with maximum height and width.

701.0716.2.2 FEED-THROUGH GUTTERS

A. Where feeders go through panelboard cabinets to serve panelboards above or beyond, the wiring gutters in panelboard cabinets shall be a minimum of 8 inches on sides, top and bottom.

701.0716.2.3 TRIM

A. One-piece, sheet steel trim with hinged door with catch and lock. One piece sheet steel with 3/4 inch flange around all edges shaped to cover edge of box. For telephone or communication cabinets trims with captive nuts or clamps. Trims shall be furnished with indicating adjustable trim clamps for panelboards.

701.0716.2.4 DOORS

A. Doors shall close against a rabbet placed all around the inside edge of the frame with a close fitting joint between door and frame. The doors shall be fitted with substantial flush hinges placed not over 24 inches apart, nor more than six inches from ends of doors, and fastened permanently to the door and frame with round-headed rivets or spot welds, or with concealed flush piano hinges. Fastening screws or clamps or trims shall be set not over 24 inches apart. Doors over 48 inches in height shall be equipped with a vault handle and a three-point catch.

701.0716.2.5 LOCKS

A. Furnish each cabinet with a combination catch and flat key lock. The telephone, electrical and signal cabinet locks shall be fitted to separate keying for each system. Furnish two keys for each cabinet.

701.0716.2.6 GROUND BAR

A. Each cabinet, for a panelboard, shall be provided with a copper interior ground bar suitably braced or bolted to the cabinet wall. The equipment ground bar shall be equivalent in current carrying capacity to the incoming feeder ground conductor and shall have approved pressure connector terminations for the associated feeders, branch circuits, etc.

701.0716.3 - EXECUTION

701.0716.3.1 CABINETS

A. Cables installed in the wiring gutters of cabinets shall be neatly bundled, routed and supported. Minimum bending radii as recommended by the cable manufacturer shall not be reduced. Lighting and power cabinets shall be installed with tops 6'-6" above floor and bottoms not less than 12 inches above floor.

701.0726 WIRING DEVICES AND PLATES

701.0726.1 - GENERAL

701.0726.1.1 RELATED DOCUMENTS

A. The general provisions for the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0726.1.2 DESCRIPTION OF WORK

A. Furnish and install all wiring devices and plates as required for the complete installation and operation of all systems throughout the project.

701.0726.1 RELATED WORK IN OTHER SECTIONS

A. Conductors, Conduit, Boxes and Fittings.

701.0726.2 - PRODUCTS

701.0726.2.1 WALL SWITCHES

A. Unless otherwise specified, each wall switch (flush tumbler-toggle) shall be of the A.C. General use type for mounting in a single gang spacing, fully rated 20 amperes minimum at 120/277 volts, conforming to minimum requirements of the latest revision of the Underwriter's Laboratories, Inc., UL 20 Fifth Edition Standard Snap Switches and further requirements herein specified. Specification grade, heavy duty, single pole, 3-way or 4-way, of the maintained, momentary or lock type as indicated on the drawings. Switches shall operate in any position and shall be fully enclosed cup type with entire body of molded phenolic, urea or melamine with cover of molded phenolic, urea or melamine. Fiber, paper or similar insulating material shall not be used for body or cover. Ivory color handles unless otherwise indicated. Silver or silver alloy contacts. A.C. 120/277 volt general use snap switches shall be capable of withstanding tests as outlined in NEMA Publications and shall be as follows unless otherwise noted:

Switch	Hubbell	P & S	AH & H	Bryant	Leviton
1P	1221-I	20-AC-1-I	1991-I	4901-I	1221-I
2P	1222-1	20-AC-2-I	1992-I	4902-I	1222-I
3-Way	1223-I	20-AC-3-I	1993-I	4903-I	1223-I
4-Way	1224-I	20-AC-4-I	1994-I	4904-I	1224-I
3-pos. 2 cct maintained	1385-I	1225-I	4361-I	4922-I	
3-pos. 2 cct momentary	1557-I	1251-I	1995-I	4921-I	
Lighted handle pilot lgt.	1221-PL	2251-SP	2999-R	4901-PL	1220-PL

701.0726.2.2 RECEPTACLES

A. General: Configuration and requirements for all connector or outlet receptacles shall be in accordance with NEMA Publications. Fire resistant, non absorptive, hot welded, phenolic composition or equal bodies and bases with metal plaster ears (integral with the supporting member). Single or duplex as shown or noted on drawings. Ivory color unless otherwise noted on the drawings. Double grip contacts for each prong.

AA. Grounding Type: All receptacles shall be grounding type with a green colored hexagonal equipment ground screw of adequate size to accommodate an insulated grounding jumper (based on Table 250-95 of the NEC with minimum size No. 14 AWG). Grounding terminals of all receptacles shall be internally connected to

the receptacle mounting yoke. Unless otherwise noted, receptacles shall be as follows:

Receptacle	Hubbell	P & S	AH & H	Bryant
20A-125V AC 2P 3W	5362-I	6300-I	5739-I	5362-I
20A-208V AC 4P 4W	7250	7250	7250	7250
30A-250V AC 3P 3W	9350	3853	9344	9303
30A-600V AC 4P 4W	3430	3430	LD3430	3430
Clock	1544	5708	4224-5	2828GS
Special	Receptacles for special applications shall be as indicated on the drawings.			

701.0726.2.3 PLUG CAPS

A. Except for duplex receptacles, and cleaning combination receptacles one matching plug cap shall be provided for each receptacle. No plug caps are required for duplex receptacles. Provide watertight, male plug caps in damp locations or where exposed to weather.

701.0726.2.4 DEVICE PLATES

A. General: Provide plates for each switch, receptacle, signal and telephone outlet and special purpose outlet. Do not use sectional gang plates. Provide multi gang outlet plates for multi gang boxes. All plates on finished walls shall be Levition #84000-40 series, stainless steel. Screws shall be of metal with countersunk heads with finish to match the finish of the plate. Device plates shall be of the one-piece type, of suitable shape for the device to be covered. Where specifically noted as "plastic" plates on the drawings, plates shall be Leviton White #88000 (85000 Brown, 87000 Grey, 86000 Ivory, if noted). Devices in this case shall match, in color, the plastic plates.

B. Exposed: Plates for exposed screw jointed fittings shall match the fittings with edges of plates flush with edges of fittings. To be heavy cadmium plates, steel, with gasket. Plates for cast type boxes at locations subject to wet or rain conditions, shall be of the cast, vapor tight type. Provide hinged lift covers for devices.

C. Communications: Plates for telephone and signal outlets shall each have a 3/8 inch bushed opening in the center. Wall plates for push button and buzzer outlets shall have openings to suit the push buttons and buzzers.

D. Plates for special purpose outlets shall be of a design suitable for the particular application.

701.0726.2.5 CLOCK OUTLETS

A. Flush, single receptacle, regressed in stainless steel device plate.

701.0726.2.6 REMOTELY CONTROLLED SWITCHES OR RELAYS

A. Electro-magnetically operated, mechanically held with clearing contacts for maintained contact control unless otherwise required. Rugged construction conforming to NEMA and IEEE test standards for industrial type power relays and the requirements of UL 508, Standards for Safety Industrial Control Equipment. Ratings as indicated on the drawings suitable for the application. Contacts shall be double break renewable, solid wiping type, silver-to-silver Tungsten alloy, self-aligning, quick-make, quick-break, with a minimum inductive load rating of 20 amps. Relays shall be as manufactured by Allen-Bradley, Cutler-Hammer, General Electric, Square D or Westinghouse, equal to Allen-Bradley Bulletin 700 Control Relays. Provide sound deadening mounting and enclosure.

701.0726.2.7 MOMENTARY CONTACT SWITCHES

A. Tumbler type single pole double throw momentary contact for 3 wire circuit, with Off position when tumbler handle is in the center, similar in appearance to the conventional snap switch. Handle or key operated as indicated on drawings. 15 ampere at 120/277 volts for control of 30, 60, or 100 ampere remotely controlled switches or relays rated 101 amperes and above. Provide nameplate to identify the circuit or equipment controlled.

701.0726.3 - EXECUTION

701.0726.3.1 OUTLET LOCATIONS

A. Shall be as indicated on the drawings. Align devices and plates horizontally and vertically.

B. It shall be the responsibility of the Contractor to determine from the architectural drawings and by actual determination on the site, the exact location of each and every outlet. The outlet locations shall be modified from those shown on the plans to accommodate changes in door swings or to clear other interferences that may arise from job construction details as well as modifications within room spaces. These modifications shall be made with no change in contract price and shall be a matter of job coordination at the expense of the Contractor. The Contractor shall check these conditions throughout the entire job and shall notify the Architect/Engineer of discrepancies as they occur before proceeding with the installation of the work to verify the modifications, if any. Wall boxes shall be set in advance of wall construction, shall be blocked in place and secured. All wall boxes shall be set flush with finished building construction and the Contractor shall furnish and install extension sleeves as required to extend boxes to the

finished surfaces of special furring. No switches shall be located behind doors without specific written authorization by the Architect.

701.0726.3.2 YOKES

A. Wiring device yokes shall be installed in physical contact with the plaster ring. Where the above contact cannot be obtained, a green covered bonding conductor shall be installed.

701.0726.3.3 PLATES

A. Shall be installed with all four edges in continuous contact with finished wall surface without the use of mats or similar devices. Plaster fillings will not be permitted. Plates shall be installed vertically and with an alignment tolerance of 1/16".

B. Device cover plates for each and every device shall be furnished and installed by this Contractor.

701.0726.3.4 RECEPTACLES

A. Shall have a separate ground wire from the grounding screw to a grounding stud in the outlet box. All receptacles shall be installed with the "U" slot in the upper position. Substitutions for duplex convenience outlets as listed in 16140 - 2.2 shall only be considered if rated as "Specification Grade".

701.0800 MOTOR AND CIRCUIT DISCONNECTS

701.0800.1 - GENERAL

701.0800.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0800.1.2 DESCRIPTION OF WORK

A. Furnish and install complete motor and circuit disconnects for various items requiring them for this project.

701.0800.1.3 RELATED WORK IN OTHER SECTIONS

A. Conductors, motors, motor starters, motor control centers, panelboards, grounding.

701.0800.2 - PRODUCTS

701.0800.2.1 DISCONNECTING MEANS

A. Safety Switches: Fusible Type HD quick break safety switches of the sizes and capacities indicated or required. NEMA 4 Raintight enclosures at locations exposed to the weather.

B. Separately Enclosed Motor Snap Switches: Motor snap switches may be used for motor disconnect means, controller and motor overcurrent protection when applicable. These devices shall be horsepower rated and shall contain motor running overcurrent protection.

701.0800.2.2 SAFETY TYPE DISCONNECTING SWITCHES

A. Heavy duty, quick make, quick break type, 250, 480 or 600 volt rating as required for the application. Number of poles and ampacity as noted or required for application, or required by code. Fusible with fuse clips suitable for Buss fuses. Short circuit rating of 200,000 RMS Amperes with Class R rejection feature installed in fuseholders. NEMA 2 enclosures for dry locations. NEMA 4 enclosures for wet locations or where exposed to weather unless otherwise noted.

B. Fuses shall be provided for all switches. Fuses for switches at motors shall be Bussman Fusetrons, sized for heavy service motor running protection. Fuses in other locations shall be as designated on the drawings or indicated in Section 262813 of these specifications. Proper fuse amp ratings shall be indicated on inside of switch cover, through the use of "Tapewriter" and should read "Use Fusetrons Only" (indicate amperage size as shown on plans). See Section 262813 for other labeling requirements.

701.0800.3 - EXECUTION

701.0800.3.1 DISCONNECT MEANS

A. Install in each location indicated on the drawings and elsewhere as required by NEC.

B. Switches installed outdoors shall be raintight and shall be suitably supported, independently of the item to be served (by unistrut rack) unless sufficient unobstructed flat surface exists on the unit to properly support the electrical equipment.

701.0813 FUSES

701.0813.1 - GENERAL

701.0813.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0813.1.2 DESCRIPTION OF WORK

A. Furnish and install all fuses required for the various electrical systems required for this project.

701.0813.1.3 RELATED WORK IN OTHER SECTIONS

A. Panelboards, motor control centers, motor and circuit disconnects

701.0813.2 - PRODUCTS

701.0813.2.1 FUSES

A General: Dual element, time delay type, based on heavy service, Buss Fusetron, or equal, unless otherwise noted or required for installation. For individual motor circuit protection, provide fuse sized approximately 125 percent of full load current with 200,000 amperes interrupting capacity.

B. Current-Limiting Fuses: Provide where indicated on the drawings. For non-motor feeder protection in conjunction with fused switches, install NEMA Class L or K Buss Limitron fuses sized 125 percent of load current or as required for coordination with air and molded case circuit breakers.

1. Above 600 amps: Class L, "Hi-Cap" as manufactured by Bussman.

2. Below 600 amps, as required by short circuit duty, Class RK-1, "Limitron" or Class RK-1, "Low Peak" or Class RK-5, "Fusetron" as manufactured by Bussman.

3. All switches having current limiting fuses installed shall have a Lamicoid nameplate with white lettering on red background reading:

WARNING, REPLACE ONLY WITH CURRENT
LIMITING FUSES AS ORIGINALLY INSTALLED

C. All fuses shall be rated 200,000 AIC and be of the rejection feature type.

701.0813.2.2 COORDINATION

A. Coordinate the low voltage fuses required for the project to provide basic selective protection and properly coordinate with the other associated protective equipment.

701.0813.3 - EXECUTION

701.0813.3.1 COORDINATION

A. Coordinate the low voltage fuses required for the project to provide basic selective protection and properly coordinate with the other associated protective equipment.

701.0813.3.2 SPARE FUSES

A. Furnish one complete spare set (3) of each size and type of fuse required on this project for panelboards, safety switches, and switchboards. Deliver to Owner in the original boxes and store in the fuse cabinet furnished under this Contract.

701.0900 MOTOR STARTERS

701.0900.1 - GENERAL

701.0900.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0900.1.2 DESCRIPTION OF WORK

A. Furnish and install all motor starters, complete as required.

701.0900.1.3 RELATED WORK IN OTHER SECTIONS

A. Grounding, Controls and Instrumentation, Motor Control Centers.

701.0900.1.4 SUBMITTALS

A. Submit complete shop drawings, control diagrams and descriptive literature.

701.0900.2 - PRODUCTS

701.0900.2.1 GENERAL

A. Starters shall be as specified in this section unless modified by other sections of these specifications or by details or control diagrams on the drawings. Provide

Provide NEMA 2 general purpose enclosures, unless otherwise noted or required, with doors arranged for padlocking. Equip starters with contactors to break each ungrounded line to the motor.

701.0900.2.2 RATING

A. Each starter shall have a horsepower rating not less than the rating of the motor it controls. Starters and all their related component parts shall be designed and properly coordinated for the rating and characteristics of the motors furnished under the various sections of these specifications. Motor starters and overcurrent devices shall be ambient temperature compensated.

B. All starters sized for motors 25 HP or larger shall be reduced voltage starters unless otherwise indicated.

C. All reduced voltage starters shall be auto-transformer type unless otherwise indicated.

701.0900.2.3 OVERLOADS

A. Provide ambient temperature compensated thermal over current devices in each phase. Provide a suitable reset device for resetting over current trip on the starter front. Overcurrent device ratings shall not exceed code maximums and shall be as recommended by the motor manufacturer for the application.

701.0900.2.4 CONTROLS

A. Control circuit conductors shall be grounded in accordance with the NEC and shall be arranged so that an accidental ground will not start the motor.

B. Energy for control circuits and indicating lights shall be 120 volts. Control circuits shall be provided by an internal control power transformer. The auxiliary motor control relays shall be supplied as part of the SCADA system.

C. Provide manual start-stop pushbuttons mounted in starter case unless automatic devices are shown on drawings or specified.

D. Automatic control devices such as thermostats, float or pressure switches may control the starting and stopping of motors directly, provided the devices used are designed for that purpose and have an adequate horsepower rating. When the automatic control device does not have such a rating, a magnetic starter shall be used, with the automatic control device actuating the pilot control circuit.

E. Starters controlled by automatic devices shall be provided with hand-off automatic selector switch mounted on starter case and connected so motor can be manually operated regardless of the position of the automatic control device.

Selector switch shall not be connected to supersede any safety device or safety interlock.

F. Provide starters with a sufficient number of auxiliary contacts (N.O. and/or N.C.) to afford the control and interlocking required. Provide additional relays if required to obtain the correct control.

701.0900.3 - EXECUTION

701.0900.3.1 GENERAL

A. Provide each motor with a motor starter of proper design to meet the requirements of the motor and drive.

701.0900.3.2 INSTALLATION

A. Install and connect in accordance with related work specified in other sections of these specifications and standard industry practice.

B. See 'Appendix C – SCADA Systems Equipment, Programming, and Integration Cost Estimates' for the items to be supplied as part of the SCADA system by the City SCADA Contractor.

701.0000 LIGHTING EQUIPMENT

701.0000.1 - GENERAL

701.0000.1.1 RELATED DOCUMENTS

A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

701.0000.1.2 DESCRIPTION OF WORK

A. Furnish and install all lighting equipment and lamps as scheduled on the drawings and as specified herein.

701.0000.1.3 RELATED WORK IN OTHER SECTIONS

A. Conduit, boxes and fittings, conductors, wiring devices and plates, acoustic ceilings.

701.0000.1.4 SUBMITTALS

A. Submit for approval complete shop drawings, catalog cuts, special installation instructions, photometric data and descriptive literature.

701.0000.2 - PRODUCTS

701.0000.2.1 GENERAL

A. Furnish all lighting fixtures, of the type indicated on the drawings, complete with lamps, sockets, wiring, fitters, hangers, plaster rings, canopies, etc., as required.

701.0000.2.2 LAMPS

A. T8 lamps, medium bipin base, correlated color temperature of 3500K with a color rendering index (CRI) of 75. They are to operate on ballasts specifically designed for 265 ma., T8 lamps.

B. LED Lamping is as called for in the Light Fixture Schedule

C. Metal Halide lamps shall be phosphor coated, mogul base with correlated color temperature of 4000 K. Lamps shall be furnished for proper lamp burning position.

D. Safety: All Metal Halide lamps shall be furnished with a means of immediately extinguishing the lamp when the outer lamp envelope is either penetrated or broken.

E. Manufacturers: General Electric, Sylvania, Westinghouse, or an approved equal.

701.0000.2.3 BALLASTS

A. Fluorescent ballasts shall be electronic type. All ballasts supplied shall optimize the performance of the specific lamp. Ballast case operating temperature shall not exceed 35° C temperature rise. The ballast shall be constant wattage electronic type with integrated control chip technology, constant wattage and constant light output with voltage fluctuations of ± 20% of nominal. Ballast shall operate at high frequency (over 20 KHZ) with a lamp current crest factor of 1.7 and a total harmonic distortion of less than 10%. The ballast shall be UL and CSA listed, high power factor, Class P, contain no PCB's and be made in the USA. Electronic circuit to meet FCC Part 18, Class A Requirements, and IEEE 587, Category A for transients. Ballast shall comply with Federal Ballast Legislation (Law 100-357) and be marked with E and have a full 3 year warranty.

B. LED engines as called in the Light Fixture Schedule.

C. Manufacturers: Advance, General Electric, Jefferson, Universal, Motorola and Magnetek as indicated on the drawings or approved equal for function specified. "Generic" ballasts that do not meet these specifications will be rejected.

701.0000.2.4 FLUORESCENT FIXTURES

A. All fixtures, ballasts and supports shall be quiet in operation. Louvers, shields, reflectors and all sections of the channel structure shall be securely held in position. Fixtures shall not be mounted in such a way that ballast hum will be amplified or transmitted into work areas.

701.0000.2.5 FINISH

A. Bonderized or equal treatment on all steel parts prior to applying finish. Metal parts shall have baked white enamel finish unless otherwise noted on the drawings.

701.0000.2.6 FLUORESCENT LAMPHOLDERS

A. Designed so lamps will be held firmly in place, electrically and mechanically, permitting easy insertion or removal of lamps. Provide corrosion resistant silver plated lamp pin contacts.

701.0000.2.7 CEILING TRIM

A. Furnish proper ceiling frames for the ceiling material in which recessed fixtures are to be installed. Verify prior to ordering. No extra allowance will be made for failure to furnish fixtures which are compatible with the ceiling system.

701.0000.2.8 LENS

A. When an acrylic lens or diffuser is specified it shall be molded of 100% virgin acrylic meeting American Society for Testing Materials specifications for Methacrylate Molding and Extrusion Compounds (ASTM D788-63). Plastic diffusing panels, luminous side panels and other luminous plastic members of fixtures shall be made of not less than .125 inch thick prismatic clear virgin acrylic material (similar and equal in pattern and construction to KSH K-12). The plastic shall be non electrostatic or the finished parts shall be treated with an anti-static wax.

701.0000.2.9 HOUSING

A. Not less than 22 gauge steel with baked white enamel finish applied over corrosion-resistant primer unless otherwise specifically approved.

701.0000.3- EXECUTION

701.0000.3.1 GENERAL

A. The Contractor shall furnish and install a lighting fixture, as hereinafter specified and scheduled, on each and every outlet in accordance with the type designation

shown on the Drawings. If a type designation is omitted, the fixture shall be of the same type as is shown for rooms of similar usage. Verify before purchase and installation.

701.0000.3.2 SUPPORTS

A. Support ceiling fixtures by anchorage to the ceiling only where the ceiling is concrete or masonry units. For ceilings of other construction, anchor ceiling fixtures to metal supports provided for that purpose, of suitable strength and stability, adequately attached to and supported by joists, trusses or other structural members, unless other methods of support are specifically approved by the Architect. Where lay-in construction is used, recessed fixtures shall be of the lay-in type. Earthquake clips will be used to secure all lay-in fixtures. The Contractor shall coordinate this work with all other trades involved. Coordinate supports for lay-in fixtures with ceiling Contractor.

701.0000.3.3 LOW DENSITY CEILING

A. Special attention is directed to the code restrictions against mounting fixtures on combustible low density cellulose fiberboard (NEC 410-76). If fixtures are to be installed that are not UL approved for this condition, a suitable mounting arrangement shall be developed which meets the approval of the Architect/Engineer.

701.0000.3.4 CEILING TRIM AND MEANS OF SUPPORT

A. The ceiling trim and means of support of recessed fixtures shall be coordinated with the type of ceiling to be installed to insure proper installation.

701.0000.3.5 SUSPENDED FIXTURES

A. Provide swivel hangers to insure a plumb installation. For single unit suspended fluorescent fixtures provide tubings or stems for wiring at one point and a tubing or rod suspension provided for each unit of chassis. Provide 3/16 inch diameter rods minimum. All hangers and fittings to be of the same manufacture as the fixture.

701.0000.3.6 LAMP GUARDS

A. Provide safety guard clips or spring loaded lampholders on open type fluorescent fixtures to prevent lamps from falling.

701.0000.3.7 CLEAN-UP

A. At final inspection all fixtures and lighting equipment shall be in first class operating order, in perfect condition as to finish and free from defects, completely lamped, clean and free from dust, plaster or paint spots and complete with the

required glassware, reflectors, side panels, louvers or other components necessary to complete the fixtures.

701.0000.3.8 CEILING TRIM

A. Furnish proper ceiling frames for the ceiling material in which recessed fixtures are to be installed, verify prior to ordering. Rims of all fixtures that overlap ceilings shall be installed tight and snug against the ceiling to prevent light leakage around the rim. If unevenness of surface allows light to show, then the Contractor shall provide soft sponge filler or gasket to correct the condition.

701.0000.3.9 All recessed fixtures shall have top connections to the outlet boxes installed in accordance with the code. Connections to lay-in fixtures shall be made with flexible conduit 4'-0" minimum length.

701.0000.3.10 The Contractor shall install new lamps in all lighting fixtures.

701.0000.3.11 All ballasts shall be installed in a manner to assure a completely silent operation with maximum ballast life.

701.0000.3.12 All surface mounted fixtures shall be furnished with top plates whenever applicable.

701.0000.3.13 All open reflector type fixtures shall be equipped with lamp safety guards to prevent lamp fallout.

701.4 MEASUREMENT & PAYMENT

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

702 SENSING AND CONTROL EQUIPMENT – INDEX

702.1 DESCRIPTION

702.2 REFERENCE SPECIFICATIONS

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702.5 MEASUREMENT AND PAYMENT

702 SENSING AND CONTROL EQUIPMENT

702.1 DESCRIPTION

The Contractor shall furnish all labor, materials, equipment, and incidentals required to provide and install the sensing and control equipment including all wiring required for monitoring and operating water facilities onsite or via SCADA System.

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

- Section 501, Water Lines and Appurtenances
- Section 504, Station Valves Piping, Appurtenances, and Associated Painting
- Section 602, Station Buildings
- Section 701, Electrical
- Section 703, SCADA SYSTEM

702.2 REFERENCE SPECIFICATIONS

Reference standards shall comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.

- Standards of the Hydraulic Institute
- National Electric Code
- Standards of National Electrical Manufacturers Association
- Institute of Electrical and Electronic Engineers
- American National Standards Institute
- Standards of American Water Works Association

702.3 SUBMITTALS

Submit for approval the following:

702.3.1 Manufacturer's Qualifications: Manufacturer shall have a minimum of 5 years of experience in the production of substantially similar equipment, and shall show evidence of satisfactory service in at least 5 installations.

Each type of meter, transducer, or other control device shall be the product of one manufacturer.

702.3.2 Manufacturer's Literature, Illustrations, Specifications, and Engineering Data: including dimensions, materials, size, weight, and performance data. Including a complete list of

equipment and material, including manufacturer's description data and technical literature, catalog cuts and installation instructions.

702.3.3 Shop Drawings: showing fabrication, assembly, installation and wiring diagrams. Drawings shall contain complete wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and will properly function as a unit at the site. Drawings shall show proposed layout and anchorage or equipment and appurtenances, clearances for maintenance and operations. Five copies of proposed drawings to be submitted for approval, two copies to be returned with required revisions noted prior to final submittal.

702.3.4 Start-up, Calibration and Testing: Start-up, calibration and performance test reports in booklet form showing all field tests performed to start-up each component and all field tests performed to prove compliance with the specified performance criteria. All calibration procedures for elevation, temperature, and/or other required factors to achieve performance criteria compliance shall be reported. Each test report shall indicate the final position or reading of controls.

702.3.5 Operation and Maintenance Manuals: Five copies of the proposed operation and maintenance manuals are to be submitted for approval, two copies to be returned with required changes noted prior to final submittal.

Five copies of final operation and maintenance manuals for the equipment furnished shall be provided. One complete set prior to performance testing and the remainder upon acceptance. Operation manuals shall detail the step-by-step procedures required for system start up, operation and shut down. Operation manuals shall include the manufacturer's name, model number, parts list, and a brief description of all equipment and their basic operating features. Maintenance manuals shall list routine maintenance procedures, possible failures and repairs and troubleshooting guides. Maintenance manuals shall include piping and equipment layout and simplified wiring and control diagrams of the system as installed. Manuals shall be approved prior to acceptance.

702.3.6 Product Delivery, Storage, and Handling:

- Handle all meters, transducers, displays and appurtenances very carefully. Damaged or dropped components will not be acceptable.
- Store all components in covered storage off the ground, and protected from the elements (rain, snow, wind) and excessive dust.
- Store materials and components to permit access for inspection.

702.4 MATERIALS

702.4.1 Materials: will in general:

1. Conform to the requirements of the project drawings and Bid Proposal.

2. Be compatible with the City of Gallup's water SCADA System.
3. All meters, transducers, displays and appurtenances shall have manufacture's name, model number, and working pressure clearly displayed on device.
4. All electrical components shall be UL listed.
5. All cables shall be custom lengths from the manufacturer and run from measurement device to the display, signal splitter or SCADA System. Field splicing of cable will not be permitted.

702.4.2 Flow Meters: Provide Magnetic flow meters as follows:

- Pressure Rating: 250 PSI
- Accuracy: ± 1.0%
- Connection: Flanged
- Meter/Display Outputs:
    - One (1) - 4 – 20 mA programmable and scalable analog output for instantaneous flow.
    - Four (4) – configurable digital outputs
    - One (1) – scalable pulse output for flow "totalization".
- Remote Display:
    - Manufacture shall be the same as the meter
    - Large four-line by 20 character LCD display with backlight suitable for local and remote display with SCADA
    - Amplifier: 32 bit signal processor, with above outputs
- Cable length as required to reach remote display or SCADA system without splice.
- Manufacturer: Badger Meter M-Series with Remote M2000 amplifier and display or Equal.

702.4.3 Non-Submersible Pressure Transducer: Provide submersible pressure transducers as follows:

- Housing constructed of 316 stainless steel.
- Accuracy: ±0.1% of full scale.
- One (1) – 4-20 mA analog output.
- Wetted threaded connection as required.
- Transducer shall be vented non- submersible type.
- Operating range: 2 - 24 ft. depth
- Pressure Rating: two (2) times service range or 25 PSI whichever is higher.
- Transducers shall be calibrated for service at 6900 ft. (Gamerco Tanks) or 6550 ft. (Yah-ta-hey Pump Station) elevation above mean sea level.
- Polyurethane encased shielded cable from transducer to display or control unit. Splicing of cable will not be permitted.
- Transducer Junction Box shall contain the following:

    - Terminal strip for electrically connecting transducer cable control/power system
    - Provide location to terminate vent tube in a vent filter.
    - Box shall IP 66 rated and mounted near digital display
- Vent filter:
    - Shall utilize indicating desiccant to prevent moisture from entering vent tube.
    - Desiccant shall change from blue to pink when exposed to moisture.
    - Shall provide a minimum of 12 months of maintenance free operation.
- Lightning protection
- Manufacturer's warranty one year from project acceptance date.
- Provide conduit connections and other appurtenances as required.
- Manufacturer: Measurement Specialties KPSI Series 30 or equal.

702.4.4 Digital Displays as Required: Provide transducer digital display as follows:

- 6 digit 14 segment 0.54" red LED
- NEMA 4X front panel
- Polycarbonate bezel, 1/8 DIN aluminum housing.
- Programmable mA or VDC input configuration
- Isolated 24 VDC@100 A power supply
- 20 bit A/D resolution
- 90 to 140 VAC, 50/60 Hz power
- Plug-in terminal block electrical connections
- 4-20 mA retransmission
- Display to be located in a NEMA 2 enclosure

702.5 MEASUREMENT AND PAYMENT

Measurement and Payment for items of work covered by this section of the specifications shall be accordance with provisions of the special conditions.

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703.6 MEASUREMENT AND PAYMENT

703 S.C.A.D.A.

703.1 GENERAL

703.1.1 Related Documents: Drawings and general provisions of the Contract, including General Conditions and the General Requirements, apply to the work specified in this section.

703.1.2 Description of Work: Service tools, equipment, etc., which are required for the complete installation of all Supervisory Control and Data Acquisition (SCADA) Work, as indicated on the Drawings and specified herein. Electrical and SCADA work indicated on the Drawings and/or Specifications covering other trades shall conform to Section 701, 702 (if included herein), and 703 of these Specifications.

Work or equipment not indicated or specified which is necessary for the complete and proper operation of the SCADA system shall be accomplished with no additional cost to the Owner.

Furnish all labor and materials required for control and sensory connections to all the various items of equipment requiring electric or wiring service throughout the project shown on the Contract Drawings (even if not shown on the Electrical or Control Drawings). Coordinate with other trades for the installation of required connections and service.

703.1.3 Requirements Or Regulatory Agencies And Standards: Installation, materials, equipment and workmanship shall conform to the applicable provisions of the National Electrical Code (NEC), the National Electrical Safety Code (NESC), Occupational Safety and Health Act (OSHA), and all local, state and national codes, ordinances and regulations governing the particular class of work involved and the terms and conditions of the electrical utility and other authorities having lawful jurisdiction pertaining to the work required. All modifications required by these codes, rules, regulations and authorities shall be made by the Contractor without additional charge to the Owner. This Contractor shall secure all permits and licenses required for his work and shall pay all fees in connection with such permits and licenses.

On completion of the various parts of the work, the installation shall be tested by the constituted authorities and approved and, on completion of the work, this Contractor shall obtain and deliver to the Owner, final certificates of acceptance. This Contractor shall furnish copies of each certificate to the Engineer.

All materials, appliances, equipment or devices shall conform to the applicable standards of Underwriter's Laboratories, Inc. where such standards have been established.

The following specifications and standards (current editions) shall form a part of these specifications:

1. National Fire Protection Association Standards (NFPA)
2. National Electrical Code, NFPA 70 (NEC)
3. Life Safety Code, NFPA 101
4. NFPA 72-A

5. Occupational Safety and Health Act (OSHA)
6. National Electrical Safety Code (NESC)
7. Underwriter's Laboratories, Inc. (STANDARDS)
8. American National Standards Institute (ANSI)
9. American Society of Testing and Materials (ASTM)
10. Institute of Electrical and Electronic Engineers (IEEE)
11. Insulated Power Cable Engineer's Association (IPECA)
12. National Electrical Manufacturer's Association (NEMA)
13. Uniform Building Code (UBC)
14. American with Disabilities Act (ADA)

703.1.4 Drawings: The electrical drawings show the general arrangement of all conduit, outlets, equipment, etc. and shall be followed as closely as actual building construction and the work of other trades will permit.

Drawings and Specifications shall be considered as complimentary. Work or materials called for by one and not mentioned in the other shall be provided as though treated by both.

In the case of conflict between Drawings and Specifications, the greater or more restrictive requirement shall apply.

703.1.5 As-Built Drawings: During progress of the work, the contractor shall maintain an accurate record of the installation of the system, identifying each connection and noting all circuiting deviations from the contract drawings. Upon completion of the installation, the contractor shall transfer all record data to a single, neat and legible set of blue line prints of the original drawings. These drawings are to be delivered to the Engineer at the completion of the project.

703.1.6 Operating Instructions and Manuals: Without additional charge to the Owner, furnish competent instruction to the Owner in the care, adjustment and operation of all parts of the control equipment and sensory devices. Upon completion of the work, prepare and deliver to the Owner, five (5) sets of complete operation and maintenance manuals for the systems and major equipment installed. Include catalog data, shop drawings, wiring diagrams, and rating data, spare parts lists and manufacturer's operation and maintenance data.

The above requirements are in addition to specific instructions and manuals specified for individual systems or equipment.

703.1.7 Site Visit: The Contractor shall visit the site prior to bidding and satisfy himself as to the conditions of the installation. No allowance shall be made, on his behalf, for his failure to make such a visit.

703.1.8 Field Measurements: The Contractor shall verify the dimensions covering the work. No extra compensation shall be claimed or allowed due to difference between actual dimensions and those indicated on the drawings. No waiver of responsibility for defective work shall be claimed or allowed due to failure to report unfavorable conditions affecting the work.

703.1.9 Performance Tests: Thoroughly test all sensory and control devices and all circuits for proper operating condition and freedom from grounds and short circuits before acceptance is requested. All equipment, appliances and devices shall be operated under load conditions.

703.1.10 Miscellaneous Items: Miscellaneous items not covered in the Specifications shall be as indicated on the Drawings, installed and connected in the proper manner and as recommended by the manufacturer.

703.1.11 Guarantee: All equipment and workmanship furnished under this contract shall be guaranteed for a period of one year from the date of final acceptance thereof against defective materials, design and workmanship. Upon receipt of notice from the Owner of failure of any part of the guaranteed equipment during the guarantee period, the affected part or parts shall be replaced promptly with new parts by, and at the expense of, the Contractor. The labor incident to the installation of these replacements shall be furnished by the Contractor.

703.2 PRODUCTS

703.2.1 Standards Of Material And Workmanship: All material shall be new and shall bear the label of the Underwriter's Laboratories, Inc. or be listed under re-examination service. All material shall be of the best grade and latest pattern of manufacture as specified. All work shall be performed in a neat, workmanlike manner and shall present a neat mechanical appearance when completed.

703.2.2 Equipment Requirements: The electrical requirements for equipment specified or indicated on the drawings are based on information available at the time of design. If equipment furnished for installation has electrical requirements other than indicated on the electrical drawings, the Contractor shall make all adjustments to wire and conduit size, controls, overcurrent protection and installation as required to accommodate the equipment supplied without additional charge to the Owner. The complete responsibility and costs for such adjustments shall be assigned to the respective section of these Specifications under which the equipment is furnished.

703.3 MATERIALS

All similar materials and equipment shall be the product of the same manufacturer.

Where no specific materials, apparatus or appliance is mentioned, any first-class product, made by a reputable manufacturer may be used, providing it conforms to the contract requirements and meets the approval of the Engineer.

Materials and equipment shall be the standard products or manufacturers regularly engaged in the production of such material and shall be the manufacturer's current standard design.

Equipment affected by altitude shall perform satisfactorily for the function intended at the altitude of the project site.

703.3.1 Sensory and Control Devices: Devices provide for sensory and control shall conform to Sections 701, 702, and 703 of these specifications. Performance requirements for devices are specified in section 702 if required.

703.3.2 Conduit, Wiring, Junction Boxes, and Cabinets: All materials used for control system shall conform to Section 701 of these specifications. Cables on sensory and control devices shall be supplied by the manufactures run for device to designated junction box, display or control system. Field splices of cables will not be permitted. Control wiring (gauge and type) and conduit runs shall be provided for the intended use as required by the control system. Coordinate with the City of Gallup Joint Utilities Control Contractor (SKM Inc.)

703.3.3 Radios, Antennas, Programmable Logic Controllers, Modems, and Battery Backups: The above shall be compatible with the City of Gallup's existing SCADA system. All SCADA equipment shall be provided by the City of Gallup Joint Utilities Control Contractor (SKM Inc.)

703.3.4 Changes: No changes shall be made in the SCADA work as shown and herein specified, unless such changes are authorized in writing by the Engineer and such authorization shall contain a statement covering the amount of the charges or credits involved in the change.

703.3.5 Substitutions: On all materials, substitutions will be considered only if requested by letter from the Contractor to the Engineer at least 10 days prior to the bid date and shall be considered as authorized only upon written addenda from the Engineer. Where materials are proposed to be substituted in lieu of the items specified, substitutions shall be equal in quality, workmanship and design. The burden of proof of equality of materials shall be placed upon the Contractor. Samples of all materials proposed for substitution shall be submitted to the Engineer, when requested, for examination.

703.3.6 Shop Drawings (5 Copies Required): Shop drawings shall be furnished for all equipment and materials. They shall be furnished by the Contractor as required in the Submittal Section. Where equipment will be furnished "as specified", a statement to that effect is sufficient. Where substitutions are proposed, complete data must be furnished, showing performance, quality and dimensions.

The Contractor shall submit to the Engineer, for checking a complete descriptive and technical data list for all items of material furnished under this contract. Complete outlines, dimensions, electrical services, control diagrams, electrical characteristics or special nature or critical to the installation and pertinent date required for installation shall be shown. Failure to submit this information can be the basis for disapproval.

All descriptive and technical data and shop drawings shall bear signed certification that they have been carefully examined and found to be correct with respect to dimension, space available, non-interference with other trades and that the equipment complies with all the requirements of these specifications. Submittals that have not been checked for compliance will not be

considered by the Engineer. Only complete submittals will be reviewed. Partial submittals will not be considered.

Contractor shall make submittals on all the following equipment (in addition to any special items indicated elsewhere in the Plans and Specifications):

- Conduit
- Wire
- Cabinets
- Sensory and Control Devices

After receiving approval on the make and the type of materials, the Contractor shall order such materials in sufficient time to prevent any delay or changes on the job. All equipment shall be coordinated with the City of Gallup Joint Utilities Control Contractor (SKM Inc.)

703.4 FUNCTION

703.4.1 General Function: The City currently utilizes a SCADA system by SKM Inc. for supervisory control and data acquisition of water production facilities. RTU/PLC units are located at facilities and in the well fields with radio communication to two networked computer stations in the city.

This project consists of installing a compatible RTU/PLC unit at each control building designated complete with all appurtenances and hardware to provide functions described below. All sensors, radios, antennas, relays, terminal strips and wiring shall be properly interfaced with pumps, flow meters, transducers, displays and other electrical equipment as required. Required software programming by SKM Inc. shall also be required for functional SCADA systems at the new and modified facilities.

The RTU/PLC units shall contain radio(s), antennas, batteries, a power supply/charger module, modules for digital i/o and an analog module within a NEMA 4, wall mounted enclosure. Modules for 16 digital inputs, 16 digital outputs and 8 analog inputs shall be provided.

The RTU/PLC, radios, antennas, and unit provided shall be provided by SKM Inc.

703.4.1.1 Hogback Pressure Reducing Station SCADA System: The Hogback Pressure Reducing Station SCADA System shall be generally arranged as shown on the project drawing and have the following capabilities.

Supervisory Control:

- ON/OFF SECURITY; Via on-site switch.

Data Acquisition: (to in town facilities as required)

Field	Indication
• Site Power	On - Off
• Security	OK - Breached
• Flow	GPM

703.4.1.2 Heaton Pump Station:
Supervisory Control:

- Open/Close PRV Valve - Energize or de-energize PRV valve solenoid per electrical drawings for on/off control; via an on-site "HOA" switch.
- ON/OFF SECURITY; Via on-site switch.

Data Acquisition: (to in-town facilities)

Field	Indication
• Site Power	On - Off
• Security	OK - Breached
• Flow	GPM
• Pump Station	Fault, ON-OFF (Ea. Pump)

:

703.5 EXECUTION

Fabrication, erection and installation of the complete electrical system shall be done in as first class, workmanlike manner by qualified personnel, experienced in such work and shall proceed in an orderly manner so as not to hold up the progress of the project. This contractor shall check all areas and surfaces where electrical equipment is to be installed, removed or relocated and report any unsatisfactory conditions before starting work. Commencement of work signifies the Contractor's acceptance of existing conditions. In the acceptance or rejection of the finished installation, no allowance will be made for lack of skill on the part of the workmen.

703.5.1 Equipment: Equipment and materials furnished by the Contractor shall fit the spaces allocated for them. Should the equipment which the Contractor proposes to install, require space conditions other than indicated on the drawings, it shall be the Contractor's responsibility to reconcile the available space with the equipment and make any changes required to accommodate the equipment. All required changes shall be made at the Contractor's expense.

The SCADA system and devices shall be calibrated, programmed, and tested to ensure proper function by SKM. Inc. The contractor shall install and pull wire (power and control) for all SCADA system devices. Wiring shall be "landed" by SKM Inc.

All equipment, Contractor and Owner furnished, shall be installed in accordance with the manufacturer's recommendations.

703.5.2 Coordination: The Contractor shall coordinate all SCADA work with SKM Inc. The SCADA Plans are diagrammatic but shall be followed as closely as actual construction and the

work or other trades will allow. Such minor changes as are necessary to make the electrical work conform to the work of other trades and to the building shall be made without cost to the Owner.

703.5.3 Bundling: In cabinets, conductors #10 and smaller shall be neatly and securely bundled and conductors larger than #10 shall be neatly and securely cabled in individual circuits, utilizing marlin twine, two ply lacing or nylon straps.

703.5.4 Identification: Tag circuits in each enclosure with wrap-around circuit designation labels where more than one feeder passes through or terminated in the enclosure.

703.5.5 Location of Equipment and Sensors: The approximate location of sensors, panels cabinets, display boards, wiring, power outlets, etc., are indicated on the Drawings. They are not, however, intended to give complete and exact information. Determine the exact location after thoroughly examining the general building plans and by actual measurements during construction, subject to the approval of the Engineer.

Verify, with the Engineer, prior to installation, all locations of conduit, boxes, etc. in the floor.

703.5.6 Protection of Materials and Equipment: This Contractor shall be responsible for the protection of all materials and equipment under this section of the work whether incorporated into the building or not.

The Contractor shall provide protection for all work where necessary and will be responsible for all damage done to property during the construction. The above protection shall be maintained while the work is in progress. In no case shall dirt, grit, etc., be ground into the floor finish or covering.

The Contractor shall provide space for storage of materials and equipment at ground level.

703.5.7 Cutting and Repairing: Cutting and repairing shall be the responsibility of the Contractor. Coordinate, to prevent unnecessary cutting and repairing. Lay out and locate equipment, openings and chases. Install sleeves, inserts and supports.

703.5.8 Warranty: Deliver originals of all guarantees and warranties on this portion of the work to the Owner. Warrant all equipment, materials and workmanship for one year in accordance with the terms of this Contract.

703.5.9 Product Handling: Use all means necessary to protect electrical materials and equipment before, during and after installation and to protect the installed work of other trades. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner at no extra cost to him.

703.6 MEASUREMENT AND PAYMENT

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

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801 DEMOLITION

801.1 GENERAL

801.1.1 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 an 457-mm (18-in) Drop
- AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
- ANSI A10.6 (1990; R 1998) Safety Requirements for Demolition Operations

801.1.2 General Requirements: Do not begin demolition until authorization is received from the City. Remove rubbish and debris from the project site daily do not allow accumulations outside the existing dwelling.

801.1.3 Submittals: The following shall be submitted in accordance with Section 101 SUBMITTAL PROCEDURES:

- SD-01 Preconstruction Submittals
- Existing Conditions
- SD-07 Certificates
- Demolition Plan
- Notifications
- Notification of Demolition and Renovation forms
- Proposed Demolition And Removal Procedures For Approval Before Work Is Started.
- SD-11 Closeout Submittals
- Receipts
- Receipts or bills of laden, as specified.

801.1.4 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.

Furnish timely notification of demolition activities to local residents.

Complete and submit Notice of Intent (NOI) to State authorities and Engineer delivered at least ten working days prior to commencement of work

801.1.5 Dust And Debris Control: Prevent the spread of dust and debris to existing dwellings 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 that may result in objectionable accumulation of debris and dirt.

801.1.6 Protection

801.1.6.1 Traffic Control Signs: Where pedestrian and driver safety is 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.

801.1.6.2 Existing Conditions Documentation: Before beginning any demolition work, survey the site and examine the drawings and specifications to determine the extent of the work. 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 4 inch 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 before 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.

801.1.6.3 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 of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required.

801.1.6.4 Existing Construction Limits and Protection: Do not disturb existing construction 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.

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

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

801.1.6.7 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.

801.1.6.8 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.

801.2 BURNING

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

801.3 RELOCATIONS

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

801.4 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.

801.5 ENVIRONMENTAL PROTECTION

Comply with the Environmental Protection Agency requirements specified.

801.6 EXISTING STRUCTURES TO BE REMOVED

Inspect and evaluate existing structures on site.

801.6.1 Structures: Remove existing structures indicated to be removed in its entirety. Remove sidewalks, curbs, gutters and retaining walls as indicated.

Demolish concrete and masonry walls in small sections.

801.6.2 Concrete: Saw concrete along straight lines to a depth of a minimum 2 inch. 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.

801.6.3 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 flush with the adjacent existing surface and shall match the existing adjacent surface as closely as possible as to texture and finish. Patching shall be as specified and indicated, and shall include:

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.

801.7 CLEANUP

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

801.8 DISPOSAL 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 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.

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

801.9 MEASUREMENT AND PAYMENT

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

802 TRAFFIC CONTROL - INDEX

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802.4 FLAGMEN OR PILOT CARS

802.5 TRAFFIC CONTROL MEASURES

802.6 GENERAL TRAFFIC REGULATIONS

802.7 MEASUREMENT AND PAYMENT

802 TRAFFIC CONTROL

802.1 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 theprovisions of the Contracting Agency's Traffic Barricade Manual, the Uniform Manual on Traffic Control Devices or any agency's Supplements to these Uniform Standard Specifications.

802.2 SUBMITTALS

Shall comply with Section 101 of the technical specifications and shall include a traffic control plan for all areas with pedestrian and vehicular traffic.

802.3 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.

- Temporary traffic control devices shall be used to guide traffic through construction areas. They include traffic cones to channelize traffic, portable barricades for warning, vertical panel channelizing devices to divert traffic, and lighting devices between the hours of sunset and sunrise.
- 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 8 feet above the roadway.
- Contractor to provide traffic control as designated on the project drawings for specific locations.

802.4 FLAGMEN OR PILOT CARS

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

802.5 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.

802.6 GENERAL TRAFFIC REGULATIONS

- 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.
- 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.
- A minimum of two traffic lanes, one for each direction, shall be maintained open to traffic at all times on all major streets.
- 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.
- 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.
- Arrangements for partial or complete street closure permits shall be handled through the Engineer on local projects or the Highway Department.
- An advance notice of 48 hours for major streets and 24 hours for local streets and alleys is required from the Contractor.
- The Contractor shall provide and maintain all necessary traffic controls to protect and guide traffic for all work in the construction area.
- 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. The Traffic Engineering Department will reinstall all traffic 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.
- 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 Contracting Agency's Sanitation Department in order that refuse collection service can be maintained.

802.7 MEASUREMENT AND PAYMENT

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

803 PROTECTED SITES - INDEX

803.1 PROJECT CONDITIONS

803.2 CONTRACTOR RESPONSIBILITES

803.3 SPECIES REMOVAL

803.4 MEASUREMENT AND PAYMENT

803 PROTECTED SPECIES

803.1 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.

Migratory Birds

1. Between March 15th and August 15th

    a. The 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 5 days before an area is to be disturbed.

    b. Notify the Contracting Officer Representative (COR) 72 hours before disturbing an area. Contact information to be made available at the Pre-Construction Meeting.

    c. Do not disturb a mating pair of endangered migratory birds with an egg.

        - Avoid the birds directed by the COR

803.2 CONTRACTOR RESPONSIBILITIES

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

803.3 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.

803.4 MEASUREMENT AND PAYMENT

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

804 PRESERVATION OF HISTORICAL AND ARCHAEOLOGICAL DATA - INDEX

804.1 GENERAL

804.2 DEFINITIONS
- 804.2.1 CULTURAL RESOURCES
- 804.2.2 CULTURAL ITEMS
- 804.2.3 HUMAN REMAINS
- 804.2.4 FUNERARY OBJECTS
- 804.2.5 NATIVE AMERICAN
- 804.2.6 SACRED OBJECTS
- 804.2.7 OBJECTS OF CULTURAL PATRIMONY

804.3 PROJECT CONDITIONS

804.4 DISCOVERY OF RESOURCES

804.5 DELAYS

804.6 ACCESS

804.7 CONTRACTOR RESPONSIBILITIES

804.8 MEASUREMENT AND PAYMENT

804 PRESERVATION OF HISTORICAL AND ARCHAEOLOGICAL DATA

804.1 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.

804.2 DEFINITIONS

804.2.1 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.

804.2.2 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.

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

804.2.4 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.

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

804.2.6 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.

804.2.7 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.

804.3 PROJECT CONDITIONS

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

1. The project crosses areas with cultural resources

    a. 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 (CO) that includes them.

        1. Exclusion Zones:

            Such zones are depicted on construction drawings for pipelines 6A west and 6B east.

    b. The Government or Engineer will retain an Archaeologist to monitor the work in these areas.

        1. The Contractor shall coordinate all work within these zones with Government or Engineer's Archaeologist.

804.4 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:

1. Immediate cease work at that location.

2. Provide immediate verbal notification to the CO, giving the location and nature of the findings

3. Provide immediate verbal notification to the USBR staff archaeologist in Durango, Colorado.

4. Follow with written confirmation to the CO within 12 hours.

In addition to notifying the CO; where the discovery occurs on state, tribal, municipal, or private lands, notify the appropriate Law Enforcement officials as prescribed by law or within two 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 CO.

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

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

804.5 DELAYS

Where appropriate by reason of discovery, the CO 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.

804.6 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. Brief delays to examine objects that are uncovered but do not result in a true discovery shall be incidental to pipeline construction.

804.7 CONTRACTOR RESPONSIBILITIES

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

804.8 MEASUREMENT AND PAYMENT

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

805 STORM WATER POLLUTION PREVENTION PLAN - INDEX

805.1 DESCRIPTION

805.2 SUBMITTALS

805.3 TEMPORARY EROSION AND SEDIMENT CONTROL STRUCTURES

805.4 SILT FENCES

805.5 STRAW BALES

805.6 MAINTENANCE

805.6.1 SILT FABRIC FENCE MAINTENANCE

805.7 RESEEDING

805.7.1 SEED MIXTURE
805.7.2 APPLICATION

805.8 CONSTRUCTION DETAILS

805.9 MEASUREMENT AND PAYMENT

805 STORM WATER POLLUTION PREVENTION

805.1 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 to be prepared by the Contractor for approval by the City, the Bureau of Reclamation and the New Mexico State Highway Department.

805.2 SUBMITTALS

Shall comply with Section 101 of the Technical Specifications.

805.3 TEMPORARY EROSION AND SEDIMENT CONTROL STRUCTURES

Structures shall consist of (1) fabric silt fences or (2) straw bales. In addition, the contractor must use good construction practices such as constructing low height earthen dikes along the perimeter of open trenches and other excavations to protect them from storm water run-off. The contractor must not clear and grub areas not intended for construction activity. Obvious areas where erosion and sedimentation will occur not included with the pollution prevention plan and delineated on the project drawings must be stabilized with temporary control measures.

805.4 SILT FENCES

The Contractor shall install silt fences as a temporary control structures 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. Silt fences shall be installed in the locations indicated on the drawings including bar ditches, swells and arroyos. Final removal of silt fence barriers shall be upon approval by the City.

The Contractor may 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 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 foot.

Silt fences shall extend a minimum of 18 inches above the ground surface and shall not exceed 24 inches above the ground surface. Filter fabric shall be from in 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 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4 inch by 4 inch trench shall be backfilled and the soil compacted

over the filter fabric. Filter fabric shall be securely fastened to posts with staples or wire ties. Silt fences shall be removed upon approval by the City. Manufacturer: American Excelsior Company or Equal.

805.5 STRAW BALES

The Contractor shall provide bales of straw as a temporary control structures to minimize erosion and sediment runoff. Bales shall be properly placed to effectively retain sediment immediately after completing each phase of work. Areas where straw bales are to be used are shown on the drawings. Final removal of straw bales shall be upon approval by the County.

The straw in the bales shall be stalks from oats, wheat, rye, barley or rice, furnished in air dry condition. The bales shall have a standard cross section of 14 inches 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 dimensions of 2 inches x 2 inches in cross section and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for securing straw bales, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 3 feet.

Straw bales shall be placed 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 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 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 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.

805.6 MAINTENANCE

The Contractor shall maintain the temporary and permanent 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 repair of erosion and sediment control measures and other protective measures. The following procedures shall be followed to maintain the protective measures.

805.6.1 Silt Fabric Fence Maintenance: 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 one-third of the height of the barrier.

When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade.

805.7 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 weeks of final construction.

805.7.1 Seed Mixture: Use the following pure live seed mixture per acre for certified seed, where PLS (Pure Live Seed) = Germination times Purity

The seed mixture shall be BLM Seed Mixture No. 3 as follows:

	Application Lbs. PLS per acre
Fourwing saltbrush (dewinged)	2.0 lbs.
Shadecale	0.5 lbs.
Indian Rice Grass	0.5 lbs.
Alkali Sacaton*	0.5 lbs.
PLS Total	3.5 lbs./acre

* Hand seed this species prior to drilling.

No primary or secondary noxious weeks shall be present in seed mixture.

805.7.2 Application: Compacted areas shall be ripped or scarified to a depth of twelve inches and disked to a depth of six inches before seeding. Seed with a disk type drill with two boxes for various seed sizes. The drill rows shall be eight to ten inches apart. The seed shall be planted at not less than one half inch deep or more than one 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 weeks after project completion.

Labels from each seed bag shall be available for inspection.

805.8 CONSTRUCTION DETAILS

Silt fabric fence and straw bale construction and installation details are attached.

805.9 MEASUREMENT AND PAYMENT

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

806 WATER POLLUTION CONTROL - INDEX

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  - 806.1.1.1 COST

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- 806.2.1 BUREAU OF RECLAMATION (USBR)
- 806.2.2 CODE OF FEDERAL REGULATIONS (CFR)
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806.3 SUBMITTALS
- 806.3.1 SUBMITTAL PROCEDURES
- 806.3.2 UPDATED SWPPP
- 806.3.3 SPILL PREVENTION, CONTROL & COUNTERMEASURE (SPCC) PLAN
  - 806.3.3.1 SPCC PLAN SUBMISSION
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806.6 CONTRACTOR RESPONSIBILITIES
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806.7.1.4.1 CONTRACTOR CONSTRUCTION OPERATIONS
806.7.1.4.2 STOCKPILED OR DEPOSITED MATERIALS
806.7.1.4.3 PETROLEUM PRODUCT STORAGE TANKS MANAGEMENT

806.1 GENERAL

806.1.1 MEASUREMENT & PAYMENT

806.1.1.1 Cost: Include in prices offered in the schedule for other items of work or incidental to the project.

806.2 REFERENCE STANDARDS

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

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

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

806.3 SUBMITTALS

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

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

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

806.3.3.1 Submit when SPCC Plan is required in accordance with 40 CFR, Part 112.

- SPCC Plan is required where release of oil and oil products could reasonably be 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.

806.3.3.2 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).

806.3.3.3 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:

a. Oil storage quantity.
b. Drawings of containment.
c. Response plan to spill.

806.4 REGULATORY REQUIREMENTS

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

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

- 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.

- If conflict occurs between Federal, State, Navajo Nation and local laws, regulations, and requirements, the most stringent shall apply.

806.4.3 Contractor Violations:

- If noncompliance should occur, immediately (verbally) report noncompliance to the City. Submit specific written information within 2 days.

- 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.

- The Contractor shall not be entitled to extension of time, claim for damage, or additional compensation by reason of such a work stoppage.
- Corrective measures required to bring activities into compliance shall be at the Contractor's expense.

806.5 REQUIRED PERMITS

806.5.1 Wastewater Discharge Permit:

806.5.1.1 Permit:

- 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 Environmental Protection Agency.

- Submit permit application(s) to the City, and to USBR for review before submitting to the agencies.

806.5.1.2 Terms and Conditions:

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

806.5.1.3 Monitoring and Treatment:

- Provide monitoring and water treatment, if necessary, to achieve compliance with permit conditions

- Provide recordkeeping required of the permittee, as stated in the permits.

806.5.1.4 Sampling:

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

806.5.1.5 Monitoring Results:

- Provide monitoring results to the appropriate agency as required by the permit.

- Send copies of all information transmitted to the appropriate agency and to the City.

806.5.2 Dredge and Fill Permit: The Bureau of Reclamation has made application for a 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. Nationwide permits are contained in Appendix F.

806.5.3 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).

806.5.3.1 Pollution Prevention Plan:

- The Contractor shall prepare a Pollution Prevention Plan as required by the permit.

- Comply with terms and conditions to obtain and maintain the stormwater discharge permit.

806.5.3.2 Monitoring and Water Treatment:

- Provide monitoring and water treatment, if necessary, to achieve compliance with applicable Water Quality Standards.

- Provide the recordkeeping required by the stormwater discharge permit associated with construction activity.

806.5.4 Stormwater Discharge Permit Associated with Industrial Activity

806.5.4.1 Stormwater Discharge Permit:

- 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.

806.5.4.2 Notice of Intent (NOI):

- 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 Environment Department, Surface Water Quality Bureau and/or the Navajo Nation Environmental Protection Agency.

806.5.4.3 Terms and Conditions:

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

806.5.4.4 Monitoring and Water Treatment:

- Provide monitoring and water treatment, if necessary, to achieve compliance with applicable Water Quality Standards.

- Provide monitoring results to the appropriate agency as required by the permit.

- Send copies of all information transmitted to the appropriate agency and to the City

806.5.5 Trench Dewatering

- Provide dewatering plan that outlines the manner in which dewatering is performed.
- Comply with Section 402 of the Clean Water Act. Contractor is responsible for obtaining 402 permits of the Clean Water Act. This includes any dewatering disposal. Please note permits may take up to 6 months to obtain.

806.6 CONTRACTOR RESPONSIBILITIES

806.6.1Permits: Contractor is responsible for all permits.

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

- Sampling,
- Site inspections, and

- Required laboratory tests to determine effluent characteristics.

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

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

806.7 EXECUTION

806.7.1 Pollution Controls

806.7.1.1 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

806.7.1.2 Sediment and Erosion Controls:

- Establish methods for controlling sediment and erosion which address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate.

- Institute stormwater management measures as required, including velocity dissipators, and solid waste controls which address controls for building materials and offsite tracking of sediment.

806.7.1.3 Wastewater and Stormwater Management Controls:

806.7.1.3.1 Pollution Prevention Measures:

- 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-ladened waters.

- Prevent wastewater from general construction activities such as drainwater 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.

- Divert stormwater runoff from upslope areas away from disturbed areas.

806.7.1.3.2 Turbidity Prevention Measures:

- 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.

- Wastewaters discharged into surface waters shall meet conditions of the permit(s).

- 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.

806.7.1.4 Construction Site Management:

806.7.1.4.1 Contractor Construction Operations:

- Perform construction activities by methods that will prevent entrance, or accidental spillage, of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources.
  1) 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.

806.7.1.4.2 Stockpiled or Deposited Materials:

- 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.

806.7.1.4.3 Petroleum Product Storage Tanks Management:

- 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.

- Do not use underground storage tanks.

- 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.
  1) Line diked areas with an impermeable barrier at least 50 mils thick.

- Areas for refueling operations: Lined with impermeable barrier at least 10 mils thick covered with 2 to 4 inches of soil.

807 ABANDONED MINE REMEDIATION – INDEX

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807 ABANDONED MINE REMEDIATION

807.1 DESCRIPTION

The work covered by this section of the specifications consists of furnishing all plant labor, equipment, appliances and materials in connection with mine remediation this project. The contractor is responsible for the safe conduct of the work required in this specification and for establishing and maintaining safeguards required to prevent unauthorized entry into areas where work is being conducted. The contractor shall comply with all federal, state, and local laws and regulations applicable to this work, including legal and safety issues as requested by the State Mine Inspector. Some of these issues may include registration of "mining" activities, monitoring equipment, liability determination, site security, etc.

807.2 SITES

A significant amount of the area in the western portion of this project is underlain with mine drifts and slopes of coal mine workings which occurred between the late 1800's and the early 1960's. Some areas where the workings were relatively shallow, usually in the vicinity of mine adits, exhibit visual evidence of settlement and subsidence of the ground surface. Most of the adits have been backfilled for safety purposes and their locations therefore difficult to determine. Several of such areas have however been identified and are to receive remediation for this project.

807.3 AVAILABLE INFORMATION

Information has been gathered on four mines that are in the vicinity of the project pipeline. Old maps which depict the underground workings correlate in some areas with evidence noted on the ground surface although there remains uncertainty about specific mine configurations and conditions. Published literature and exploratory drilling indicate that the coal seams vary in thickness from 3ft. to 6ft.

Exploratory drilling has provided additional information as to the location of voids and collapsed ceilings in suspected drifts and slopes as well as fractures and voids above mined areas. Some of the drill hole information was enhanced by video recordings. The exploratory drilling information and old map layouts for the following listed mines are provided on the project drawings.

A. Black Diamond Mine
B. Brown – McVickers Mine
C. Bubany Mine
D. Otero and Unknown Entry

807.4 OBJECTIVE

The objective of this work is to stabilize and fill underground voids that have or could cause subsidence along the pipeline route of this project. The focus will be on the three mine areas

listed under A, B and C above although any mine related problems encountered along the pipeline route will need to be addressed in a similar manner. Grouting and excavation/backfill methods are to be used in this project with flexibility to achieve objective goals.

807.5 IMPLEMENTATION

The extent and location of different type or remediation efforts (drilling, grouting and excavation) shall be as directed by the Engineer after consultation with the Contractor.

807.6 GROUTING

807.6.1 General: Grouting methods will require the use of air drilling equipment with depth capability of 50 ft. Two video cameras will be required that are capable of operating within the drill holes and depicting clear views of the underground conditions. Cameras to provide for real time onsite viewing and digital recording for office viewing by the Engineer. The maximum depth of grout remediation will vary depending on the extent of voids encountered but should not exceed 40ft.

Existing drill holes to be utilized if possible and/or new drill holes to be placed at approximately 10 feet intervals, usually, to the depth of suspected mine working floors, along pipeline alignment at locations as directed by the Engineer. Contractor to mobilize for pumping grout into the drill holes after review of video recordings by the Engineer. Contractor to be equipped for pumping at low pressures in larger voids or at higher pressures utilizing packers between drop pipe and hole. Pumping to begin in the lower levels in one hole while observing in adjacent holes. Pumping is to continue until the grout level is raised to a point above the void and is observed in adjacent holes,(assuming communication between holes). Pumping is then to be carried out in a similar fashion in successive adjacent holes.

Initial grout consistency in most cases should be relatively thin to achieve penetration and spread in broken rock. Many of the "minded out" areas contain broken rock within larger voids. In such cases therefore, a more viscous consistency should follow initial pumping. Grout pumping may need to be carried out in different stages utilizing different mixes and/or consistencies. Large voids may prove difficult to achieve fill-up and may require various grout modifying techniques. Such techniques could involve varying the consistency of the grout by adding cement, accelerants, flyash or approved LCM (Lost Circulation Material). Fill-up in one hole could also act as a partial bulk head for grout in adjacent holes. Grout levels to be observed until initial set occurs while grout is still above the void ceiling. Retreat of the grout level below the void ceiling will require additional grout placement.

The above procedures shall be repeated in similar fashion after development of sufficient grout strength for fractures and voids above "mined out" intervals up to a point where pipeline bedding material is to be placed.

It is the intent of the procedure described above to achieve a stable foundation for the project pipeline along its alignment including lateral extents of approximately 6 ft. (12ft. total) rather than extensive lengthwise filling of tunnels and drifts. It is believed that drill holes at

approximately 10ft. longitudinal spacing with lateral extents of 0-6ft each way is adequate to accomplish required stabilization. Close communication shall be maintained between the Engineer and contractor to coordinate and control conditions encountered and volumes of grout placed. It shall be the responsibility of the Contractor to control grouting pressures to prevent heaving of the ground surface.

807.6.2 Grout Materials: Typical grout shall be cementitious material consisting of water, cement, sand and flyash with accelerator additives as necessary. Grout may also be an approved cementious product which is utilized by companies who specialize in filling voids. Some of these products will have a cured density of 1/3 to ½ that of normal compacted soil. The properties of grout shall be such that consistencies may be varied to permit material to travel and penetrate or stack as required. Any combination of grout materials shall produce an unconfined grout strength of at least 200 PSI after 28 days.

807.6.3 Water: Water used in the grout shall be clean and free from deleterious amounts of sewage, oil, acid, alkalines, salts, organic matter or any other foreign solids. Water for the project will be available from City Well 13 located in the vicinity of County Road 43 and Miyamura Overpass.

807.6.4 Cement: The cement used shall conform to ASTM designation C 150 for Portland Cement Type I or Type II. Either bag or bulk cement will be accepted. Bag cement shall be delivered in approved paper bags with name brand, type and manufacturer marked clearly thereon. Similar information shall be provided on shipping notices accompanying each bulk shipment. A bag of cement shall contain 94 lbs. net and will be considered equal to one cubic foot.

807.6.5 Solids: Typical solids (other than cement) to be inorganic, non-soluble dry minus No. 40 mesh solids (flyash or quartz sand) will be accepted. Well rounded sand is preferable. Lost circulation material (LCM) to be evaluated during the submittal process.

807.6.6 Design Mixes: Design mixes for the types of grout to be used shall be prepared and tested for strength by a qualified testing lab. Grout material that expands once in place shall have data which shows the ratio of initial verses final volumes as well as the relationship of that ratio and consistency of material pumped into voids.

807.6.7 Grout Equipment: All drilling and grouting equipment used shall be of a type, capacity and mechanical condition suitable for accomplishing all requirements of this work. Equipment shall be maintained in first class operating condition at all times and any grout hole that is lost due to mechanical failure of equipment shall be replaced by another hole drilled at the Contractor's expense.

The grouting equipment shall include a mixer equipped with mechanically operated paddle type agitator or equivalent, and capable of mixing adequate volumes of grout per batch. This may be accomplished by using a single or multiple batch bin system. The grout pump shall be of the positive displacement variety with a capacity of 150 gpm and up to 100 psi pressure. Gauges must be present at the pump, and points of injection pressure.

A water meter shall be installed on the water line to permit accurate measurement of the quantity of water used in making the various mixes.

Facilities shall be provided to measure the proportions of water and cement required in the design mix.

The requirements described above do not preclude the use of a redi-mix material delivered to the site, or the use of equipment or material specifically designed for grout production by approved companies with experience in the business of filling voids.

807.7 EXCAVATION/BACKFILL METHODS

807.7.1 Adit (Portal) and Shallow Exploration: Exploration for adits may be carried out at some abandoned mine locations as directed by the Engineer or as called for in the project documents. The probe for location of adits are to be used to possibly better define the configuration of the mine including the floor level, ceiling, and the direction of the tunnel into the mine. Excavation is to begin at suspected floor level and continued toward natural escarpment, through fill material until rim rock header or shoring and evidence of an adit is reached. Additional excavation and clean out to be carried out as required to make desired observations. The excavated material shall be replaced and compacted to 90% Standard Proctor provided however, that material beneath pipeline is to be compacted to 92% Standard Proctor. The width of excavation to be limited as directed when exploring for adits.

Areas that consist of unconsolidated fill or that are best handled by earth moving equipment shall be stabilized by the excavation/backfill method.

807.7.2 Excavation/Backfill Beneath Pipeline: Excavation/Backfill methods may be carried out for remediation in some areas where the depth to abandoned mine floor levels or to voids above collapsed areas are not too great. Backfill beneath pipeline to be compacted to 92% Standard Proctor. Lateral reaches to be compacted to 90% Standard Proctor.

807.8 BLACK DIAMOND MINE

807.8.1 Adit (Portal) Exploration And Excavation: Contractor to excavate soil and rocks as required along pipeline alignment, with adequate sized equipment, to determine whether or not an adit once existed in the designated area. If an adit is located, and it is within or near the pipeline route, work shall follow to close the opening so that grouting methods may be employed to fill voids beneath the pipeline. All un-compacted material that was used to close the adit shall be removed and then replaced and compacted in layers of proper thickness and moisture content to achieve specified densities. Compacted material to be constructed as near as possible to the portal without entering the old tunnel.

Contractor to provide forms or earthen bulkheads as required to guide grout or flowable fill into the adit if pipeline route is in close proximity. Closure of the adit to be followed by grout remediation methods provided however that an excessive large open tunnel or void may require pipeline realignment.

807.8.2 Grouting: Grouting to follow procedures described in paragraphs above. Drill hole videos show the, coal seam increasing in depth as drill holes advance to the west. Contractor to continue the drilling until no large voids are encountered within reasonable depth as determined by the Engineer.

807. 9 BROWN-McVICKERS MINE

807.9.1 General: Depths to the floor of coal seam along pipeline alignment vary from 5ft. to approximately 25ft. where test holes were drilled. Contractor to excavate and compact backfill to suspected floor levels along the western portion of pipeline alignment. Contractor shall also probe for mine adit as directed by the Engineer where the proposed pipeline will apparently cross the abandoned tunnel. Loose and unconsolidated material encountered to be stabilized by excavation/backfill methods. Stabilization east of abandoned adit to be by excavation/backfill or grouting methods as directed after initial excavation.

Note: Water encountered in test holes is believed to be derived from surface water which has collected in areas of subsidence.

807.10 BUBANY MINE

807.10.1 General: Drill and video observation indicate coal and mining activity at depths of 34.0' to 38.0'. Old mine maps seem to be fairly accurate as evidenced by an adit still visible and sink holes that plot accurately along a slope depicted on the map. There is no apparent subsidence along the pipeline route however there are fractures and some voids above the observed coal seam. Grout and excavation/backfill methods to reasonable depths as determined by the Engineer previously described are to be used to insure the stability of formation below the bedding material for the pipeline. Remediation methods at the depth of the abandonded coal seam are deemed unnecessary unless additional test holes show otherwise.

807.11 OTERO AND UNKNOWN ENTRY

807.11.1 General: No planned remediation

807.12 MEASUREMENT & PAYMENT

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

901 DESIGN CODES AND REFERENCES – INDEX

901.1 CAST IN PLACE CONCRETE

901.2 REFERENCE STANDARDS

901.3 STEEL WATER RESERVOIRS (TANKS)

901.4 CHAIN LINK FENCING

901.5 SAFETY

901.6 ELECTRICAL

901.7 DUCTILE IRON PIPE

901.8 REGULATORY

901.9 VALVES

901.10 PIPE INSTALLATION

901.11 DISENFECTION

901.12 PAINTED SURFACES PREPARATION

901.13 INTERIOR TANKS AND OTHER VESSEL COATINGS

901.1 CAST IN PLACE CONCRETE:

- **Retaining Walls, Ringwalls, Underground Vaults**

ACI 318-08 Building Code Requirements for Structural Concrete
Table 7.2 – Minimum Diameter of Bend
Numbers 3 through 8 – 6d (inside diameter)
7.7.1(a) – Concrete cast against earth min. cover = 3in.
7.12 – Shrink page and temperature reinforcement min. rebar to concrete ratio = .0020

- **Geotechnical Report – Geomat Inc., Farmington, NM**

Active Soil Pressure 30 PSF/ft.
(37.5 Used for design)
Passive Soil Pressure 250 PSF/ft.
Allowable Bearing Pressure
5000 PSF Sandstone
3500 PSF Engineered Fill
Minimum Footing Depth – 2.5 ft.

- **AASHTO – Standard Specifications for Highway Bridges**

Allowable Stress Design
Fc = .40 f'c
Grade 40 Reinforcement = 20,000 psi
Grade 60 Reinforcement = 24,000 psi

901.2 REFERENCE STANDARDS

A. American Concrete Institute (ACI)

1. ACI 305.R-10	Standard Specification for Hot Weather Concreting
2. ACI 306.1-90(2002)	Standard Specifications for Cold Weather Concreting

B. ASTM International (ASTM)

1. ASTM A 615/A 615M-09b	Deformed and Plain Bars for Concrete Reinforcement
2. ASTM A 996/A 996M-09b	Rail-Steel and Axle –Steel Deformed Bars for Concrete Reinforcement
3. ASTM C 31/C 31M-10	Making and Curing Concrete Test Specimens in the Field
4. ASTM C33/C 33M-11	Concrete Aggregates

5. ASTM C 39/C 39M-11a	Compressive Strength of Cylindrical Concrete Specimens
6. ASTM C 42/C 42M-10a	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
7. ASTM C 94/C 94M-11b	Ready-Mixed Concrete
8. ASTM C 114-11b	Chemical Analysis of Hydraulic Cement
9. ASTM C 143/C 143M-10a	Slump of Hydraulic-Cement Concrete
10. ASTM C 150/C 150M-11	Portland Cement
11. ASTM C 171-07	Sheet Materials for Curing Concrete
12. ASTM C 231/C 231-10	Air Content of Freshly Mixed Concrete by the Pressure Method
13. ASTM C 260-10a	Air-Training Admixtures for Concrete
14. ASTM C 309-11a	Liquid Membrane-Forming Compounds for Curing Concrete
15. ASTM C 494/C 494M-11	Chemical Admixtures for Concrete
16. ASTM C 618-08a	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
17. ASTM C 1017/C 1017M-07	Chemical Admixtures for Use in Producing Flowing Concrete
18. ASTM C 1260-07	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
19. ASTM C 1293-08b	Determination of Length Change of Concrete Due to Alkali-Silica Reaction
20. ASTM C 1567-11	Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
21. ASTM C 1602/C 1602M-06	Mixing Water Used in the Production of Hydraulic Cement Concrete

- **Precast Circular Manhole Vaults:**

ASTM C-478 Precast Reinforced Concrete
AASHTO M-199 Precast Reinforced Concrete
AASHTO M-198B Flexible Butyl Resin Sealant
ASTM D-4479 Foundation Coating

901.3 STEEL WATER RESERVOIRS (TANKS):

ANSI/AWWA D100-05 – Welded Carbon Steel Tanks for Water Storage

901.4 CHAIN LINK FENCING:

ASTM	A121 Specification for Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM	A392 Specification for Zinc-Coated Steel Chain Link Fence Fabric
ASTM	F626 Specification for Fence Fitttings
ASTM	F1083 Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, for Fence Structures
ASTM	F900 Specification for Industrial and Commercial Swing Gates

901.5 SAFETY:

- **OSHA** Construction Standards for Excavations
- **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

901.6 ELECTRICAL:

- **NEC** National Electric Code
- **NFPA** National Fire Protection Association Standards
- **IEEE** Institute of Electrical and Electronic Engineers
- **GJU** City of Gallup Joint Utilities- Electrical Line, Meter Disconnect and Service Standards

901.7 DUCTILE IRON PIPE:

AWWA C104	Cement Mortar Lining for Ductile Iron Pipe
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	Flanged Ductile Iron Pipe with Ductile Iron
AWWA C150	Tlucknes Design for Ductile Iron Pipe
AWWA C151	Ductile Iron Pipe Centrifugally Cast, for Water or Other Liquids

901.8 REGULATORY:

- **NMDWR** New Mexico Drinking Water Regulations

901.9 VALVES:

AWWA C509	Resilient Wedge Gate Valves for Water Supply (2"–12")
AWWA C515	Resilient Wedge Gate Valves for Water Supply (14"– 48")
AWWA C550	Protective Epoxy Coatings for Values & Hydrants

901.10 PIPE INSTALLATION:

AWWA C600	Installation of Ductile Iron Water Mains and Appurtenances

901.11 DISENFECTION:

AWWA C651 Standard for Disinfecting Water Mains
AWWA C652 Standards for Disinfecting Water Storage Facilities

901.12 PAINTED SURFACES PREPARATION:

- **SSPC** Steel Structures Painting Council
  Steel Structures Painting Manual
  SSPC-SP10 Neat White Blast Cleaning
  SSPC-SP6 Commercial Blast Cleaning

901.13 INTERIOR TANKS AND OTHER VESSEL COATINGS:

NSF61 All Welted Materials (Potable Water)

APPENDICIES

A. EPA FORMS (NPDES)
   NOTICE OF INTENT
   NOTICE OF TERMINATION

B. NEW MEXICO WAGE RATES

C. S.C.A.D.A. AND ELECTRICAL COST ESTIMATES
   1. SKM, INC. S.C.A.D.A. COST ESTIMATES (HEATON & HOGBACK)
   2. HEATON PUMP STATION LINE REVISIONS & TRANSFORMER - CITY OF GALLUP
   3. HOGBACK PRV STATION SINGLE PHASE LINE EXTENSION & TRANSFORMER - CITY OF GALLUP

D. GEOTECHNICAL REPORTS
   1. NAVAJO GALLUP WATER SUPPLY PROJECT – REACH 27.6. MCKINLEY COUNTY, NEW MEXICO
   2. NAVAJO GALLUP WATER SUPPLY PROJECT – HEATON PUMP STATION & HOGBACK PRESSURE REDUCING STATION. GALLUP, NEW MEXICO

E. HIGHWAY PERMITS
   1. HIGHWAY 608 - 18" LINE CROSSING
   2. HIGHWAY I-40/X-RD - 12" LINE CROSSING
   3. HIGHWAY 118 - 12" LINE CROSSING
   4. HIGHWAY I-40 - 14" LINE CROSSING
   5. WORK PERMIT FORM

F. 404 & 401 PERMITS
   DEPARTMENT OF THE ARMY ALBUQUERQUE DISTRICT CORPS OF ENGINEERS
   - ACTION NUMBER SPA-2012-00254-ABQ USBR NAVAJO-GALLUP WATER SUPPLY PROJECT, REACHE 27.6 (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

G. BNSF RAILWAY PIPELINE LICENSE

APPENDIX A

EPA Forms (NPDES)

Notice of Intent

Notice of Termination

This Form Replaces Form 3510-9 (8-98)
Refer to the Following Pages for Instructions

Form Approved OMB Nos. 2040-0188 and 2040-0211

NPDES FORM

EPA

United States Environmental Protection Agency
Washington, DC 20460

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

Submission of this Notice of Intent (NOI) constitutes notice that the party identified in Section II of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section I of this form. Submission of this NOI also constitutes notice that the party identified in Section II of this form meets the eligibility requirements of the CGP for the project identified in Section III of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Refer to the instructions at the end of this form.

I. Permit Number

II. Operator Information

Name:

IRS Employer Identification Number (EIN): –

Mailing Address:

Street:

City: State: Zip Code: -

Phone: - - Fax (optional): - -

E-mail:

III. Project/Site Information

Project/Site Name:

Project Street/Location:

City: State: Zip Code: -

County or similar government subdivision:

Latitude/Longitude (Use one of three possible formats, and specify method)

Latitude 1. __°__'__.__" N (degrees, minutes, seconds)
2. __°__.__' N (degrees, minutes, decimal)
3. __.__ __ __° N (degrees decimal)

Longitude 1. ___°__'__.__" W (degrees, minutes, seconds)
2. ___°__.__' W (degrees, minutes, decimal)
3. ___.__ __ __" W (degrees decimal)

Method: ☐ U.S.G.S. topographic map ☐ EPA web site ☐ GPS ☐ Other:

If you used a U.S.G.S. topographic map, what was the scale? _____

Project located in Indian Country? ☐ YES ☐ NO

If yes, name of reservation, or if not part of a reservation, put "Not Applicable:" _____

Estimated Project Start Date: / / (Month / Day / Year)

Estimated Project Completion Date: / / (Month / Day / Year)

Estimated Area to be Disturbed (to the nearest quarter acre): .

IV. SWPPP Information

Has the SWPPP been prepared in advance of filing this NOI? ☐ YES ☐ NO

Location of SWPP for Viewing: ☐ Address in Section II ☐ Address in Section III ☐ Other
If other:

SWPPP Street:

City: State: Zip Code: -

SWPPP Contact Information (if different than that in Section II):

Name:

Phone: - - Fax (optional): - -

E-mail:

V. Discharge Information

Identify the name(s) of waterbodies to which you discharge. _____

_____

Is this discharge consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s)? ☐ YES ☐ NO

VI. Endangered Species Protection

Under which criterion of the permit have you satisfied your ESA eligibility obligations?

☐ A ☐ B ☐ C ☐ D ☐ E ☐ F

If you select criterion F, provide permit tracking number of operator under which you are certifying eligibility:

VII. Certification Information

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:

Title:

Signature: _____ Date:

E-mail: _____

NOI Preparer (Complete if NOI was prepared by someone other than the certifier)

Prepared by:

Organization:

Phone: - - Ext. E-mail: _____

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit

NPDES Form Date | This Form Replaces Form 3510-9 (8/98) | Form Approved OMB Nos. 2040-0188 and 2040-0211

Who Must File an NOI Form

Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et. seq.; the Act), federal law prohibits storm water discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) Permit. Operator(s) of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must submit an NOI to obtain coverage under an NPDES general permit. Each person, firm, public organization, or any other entity that meets either of the following criteria must file this form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with SWPPP requirements or other permit conditions. If you have questions about whether you need an NPDES storm water permit, or if you need information to determine whether EPA or your state agency is the permitting authority, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755.

Where to File NOI Form

See the applicable CGP for information on where to send your completed NOI form.

Completing the Form

Obtain and read a copy of the appropriate EPA Storm Water Construction General Permit for your area. To complete this form, type or print uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink . do not send a photocopied signature.

Section I. Permit Number

Provide the number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible permit numbers).

Section II. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application. An operator of a project is a legal entity that controls at least a portion of site operations and is not necessarily the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS), also commonly referred to as your taxpayer ID. If the applicant does not have an EIN enter "NA" in the space provided. Also provide the operator's mailing address, telephone number, fax number (optional) and e-mail address (to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

The applicant must also provide the latitude and longitude of the facility either in degrees, minutes, seconds; degrees, minutes, decimal; or decimal format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and EPA's web-based siting tools, among others. Refer to *www.epa.gov/npdes/stormwater/cgp* for further guidance on the use of these methodologies. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. Applicants must specify which method they used to determine latitude and longitude. If a U.S.G.S. topographic map is used, applicants are required to specify the scale of the map used.

Indicate whether the project is in Indian country, and if so, provide the name of the Reservation. If the project is in Indian Country Lands that are not part of a Reservation, indicate "not applicable" in the space provided.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 05/27/1998). Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest quarter acre. Note: 1 acre = 43,560 sq. ft.

Section IV. SWPPP Information

Indicate whether or not the SWPPP was prepared in advance of filing the NOI form. Check the appropriate box for the location where the SWPPP may be viewed. Provide the name, fax number (optional), and e-mail address of the contact person if different than that listed in Section II of the NOI form.

Section V. Discharge Information

Enter the name(s) of receiving waterbodies to which the project's storm water will discharge. These should be the first bodies of water that the discharge will reach. (Note: If you discharge to more than one waterbody, please indicate all such waters in the space provided and attach a separate sheet if necessary.) For example, if the discharge leaves your

site and travels through a roadside swale or a storm sewer and then enters a stream that flows to a river, the stream would be the receiving waterbody. Waters of the U.S. include lakes, streams, creeks, rivers, wetlands, impoundments, estuaries, bays, oceans, and other surface bodies of water within the confines of the U.S. and U.S. coastal waters. Waters of the U.S. do not include man-made structures created solely for the purpose of wastewater treatment. U.S. Geological Survey topographical maps may be used to make this determination. If the map does not provide a name, use a format such as "unnamed tributary to Cross Creek". If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.

Indicate whether your storm water discharges from construction activities will be consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s). To answer this question, refer to www.epa.gov/npdes/stormwater/cgp for state- and regional-specific TMDL information related to the construction general permit. You may also have to contact your EPA regional office or state agency. If there are no applicable TMDLs or no related requirements, please check the "yes" box in the NOI form.

Section VI. Endangered Species Information

Indicate for which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of federally listed endangered and threatened species, and designated critical habitat. See Part 1.3.C.6 and Appendix C of the permit. If you select criterion F, provide the permit tracking number of the operator under which you are certifying eligibility. The permit tracking number is the number assigned to the operator by the Storm Water Notice Processing Center after EPA acceptance of a complete NOI.

Section VII. Certification Information

All applications, including NOIs, must be signed as follows: *For a corporation:* By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means:

(i) a 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, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name, title, and email address of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage. If the NOI was prepared by someone other than the certifier (for example, if the NOI was prepared by the facility SWPPP contact or a consultant for the certifier's signature), include the name, organization, phone number and email address of the NOI preparer.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of 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: Chief, Information Policy Branch 2136, U.S. Environmental Protection, Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

Visit this website for mailing instructions:
www.epa.gov/npdes/stormwater/mail

Visit this website for instructions on how to submit electronically:
www.epa.gov/npdes/stormwater/enoi

This Form Replaces Form 3517-7 (8-98)
Refer to the Following Page for Instructions

Form Approved OMB Nos. 2040-0086 and 2040-0211

NPDES FORM

EPA

United States Environmental Protection Agency
Washington, DC 20460

Notice of Termination (NOT) of Coverage Under an NPDES General Permit for Stormwater Discharges Associated with Construction Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge stormwater associated with construction activity under the NPDES program from the site identified in Section III of this form. All necessary information must be included on this form. Refer to the instructions at the end of this form.

I. Permit Information

NPDES Stormwater General Permit Tracking Number:

Reason for Termination (Check only one):

- ☐ Final stabilization has been achieved on all portions of the site for which you are responsible.
- ☐ Another operator has assumed control, according to Appendix G, Section 11.C of the CGP, over all areas of the site that have not been finally stabilized.
- ☐ Coverage under an alternative NPDES permit has been obtained.
- ☐ For residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

II. Operator Information

Name:

IRS Employer Identification Number (EIN): –

Mailing Address:

Street:

City: State: Zip Code: -

Phone: - - Fax (optional): - -

E-mail:

III. Project Site Information

Project/Site Name:

Project Street/Location:

City: State: Zip Code: -

County or similar government subdivision:

IV. Certification Information

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: _____

Email: _____

Signature: _____

Date: _____

Instructions for Completing EPA Form 3510-13

Notice of Termination (NOT) of Coverage Under an NPDES General Permit for Stormwater Discharges Associated with Construction Activity

NPDES Form | This Form Replaces Form 3517-7 (8-98) | Form Approved OMB Nos. 2040-0086 and 2040-0211

Who May File an NOT Form
Permittees who are presently covered under the EPA-issued National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity may submit an NOT form when final stabilization has been achieved on all portions of the site for which you are responsible; another operator has assumed control in accordance with Appendix G, Section 11.C of the General Permit over all areas of the site that have not been finally stabilized; coverage under an alternative NPDES permit has been obtained; or for residential construction only, temporary stabilization has been completed and the residence has been transferred to the homeowner.

"Final stabilization" means that all soil disturbing activities at the site have been completed and that a uniform perennial vegetative cover with a density of at least 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed. See "final stabilization" definition in Appendix A of the Construction General Permit for further guidance where background native vegetation covers less than 100 percent of the ground, in arid or semi-arid areas, for individual lots in residential construction, and for construction projects on land used for agricultural purposes.

Completing the Form
Type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, refer to *www.epa.gov/npdes/stormwater/cgp* or telephone the Stormwater Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number
Enter the existing NPDES Stormwater General Permit Tracking Number assigned to the project by EPA's Stormwater Notice Processing Center. If you do not know the permit tracking number, refer to *www.epa.gov/npdes/stormwater/cgp* or contact the Stormwater Notice Processing Center at (866) 352-7755.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box. Check only one:

Final stabilization has been achieved on all portions of the site for which you are responsible.

Another operator has assumed control according to Appendix G, Section 11.C over all areas of the site that have not been finally stabilized.

Coverage under an alternative NPDES permit has been obtained.

For residential construction only, if temporary stabilization has been completed and the residence has been transferred to the homeowner.

Section II. Operator Information
Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this application and is covered by the permit tracking number identified in Section I. The operator of the project is the legal entity that controls the site operation, rather than the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS). If the applicant does not have an EIN enter "NA" in the space provided. Enter the complete mailing address, telephone number, and email address of the operator. Optional: enter the fax number of the operator.

Section III. Project/Site Information
Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., Intersection of State Highways 61 and 34). Complete site information must be provided for termination of permit coverage to be valid.

Section IV. Certification Information
All applications, including NOIs, must be signed as follows:
For a corporation: By a responsible corporate officer. For the purpose of this Part, a responsible corporate officer means: (i) a 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, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name, title, and email address of the person signing the form and the date of signing. An unsigned or undated NOT form will not be considered valid termination of permit coverage.

Paperwork Reduction Act Notice
Public reporting burden for this application is estimated to average 0.5 hours per notice, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of 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: Chief, Information Policy Branch, 2136, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Include the OMB number on any correspondence. Do not send the completed form to this address.

Visit this website for mailing instruction:
www.epa.gov/npdes/stormwater/mail

Visit this website for instructions on how to submit electronically:
www.epa.gov/npdes/stormwater/enoi

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

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.

General Contractor

- Provide a complete Subcontractor List and Statements of Intent (SOI) to pay Prevailing Wages for each Contractor 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.
- Submit bi-weekly certified payrolls to the Contracting Agency.
- 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.
- Make sure, when a project has been completed, the Affidavits of Wages Paid (AWP) is sent to the Contracting Agency.

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.
- Submit bi-weekly certified payrolls to the General Contractor(s).

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

- 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.

Additional Information

Reference material and forms may be found at New Mexico Department of Workforce Solutions Public Works web pages at: http://www.dws.state.nm.us/new/Labor_Relations/publicworks.html.

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, 2016

Trade Classification	Base Rate	Fringe Rate
Bricklayer/Blocklayer/Stonemason	23.32	8.04
Carpenter/Lather	23.40	9.02
Cement Mason	17.11	6.32
Ironworker	26.50	14.32
Painter (Brush/Roller/Spray)	16.00	5.58
Electricians (outside)		
Groundman	21.28	10.53
Equipment Operator	30.54	12.94
Lineman/Wireman or Tech	35.94	14.34
Cable Splicer	39.52	15.28
Plumber/Pipefitter	28.30	4.07
Laborers		
Group I	12.20	5.30
Group II	12.50	5.30
Group III	12.90	5.30
Operators		
Group I	16.69	6.16
Group II	17.44	6.16
Group III	17.55	6.16
Group IV	17.63	6.16
Group V	17.75	6.16
Group VI	17.89	6.16
Group VII	18.27	6.16
Group VIII	18.50	6.16
Group IX	25.45	6.16
Group X	28.35	6.16
Truck Drivers		
Group I	13.32	0.26
Group II	13.52	0.26
Group III	13.72	0.26
Group IV	13.92	0.26

NOTE: SUBSISTENCE, ZONE AND INCENTIVE PAY APPLY ACCORDING TO THE PARTICULAR TRADES COLLECTIVE BARGAINING AGREEMENT. DETAILS ARE LOCATED AT WWW.DWS.STATE.NM.US.

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:
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 Contract Amount:		Start date 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 Contract Amount:		Start date 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 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

(Revised 08/22/2013)

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

S.C.A.D.A. & Electrical Cost Estimates

SKM, Inc.

S.C.A.D.A.

Cost Estimate

skm inc

533 W. 2600 S., SUITE 25 BOUNTIFUL, UTAH 84010 PHONE: (801) 677-0011 / FAX: (801) 677-0013

PROJECT PROPOSAL

DATE: July 29, 2015

TO: Kurt Spolar

FROM: Mark Jeppsen

RE: Heaton Pump Station Systems Integration Proposal Revision 0

CC:

SKM is pleased to provide this proposal to provide Systems Integration for the Heaton Pump Station for the City of Gallup. The proposal is broken down into three parts:

1. Assumed Systems Integration Criteria
2. Project Tasks / Scope of Work
3. Cost Breakdown

1. Assumed Systems Integration Criteria

The following assumptions have been made for the Systems Integration Criteria in developing the tasks and cost breakdown for this project:

1. SKM will be providing an RTU panel to be located at the Heaton Pump Station. This control panel will have PLC equipment and Radio Equipment
2. SKM will provide all antennas and associated radio cabling and lightning protection. The Electrical Contractor will be responsible for installing the antenna mast and any necessary conduit to the RTU panel.
3. The Electrical Contractor will install the RTU panel and all corresponding conduit, wire and instrumentation connections.
4. SKM will be providing the labor to add the Heaton Site to the overall SCADA System.
5. The Heaton site will have a PC for monitoring and controlling the SCADA system. This will require an Ethernet radio and associated equipment.

2. Project Tasks / Scope of Work

<u>Task #1 – Equipment</u>

1.1 Heaton Pump Station RTU Panel completely built and assembled which includes the following:

- 48"h x 36"w x 12"d NEMA 12 Enclosure and backpanel
- Control Microsystems SCADAPack 334 Controlller
- MDS SD4 radio for communications with the master radio
- All necessary antennas, coaxial and lightning arrestors.
- All other necessary panel components
- Ethernet radio, switch for operator workstation

- Desktop PC with SCADA Client License

Task #2 – Labor and Startup

2.1 Heaton Pump Station RTU Panel Design
2.2 PLC and HMI Programming for the Heaton Pump Station RTU, including the comm logic to Sacred Heart Tank
2.3 Radio reconfigurations
2.4 Ethernet network configuration and SCADA workstation configuration
2.5 Startup and Commissioning

3. Cost Breakdown

This project will be performed on a fixed fee basis in accordance with the costs shown herein. Invoices will be based on a percentage of completion. I have planned on two days on site to complete the work. For this trip I have budgeted for two 10 hour days for one individual with flights, rentals, hotels and travel time. These costs are shown as a line item for each task. The cost breakdown is associated with the tasks described above and with the following rates:

1. Project Manager / Professional Engineer - $120/Hour
2. Senior Programmer - $110/Hour
3. Draftsman - $75/Hour.

Task Information		Hours of Service Required			Equipment	Per Diem	Cost
Task #	Description	PM / Engineer	Senior Programmer	Draftsman			
1	Equipment				$16,000		$16,000
2	Labor and Startup	20	80	24	$100	$1,000	$14,100

Total Cost: **$30,100**

- END -

skm inc

533 W. 2600 S., SUITE 25 BOUNTIFUL, UTAH 84010 PHONE: (801) 677-0011 / FAX: (801) 677-0013

PROJECT PROPOSAL

DATE: July 29, 2015

TO: Kurt Spolar

FROM: Mark Jeppsen

RE: Hogback PRV Station Systems Integration Proposal Revision 0

CC:

SKM is pleased to provide this proposal to provide Systems Integration for the Hogback PRV Station for the City of Gallup. The proposal is broken down into three parts:

1. Assumed Systems Integration Criteria
2. Project Tasks / Scope of Work
3. Cost Breakdown

1. Assumed Systems Integration Criteria

The following assumptions have been made for the Systems Integration Criteria in developing the tasks and cost breakdown for this project:

1. SKM will be providing an RTU panel to be located at the Hogback PRV Station. This control panel will have PLC equipment and Radio Equipment
2. SKM will provide all antennas and associated radio cabling and lightning protection. The Electrical Contractor will be responsible for installing the antenna mast and any necessary conduit to the RTU panel.
3. The Electrical Contractor will install the RTU panel and all corresponding conduit, wire and instrumentation connections.
4. SKM will be providing the labor to add the Hogback PRV Station Site to the overall SCADA System.

2. Project Tasks / Scope of Work

<u>Task #1 – Equipment</u>

1.1 Hogback PRV Station RTU Panel completely built and assembled which includes the following:

- 48"h x 36"w x 12"d NEMA 12 Enclosure and backpanel
- Control Microsystems SCADAPack 334 Controlller
- MDS TransNET radio for communications with the radio system
- All necessary antennas, coaxial and lightning arrestors.
- All other necessary panel components

<u>Task #2 – Labor and Startup</u>

skm inc

533 W. 2600 S., SUITE 25 BOUNTIFUL, UTAH 84010 PHONE: (801) 677-0011 / FAX: (801) 677-0013

2.1 Hogback PRV Station RTU Panel Design
2.2 PLC and HMI Programming for the Hogback PRV RTU
2.3 Radio reconfigurations
2.4 Startup and Commissioning

3. Cost Breakdown

This project will be performed on a fixed fee basis in accordance with the costs shown herein. Invoices will be based on a percentage of completion. I have planned on two days on site to complete the work. For this trip I have budgeted for two 10 hour days for one individual with flights, rentals, hotels and travel time. These costs are shown as a line item for each task. The cost breakdown is associated with the tasks described above and with the following rates:

1. Project Manager / Professional Engineer - $120/Hour
2. Senior Programmer - $110/Hour
3. Draftsman - $75/Hour.

Task Information		Hours of Service Required			Equipment	Per Diem	Cost
Task #	Description	PM / Engineer	Senior Programmer	Draftsman			
1	Equipment				$8,500		$8,500
2	Labor and Startup	12	40	20	$100	$1,000	$8,440

Total Cost: **$16,940**

- END -

Heaton Pump Station Line Revisions & Transformer City of Gallup

CITY OF GALLUP

Date: 5/2/2014

Estimate #: *Preliminary*

Estimate For :

DePauli Engineering
Kurt Spolar
505-863-5440
Email:kuspolar@depauliengineering.com
RE: Heaton Pump Station Estimate

Overhead Installation Description	Qty.	Material	/ Unit	Total	Material	Labor	Equipment
45 ft Class 3 Wood Pole	1	$1,133.53	/ Unit	$1,133.53	$903.88	$144.77	$84.88
Three Phase Tangent Assembly	1	$354.02	/ Unit	$354.02	$111.31	$144.77	$97.94

Underground Installation Description	Qty.	Material	/ Unit	Total	Material	Labor	Equipment
Three Phase Riser Assembly	1	$1,405.61	/ Unit	$1,405.61	$758.41	$386.04	$261.16
225 KVA Pad Mount 480/277 V Transformer	1	$6,416.00	/ Unit	$6,416.00	$6,416.00	$0.00	$0.00
Three Phase Transformer Assembly	1	$792.70	/ Unit	$792.70	$412.47	$337.79	$42.44
No. 2 Aluminum 15 KV URD Conductor	300	$4.12	/ FT	$1,236.00	$594.00	$216.00	$426.00
Engineering / Office	8		Hrs		$0.00	$191.44	$12.19
City of Gallup Overhead	37%				$0.00	$525.70	$0.00
					$9,196.07	$1,946.51	$924.61
	Tax: 8.3125%				$764.42	$161.80	$0.00
					$9,960.49	$2,108.31	$924.61

Subtotal :	$12,993.42
Miscellaneous Materials, Labor, and Equipment:	$1,949.01
GJU Transformer Contribution:	$1,500.00
Total Cost of Power Line Project :	$13,442.43

Miscellaneous Material, Labor and Equipment 15%
Gross Receipts Tax : 8.3125%

Eric Winkler
Engineering Tech
GJU, Utilities Administration

Customer's Signature
Acknowledging Estimate And
Authorizing Commencement of Project

Hogback PRV Station Single Phase Line Extension & Transformer City of Gallup

CITY OF GALLUP

Date: 5/2/2014

Estimate #: *Preliminary*

Estimate For :

DePauli Engineering
Kurt Spolar
505-863-5440
Email:kuspolar@depauliengineering.com
RE: Hogback Site - East Gallup

Installation Description	Qty.	Material / Unit	Total	Material	Labor	Equipment
45 ft Class 3 Wood Pole With Grounding	3	$942.19 / Unit	$2,826.57	$2,137.62	$434.31	$254.64
Single Phase Dead End Assembly	4	$231.17 / Unit	$924.68	$115.68	$482.56	$326.44
Single Phase Tangent Assembly	1	$173.15 / Unit	$173.15	$43.71	$77.21	$52.23
Single Phase Down Guy Assembly	4	$332.90 / Unit	$1,331.60	$713.12	$386.04	$232.44
10 KVA Single Phase Pole Mount Transformer	1	$750.15 / Unit	$750.15	$750.15	$0.00	$0.00
Single Phase Pole Mount Transformer Assembly	1	$303.52 / Unit	$303.52	$182.17	$72.38	$48.97
No. 2 ACSR 15 KV Conductor	1560	$0.86 / FT	$1,341.60	$436.80	$374.40	$530.40
Engineering / Office	8	Hrs		$0.00	$200.00	$30.00
City of Gallup Overhead	37%			$0.00	$749.95	$0.00
				$4,379.25	$2,776.85	$1,475.12
	Tax: 8.3125%			$364.03	$230.83	$0.00
				$4,743.28	$3,007.68	$1,475.12

Subtotal :	$9,226.07
Miscellaneous Material, Equipment, and Labor :	$1,383.91
Total Cost of Power Line Project :	$10,609.99
GJU Project Contribution :	$1,500.00
Customer Pays:	$9,109.99

Miscellaneous Material, Equipment, and Labor : 15%
Gross Receipts Tax : 8.3125%

Eric Winkler
Engineering Tech
GJU, Utilities Administration

Customer's Signature
Acknowledging Estimate And
Authorizing Commencement of Project

APPENDIX D

Geotechnical Engineering Reports

Geotechnical Engineering Report

Navajo Gallup Water Supply Project – Reach 27.6 McKinley County, New Mexico

DePauli Engineering & Surveying, LLC
-Civil Engineering and Land Surveyors-

GEOTECHNICAL ENGINEERING REPORT
NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.6
MCKINLEY COUNTY, NEW MEXICO

Submitted To:

Marc A. DePauli, PE/PS
DePauli Engineering & Surveying LLC
102 West Hill Avenue
Gallup, New Mexico 87301

Submitted By:

GEOMAT Inc.
915 Malta Avenue
Farmington, New Mexico 87401

June 7, 2012
GEOMAT Project 122-1529

GEOMAT INC
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

June 7, 2012

Marc A. DePauli, PE/PS
DePauli Engineering & Surveying LLC
102 West Hill Avenue
Gallup, New Mexico 87301

RE: Geotechnical Engineering Study
Navajo Gallup Water Supply Project
Reach 27.6
McKinley County, New Mexico
GEOMAT Project No. 122-1529

GEOMAT Inc. (GEOMAT) has completed the geotechnical engineering exploration for Reach 27.6 of the proposed Navajo Gallup Water Supply Project to be located between Gallup and Rehoboth in McKinley County, New Mexico. This study was performed in general accordance with the scope of work described in our revised Proposal No. 112-10-04 dated April 16, 2012.

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

GEORGE A. MADRID NEW MEXICO 9110 REGISTERED PROFESSIONAL ENGINEER

George A. Madrid, P.E. 6.7.12
President, Principal Engineer

Copies to: Addressee (2)

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GEOTECHNICAL ENGINEERING REPORT
NAVAJO GALLUP WATER SUPPLY PROJECT
REACH 27.6
MCKINLEY COUNTY, NEW MEXICO
GEOMAT PROJECT NO. 122-1529

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for Reach 27.6 of the proposed Navajo Gallup Water Supply Project to be located between Gallup and Rehoboth 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 27.6 of the Navajo Gallup Water Supply Project will consist of approximately 33,000 lineal feet of 12- and 18-inch diameter, Class 250 or 350 ductile iron water line between Gallup on the west and Rehoboth on the east. The minimum depth of soil cover over the pipe is understood to be three and one-half feet. The project is divided into Reaches 27.6A (approximately 17,970 lineal feet) and 27.6B (approximately 12,686 lineal feet). In addition to Reaches 27.6 A and 27.6B, the project includes the Rehoboth line (approximately 800 lineal feet) and the Montoya line (approximately 1,600 lineal feet).

SITE EXPLORATION

Our scope of services performed for this project included a site reconnaissance by a staff geologist, in-situ soil resistivity and density testing, a subsurface exploration program, laboratory testing and engineering analyses.

Field Exploration:

Sixteen in-situ soil resistivity tests were performed on April 18 and 19, 2012 at approximately 2,500-foot intervals along the pipeline alignment as shown on the Site Plan. The resistivity tests, designated R-1 through R-16, 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 May 1 - 3, 2012, by excavating 31 exploratory test pits at the approximate locations shown on the Site Plan in Appendix A. The test pits, designated TP-1 through TP-32, were excavated at roughly 1,200-foot intervals along the alignment using a Case 590 rubber-tire backhoe with a 24-inch wide bucket.

By consensus with PNM personnel and DePauli Engineering & Surveying, test pit TP-23 was not excavated due to the presence of an underground gas pipeline at the proposed test pit location. Due to the rugged terrain, it was not practical to move the test pit to a different location.

The natural moisture content and in-place dry density of the soils were measured in each test pit at a depth of approximately four feet below existing ground surface using a nuclear densometer. The test pits were advanced to depths of approximately ten feet or to practical refusal on formational rock.

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.

In addition to the resistivity testing and subsurface exploration, we obtained a representative sample of borrow soil from the City of Gallup materials stockpile. The sample was tested for gradation, plasticity, maximum density/optimum moisture, swell potential, sulfate content, and

electrical resistivity to help evaluate its suitability for use as bedding and/or backfill during construction of the pipeline. Results of these tests are presented in Appendix B.

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.

SITE CONDITIONS

From its beginning approximately one-half mile south of the intersection of U.S. Highway 491 and South Chino Road (Station 0+00), the Reach 27.6 alignment extends generally eastward roughly 5.7 miles to its end approximately one mile west of Rehoboth. The project is divided into two major sections: Reach 27.6A (Station 0+00 to 175+00) and Reach 27.6B (Station 0+00 to 126+00).

The western portion of the alignment (Reach 27.6A) traverses rough, hilly terrain for approximately three miles through the area north of Gallup and Interstate 40. The majority of this area was undeveloped and was vegetated by moderate to thick growths of sagebrush, grasses, and weeds. Bedrock was observed at the ground surface and in outcrops in many areas along this portion of the alignment.

The eastern portion of the alignment (Reach 27.6B) generally follows County Road 43 for roughly two miles to the end of project near the intersection of CR 43 and Interstate 40.

The project also includes two shorter sections of pipeline: the Rehoboth Line and the Montoya Line. The Rehoboth Line consists of roughly 800 feet of pipeline running north-south between the junction of Reaches 27.6A and 27.6B on the north and Interstate 40 on the south. The Montoya Line consists of roughly 1,600 feet of pipeline running along the north side of CR 43 in the vicinity of the Armory building.

SUBSURFACE CONDITIONS

Soil Conditions:

As presented on the Test Pit Logs in Appendix A, we encountered formational rock at relatively shallow depths along much of the Reach 27.6A alignment. The rock was generally slightly to highly weathered and included sandstone, shale, and coal. Formational rock was

encountered at depths ranging from the surface to approximately five feet below existing ground surface. Using a backhoe with a 24-inch wide bucket, it was possible to excavate between approximately one to five feet into the sandstone, before experiencing practical refusal, as noted on the individual test pit logs in Appendix A. It was possible to excavate the shale to the full depths of the test pits with slight to moderate difficulty.

In topographically lower areas along the Reach 27.6A alignment, we encountered sandy and clayey soils to the total depths explored. The soils were generally slightly damp to moist and included silty sand, clayey sand, lean clay, and fat clay.

Along the Reach 27.6B, Rehoboth, and Montoya alignments, we encountered generally sandy and clayey soils to the total depths explored, with the exception of the areas near test pits TP-24 and TP-32, where formational shale was encountered below the surficial soils. The soils were generally slightly damp to moist and included sand, silty sand, lean clay, fat clay, and minor occurrences of gravel.

In-place nuclear density/moisture tests were performed in the test pits where practical. Based on the nuclear tests, the in-place dry densities of the subsurface materials ranged from approximately 83 to 106 pounds per cubic foot (pcf). Existing moisture contents ranged from approximately 5 to 24 percent. Results of the nuclear density/moisture tests are presented on the Test Pit Logs and on the Summary of Soil Tests table in Appendices A and B, respectively.

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.

Although no free water was encountered, elevated soil moisture contents were observed in test pit TP-31. The elevated moisture contents are likely due to the close proximity of TP-31 to a storm drain/drywell. No water was observed in the drywell at the time of our exploration.

Laboratory Test Results:

Sieve analyses, Atterberg Limits determinations, and standard proctor (ASTM D698) tests were performed on representative samples obtained from approximately the 4-foot depth in the test pits. The samples tested had fines contents (silt- and/or clay-sized particles passing the U.S. No. 200 sieve) ranging from approximately 10 percent to 97 percent. Plasticity indices ranged from non-plastic (NP) to 65.

Maximum laboratory dry densities based on the proctor tests ranged from approximately 86 to 117 pounds per cubic foot (pcf); optimum moisture contents ranged from approximately 11 to 30 percent.

Results of all laboratory tests are presented in Appendix B.

Soil Resistivity Results:

In-situ electrical resistivity of the soil/rock was measured at eight 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 345 to 22,000 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.

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 590 rubber-tire backhoe with a 24-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 and/or clayey soils along the alignment should be possible using standard excavation equipment. Excavations in areas where sandstone 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.

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, most of 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 excavations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

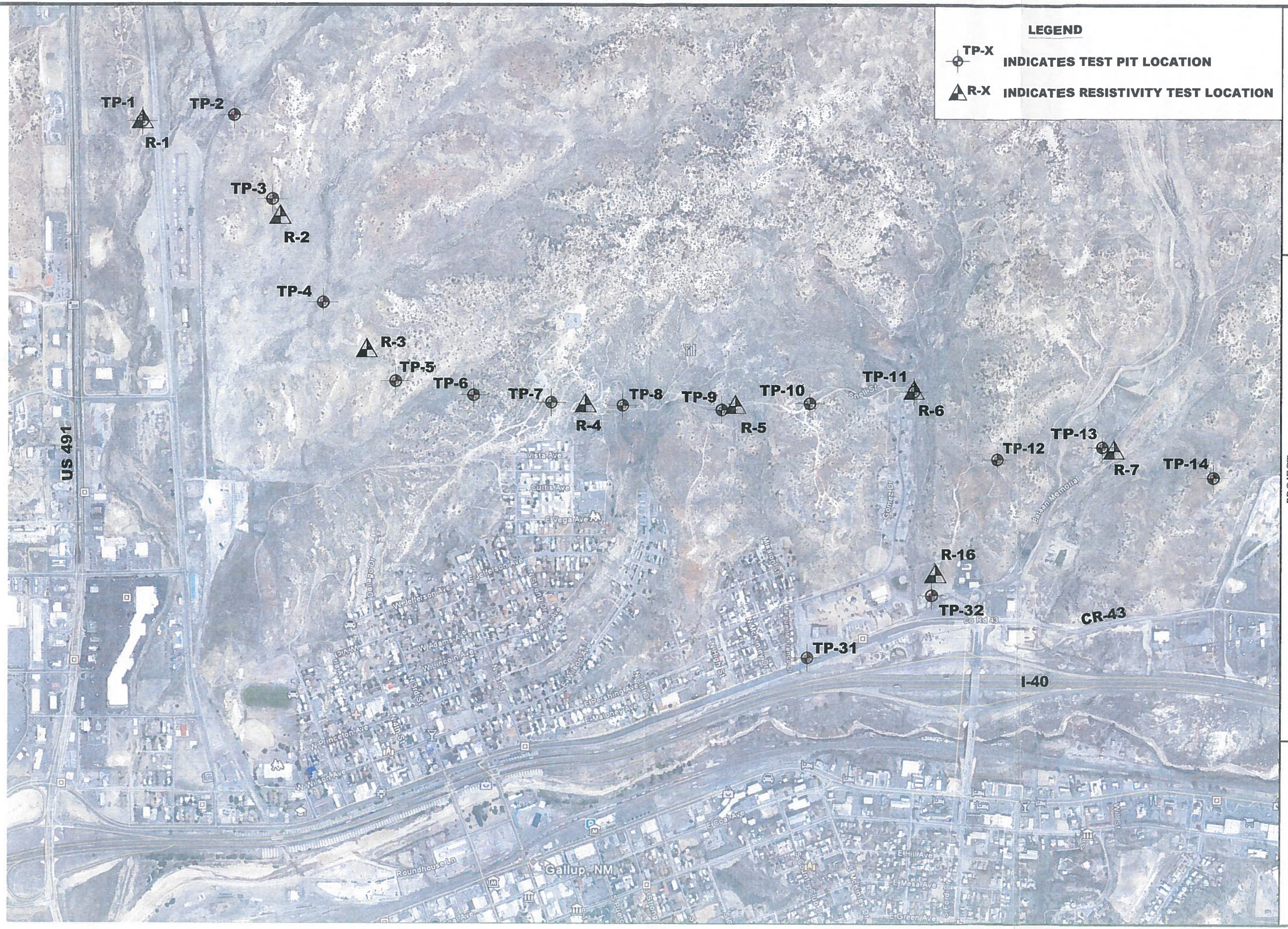
Our professional services were performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities at the same time. No warranty, express or implied, is intended or made. We prepared the report as 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.

Geomat Project 122-1529

APPENDIX A



GEOMAT INC

PROJECT

Navajo Gallup Water Supply Project
Reach 27.6
McKinley County, New Mexico

GEOMAT Project No.122-1529
Dates of Explorations:
April 18-19 and May 1-3, 2012
Scale: N.T.S.

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-1

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5494421°
Longitude: -108.7565127°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 0+00

Soil Properties										Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	
105.5	49	9	7.8	MD	GRAB		SC		1–10	CLAYEY SAND, tan to gray, fine-grained, slightly damp
									11–15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-2

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5495941°
Longitude: -108.7532287°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 10+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
							SM		1	SILTY SAND, brown to gray, fine-grained, slightly damp
99.4	76	22	14.8	MD	GRAB		RK		2 3 4 5 6 7 8 9 10	SHALE, gray, moderately to highly weathered, highly fractured gray to tan
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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GEOMAT INC
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-3

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5471491°
Longitude: -108.7518168°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 20+00

Soil Properties: Dry Density (pcf)	Soil Properties: % Passing #200 Sieve	Soil Properties: Plasticity Index	Soil Properties: Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
							RK		1	SANDSTONE at ground surface, tan, moderately weathered
									2	Test pit terminated at 1 foot due to backhoe refusal on sandstone Total Depth 1 feet
									3	
									4	
									5	
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-4

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5442289°
Longitude: -108.7500666°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 32+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
82.7	40	NP	6.5	MD	GRAB		SM		1 2 3 4 5	SILTY SAND, brown to gray, fine-grained, slightly damp
							RK		6 7 8 9 10	LEAN CLAY, gray, hard, blocky, slightly damp
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-5

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5419346°
Longitude: -108.7474415°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 44+00

Soil Properties										Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	
	20	NP		MD	GRAB		SM		1–10	SILTY SAND, brown to gray, fine-grained, slightly damp
									11–15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

GEOMAT INC
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-6

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5415122°
Longitude: -108.7446419°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 54+00

Soil Properties: Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
							SC		1–2	CLAYEY SAND, brown, fine-grained, damp to moist
							RK		3–4	SHALE, dark gray to black, highly weathered, carbonaceous, fissile
							RK		5–8	COAL, black, highly fractured
									9–15	Total Depth 8 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT INC
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-7

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5412697°
Longitude: -108.7418895°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 63+00

Soil Properties: Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
							SM		1	SILTY SAND, brown to gray, fine-grained, slightly damp
							RK		2	SANDSTONE, light gray to white, fine-grained, moderately weathered
									3	Test pit terminated at 2 feet due to backhoe refusal on sandstone Total Depth 2 feet
									4	
									5	
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-8

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5412356°
Longitude: -108.7393882°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 70+50

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
88.7	34	14	11.0	MD	GRAB		SC		1 2 3 4 5	CLAYEY SAND, brown to gray, fine-grained, slightly damp
							RK		6 7 8 9 10	COAL, black, highly fractured
							RK		11	SHALE, gray, highly weathered
									12 13 14 15	Total Depth 11 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-9

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5410988°
Longitude: -108.7358635°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 81+50

Soil Properties: Dry Density (pcf)	Soil Properties: % Passing #200 Sieve	Soil Properties: Plasticity Index	Soil Properties: Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
									1	SHALE at surface, brown to dark gray, highly weathered, weakly fissile
									2	
									3	carbonaceous
									4	
							RK		5	tan to gray massive to blocky
									6	
									7	
									8	
									9	
									10	
									11	Total Depth 10 feet
									12	
									13	
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-10

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5412880°
Longitude: -108.7327672°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 91+00

Soil Properties: Dry Density (pcf)	Soil Properties: % Passing #200 Sieve	Soil Properties: Plasticity Index	Soil Properties: Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
							RK		1 2 3	SANDSTONE at surface, light gray, fine-grained, slightly weathered, moderately to highly fractured, beds approx. 6" - 10" thick
									4 5 6 7 8 9 10 11 12 13 14 15	Test pit terminated at 3 feet due to backhoe refusal on sandstone Total Depth 3 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-11

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5416675°
Longitude: -108.7290294°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 103+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
84.3	47	NP	7.6	MD	GRAB		SM		1 2 3 4 5 6 7 8 9 10	SILTY SAND, tan, fine-grained, slightly damp
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-12

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5396879°
Longitude: -108.7261507°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 115+00

Soil Properties: Dry Density (pcf)	Soil Properties: % Passing #200 Sieve	Soil Properties: Plasticity Index	Soil Properties: Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
	45	13		MD	GRAB		SC		1	CLAYEY SAND, brown to gray, fine-grained, slightly damp
									2	
							RK		3	SANDSTONE, light gray to white, fine-grained, slightly to moderately weathered, moderately fractured, beds approx. 6" thick
									4	Test pit terminated at 3 feet due to backhoe refusal on sandstone
									5	Total Depth 3 feet
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-13

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5400611°
Longitude: -108.7223461°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 127+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
104.6	41	NP	9.7	MD	GRAB		SC		1 2 3 4 5 6 7 8 9 10	CLAYEY SAND, brown to gray, fine-grained, slightly damp contains occasional lenses of sandy clay
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-14

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5391740°
Longitude: -108.7185072°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 139+00

Soil Properties: Dry Density (pcf)	Soil Properties: % Passing #200 Sieve	Soil Properties: Plasticity Index	Soil Properties: Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
							RK		1 2 3 4	SHALE at surface, gray, highly weathered, highly fractured
							RK		5	SANDSTONE, light gray, fine-grained, slightly weathered
									6 7 8 9 10 11 12 13 14 15	Test pit terminated at 5 feet due to backhoe refusal on sandstone Total Depth 5 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-15

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5393641°
Longitude: -108.7148670°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 151+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
100.8	60	21	17.4	MD	GRAB		CL		1 2 3 4 5	SANDY LEAN CLAY with sand and gravel, gray, loose, damp to moist (FILL)
							RK		6 7 8 9 10	SANDSTONE, light gray, fine-grained, highly weathered, highly fractured, beds approx. 12" thick relatively easy digging
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-16

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5393065°
Longitude: -108.7109409°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 163+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
104.6	63	16	6.9	MD	GRAB		CL		1 2 3 4 5 6 7 8 9 10	SANDY LEAN CLAY, brown to gray, slightly damp
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-17

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5360228°
Longitude: -108.7112755°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6A - Sta 175+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
93.4	94	36	13.8	MD	GRAB		CH		1 2 3 4 5 6 7 8 9 10 11	FAT CLAY, brown, moist slightly damp below 5 feet
									12 13 14 15	Total Depth 11 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-18

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5345318°
Longitude: -108.7106787°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 0+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
97.4	95	39	16.5	MD	GRAB		CH		1 2 3 4 5 6 7	FAT CLAY, brown to gray, hard, blocky, slightly damp
							SM		8 9 10 11	SILTY SAND, brown to tan, fine-grained, loose, slightly damp
									12 13 14 15	Total Depth 11 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-19

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5361415°
Longitude: -108.7087429°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 12+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
89.2	77	19	5.1	MD	GRAB		CL		1 2 3 4 5	LEAN CLAY with sand, brown to gray, slightly damp
							SP-SM		6 7 8 9 10	SAND with silt, brown to tan, fine-grained, poorly graded, slightly damp
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-20

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5371540°
Longitude: -108.7056540°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 24+00

Soil Properties: Dry Density (pcf)	Soil Properties: % Passing #200 Sieve	Soil Properties: Plasticity Index	Soil Properties: Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
98.3	44	NP	11.4	MD	GRAB		SM		1 2 3	SILTY SAND, brown to gray, fine-grained, slightly damp contains occasional lenses of clay
							CL		4 5 6	LEAN CLAY, brown to gray, hard, blocky, slightly damp
							SM		7 8 9 10 11 12 13	SILTY SAND, brown to gray, fine-grained, slightly damp
									14 15	Total Depth 13 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-21

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5367242°
Longitude: -108.7016875°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 35+90

Soil Properties: Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
94.2	85	33	7.6	MD	GRAB		CH		1–9	FAT CLAY with sand, brown to gray, slightly damp
							SM		9–11	SILTY SAND, brown, fine-grained, slightly damp
									11	Total Depth 11 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-22

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5358424°
Longitude: -108.6978032°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 48+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
88.0	94	49	20.4	MD	GRAB		CH		1 2 3 4 5 6 7 8 9 10 11 12 13	FAT CLAY, red-brown, blocky, damp to moist gray
									14 15	Total Depth 13 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-23

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5346305°
Longitude: -108.6941188°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: OMITTED DUE TO UTILITY CONFLICT

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
									1	Test pit omitted by concensus due to utility conflict Presence of high pressure natural gas pipeline verified by PNM locator Total Depth 0 feet
									2	
									3	
									4	
									5	
									6	
									7	
									8	
									9	
									10	
									11	
									12	
									13	
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-24

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5342214°
Longitude: -108.6903984°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 72+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
							CL		1 2 3	LEAN CLAY with sand, gray, damp to moist
97.5	71	22	19.9	MD	GRAB		RK		4 5 6 7 8 9 10	SHALE, dark gray, moderately to highly weathered, moderately fractured contains abundant gypsum crystals
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

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Test Pit TP-25

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5347963°
Longitude: -108.6865243°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 84+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
							SM		1	SILTY SAND, brown, fine-grained, damp
									2	
							GM		3	SILTY GRAVEL with sand, dark gray, fine-grained, damp
94.8	22	NP	5.5	MD	GRAB				4	SILTY SAND, brown, fine-grained, damp
									5	
									6	
									7	
							SM		8	
									9	
									10	
									11	
									12	
									13	Total Depth 12 feet
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-26

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5351233°
Longitude: -108.6825123°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 96+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
98.9	10	NP	3.7	MD	GRAB		SP-SM		1 2 3 4 5	SAND with silt and trace gravel, brown, fine- to coarse-grained, poorly graded, damp
							CL		6 7 8 9 10	LEAN CLAY, red-brown, damp to moist
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
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Fax (505) 326-5721

Test Pit TP-27

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5334382°
Longitude: -108.6802133°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 108+00

Soil Properties: Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
90.1	93	54	24.0	MD	GRAB		CH		1–10	FAT CLAY, red-brown, damp, fractured (frost heaving?) massive to blocky below 2 feet
									11–15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-28

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5313871°
Longitude: -108.6798257°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 116+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
92.0	97	65	23.9	MD	GRAB		CH		1 2 3 4 5 6 7 8 9 10	FAT CLAY, red-brown, mottled with tan, damp to moist
									11 12 13 14 15	Total Depth 10 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

GEOMAT INC
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-29

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/1/2012
Latitude: 35.5290584°
Longitude: -108.6792392°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Reach 27.6B - Sta 126+00

Soil Properties									
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
93.5	97	56	20.7	MD	GRAB		CH		1–10	FAT CLAY, red-brown, damp
									10	Total Depth 10 feet
									11–15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-30

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5327732°
Longitude: -108.7116563°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Rehoboth Line Sta 8+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
95.8	73	29	14.2	MD	GRAB		CL		1 2 3 4 5 6	LEAN CLAY with sand, brown to gray, slightly damp, hard, blocky
					GRAB		SM		7 8 9 10 11	SILTY SAND, brown to tan, fine-grained, slightly damp
									12 13 14 15	Total Depth 11 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-31

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/3/2012
Latitude: 35.5339842°
Longitude: -108.7327904°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Montoya Line - Sta 1+00

Soil Properties										Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	
99.5	87	16	18.5	MD	GRAB		CL		1 2 3 4 5 6 7 8 9 10 11	LEAN CLAY, brown, moist moist to wet below 7 feet elevated moisture likely due to proximity to storm drain/drywell
									12 13 14 15	Total Depth 11 feet

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Test Pit TP-32

Project Name: Navajo Gallup Water Supply Project
Project Number: 122-1529
Client: DePauli Engineering & Surveying
Site Location: McKinley County, New Mexico
Rig Type: Case 590 Extendahoe
Excavation Method: 24" Bucket
Sampling Method: Hand sample
Hammer Weight: N/A
Hammer Fall: N/A

Date Excavated: 5/2/2012
Latitude: 35.5357609°
Longitude: -108.7283692°
Elevation: Not Determined
Test Pit Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: DB
Remarks: Montoya Line - Sta 16+00

Soil Properties				In-Situ Test	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)							
							GP		1	GRAVEL, gray, fine-grained, loose, dry (surfacing material)
							SM		2	SILTY SAND with gravel, tan, fine-grained, damp
91.7	45	NP	7.3	MD	GRAB				3	
									4	
									5	
							CL		6	SANDY LEAN CLAY, tan, damp
									7	
									8	
									9	
							RK		10	SHALE, gray to black, highly weathered, carbonaceous
									11	
									12	Total Depth 11 feet
									13	
									14	
									15	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon MD = Nuclear Moisture/Density Gauge G = Grab Sample

GEOMAT 122-1529.GPJ GEOMAT.GDT 06/05/12

UNIFIED SOIL CLASSIFICATION SYSTEM					CONSISTENCY OR RELATIVE DENSITY CRITERIA
Major Divisions			Group Symbols	Typical Names	
Coarse-Grained Soils More than 50% retained on No. 200 sieve	**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	Standard Penetration Test Density of Granular Soils
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	Penetration Resistance, N (blows/ft.) / Relative Density
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures	0-4 Very Loose
			GC	Clayey gravels, gravel-sand-clay mixtures	5-10 Loose
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	11-30 Medium Dense
			SP	Poorly graded sands and gravelly sands, little or no fines	31-50 Dense
		Sands with Fines	SM	Silty sands, sand-silt mixtures	>50 Very Dense
			SC	Clayey sands, sand-clay mixtures	
Fine-Grained Soils 50% or more passes No. 200 sieve	**Silts and Clays** Liquid Limit 50 or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	Standard Penetration Test Density of Granular Soils
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Penetration Resistance, N (blows/ft.) / Consistency / Unconfined Compressive Strength (Tons/ft2)
			OL	Organic silts and organic silty clays of low plasticity	<2 Very Soft <0.25
	Silts and Clays Liquid Limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous free sands or silts, elastic silts	2-4 Soft 0.25-0.50
			CH	Inorganic clays of high plasticity, fat clays	4-8 Firm 0.50-1.00
			OH	Organic clays of medium to high plasticity	8-15 Stiff 1.00-2.00
					15-30 Very Stiff 2.00-4.00
Highly Organic Soils			PT	Peat, mucic & other highly organic soils	>30 Hard >4.0

U.S. Standard Sieve Sizes	3"	3/4"	#4	#10		#40	#200	
Unified Soil Classification	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

Geomat Project 122-1529

APPENDIX B

LAB NO.	TEST PIT	STATION NO.	IN-SITU CONDITIONS		ASTM D698 PROCTOR		SIEVE ANALYSIS, CUMULATIVE PERCENT PASSING												ATTERBERG LIMITS			USCS CLASSIFICATION
			MOISTURE (%)	DRY DENSITY (pcf)	MOISTURE (%)	DRY DENSITY (pcf)	1"	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	
REACH 27.6A																						
12901	TP-1	0+00	7.8	105.5	13.2	113.0	100	100	100	100	100	99	99	99	99	98	96	75	49	25	16	9	Clayey SAND (SC)
12902	TP-2	10+00	14.8	99.4	16.6	107.2	100	100	100	100	99	99	99	98	97	96	95	88	76	38	16	22	Shale
12903	TP-4	32+00	6.5	82.7	15.2	106.3	100	99	85	77	100	99	99	99	98	96	92	72	40	NLL	NPL	NP	Silty SAND (SM)
12904	TP-5	44+00	NT	NT	13.9	111.1	100	100	100	99	97	93	91	85	75	70	64	33	20	NLL	NPL	NP	Silty SAND (SM)
12905	TP-8	70+50	11.0	88.7	15.8	106.5	100	100	96	94	90	87	86	85	81	78	74	53	34	29	15	14	Clayey SAND (SC)
12906	TP-11	103+00	7.6	84.3	15.4	109.1	100	100	100	100	100	99	99	98	95	93	87	67	47	NLL	NPL	NP	Silty SAND (SM)
12907	TP-12	115+00	NT	NT	13.5	114.8	100	100	97	97	95	94	93	91	87	83	75	56	45	26	13	13	Clayey SAND (SC)
12908	TP-13	127+00	9.7	104.6	14.3	111.5	100	100	100	100	99	99	99	98	97	95	92	62	41	NLL	NPL	NP	Silty SAND (SM)
12909	TP-15	151+00	17.4	100.8	15.7	107.8	92	91	89	88	85	82	81	79	77	76	75	69	60	38	17	21	Sandy Lean CLAY w/ gravel (CL)
12910	TP-16	163+00	6.9	104.6	16.8	109.8	100	100	99	99	97	96	96	95	94	93	91	77	63	29	13	16	Sandy Lean CLAY (CL)
12911	TP-17	175+00	13.8	93.4	22.3	99.6	100	100	100	100	100	100	100	100	100	100	99	98	94	53	17	36	Fat CLAY (CH)

NT = Not Tested

GEOMAT INC.

SUMMARY OF SOIL TESTS
Page 1 of 2

Project	Navajo Gallup Water Supply Project - Reach 27.6
Job No.	122-1529
Location	McKinley County, New Mexico
Dates of Exploration	May 1 - 3, 2012

LAB NO.	TEST PIT	STATION NO.	IN-SITU CONDITIONS		ASTM D698 PROCTOR		SIEVE ANALYSIS, CUMULATIVE PERCENT PASSING												ATTERBERG LIMITS			USCS CLASSIFICATION
			MOISTURE (%)	DRY DENSITY (pcf)	MOISTURE (%)	DRY DENSITY (pcf)	1"	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	
REACH 27.6B																						
12912	TP-18	0+00	16.5	97.4	17.6	103.2	100	100	100	100	100	100	100	100	99	99	98	97	95	56	17	39	Fat CLAY (CH)
12913	TP-19	12+00	5.1	89.2	17.0	104.1	100	100	100	100	100	100	100	100	100	99	99	91	77	35	16	19	Lean CLAY w/ sand (CL)
12914	TP-20	24+00	11.4	98.3	15.3	108.9	100	100	100	100	100	100	100	100	99	99	98	77	44	NLL	NPL	NP	Silty SAND (SM)
12915	TP-21	35+90	7.6	94.2	16.5	100.1	100	100	100	100	100	100	100	100	99	99	98	92	85	50	17	33	Fat CLAY w/ sand (CH)
12916	TP-22	48+00	20.4	88.0	19.8	96.1	100	100	100	100	100	100	100	100	99	99	99	97	94	71	22	49	Fat CLAY (CH)
12917	TP-24	72+00	19.9	97.5	16.3	106.1	100	100	100	100	99	98	98	96	95	94	92	85	71	37	15	22	Lean CLAY w/ sand (CL)
12918	TP-25	84+00	5.5	94.8	12.1	115.9	100	99	98	98	98	97	97	97	94	91	85	57	22	NLL	NPL	NP	Silty SAND (SM)
12919	TP-26	96+00	3.7	98.9	10.9	117.3	99	97	95	93	88	82	79	73	65	59	51	25	10	NLL	NPL	NP	SAND w/ silt (SP-SM)
12920	TP-27	108+00	24.0	90.1	27.2	86.3	100	100	100	100	100	100	100	100	100	99	99	97	93	79	25	54	Fat CLAY (CH)
12921	TP-28	116+00	23.9	92.0	26.3	86.9	100	100	100	100	100	100	100	100	100	100	100	99	97	83	18	65	Fat CLAY (CH)
12922	TP-29	126+00	20.7	93.5	29.5	90.0	100	100	100	100	100	100	100	100	100	100	100	99	97	80	24	56	Fat CLAY (CH)
REHOBOTH LINE																						
12923	TP-30	8+00	14.2	95.8	19.1	103.4	100	100	100	100	100	100	100	100	100	99	98	87	73	44	15	29	Lean CLAY w/ sand (CL)
MONTOYA LINE																						
12924	TP-31	1+00	18.5	99.5	17.5	108.4	100	100	100	100	100	100	100	100	100	100	99	95	87	30	14	16	Lean CLAY (CL)
12925	TP-32	16+00	7.3	91.7	14.1	114.4	100	100	99	99	98	97	97	96	96	95	92	72	45	NLL	NPL	NP	Silty SAND (SM)

GEOMAT INC.

SUMMARY OF SOIL TESTS
Page 2 of 2

Project	Navajo Gallup Water Supply Project - Reach 27.6
Job No.	122-1529
Location	McKinley County, New Mexico
Dates of Exploration	May 1 - 3, 2012

envirotech
Analytical Laboratory

Resistivity

Client:	Geomat Inc.	Project #:	04001-0002
Sample ID:	COG.SP. 041812	Date Reported:	04-30-12
Laboratory Number:	61836	Date Sampled:	04-18-12
Chain of Custody:	13316	Date Received:	04-20-12
Sample Matrix:	Soil Extract	Date Extracted:	04-23-12
Preservative:		Date Analyzed:	04-24-12
Condition:	Intact		

Parameter	Analytical Result	Units
Resistivity	**3,530**	**Ohm-cm**

Bulk sample obtained from City of Gallup Materials Stockpile

Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.
Standard Methods For The Examination of Water And Waste Water", 18th ed., 1992.
ASTM D 516, Standard Test Method for Sulfate Ion in Water.

Comments: **NGWSP/Gallup, NM**

Review

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envirotech-inc.com
laboratory@envirotech-inc.com

envirotech
Analytical Laboratory

WATER ANALYSIS

Client:	Geomat Inc.	Project #:	04001-0002
Sample ID:	COG.SP. 041812	Date Reported:	04-30-12
Laboratory Number:	61836	Date Sampled:	04-18-12
Chain of Custody:	13316	Date Received:	04-20-12
Sample Matrix:	Soil Extract	Date Analyzed:	04-24-12
Preservative:			
Condition:	Intact		

Parameter	Analytical Result	Units
pH	**8.29**	s.u.
Chloride	**70.0**	mg/L
Sulfate	**27.2**	mg/L

Bulk Sample obtained from City of Gallup Materials Stockpile

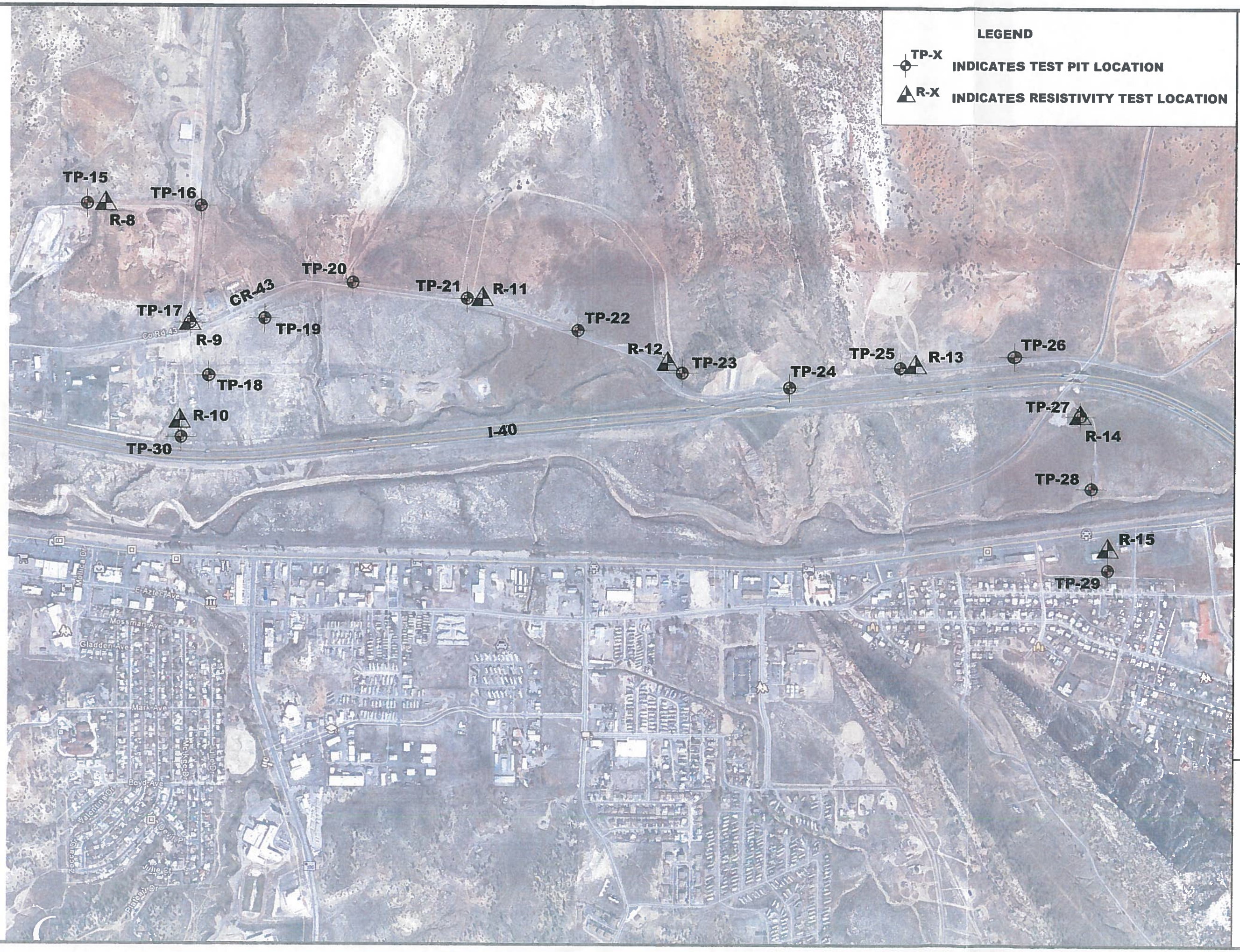
Reference: U.S.E.P.A., 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes", 1983.
Standard Methods For The Examination of Water And Waste Water", 18th ed., 1992.

Comment: **NGWSP/Gallup, NM**

Analyst

Review

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GEOMAT INC

PROJECT

Navajo Gallup Water Supply Project
Reach 27.6
McKinley County, New Mexico

GEOMAT Project No. 122-1529
Dates of Explorations:
April 18-19 and May 1-3, 2012
Scale: N.T.S.

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.

Geomat Project 122-1529

APPENDIX C

RESULTS OF IN-SITU SOIL RESISTIVITY TESTING
Navajo Gallup Water Supply Project
GEOMAT Project No. 122-1529
Reach 27.6

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	R-7	R-8
3	4136	11203	6320	7756	10628	13501	11777	10916
6	3677	5515	5400	9652	5400	10456	10111	10916
9	3619	5688	3792	11892	4481	8187	7756	10427
12	4136	6205	4136	10916	3677	6664	6779	10341
15	4022	7181	2614	11203	3303	5171	6463	9479
18	3792	7239	2482	10341	2861	5343	6377	8273
24	3493	7354	1609	6894	3217	4550	5515	5285
30	3332	6320	1436	575	2987	4251	4366	6320
36	3861	6894	1241	4481	3033	4205	3516	5722
45	4481	8273	1206	3792	3533	4826	3275	5084

NOTES:

[1]Spacing in feet between each of four equally-spaced electrodes per ASTM G57 (Wenner 4-Pin Method)
[2]Apparent resistivity at each electrode spacing = (meter reading in ohms)(spacing in feet)(191.5)
[3]Test 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. 122-1529
Reach 27.6

Electrode Spacing[1] (ft)	Apparent Resistivity in Ohm-cm[2]							
	Resistivity Test No.[3]							
	R-9	R-10	R-11	R-12	R-13	R-14	R-15	R-16
3	1092	3131	4424	3878	6320	1178	804	22406
6	2011	5113	4826	4596	5745	632	747	18384
9	2844	6808	5171	5084	7928	724	620	12495
12	3562	7583	5975	6090	8043	712	529	10801
15	4165	8043	6750	5745	6176	661	546	7899
18	4653	8273	7583	5515	7239	724	552	6032
24	5975	8503	8273	5515	7354	506	597	5285
30	6607	8905	8618	5917	6894	402	563	5515
36	6549	9307	8618	5239	5929	414	538	5308
45	6722	9479	7842	3188	4826	86	534	5946

NOTES:

[1]Spacing in feet between each of four equally-spaced electrodes per ASTM G57 (Wenner 4-Pin Method)
[2]Apparent resistivity at each electrode spacing = (meter reading in ohms)(spacing in feet)(191.5)
[3]Test locations are shown on the Site Plan in Appendix A

Geomat Project 122-1529

APPENDIX D

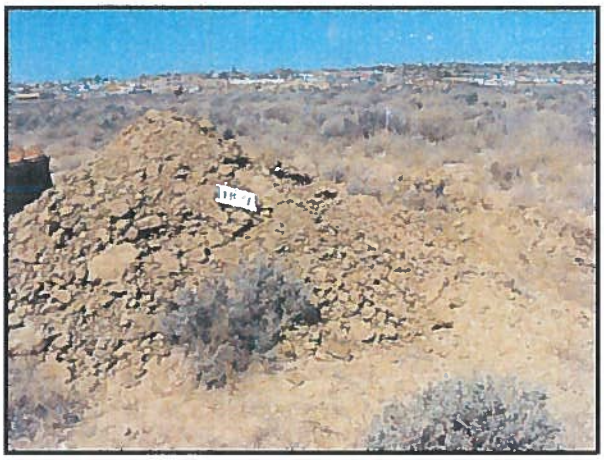
PHOTOGRAPHS OF TEST PITS – REACH 27.6



Test Pit TP-2



Test Pit TP-3



Test Pit TP-4



Test Pit TP-5



Test Pit TP-6



Test Pit TP-7

PHOTOGRAPHS OF TEST PITS – REACH 27.6



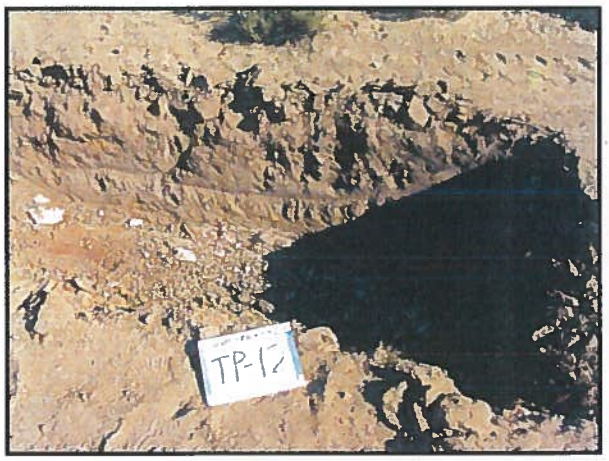
Test Pit TP-9



Test Pit TP-10



Test Pit TP-11



Test Pit TP-12



Test Pit TP-14



Test Pit TP-16

PHOTOGRAPHS OF TEST PITS – REACH 27.6



Test Pit TP-17



Test Pit TP-18



Test Pit TP-19



Test Pit TP-20



Test Pit TP-21



Test Pit TP-22

PHOTOGRAPHS OF TEST PITS – REACH 27.6



Test Pit TP-24



Test Pit TP-25



Test Pit TP-26



Test Pit TP-27



Test Pit TP-28



Test Pit TP-29

PHOTOGRAPHS OF TEST PITS – REACH 27.6



Test Pit TP-30



Test Pit TP-31



Test Pit TP-32

Geotechnical Engineering Report

Navajo Gallup Water Supply Project – Heaton Pump Station & Hogback Pressure Reducing Station Gallup, New Mexico



GEOTECHNICAL ENGINEERING REPORT
NAVAJO GALLUP WATER SUPPLY PROJECT
HEATON PUMP STATION
HOGBACK PRESSURE REDUCING STATION
GALLUP, NEW MEXICO

Submitted To:

Kurt Spolar, 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 29, 2014
GEOMAT Project 142-2089

GEOMAT INC.
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

September 29, 2014

Kurt Spolar, P.E.
DePauli Engineering & Surveying LLC
307 South 4th Street
Gallup, New Mexico 87301

RE: Geotechnical Engineering Study
Navajo Gallup Water Supply Project – Reach 27.6
Heaton Pump Station and Hogback Pressure Reducing Station
Gallup, New Mexico
GEOMAT Project No. 142-2089

GEOMAT Inc. (GEOMAT) has completed the geotechnical engineering exploration for the proposed Heaton Pump Station and Hogback Pressure Reducing Station to be located along the alignment of Reach 27.6 of the Navajo Gallup Water Supply Project (NGWSP) in Gallup, New Mexico. This study was performed in general accordance with our Proposal No. 142-08-20, dated August 19, 2014.

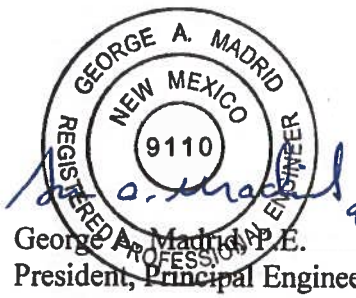
The results of our engineering study, including the geotechnical recommendations, site plan, boring records, and laboratory test results are attached. Based on the geotechnical engineering analyses, subsurface exploration and laboratory test results, the proposed structures could be supported on either drilled shaft foundations or on spread footings on engineered fill. Other design and construction details, based upon geotechnical conditions, are presented in the report.

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



9.29.14

George A. Madrid, P.E.
President, Principal Engineer

Copies to: Addressee (1)

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GEOTECHNICAL ENGINEERING REPORT
NAVAJO GALLUP WATER SUPPLY PROJECT
HEATON PUMP STATION
HOGBACK PRESSURE REDUCING STATION
GALLUP, NEW MEXICO

INTRODUCTION

This report contains the results of our geotechnical engineering exploration for the proposed Heaton Pump Station and Hogback Pressure Reducing Station to be located along the alignment of Reach 27.6 of the Navajo Gallup Water Supply Project (NGWSP) in Gallup, New Mexico, as shown on the Site Plans 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
- lateral soil pressures
- earthwork
- foundation design and construction
- slab design and construction
- drainage

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 the project consists of the design and construction of a pump station and a pressure reducing station. The two structures are located at two separate sites approximately 1.5 miles apart along the alignment of Reach 27.6.

The Heaton Pump Station will be housed in a new single-story, reinforced masonry building having a footprint of approximately 2,500 square feet. The maximum structural loads are understood to be 2.9 ksf at the intermediate columns. Based on our experience with similar projects, we estimate the maximum wall loads will be approximately 3 KLF.

The Hogback Pressure Reducing Station will be housed in a new single-story, reinforced masonry building having a footprint of approximately 350 square feet.

Both of the structures are expected to have concrete slab on grade floors and no basements or other below-grade structures are planned for either building. We understand that approximately 3 to 6 feet of fill will be required to achieve that planned finished grades at each site.

SITE EXPLORATION

Our scope of services performed for this project included a site reconnaissance by a staff engineer, a subsurface exploration program, laboratory testing and engineering analyses.

Field Exploration:

Subsurface conditions at the sites were explored on September 5, 2014, by drilling two exploratory borings at the Heaton site and one at the Hogback site, at the approximate locations shown on the Site Plan in Appendix A. Borings B-1 and B-2 were drilled within the footprint of the proposed Heaton Pump Station. Boring B-3 was drilled within the footprint of the proposed Hogback Pressure Reducing Station.

The borings were advanced to an approximate depth of 15 feet below existing ground surface using a CME-45 truck-mounted drill rig with continuous-flight, 7.25-inch O.D. hollow-stem auger. The borings were continuously monitored by an engineer from our office who examined and classified the subsurface materials encountered, obtained representative samples, observed groundwater conditions, and maintained a continuous log of each boring.

Soil samples were obtained from the borings using a combination of standard 2-inch O.D. split spoon and 3-inch O.D. modified California ring barrel samplers. The samplers were driven using a 140-pound hammer falling 30 inches. The standard penetration resistance was determined by recording the number of hammer blows required to advance the sampler in six-inch increments. Representative bulk samples of subsurface materials were also obtained.

Groundwater evaluations were made in each boring at the time of site exploration. Soils were classified in accordance with the Unified Soil Classification System described in Appendix A. Boring logs were prepared and are presented in Appendix A.

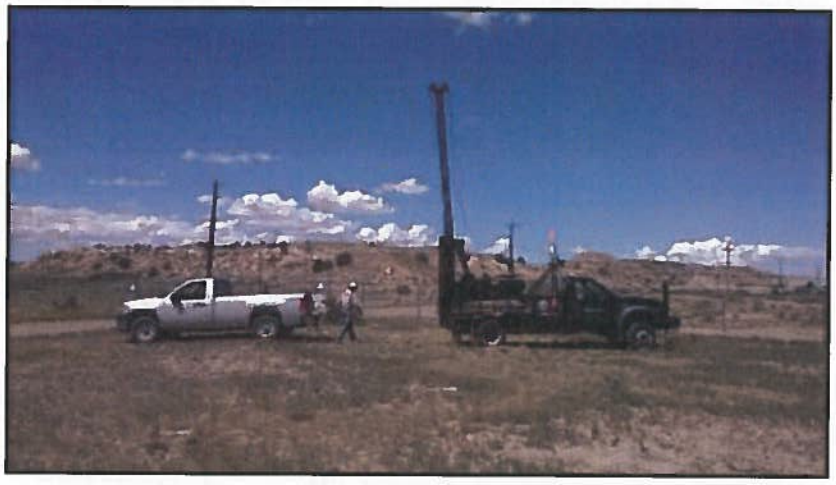
Laboratory Testing:

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.

SITE CONDITIONS

Heaton Site:

The site of the proposed Heaton Pump Station is located approximately 300 feet south of Hasler Valley Road, approximately 0.8 miles east of the intersection of Hasler Valley Road and Bataan Veterans Street, and roughly 800 feet north of Interstate 40. The ground surface appeared to be relatively level across the site, and was vegetated by a sparse to moderate growth of weeds and grasses at the time of our exploration. An overhead electric line traverses the northern portion of the site in an east-west direction. No evidence of prior structural development was noted at the site. The following photograph depicts the site at the time of our exploration.



Heaton Site
Drill Rig at Boring B-1
View to the Northwest

Hogback Site:

The site of the proposed Hogback Pressure Reducing Station is located approximately 1.7 miles east of the Heaton site, roughly 2.7 miles east of the intersection of Hasler Valley Road and Bataan Veterans Street. The site is situated approximately 200 feet south of Interstate 40. The ground surface appeared to be relatively level across the site, and was vegetated by a sparse to moderate growth of weeds at the time of our exploration. No evidence of prior structural development was noted at the site. The following photograph depicts the site at the time of our exploration.



Hogback Site
Drill Rig at Boring B-3
View to the Northwest

SUBSURFACE CONDITIONS

Heaton Site:

As presented on Boring Logs B-1 and B-2 in Appendix A, we encountered damp, very stiff to hard fat clay soils from the surface to depths of approximately 7 to 8 feet below existing ground surface. Below the fat clay soils, we encountered slightly damp, loose to medium dense silty sand soils to the total depth explored.

Groundwater was not encountered at the Heaton site to the depths explored. Groundwater elevations can fluctuate over time depending upon precipitation, irrigation, runoff and infiltration of surface water. We do not have any information regarding the historical fluctuation of the groundwater level in this vicinity.

Hogback Site:

As presented on Boring Log B-3 in Appendix A, we encountered damp, very stiff to hard fat clay soils from the surface to the total depth explored.

Groundwater was not encountered at the Hogback site to the depths explored. Groundwater elevations can fluctuate over time depending upon precipitation, irrigation, runoff and infiltration

of surface water. We do not have any information regarding the historical fluctuation of the groundwater level in this vicinity.

Laboratory Test Results:

Heaton Site:

A representative sample of the fat clay had a plasticity index of 43 and a fines content (silt- and/or clay-sized particles passing the U.S. No. 200 sieve) of 97 percent. In-place dry densities of the fat clay soils ranged from approximately 90 to 108 pcf; natural moisture contents ranged from approximately 10 to 12 percent.

A representative sample of the silty sand soils had a fines content of 22 percent. In-place dry densities of the silty sand soils were approximately 91 pounds per cubic foot (pcf), with natural moisture contents ranging from approximately 3 to 5 percent.

Laboratory consolidation/expansion testing was performed on undisturbed ring samples of the fat clay soils beneath the proposed building. Results of these tests indicate that the fat clay soils undergo slight compression when subjected to anticipated foundation stresses at the existing moisture contents. When subjected to increased moisture conditions at these stresses, they undergo moderate to significant expansion (swell). The fat clay soils at the Heaton site were characterized as highly expansive.

Hogback Site:

A representative sample of the fat clay soils had a plasticity index of 66 a fines content of 98 percent. The in-place dry density and natural moisture content of a second representative sample were approximately 94 pcf and 24 percent, respectively.

Laboratory consolidation/expansion testing was performed on an undisturbed ring sample of the subgrade soils beneath the proposed building. The results of this test indicate that the fat clay soils undergo slight compression when subjected to anticipated foundation stresses at the existing moisture contents. When subjected to increased moisture conditions at these stresses, they undergo significant expansion (swell). The fat clay soils at the Hogback site were characterized as highly expansive.

Results of all laboratory tests are presented in Appendix B.

OPINIONS AND RECOMMENDATIONS

Geotechnical Considerations:

The sites are considered suitable for the proposed buildings based on the geotechnical conditions encountered and tested for this report. However, the fat clay soils at both sites are highly expansive and could expand (swell) if they experience an increase in their existing moisture content, causing damage to buildings supported on conventional shallow foundations. To reduce the potential for heaving, either the buildings should be supported on deep foundations, or the fat clay soils should be removed from below the buildings and replaced with engineered fill.

Below the fat clay soils at the Heaton Pump Station site, we encountered sandy soils at depths of approximately 7 to 8 feet below existing ground surface. The building could be supported on conventional shallow spread footings, provided the fat clay soils are completely removed down to the underlying sandy soils and replaced with engineered fill. Alternatively, the building could be supported on deep foundation members, such as drilled shafts, bearing in the sandy soils below the fat clay. Deep foundations should be used in conjunction with grade beams and a suspended structural floor system. If deep foundations are used, the fat clay soils could be left in place.

At the Hogback Pressure Reducing Station site, the fat clay soils were encountered to the total depth explored in our borings. The building at the Hogback site could be supported on deep foundation members bearing in the fat clay soils below the "active zone" of the soils (the depth to which significant moisture changes could be expected to occur). Deep foundations should be used in conjunction with grade beams and a suspended structural floor system.

As requested, we considered other foundations types for the buildings, including Geofoam, rammed aggregate piers, helical piers, driven piles, auger cast piles and micropiles. In our opinion, these options are not likely to be as feasible as drilled shafts or removal and replacement of the clayey soils. A brief discussion of alternative foundation types follows.

- Geofoam – Geofoam is a relatively low density material commonly used in lieu of engineered fill in situations where the underlying soils are compressible or have insufficient bearing capacity. Replacing the existing clayey soils with Geofoam would likely result in a net decrease in the overburden load on the underlying soils, increasing the potential for any remaining expansive soils to expand. Geofoam is therefore not considered feasible for the Heaton and Hogback sites.
- Rammed Aggregate Piers – Rammed aggregate piers (Geopiers) are not considered suitable on expansive sites because of their potential to deform due to lateral pressures if the surrounding clayey soils were to become wet and expand.

- Helical Piers – Helical piers could be a possible foundation type. However, the clayey soils on both sites are hard and may present difficulty advancing the anchors to the depths required to provide sufficient lateral capacity. Pre-drilling pilot holes may be required in order to advance the anchors into the clay. Additionally, at the Heaton site, the sandy soils below the clay are loose and may not provide sufficient bearing capacity for helical piers.
- Micropiles – Micropiles could be a possible foundation type. However, similar to helical piers, the loose sand below the clay at the Heaton site may not provide sufficient bearing capacity for micropiles.
- Auger Cast Piles – Are not considered suitable for this site, due to the upward and lateral forces the soils could exert on the piles, if the soils became wet.
- Driven Steel Piles – Were considered and could be used for this site, however, they are not likely to be as economical as drilled shafts.

Based on the above discussion, we are providing recommendations for supporting the buildings on drilled shafts. We are also providing recommendations for supporting the buildings on spread footings bearing on engineered fill. Other types of deep foundations, such as helical piers, driven piles and micropiles, could also be possible foundation types. However, they are not likely to be as feasible as drilled shafts for this project. We will provide recommendations for other types of deep foundations if requested.

If there are any significant deviations from the assumed floor elevations, structure locations and/or loads noted at the beginning of this report, the opinions and recommendations of this report should be reviewed and confirmed/modified as necessary to reflect the final planned design conditions.

Foundations:

Drilled Shafts:

Based on our understanding of the type of structures to be built and the results of our field subsurface exploration and laboratory testing, the Heaton and/or Hogback buildings could be supported on drilled shafts.

Drilled Shaft Design:

Drilled shafts should bear a minimum of twelve feet below existing grade. At the Heaton site, the drilled shafts should bear in the sandy soils below the fat clay. At the Hogback site, the drilled shafts should bear in the fat clay soils.

Drilled shafts should be designed on an equivalent end-bearing basis using an allowable bearing pressure of 12,000 psf for vertical downward loads. Uplift load capacities could be calculated using

the weight of the drilled shaft plus an adhesion value of 250 pounds per square foot of the contact area between the concrete in the drilled shaft and the adjacent soil. Since the top portion of the soil adjacent to the shaft may become disturbed during drilling, we recommend neglecting the upper two feet of soil/concrete area in the calculation of the allowable uplift capacity due to the adhesion.

Lateral capacities of the shafts should be calculated using an allowable equivalent fluid passive pressure of 450 pounds per square foot per foot of depth. We recommend neglecting the upper two feet of the soil/concrete area in the calculation of the allowable lateral capacity. If the lateral capacity of the shafts is to be calculated using an LPILE analysis, we should be contacted to provide the appropriate design values.

Drilled Shaft Construction:

Drilled shafts should be a minimum of two (2.0) feet in diameter. Shafts should not be drilled within 10 feet of another shaft while the adjacent shaft is either open or the concrete in the shaft has not been in place for at least 12 hours.

Concrete should be placed in accordance with the American Concrete Institute (ACI) Specification for the Construction of Drilled Piers (ACI 336.1-01).

Concrete may be placed by free-falling, provided that concrete is guided so as not to hit the reinforcement, hole sides, or anchor bolt assemblies (ACI 336.1-01, Section 3.5.6). Placing concrete by free-falling is not recommended for shaft depths greater than 60 feet.

Groundwater was not encountered in the borings during exploration, and it is not anticipated that it will be encountered during construction. However, if unexpected groundwater is encountered, drilling mud/slurry and/or tremie concrete placement methods may be used. Concrete should not be allowed to free-fall through drilling mud/slurry.

It is recommended that the following items concerning the installation of drilled shafts be addressed in the job specifications.

1. A GEOMAT representative should be present at the site during drilling to observe and document the conditions encountered and to provide alternate recommendations, if applicable. All drilled shaft installation procedures and techniques and concrete placement shall be observed and documented by qualified geotechnical personnel.

2. Holes shall be drilled or bored in such a manner as to provide the full-sized shaft diameter and length as specified on the drawings or in the specifications.

3. Before and after placement of reinforcement cages and before placing concrete, the

diameter, depth, and bearing stratum of each borehole must be verified by a representative of the owner (Geotechnical Engineer).

4. Under no circumstances should concrete be allowed to free fall against shaft sides or reinforcing. Free-falling concrete should be guided so that it does not hit the reinforcement, hole sides, or anchor bolt assemblies.

5. If the Geotechnical Engineer deems the bearing stratum as not capable of providing sufficient bearing support, the shaft length shall be extended as directed, or the diameter of the shaft should be enlarged.

6. All loose material and slough shall be removed from drilled shafts before reinforcing and concrete placement. Excavate shaft bottoms to a level plane, as approved by the Geotechnical Engineer. If caving occurs or "slough" from the surface falls into the borehole after placement of the reinforcement cage, the reinforcement cage shall be removed, the bottom cleaned out, and reinforcement cage reinserted.

7. It is not anticipated that groundwater will be encountered; however, should unforeseen groundwater be encountered or should drilling mud/slurry be necessary, tremie concrete placement methods, as described below, may be used.

    a. Drilled shafts shall be cleaned with a clean-out bucket, immediately before concrete placement.

    b. The tremie or pump pipe shall have watertight joints.

    c. During the initial concrete placement, the concrete tremie or pump pipe shall be extended to the bottom of the drilled shaft before concrete placement.

    d. During placement of concrete, the bottom of the pipe shall be maintained below the top of the concrete at all times. If the seal is lost, the pipe shall be re-inserted and the operation restarted.

    e. Sufficient embedment of the tremie or pump pipe in concrete shall be maintained throughout concrete placement to prevent re-entry of water. The minimum embedment depth shall be 5 feet

    f. The first-placed portion of concrete flow that comes to the top of the shaft shall be wasted, as determined by the Geotechnical Engineer.

g. Under no circumstances shall concrete be allowed to free fall through water or drilling fluid.

8. The placement of concrete for each drilled shaft shall be completed in one placement before commencing the placement of concrete in another.

9. Quantities of concrete placed for each drilled shaft shall be provided to the representative of the Owner.

10. Concrete shall have an ultimate compressive strength of not less than that provided for in the specifications and shall be workable and plastic so that it may be placed without segregation. A slump of 6 to 8 inches is recommended.

11. Concrete shall be cast-in-place against undisturbed earth in the holes in such a manner to provide for the exclusion of foreign matter in the concrete. Concrete shall not be dropped vertically into the dry excavation more than 60 feet unless an approved tremie (elephant trunk) or other similar approved method is used to prevent the concrete from striking the sides of the excavation.

12. The Geotechnical Engineer should review drilled shaft spacing at the time of construction. In order to prevent blowout between drilled shafts, it may be necessary to place concrete and allow it to harden for at least 8 hours before drilling adjacent shafts.

The test drilling was performed using a truck-mounted, CME-45 drill rig with 7.25-inch-diameter augers. It is not possible to accurately correlate the auger drilling results with the ease or difficulty of excavation at the sites with other types of equipment. We present the following general comments regarding excavatability for the designers' information with the understanding that they are opinions based on the test boring data. More accurate information regarding excavatability should be evaluated by contractors or other interested parties from test excavations using the equipment that will be used during construction. Based on the conditions encountered in our test borings, we anticipate that drilling to design depths may be possible with appropriate rotary or single-flight power augers.

Final concrete quantities should be expected to exceed ideal geometric quantities, due to raveling and sloughing of the drilled shafts.

Spread Footings:

Based on our understanding of the type of structures to be built and the results of our field subsurface exploration and laboratory testing, the buildings could be founded on conventional shallow spread footings bearing on engineered fill, provided that the fat clay is removed from below the buildings.

At the Heaton site, the fat clay should be removed down to the underlying silty sand soils (encountered in our borings at a depth of approximately 7 to 8 feet below existing ground surface). **At the Hogback site**, the fat clay should be removed for a minimum depth of seven (7.0) feet **below existing ground surface**. At both sites, the fat clay should be removed for a minimum lateral distance of five (5.0) feet beyond the perimeter of the buildings. The removed soils should be replaced with engineered fill to the planned bottom-of-footing and/or floor slab subgrade elevation.

Materials and compaction criteria for the engineered fill should be as recommended in the **Earthwork** section of this report. Adequate drainage should be provided to prevent the supporting soils from undergoing significant moisture changes.

The recommended design bearing capacities and footing depths are presented in the following table.

Footing Depth[1] (ft)	Allowable Bearing Pressure (psf)	Bearing Soil
2.5[2]	2,500	Engineered Fill
3.0	3,000	Engineered Fill

[1]Footing depth referenced below lowest adjacent finished grade. Finished grade is the lowest adjacent grade for perimeter footings and floor level for interior footings.

[2]Minimum footing depth for frost protection.

Total and differential settlements resulting from the assumed structural loads are estimated to be on the order of ½ inch or less. Proper drainage should be provided in the final design and during construction and areas adjacent to the structure should be designed to prevent water from ponding or accumulating next to the structure.

Total and differential settlements should not exceed predicted values, provided that:

- Foundations are constructed as recommended, and
- Essentially no changes occur in water contents of foundation soils.

For foundations adjacent to descending slopes, a minimum horizontal setback of five (5) feet should be maintained between the foundation base and slope face. In addition, the setback should be such that an imaginary line extending downward at 45 degrees from the nearest foundation edge does not intersect the slope.

Footings and foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement.

Foundation excavations should be observed by GEOMAT. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

Site Classification:

Based on the subsurface conditions encountered in the borings, we estimate that Site Class D is appropriate for both the Heaton and Hogback sites according to Table 1613.5.2 of the 2009 International Building Code. This parameter was estimated based on extrapolation of data beyond the deepest depth explored, using methods allowed by the code. Actual shear wave velocity testing/analysis and/or exploration to a depth of 100 feet were not performed as part of our scope of services for this project.

Lateral Earth Pressures:

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are presented in the following table:

- **Active:**
  Granular soil backfill (on-site sand).....35 psf/ft
  Undisturbed subsoil .....30 psf/ft

- **Passive:**
  Shallow foundation walls .....250 psf/ft
  Shallow column footings.....350 psf/ft

- **Coefficient of base friction**: 0.40
  The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

Where the design includes restrained elements, the following equivalent fluid pressures are recommended:

- **At rest:**
  Granular soil backfill (on-site sand) ..... 50 psf/ft
  Undisturbed subsoil ..... 60 psf/ft

Fill against grade beams and retaining walls should be compacted to densities specified in **Earthwork**. Medium to high plasticity clay soils should not be used as backfill against retaining walls. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Over compaction may cause excessive lateral earth pressures that could result in wall movement.

Floor Slab Design and Construction:

If deep foundations are used, the floors should be suspended structural slabs. A minimum void space of 6 inches should be provided between the bottom of the floor and the underlying soils.

If the buildings are supported on shallow spread footings, the floors could be constructed as slabs-on-grade. Slab-on-grade floors should be placed on a minimum of four (4.0) feet of engineered fill (including the base course). Imported soils with low expansive potentials should be used in fills that will support the floor slabs. Some differential movement of a slab-on-grade floor system is possible if the subgrade soils become elevated in moisture content. Such movements are considered within general tolerance for normal slab-on-grade construction. To reduce potential slab movements, the subgrade soils should be prepared as outlined in the **Earthwork** section of this report.

For structural design of concrete slabs-on-grade, a modulus of subgrade reaction of 250 pounds per cubic inch (pci) may be used for floors supported on compacted engineered fill.

Additional floor slab design and construction recommendations are as follows:

- Control joints should be provided in slabs to control the location and extent of cracking. Joint spacing should be designed by the structural engineer.

- Interior trench backfill placed beneath slabs should be compacted in accordance with recommended specifications outlined below.

- In areas subjected to normal loading, a minimum 4-inch layer of clean-graded gravel, aggregate base course should be placed beneath interior slabs. For heavy loading, re-evaluation of slab and/or base course thickness may be required.

- Other design and construction considerations, as outlined in the ACI Design Manual, Section 302.1R are recommended.

- If moisture sensitive floor coverings are used on interior slabs, consideration should be given to the use of membranes to help reduce the potential for vapor rise through the slab.

Subgrade preparation and moisture control recommendations provided in this report help to reduce soil related problems that may result in distress of concrete floor slabs on grade. However, concrete drying shrinkage, temperature induced volume change and curling can create cracking and distress in the concrete slab on grade. To reduce distress from these causes, properly proportioned concrete mixes with adequate curing and proper joint spacing must be provided. These options should be discussed with the project Architect/Engineer.

Slopes:

Assuming fill specifications, compaction requirements, and recommended setbacks provided in this report are followed, cut and fill slopes as steep as to 2.5:1 (horizontal:vertical) should be stable. Depending upon specific project conditions, adequate factors of safety against slope failure may be available for steeper configurations. However, such a determination would require additional analysis.

Earthwork:

General Considerations:

The opinions contained in this report for the proposed construction are contingent upon compliance with recommendations presented in this section. Although underground facilities such as foundations, septic tanks, cesspools, basements and irrigation systems were not encountered during site reconnaissance, such features could exist and might be encountered during construction.

Site Clearing:

1. Strip and remove all existing pavement, fill, debris and other deleterious materials from the proposed building area. Any existing structures should be completely removed from below any building, including foundation elements and any associated development such as

underground utilities, septic tanks, etc. All exposed surfaces below footings and slabs should be free of mounds and depressions which could prevent uniform compaction.

2. If unexpected fills or underground facilities are encountered during site clearing, we should be contacted for further recommendations. All excavations should be observed by GEOMAT prior to backfill placement.

3. Stripped materials consisting of vegetation and organic materials should be removed from the site, or used to re-vegetate exposed slopes after completion of grading operations. If it is necessary to dispose of organic materials on-site, they should be placed in non-structural areas, and in fill sections not exceeding 5 feet in height.

4. Sloping areas steeper than 5:1 (horizontal:vertical) should be benched to reduce the potential for slippage between existing slopes and fills. Benches should be level and wide enough to accommodate compaction and earth moving equipment.

5. All exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of eight inches, conditioned to near optimum moisture content, and compacted to at least 95% of standard proctor (ASTM D698).

Excavation:

1. 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 boring data. 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 shallow excavations in soils at the site will be possible using standard excavation equipment.

2. On-site soils may pump or become unstable or unworkable at high water contents, especially for excavations near the water table. Dewatering may be necessary to achieve a stable excavation. 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.

Slab Subgrade Preparation:

1. After site clearing is complete, the existing soil below slab-on-grade areas should be prepared as recommended in the **Floor Slab Design and Construction** and **Site Clearing** sections of this report. The existing fat clay soils should be removed and replaced with engineered fill as recommended in the **Spread Footings** section of this report. Floor slabs-on-grade should be supported on a minimum four (4.0) foot thickness of engineered fill and base course below the floor slab.

2. A minimum 4-inch layer of aggregate base course should be placed beneath floor slabs on grade.

Foundation Preparation:

All loose and/or disturbed soils should be removed from the bottoms of drilled shafts prior to placing reinforcing steel and concrete.

Spread footings should bear on engineered fill as recommended in the **Foundations** section of this report. All loose and/or disturbed soils should either be compacted or removed from the bottoms of footing excavations prior to placement of reinforcing steel and/or concrete.

Fill Materials:

1. The on-site fat clay soils are highly expansive and are not suitable for use as engineered fill. Imported soils with low expansive potentials could be used as fill material for the following:

    - general site grading
    - foundation areas
    - interior floor slab areas
    - foundation backfill
    - exterior slab areas

2. Select granular materials should be used as backfill behind walls that retain earth.

3. On site or imported soils to be used in structural fills should conform to the following:

Gradation	Percent finer by weight (ASTM C136)
3"	100
No. 4 Sieve	50-100
No. 200 Sieve	50 Max
Maximum expansive potential (%)*	1.5

* Measured on a sample compacted to approximately 95 percent of the ASTM D698 maximum dry density at about 3 percent below optimum water content. The sample is confined under a 144-psf surcharge and submerged.

4. Aggregate base should conform to Section 303 of 2014 NMDOT specifications.

Placement and Compaction:

1. Place and compact fill in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift.

2. Un-compacted fill lifts should not exceed 10 inches loose thickness.

3. Materials should be compacted to the following:

Material	Minimum Percent (ASTM D698)
Subgrade soils beneath fill areas	95
On site or imported soil fills:	
Beneath footings, slabs on grade and pavements	95
Aggregate base beneath slabs and pavements	95
Miscellaneous backfill	90

4. On-site and imported soils should be compacted at moisture contents near optimum.

Compliance:

Recommendations for slabs-on-grade and foundation elements supported on compacted fills depend upon compliance with **Earthwork** recommendations. To assess compliance, observation and testing should be performed by GEOMAT.

Drainage:

Surface Drainage:

1. Positive drainage should be provided during construction and maintained throughout the life of the proposed project. Infiltration of water into utility or foundation excavations must be prevented during construction. Planters and other surface features that could retain water in areas adjacent to the building or pavements should be sealed or eliminated.

2. In areas where sidewalks or paving do not immediately adjoin the structure, we recommend that protective slopes be provided with a minimum grade of approximately 5 percent for at least 10 feet from perimeter walls. Backfill against footings, exterior walls, and in utility and sprinkler line trenches should be well compacted and free of all construction debris to reduce the possibility of moisture infiltration.

3. Downspouts, roof drains or scuppers should discharge into splash blocks or extensions when the ground surface beneath such features is not protected by exterior slabs or paving.

4. Sprinkler systems should not be within 5 feet of foundation walls. Irrigated landscaping adjacent to the foundation system should be minimized or eliminated.

Subsurface Drainage:

Free-draining, granular soils containing less than five percent fines (by weight) passing a No. 200 sieve should be placed adjacent to walls which retain earth. A drainage system consisting of either weep holes or perforated drain lines (placed near the base of the wall) should be used to intercept and discharge water which would tend to saturate the backfill. Where used, drain lines should be embedded in a uniformly graded filter material and provided with adequate clean-outs for periodic maintenance. An impervious soil should be used in the upper layer of backfill to reduce the potential for water infiltration.

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 grading and foundation 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 excavation, grading, foundation, and construction phases of the work. Observation of footing excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present and is considered a necessary part of continuing geotechnical engineering services for the project. Construction testing, including field and laboratory evaluation of fill, backfill, pavement materials, concrete and steel 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 borings 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.

Geomat Project 142-2089

APPENDIX A



Approximate Not to Scale	VICINITY MAP Site Locations (approximate) GEOMAT Project No. 142-2089 Dates of Exploration: September 5, 2014	PROJECT Heaton Pump Station & Hogback Pressure Reducing Station, NGWSP Reach 27.6 Gallup, New Mexico	GEOMAT INC



Approximate Not to Scale	SITE PLAN Boring Locations (approximate) GEOMAT Project No. 142-2089 Dates of Exploration: September 5, 2014	PROJECT Heaton Pump Station Gallup, New Mexico

GEOMAT INC



Approximate Not to Scale	SITE PLAN Boring Locations (approximate) GEOMAT Project No. 142-2089 Dates of Exploration: September 5, 2014	PROJECT Hogback Pressure Reducing Station Gallup, New Mexico

GEOMAT INC

GEOMAT INC
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Borehole B-1

Project Name: Heaton PS & Hogback PRS
Project Number: 142-2089
Client: DePauli Engineering & Surveying
Site Location: Gallup, New Mexico
Rig Type: CME-45
Drilling Method: 7.25" O.D. Hollow Stem Auger
Sampling Method: Ring and Split spoon samples
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 9/5/2014
Northing: Not Determined
Easting: Not Determined
Elevation: Not Determined
Boring Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: TC
Remarks: Heaton Pump Station

Laboratory Results: Dry Density (pcf)	Laboratory Results: % Passing #200 Sieve	Laboratory Results: Plasticity Index	Laboratory Results: Moisture Content (%)	Blows per 6"	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
					A				1	FAT CLAY, dark brown, very stiff to hard, damp
				3-12-20	SS 18		CH		2	
									3	
									4	
107.8			10.1	10-30-25	MC 18				5	very stiff
									6	
									7	
									8	SILTY SAND, tan, fine-grained, medium dense, slightly damp
									9	
				4-6-5	SS 18		SM		10	
									11	
									12	
									13	
									14	
91.4	22		3.1	5-7-13	MC 18				15	loose
									16	
									17	Total Depth 16.5 feet
									18	
									19	
									20	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer bgs = Below Existing Ground Surface

GEOMAT 142-2089.GPJ GEOMAT.GDT 09/18/14

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Borehole B-2

Project Name: Heaton PS & Hogback PRS
Project Number: 142-2089
Client: DePauli Engineering & Surveying
Site Location: Gallup, New Mexico
Rig Type: CME-45
Drilling Method: 7.25" O.D. Hollow Stem Auger
Sampling Method: Ring and Split spoon samples
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 9/5/2014
Northing: Not Determined
Easting: Not Determined
Elevation: Not Determined
Boring Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: TC
Remarks: Heaton Pump Station

Laboratory Results										
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	Blows per 6"	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
					A				1	FAT CLAY, dark brown, very stiff, damp
									2	
90.0			11.6	15-15-18	MC 18		CH		3	
									4	
	97	43		5-10-19	SS 18				5	slightly damp
									6	
									7	
									8	
									9	SILTY SAND, tan, fine-grained, loose, slightly damp
91.3			5.4	6-8-12	MC 18		SM		10	
									11	
									12	
									13	
									14	
				4-5-7	SS 18				15	medium dense
									16	
									17	Total Depth 16.5 feet
									18	
									19	
									20	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer bgs = Below Existing Ground Surface

GEOMAT 142-2089.GPJ GEOMAT.GDT 09/18/14

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

Borehole B-3

Project Name: Heaton PS & Hogback PRS
Project Number: 142-2089
Client: DePauli Engineering & Surveying
Site Location: Gallup, New Mexico
Rig Type: CME-45
Drilling Method: 7.25" O.D. Hollow Stem Auger
Sampling Method: Ring and Split spoon samples
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 9/5/2014
Northing: Not Determined
Easting: Not Determined
Elevation: Not Determined
Boring Location: See Site Plan
Groundwater Depth: None Encountered
Logged By: TC
Remarks: Hogback Pressure Reducing Station

Laboratory Results										
Dry Density (pcf)	% Passing #200 Sieve	Plasticity Index	Moisture Content (%)	Blows per 6"	Sample Type & Length (in)	Recovery	USCS	Soil Symbol	Depth (ft)	Soil Description
									1	FAT CLAY, red-brown, very stiff, damp
									2	
	98	66		10-10-13	SS 18				3	
									4	
93.7			23.6	5-23-40	MC 18				5	
									6	
									7	
							CH		8	
									9	
				9-18-21	SS 18				10	hard
									11	
									12	
									13	
									14	
				14-33-43	MC 18				15	
									16	
									17	Total Depth 16.5 feet
									18	
									19	
									20	

A = Auger Cuttings MC = Modified California (Ring Sample) SS = Split Spoon PP = Pocket Penetrometer bgs = Below Existing Ground Surface

GEOMAT 142-2089.GPJ GEOMAT.GDT 09/18/14

UNIFIED SOIL CLASSIFICATION SYSTEM					CONSISTENCY OR RELATIVE DENSITY CRITERIA		
Major Divisions			Group Symbols	Typical Names			
Coarse-Grained Soils More than 50% retained on No. 200 sieve	**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	Standard Penetration Test Density of Granular Soils		
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	Penetration Resistance, N (blows/ft.)	Relative Density	
		Gravels with Fines	GM	Silty gravels, gravel-sand-silt mixtures	0-4	Very Loose	
			GC	Clayey gravels, gravel-sand-clay mixtures	5-10	Loose	
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	11-30	Medium Dense	
			SP	Poorly graded sands and gravelly sands, little or no fines	31-50	Dense	
		Sands with Fines	SM	Silty sands, sand-silt mixtures	>50	Very Dense	
			SC	Clayey sands, sand-clay mixtures			
Fine-Grained Soils 50% or more passes No. 200 sieve	**Silts and Clays** Liquid Limit 50 or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	Standard Penetration Test Density of Granular Soils		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	Penetration Resistance, N (blows/ft.)	Consistency	Unconfined Compressive Strength (Tons/ft2)
			OL	Organic silts and organic silty clays of low plasticity	<2	Very Soft	<0.25
	Silts and Clays Liquid Limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous free sands or silts, elastic silts	2-4	Soft	0.25-0.50
			CH	Inorganic clays of high plasticity, fat clays	4-8	Firm	0.50-1.00
			OH	Organic clays of medium to high plasticity	8-15	Stiff	1.00-2.00
					15-30	Very Stiff	2.00-4.00
Highly Organic Soils			PT	Peat, mucic & other highly organic soils	>30	Hard	>4.0

U.S. Standard Sieve Sizes	3"	3/4"	#4	#10		#40	#200
Unified Soil Classification	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.

Geomat Project 142-2089

APPENDIX B

LAB NO.	BORING NO.	SAMPLE DEPTH (ft)	ASTM D698		MOISTURE CONT. (%)	DENSITY		ATTERBERG LIMITS			SWELL (%)	CONSOL TEST	% PASS #200 SIEVE	CLASSIFICATION
			Density	Moisture		WET (pcf)	DRY (pcf)	LL	PL	PI				
1195	B-1	5			10.1	118.7	107.8					Attached		Fat **CLAY** (CH)
1196	B-1	15			3.1	94.2	91.4						22	Silty **SAND** (SM)
1197	B-2	2.5			11.6	100.4	90.0					Attached		Fat **CLAY** (CH)
1198	B-2	5						63	20	43			97	Fat **CLAY** (CH)
1199	B-2	10			5.4	96.2	91.3							Silty **SAND** (SM)
1200	B-3	2.5						89	23	66			98	Fat **CLAY** (CH)
1201	B-3	5			23.6	115.8	93.7					Attached		Fat **CLAY** (CH)

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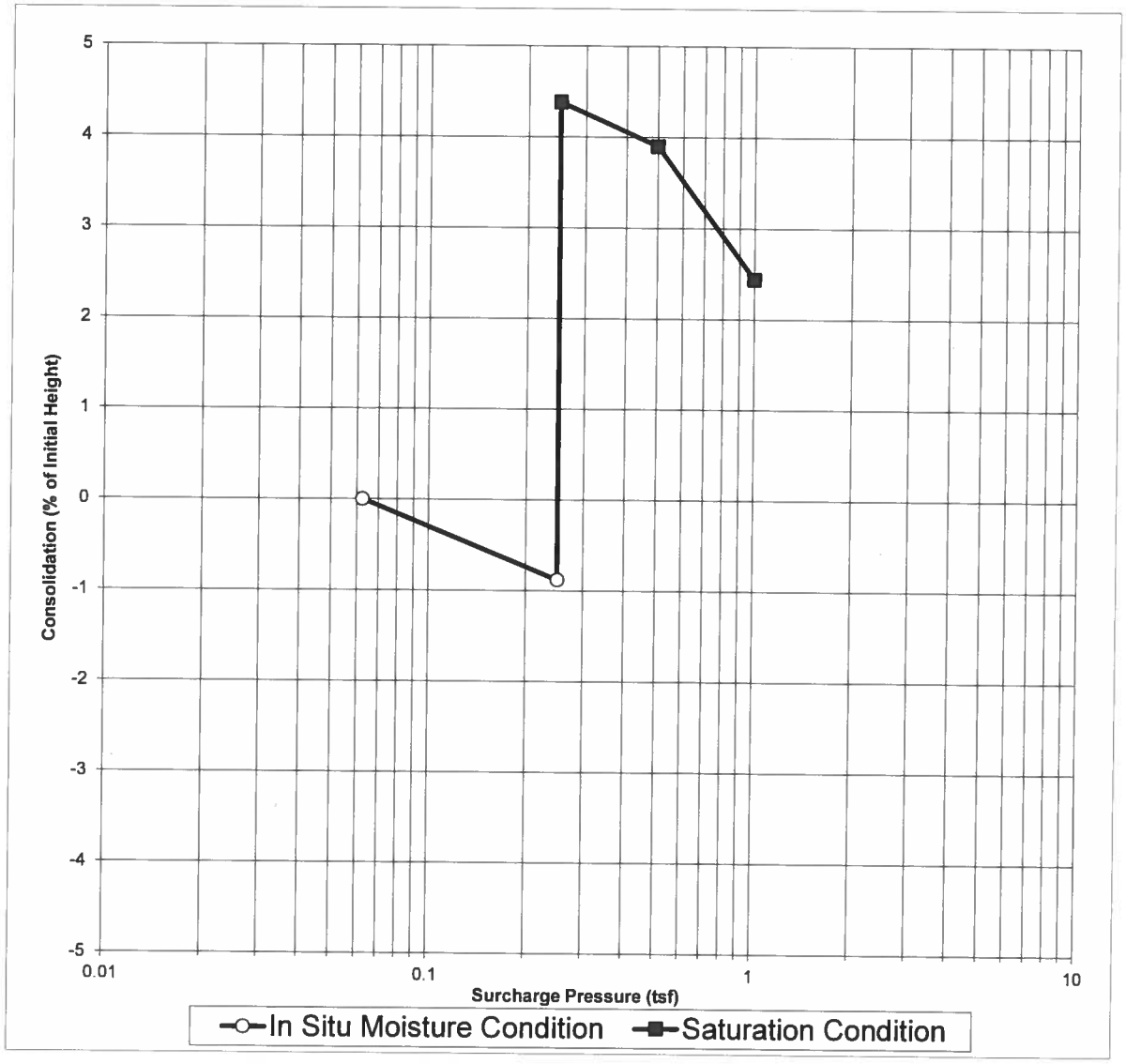
SUMMARY OF SOIL TESTS

Project	NGWSP Reach 27.6 Heaton PS & Hogback PRS
Job No.	142-2089
Location	Gallup, New Mexico
Date of Exploration	9/5/2014

PROJECT:	NGWSP Reach 27.6 Heaton Pump Station	**JOB NO:**	142-2089
CLIENT:	DePauli Engineering & Surveying	**WORK ORDER NO:**	NA
MATERIAL:	Fat CLAY (CH)	**LAB NO:**	1195
SAMPLE SOURCE:	B-1 @ 5'	**DATE SAMPLED:**	9/5/2014
SAMPLE PREP.:	In Situ	**SAMPLED BY:**	TC

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

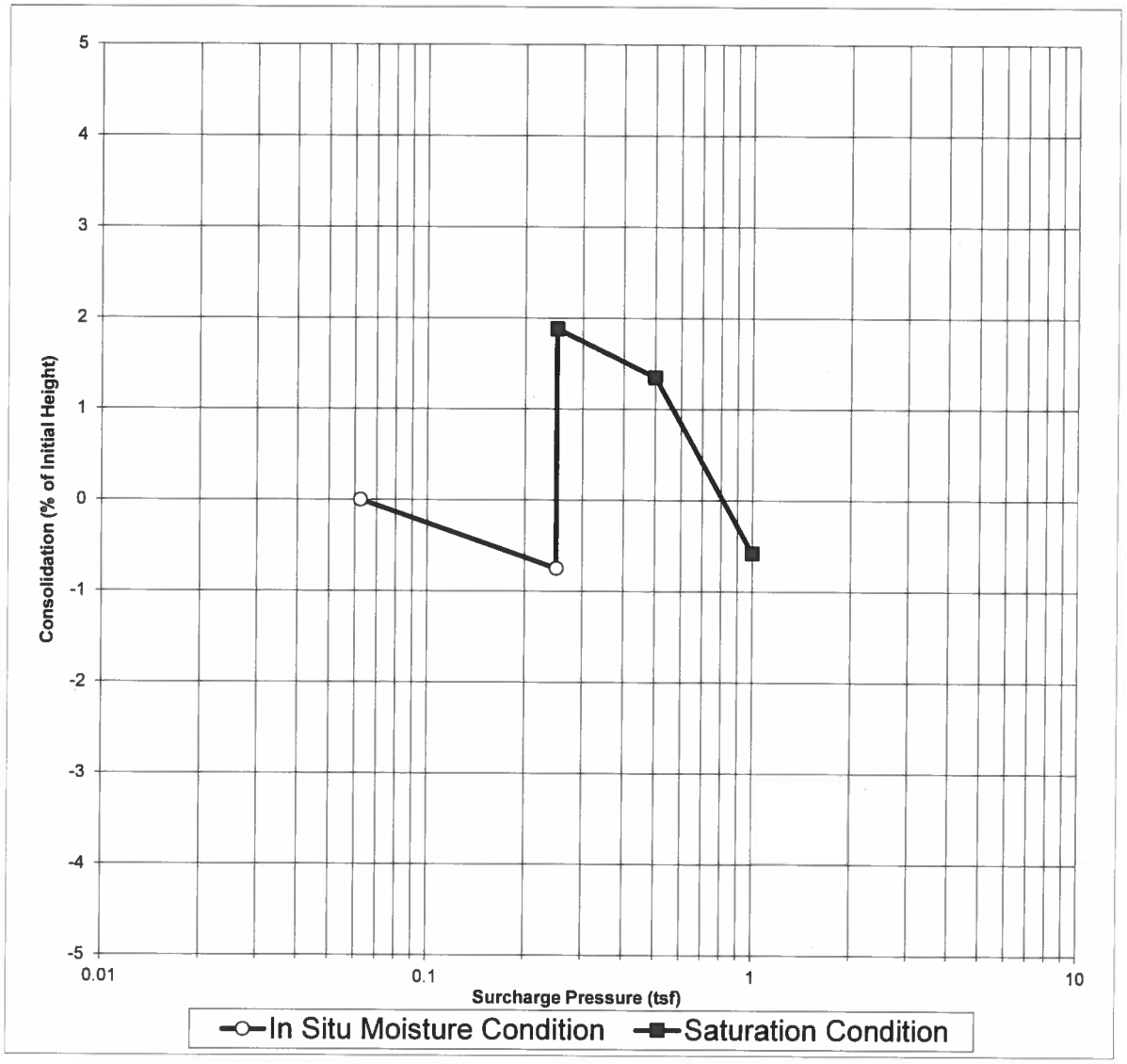
INITIAL VOLUME (cu.in)	4.60	FINAL VOLUME (cu.in)	4.72
INITIAL MOISTURE CONTENT	10.1%	FINAL MOISTURE CONTENT	20.2%
INITIAL DRY DENSITY(pcf)	107.8	FINAL DRY DENSITY(pcf)	104.7
INITIAL DEGREE OF SATURATION	36%	FINAL DEGREE OF SATURATION	68%
INITIAL VOID RATIO	0.54	FINAL VOID RATIO	0.58
ESTIMATED SPECIFIC GRAVITY	2.651	SATURATED AT	0.25 tsf



PROJECT:	NGWSP Reach 27.6 Heaton Pump Station	**JOB NO:**	142-2089
CLIENT:	DePauli Engineering & Surveying	**WORK ORDER NO:**	NA
MATERIAL:	Fat CLAY (CH)	**LAB NO:**	1197
SAMPLE SOURCE:	B-2 @ 2.5'	**DATE SAMPLED:**	9/5/2014
SAMPLE PREP.:	In Situ	**SAMPLED BY:**	TC

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

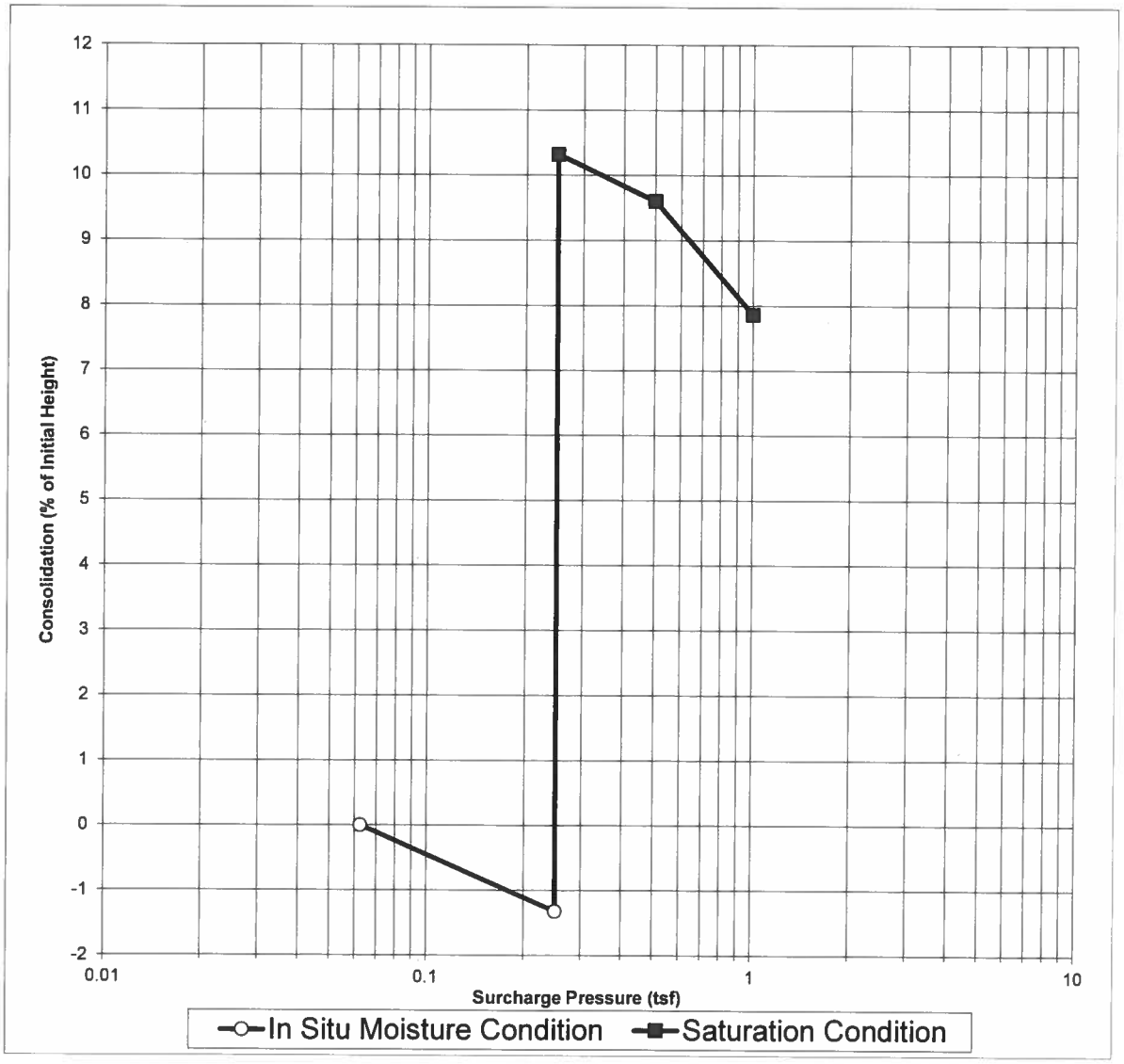
INITIAL VOLUME (cu.in)	4.60	FINAL VOLUME (cu.in)	4.58
INITIAL MOISTURE CONTENT	11.6%	FINAL MOISTURE CONTENT	26.7%
INITIAL DRY DENSITY(pcf)	90.0	FINAL DRY DENSITY(pcf)	90.1
INITIAL DEGREE OF SATURATION	29%	FINAL DEGREE OF SATURATION	68%
INITIAL VOID RATIO	0.85	FINAL VOID RATIO	0.84
ESTIMATED SPECIFIC GRAVITY	2.651	SATURATED AT	0.25 tsf



PROJECT:	NGWSP Reach 27.6 Hogback Pressure Reducing Station	**JOB NO:**	142-2089
CLIENT:	DePauli Engineering & Surveying	**WORK ORDER NO:**	NA
MATERIAL:	Fat CLAY (CH)	**LAB NO:**	1201
SAMPLE SOURCE:	B-3 @ 5'	**DATE SAMPLED:**	9/5/2014
SAMPLE PREP.:	In Situ	**SAMPLED BY:**	TC

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL VOLUME (cu.in)	4.60	FINAL VOLUME (cu.in)	4.97
INITIAL MOISTURE CONTENT	23.6%	FINAL MOISTURE CONTENT	35.2%
INITIAL DRY DENSITY(pcf)	93.7	FINAL DRY DENSITY(pcf)	86.5
INITIAL DEGREE OF SATURATION	64%	FINAL DEGREE OF SATURATION	83%
INITIAL VOID RATIO	0.77	FINAL VOID RATIO	0.91
ESTIMATED SPECIFIC GRAVITY	2.651	SATURATED AT	0.25 tsf



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 E

Highway Permits

Highway 608
18” Line
Crossing

New Mexico DEPARTMENT OF
TRANSPORTATION

October 19, 2015

DePauli Engineering
307 South 4th Street
Gallup, NM
Attn: Daniella Aretino

RE: Utility Permit 15-6U-030
Subject: Authorization to Proceed for DePauli Engineering
Location: NM 608 (9th St.) 1.4 miles North of I-40

Dear Ms. Aretino:
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 Stephanie Parra via email: stephanie.parra@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.
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)

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Tom Church
Cabinet Secretary

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Chairman
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District 5

Jackson Gibson
Commissioner
District 6

New Mexico DEPARTMENT OF
TRANSPORTATION

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If you have any questions please call me at 505-285-3255 or you can reach me by email: stephanie.parra@state.nm.us

Sincerely,

Stephanie Parra
Traffic Section Supervisor (acting)

Enclosure

Cc: Gallup (46-58)
Records
File

Susana Martinez
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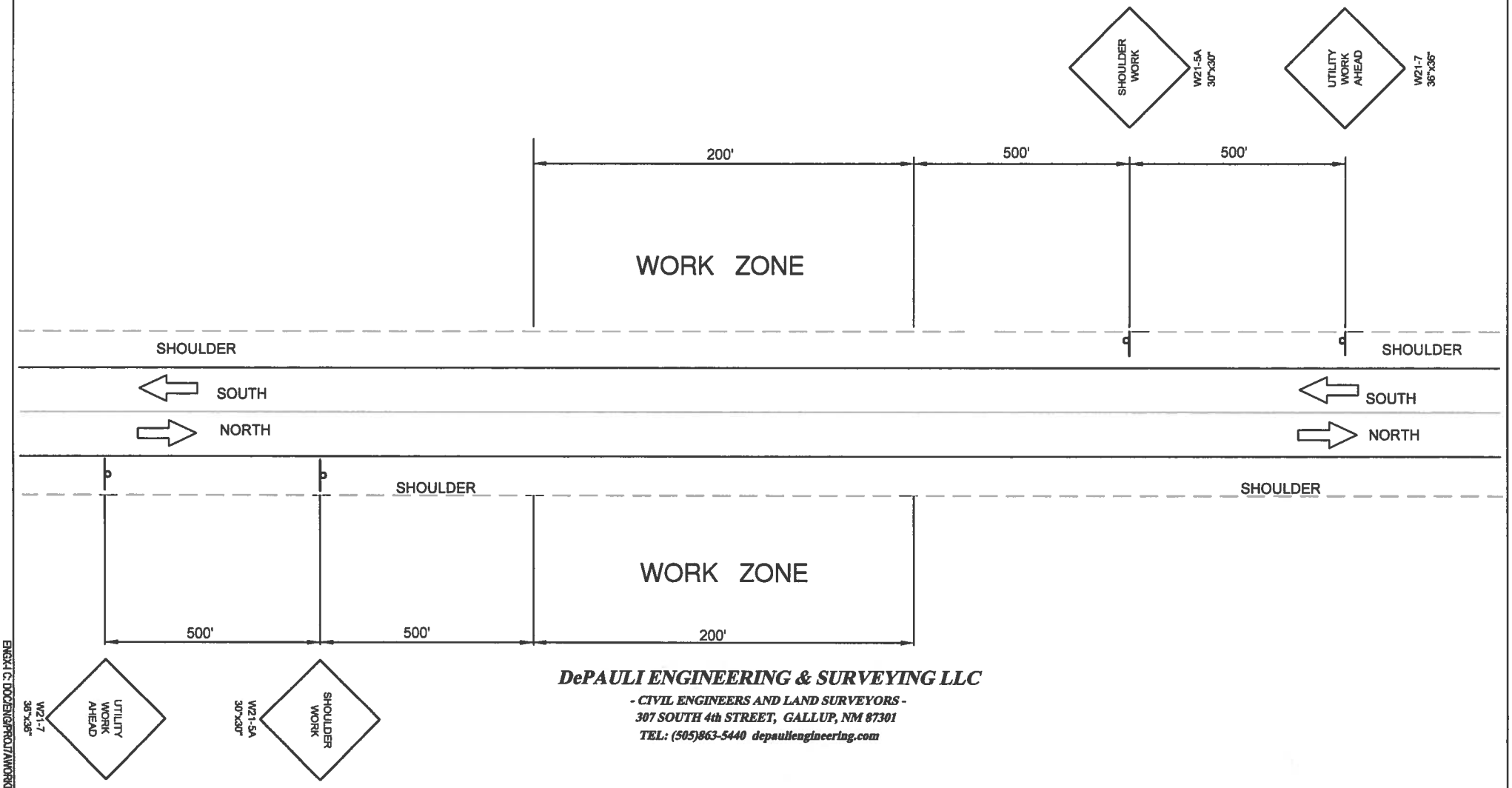
Butch Mathews
Commissioner
District 5

Jackson Gibson
Commissioner
District 6

TRAFFIC CONTROL PLAN
NAVAJO-GALLUP WATER SUPPLY PROJECT
REACH 27.6

NMSHC PROJ. NO. TPO-666-1(51)00
STA. 3+291.26 MTRS., 18" WATERLINE X-IN G

SECTION 9, T15N, R18W, NMPM
McKINLEY COUNTY, NEW MEXICO



DePAULI ENGINEERING & SURVEYING LLC
- CIVIL ENGINEERS AND LAND SURVEYORS -
307 SOUTH 4th STREET, GALLUP, NM 87301
TEL: (505)863-5440 depaulengineering.com

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Highway I-40/X-Rd 12" Line Crossing

New Mexico DEPARTMENT OF
TRANSPORTATION

October 19, 2015

DePauli Engineering
307 South 4th Street
Gallup, NM
Attn: Daniella Aretino

RE: Utility Permit 15-6U-031
Subject: Authorization to Proceed for DePauli Engineering
Location: I-40 Mile Marker 25.2 (12" waterline)

Dear Ms. Aretino:
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 Stephanie Parra via email: stephanie.parra@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.

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New Mexico DEPARTMENT OF
TRANSPORTATION

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If you have any questions please call me at 505-285-3255 or you can reach me by email: stephanie.parra@state.nm.us

Sincerely,

Stephanie Parra
Traffic Section Supervisor (acting)

Enclosure

Cc: Gallup (46-58)
Records
File

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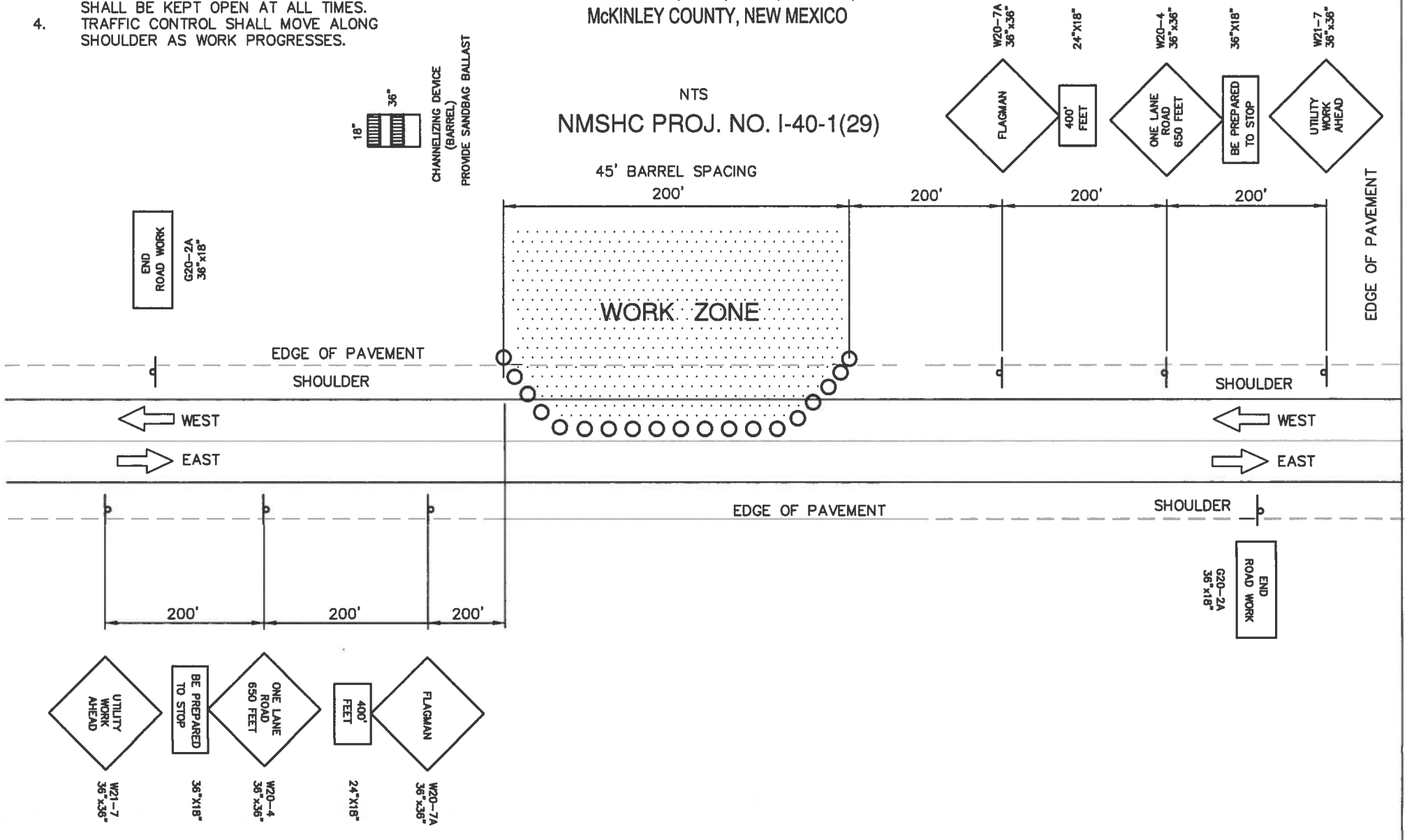
TRAFFIC CONTROL PLAN
GALLUP-RURAL NAVAJO WATER SUPPLY PROJECT
PROJECT 6B
12" WATERLINE CONSTRUCTION
NMSHC PROJ. NO. I-40-1(29)18
CROSS RD. STA. 7+32.21

SECTION 18, T15N, R17W, N.M.P.M.;
McKINLEY COUNTY, NEW MEXICO

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.

NTS

NMSHC PROJ. NO. I-40-1(29)



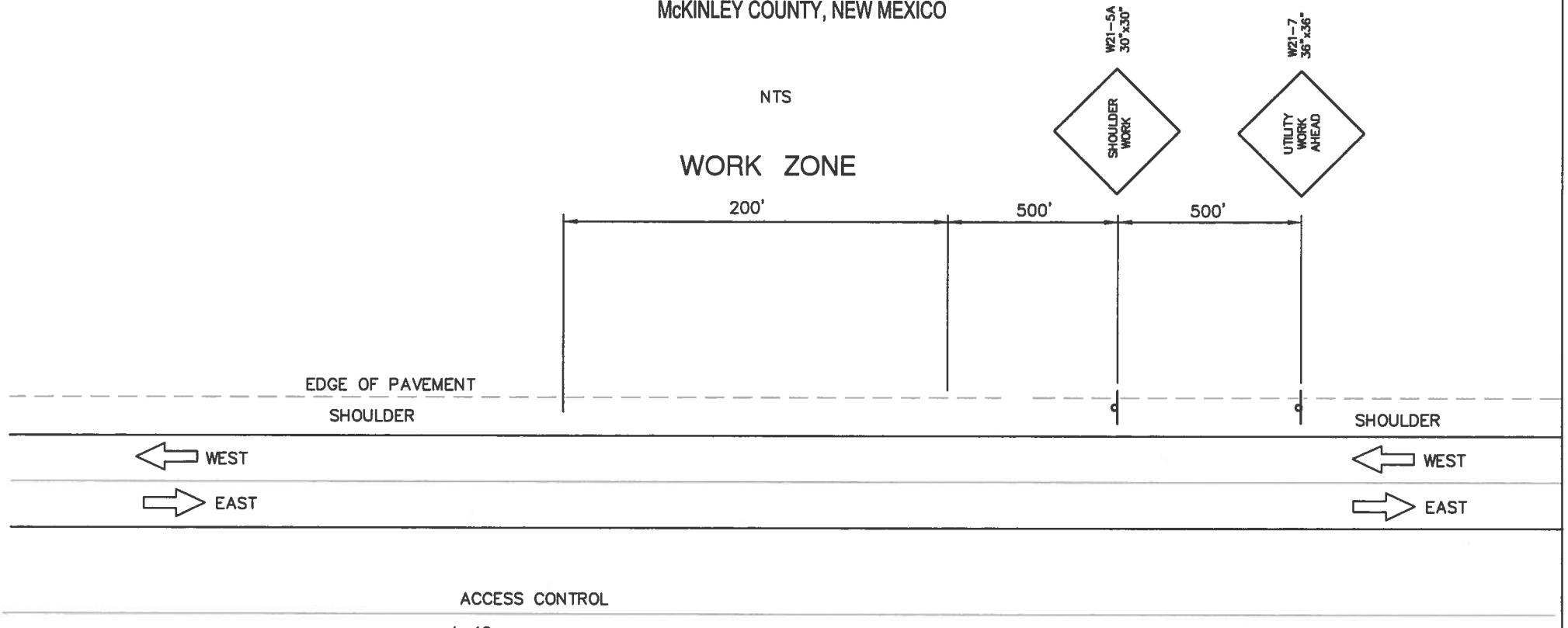
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TRAFFIC CONTROL PLAN
GALLUP-RURAL NAVAJO WATER SUPPLY PROJECT
PROJECT 27.6B
12" WATERLINE CONSTRUCTION
NMSHC PROJ. NO. I-40-1(29)18
FRONTAGE RD. STATION 1333+87.27

SECTION 18, T15N, R17W, N.M.P.M.;
McKINLEY COUNTY, NEW MEXICO

NOTE:
TRAFFIC CONTROL DEVICES & SIGNS TO CONFORM TO MUTCD STANDARDS.

NTS



DePAULI ENGINEERING & SURVEYING LLC
- CIVIL ENGINEERS AND LAND SURVEYORS -
102 WEST HILL AVENUE GALLUP, NM 87301
TEL: (505)863-5440 DES@CNETCO.COM

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Highway 118
12” Line
Crossing

New Mexico DEPARTMENT OF
TRANSPORTATION

October 19, 2015

DePauli Engineering
307 South 4th Street
Gallup, NM
Attn: Daniella Aretino

RE: Utility Permit 15-6U-033
Subject: Authorization to Proceed for DePauli Engineering
Location: NM 118 Sta. 134+14.42 to 138+69.76 (12" waterline)
*****DePauli Engineering is to notify local business before work is to commence*****

Dear Ms. Aretino:
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 Stephanie Parra via email: stephanie.parra@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.

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4. Should the roadside disturbance in conjunction with this permit application be

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Keith Mortensen
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If you have any questions please call me at 505-285-3255 or you can reach me by email: stephanie.parra@state.nm.us

Sincerely,

Stephanie Parra
Traffic Section Supervisor (acting)

Enclosure

Cc: Gallup (46-58)
Records
File

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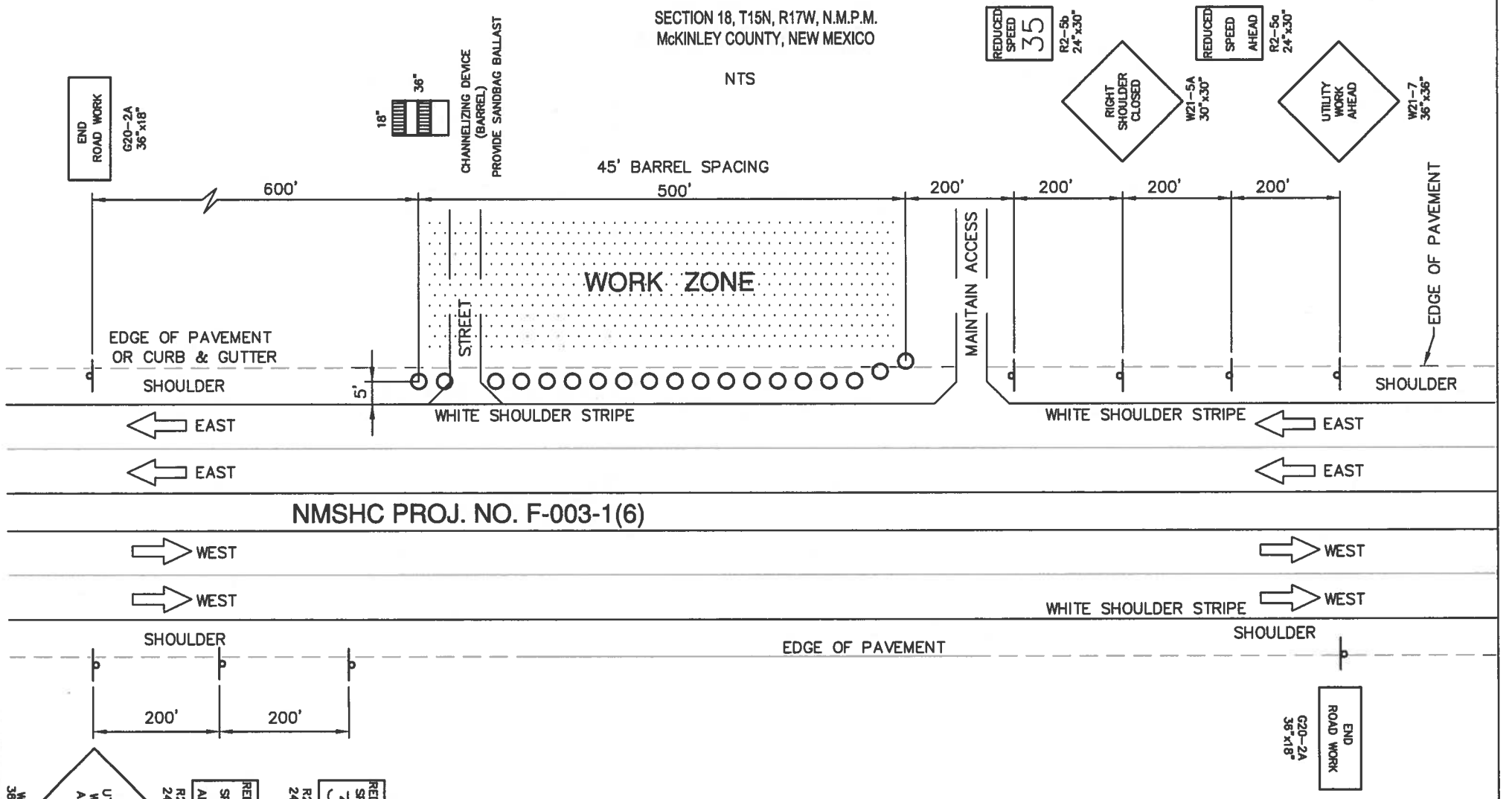
Jackson Gibson
Commissioner
District 6

TRAFFIC CONTROL PLAN
GALLUP-RURAL NAVAJO WATER SUPPLY PROJECT
PROJECT 6B
12" WATERLINE CONSTRUCTION
NMSHC PROJ. NO. F-003-1(6)
NEAR STATION 134+70

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.
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SECTION 18, T15N, R17W, N.M.P.M.
McKINLEY COUNTY, NEW MEXICO

NTS



DePAULI ENGINEERING & SURVEYING LLC
- CIVIL ENGINEERS AND LAND SURVEYORS -
102 WEST HILL AVENUE GALLUP, NM 87301
TEL: (505)863-5440 DES@CNETCO.COM

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Highway I-40
14” Line
Crossing

New Mexico DEPARTMENT OF
TRANSPORTATION

October 19, 2015

DePauli Engineering
307 South 4th Street
Gallup, NM
Attn: Daniella Aretino

RE: Utility Permit 15-6U-032
Subject: Authorization to Proceed for DePauli Engineering
Location: I-40 Mile Marker 23.6 (14" waterline)

Dear Ms. Aretino:
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.

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If you have any questions please call me at 505-285-3255 or you can reach me by email: stephanie.parra@state.nm.us

Sincerely,

Stephanie Parra

Stephanie Parra
Traffic Section Supervisor (acting)

Enclosure

Cc: Gallup (46-58)
Records
File

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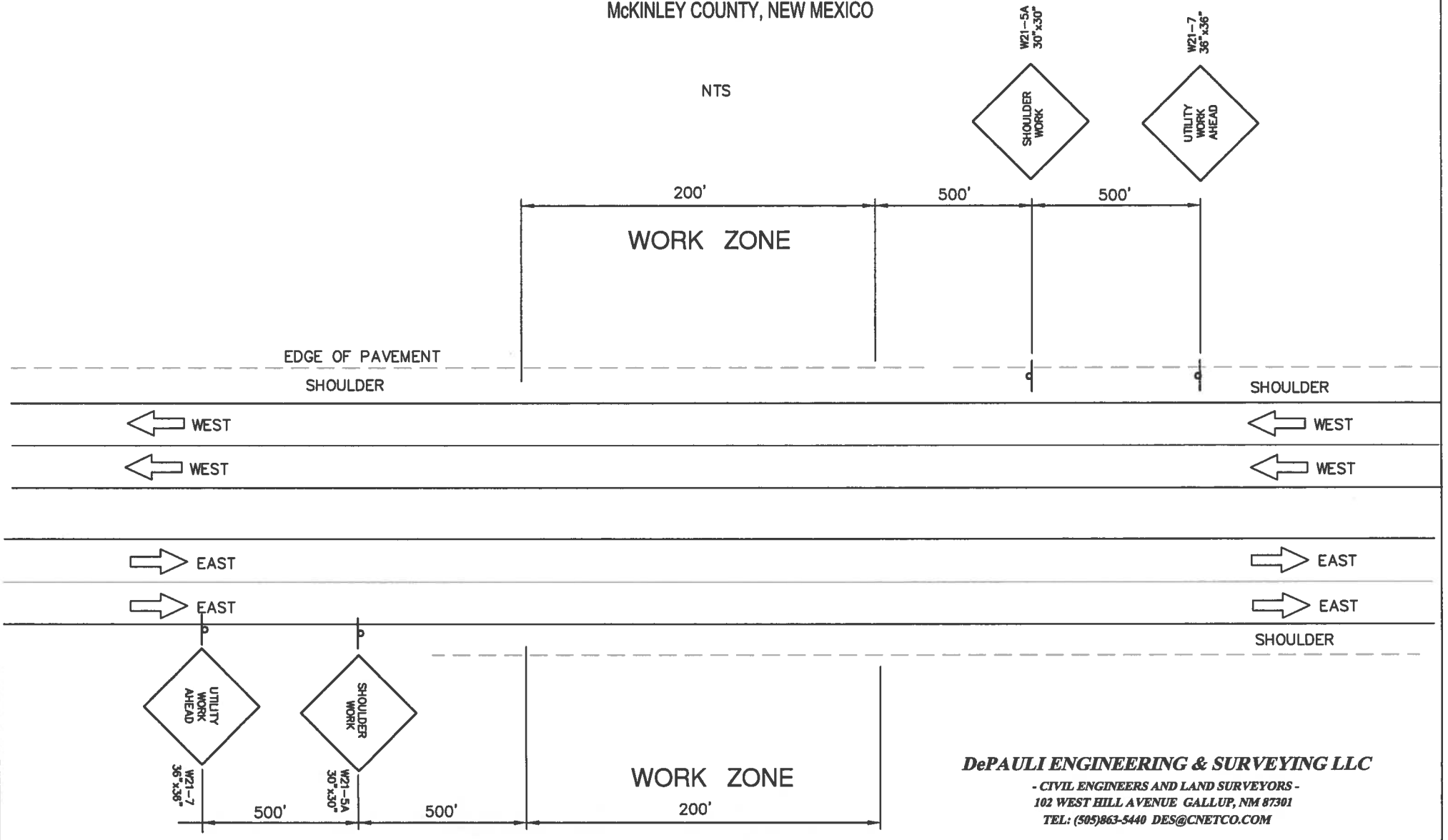
Jackson Gibson
Commissioner
District 6

TRAFFIC CONTROL PLAN
GALLUP-RURAL NAVAJO WATER SUPPLY PROJECT
PROJECT 27.6B
14" WATERLINE CONSTRUCTION
NMSHC PROJ. NO. I-40-1(29)18
STATION 1241+86.67

SECTION 14, T15N, R18W, N.M.P.M.;
McKINLEY COUNTY, NEW MEXICO

NOTE:
TRAFFIC CONTROL DEVICES & SIGNS TO CONFORM TO MUTCD STANDARDS.

NTS



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102 WEST HILL AVENUE GALLUP, NM 87301
TEL: (505)863-5440 DES@CNETCO.COM

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Work Permit Form



NMDOT District 6 - Work Permit Application Checklist

For your work permit, please provide:

- Traffic Control: please show the following- (signage, label the feet for distance between signs, shoulder taper, taper, tangent, buffer space, work zone and a downstream buffer space).
- Insurance, we ask for 1 million, to name NMDOT as the additional insured and as the Certificate Holder.
- Plan sets- drawings
- Hold Harmless Agreement form must be signed and notarized.
- Please send a location map from Google Earth showing the area where the work is going to be done.

If any questions, please give us a call here in the Traffic Section.

NMDOT D6 – Traffic Engineer – Jan Niclas (505) 285-3220
Email- jan.niclas@state.nm.us

Form No. A-66
New 03/13

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.

For Official Use:

☐ **Approved** (see conditions below) ☐ **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 F

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 27.6 (404 Permit)

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
4101 Jefferson Plaza NE
Albuquerque, NM 87109

March 3, 2016

REPLY TO
ATTENTION OF:

Regulatory Division
New Mexico/Texas Branch

SUBJECT: Action No. SPA-2012-00254-ABQ, USBR Navajo-Gallup Water Supply Project, Reach 27.6, Gallup, McKinley County, New Mexico

US Bureau of Reclamation
Attn: Barry Longwell
2200 Bloomfield Highway
Farmington, NM 87401-8110

Dear Mr. Longwell:

The U.S. Army Corps of Engineers (Corps) is in receipt of your application dated November 24, 2015, requesting authorization for your proposed Reach 27.6 waterline between the existing Gibson Pressure Reducing Valve Station and the endpoint of the waterline, in Gallup, McKinley County, New Mexico. The project consists of the installation of 30,000 linear feet of 10- and 18-inch diameter pipeline with ten ephemeral wash crossings to be completed via open trench, ranging from 100 to 2600 square feet of temporary impact for each crossing. Four of the wash crossings would have riprap and/or gabion grade control installed; these include Gibson Wash (450 sq ft riprap), Unnamed Tributary 26.3 (216 sq ft gabion), Sunshine Canyon Wash (108 and 288 sq ft gabion), and Rocky Cliff Canyon Wash (486 sq ft riprap). The total sum acreage of temporary impacts proposed for the crossings is 4680 sq ft and permanent impacts 1548 sq ft. The project is located starting near wash crossing point latitude 35.549451, longitude -108.755348 and ending near wash crossing at point latitude 35.534550, longitude -108.689086. We have assigned Action No. SPA-2012-00254-ABQ to your file. To avoid delay, please include this number in all future correspondence concerning this project.

We have reviewed this project in accordance with Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. Under Section 404, the Corps regulates the discharge of dredged and fill material into waters of the United States (U.S.), including wetlands. Our responsibility under Section 10 is to regulate any work in, or affecting, navigable waters of the U.S. Based on your description of the proposed work, and other information available to us, we have determined that the proposed project will involve activities subject to Section 404. Therefore, a Department of the Army permit is required.

We have determined that this project is authorized by Nationwide Permit (NWP) 12, for utility line projects, and NWP 13, for bank stabilization. A summary of this permit and the regional conditions for New Mexico are available on our website at www.spa.usace.army.mil/reg/NWP. You are only authorized to conduct the work described in your submittal. To use this permit, you must ensure that the work complies with the terms and conditions listed in the permit.

Under Section 401 of the Clean Water Act, certification of compliance with state or tribal water quality standards by the state water quality agency or tribal water quality certifying authority is required for any discharge of dredged and fill material into waters of the United States under Section 404 of the Clean Water Act. The New Mexico Environment Department, Surface Water Quality Bureau has issued a conditioned Water Quality Certification for the NWPs. Following the conditions in the certification is a requirement of the NWPs, and your authorization maybe suspended or revoked for non-compliance with the conditions. You may find a copy of the certification at http://www.spa.usace.army.mil/Missions/RegulatoryProgramandPermits/WaterQualityCertification.aspx

Our review of this project also addressed its effects on threatened and endangered species and historic properties in accordance with general conditions 18 and 20. You have determined, as lead federal agency, that this project will not affect any species listed as threatened or endangered by the U.S. Fish and Wildlife Service within the permit area. You have also determined that this project will not affect historic properties listed, or eligible for listing, in the National Register of Historic Places. However, please note that you are responsible for meeting the requirements of general condition 18 on endangered species and general condition 20 on historic properties.

The Corps based this decision on a preliminary jurisdictional determination (JD) that there may be waters of the United States on the project site. Preliminary JDs are advisory in nature and may not be appealed. An approved JD is an official Corps determination that "waters of the U.S." and/or "navigable waters of the U.S." are either present or absent on a particular site. An approved JD precisely identifies the limits of those waters on the project site determined to be jurisdictional under the CWA or RHA. If you wish, you may request that the USACE reevaluate this case and issue an approved JD. If you choose to begin work prior to receipt of the approved JD, you do so at your own risk. Please contact me if you wish to request an approved JD for this case.

This letter does not constitute approval of the project design features, nor does it imply that the construction is adequate for its intended purpose. This permit does not authorize any injury to property or invasion of rights or any infringement of federal, state or local laws or regulations. You and/or any contractors acting on your behalf must possess the authority and any other approvals required by law, including property rights, in order to undertake the proposed work.

This permit verification is valid until March 18, 2017 (33 CFR 330.6), unless the nationwide permit is modified, suspended, revoked or reissued prior to that date. Continued confirmation that an activity complies with the terms and conditions, and any changes to the nationwide permit, is your responsibility. Activities that have commenced, or are under contract to commence, in reliance on a nationwide permit will remain authorized provided the activity is completed within 12 months of the date of the nationwide permits expiration, modification, or revocation.

Within 30 days of project completion, you must fill out the enclosed Certification of Compliance form and return it to our office. The landowner must allow Corps representatives to inspect the authorized activity at any time deemed necessary to ensure that it is being, or has been, accomplished in accordance with the terms and conditions of the nationwide permit.

I am forwarding a copy of this letter to Neal Schaeffer, NMED. If you have any questions, please contact me at 505-342-3280 or by e-mail at Deanna.L.Cummings@usace.army.mil.

Sincerely,

CUMMINGS.DEANNA.L.1246005202

Digitally signed by CUMMINGS.DEANNA.L.1246005202
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=CUMMINGS.DEANNA.L.1246005202
Date: 2016.03.03 15:41:52 -07'00'

Deanna L. Cummings
Senior Regulatory Project Manager

Certification of Compliance
with Department of the Army Nationwide Permit

Action Number: SPA-2012-00254-ABQ

Name of Permittee: Barry Longwell, US Bureau of Reclamation

Nationwide Permit: 12, Utility Crossings
13, Bank Stabilization

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Deanna Cummings
Albuquerque District, U.S. Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109
505-342-3280

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Please enclose photographs showing the completed project (if available).

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

Date Work Started _____

Date Work Completed _____

_____ _____

Date Signature of Permittee

Links to the United States Army Corps of Engineers Stipulations for Reach 27.6 Nationwide Permits 12 & 13.

1. Nationwide Permit General Conditions
http://www.usace.army.mil/Portals/2/docs/civilworks/nwp/2012/NWP2012_corrections_21-sep-2012.pdf

2. 2012 Regional Conditions in New Mexico
http://www.spa.usace.army.mil/Portals/16/docs/civilworks/regulatory/Regional%20Conditions/NM%20regional%20conditions%20FINAL.pdf

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

NEW MEXICO
ENVIRONMENT DEPARTMENT

Surface Water Quality Bureau

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

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 (NWPs) 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 NWPs 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 NWPs 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 NWPs.

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 NWPs:

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

[illegible] 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 exceedence of applicable Standards.

Denial of Certification of NWPs

NMED denies Certification of NWPs 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 NWPs. This condition is necessary to ensure that no degradation is allowed in ONRWs by requiring proposed discharges

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

Albuquerque, NM 87109

505-342-3280

http://www.spa.usace.army.mil/Missions/RegulatoryProgramandPermits.aspx

Like us on Facebook: https://www.facebook.com/albuquerquedistrict

You are invited to complete our customer survey, located at the following link: http://corpsmapu.usace.army.mil/cm_apex/f?p=regulatory_survey.

From: Vance, Gary [mailto:gvance@usbr.gov]
Sent: Friday, January 15, 2016 2:26 PM
To: Cummings, Deanna L SPA
Subject: [EXTERNAL] Fwd: NMED 401 Certifications

Deanna,

Please read thru this message traffic between you, me and Neal on the Reach 12B 401 authorization specifically and his open cut trenching approved for the whole NGWSP.

Thanks,

Gary

---------- Forwarded message ----------
From: **Schaeffer, Neal, NMENV** <neal.schaeffer@state.nm.us>
Date: Thu, Nov 5, 2015 at 8:40 AM
Subject: RE: NMED 401 Certifications
To: "Vance, Gary" <gvance@usbr.gov>
Cc: Robert Waldman <RWaldman@usbr.gov>, "Hubert (Chico) Quintana" <hquintana@usbr.gov>, "Cummings, Deanna L SPA" <Deanna.L.Cummings@usace.army.mil>

Okay, I anticipated your request but honestly didn't have time to deal with it earlier.

This email is to approve open-cut trenching as proposed at the identified crossings. I wish to signal that I'm happy to approve open-cut trenching for this whole project.

As before, good luck with this construction.

--

Neal

From: Vance, Gary [mailto:gvance@usbr.gov]
Sent: Tuesday, November 03, 2015 3:33 PM
To: Schaeffer, Neal, NMENV
Cc: Robert Waldman; Hubert (Chico) Quintana; Cummings, Deanna L SPA
Subject: Re: NMED 401 Certifications

Hello Neal,

Does Reclamation still need to get NMED authorization for all open-cut trenching? I interpreted your last email authorization for Reach 22A to state that requirement.

"For the "Navajo-Gallup Water Supply Project, Reach 22a" project, this email is to approve open-cut trenching pursuant to 401 cert condition #5 (Blockedhttp://www.spa.usace.army.mil/Portals/16/docs/civilworks/regulatory/Water%20Quality%20Certification/404%20NWP%20Final%20Certs.pdf):

> ... Unless otherwise approved by NMED, directional borehole (horizontal) drilling must be used instead of open-cut trenching for the placement of utility lines or other buried structures crossing the channel...

Good luck with this construction.

Thanks,

Gary

On Tue, Nov 3, 2015 at 11:34 AM, Schaeffer, Neal, NMENV <neal.schaeffer@state.nm.us> wrote:

Gary,

If the Corps can authorize this work under a nationwide permit, then you don't need anything from me. Please just comply with our 401 certification that we issued years ago. (I'm not in the office today, soI can't forward the link.)

Per Regional Condition (a), you don't even need a Confirmation email from me. This is because these are ephemeral stream crossings.

We've tried to streamline permitting at ephemeral streams, like that.

--
Neal

From: Vance, Gary [gvance@usbr.gov]
Sent: Tuesday, November 03, 2015 10:42 AM
To: Schaeffer, Neal, NMENV
Cc: Robert Waldman; Hubert (Chico) Quintana; Cummings, Deanna L SPA
Subject: NMED 401 Certifications

Hello Neal,

I have attached the Reach 12B USACE package for your review in Reclamation's request for the NMED 401 conditional certification. There are three ephemeral washes on private lands in the project area that will be open cut crossed on a temporary basis. The open cut procedure is being used for economic savings.

Reclamation is requesting your review and approval of the conditional certification for these three washes.

Please contact me if you have any questions.

Thanks,

Gary

--

Gary P. Vance

Environmental Protection Specialist
Environmental and Planning Group
Western Colorado Area Office

Upper Colorado Region
Bureau of Reclamation
185 Suttle Street

Suite 2
Durango, CO 81303-7911
Office 970-385-6555
cell 970-749-0979
fax 970-385-6539

--

Gary P. Vance

Environmental Protection Specialist
Environmental and Planning Group
Western Colorado Area Office

Upper Colorado Region
Bureau of Reclamation
185 Suttle Street

Suite 2
Durango, CO 81303-7911
Office 970-385-6555
cell 970-749-0979
fax 970-385-6539

Daniella Aretino

From: Vance, Gary <gvance@usbr.gov>
Sent: Wednesday, March 9, 2016 7:12 AM
To: Daniella Aretino
Cc: Dianne Paxton
Subject: Fwd: [EXTERNAL] Fwd: NMED 401 Certifications (UNCLASSIFIED)

Dani,

Please print this email traffic and highlight the message from Neal Schaeffer on Nov 3, 2015 for the Reach 27.6 spec package giving NMED project wide approval for open-cutting all ephemeral washes.

I will forward the NMED stipulations in another message.

Thanks,

Gary
---------- Forwarded message ----------
From: **Cummings, Deanna L SPA** <Deanna.L.Cummings@usace.army.mil>
Date: Fri, Jan 15, 2016 at 2:28 PM
Subject: RE: [EXTERNAL] Fwd: NMED 401 Certifications (UNCLASSIFIED)
To: "Vance, Gary" <gvance@usbr.gov>
Cc: "Cummings, Deanna L SPA" <Deanna.L.Cummings@usace.army.mil>

Classification: UNCLASSIFIED
Caveats: NONE

Got it. Thanks.

Heading home now – we'll chat on Tuesday. Cheers and have a lovely long weekend. Deanna

Deanna L. Cummings

Senior Regulatory Project Manager

Regulatory Program

U.S. Army Corps of Engineers

Albuquerque District

4101 Jefferson Plaza NE

APPENDIX G

BNSF Railway Pipeline License

JONES LANG LASALLE

Jones Lang LaSalle Brokerage, Inc
4300 Amon Carter Blvd., Suite 100
Fort Worth, Texas 76155-2685
tel +1 817-230-2600, fax +1 817 306-8265

October 7, 2013

Tracking # 12-46427

City of Gallup, New Mexico
Attention: Mr. Lance Allgood
P.O. Box 1270
Gallup, NM 87301

Dear Mr. Allgood,

Enclosed please find one (1) fully executed Agreement for your file. **A copy of the executed Agreement must be available upon request at the job site allowing authorization to do the work.** Please contact Mr. Gerardo Gonzales, Road Master, at telephone (505) 722-2755 or cell (505) 414-9265 ten (10) days in advance of entry to schedule a flagger and **BEFORE YOU DIG, CALL 1-800-533-2891**. If you need additional information please contact me at (817) 230-2631.

Sincerely,

Tanita Thomas
Associate Contract Specialist

Enclosure

cc: Gerardo Gonzales, BNSF, 811 Roundhouse Rd Gallup, NM 87301

PIPELINE LICENSE

THIS PIPELINE LICENSE ("**License**") is made to be effective October 7, 2013 (the "**Effective Date**") by and between **BNSF RAILWAY COMPANY**, a Delaware corporation ("**Licensor**") and **CITY OF GALLUP, NEW MEXICO**, a New Mexico corporation ("**Licensee**").

In consideration of the mutual covenants contained herein, the parties agree to the following:

GENERAL

1. Grant of License. Licensor hereby grants Licensee a non-exclusive license, subject to all rights, interests, and estates of third parties, including, without limitation, any leases, use rights, easements, liens, or other encumbrances, and upon the terms and conditions set forth below, to construct and maintain, in strict accordance with the drawings and specifications approved by Licensor as part of Licensee's application process (the "**Drawings and Specifications**"), one (1) pipeline, twelve (12) inches in diameter inside a twenty three (23) inch STEEL casing (collectively, the "**Pipeline**"), across or along Licensor's rail corridor at or near the station of Gallup, County of McKinley, State of New Mexico, Line Segment 7200, Mile Post 154.11 as shown on the attached Drawing No. 1-56244, dated October 26, 2012, attached hereto as **Exhibit "A"** and incorporated herein by reference (the "**Premises**").

2. Term. This License shall commence on the Effective Date and shall continue for a period of twenty-five (25) years, subject to prior termination as hereinafter described.

3. Existing Improvements. Licensee shall not disturb any improvements of Licensor or Licensor's existing lessees, licensees, easement beneficiaries or lien holders, if any, or interfere with the use, repair, maintenance or replacement of such improvements.

4. Use of the Premises. Licensee shall use the Premises solely for construction, maintenance, and use of the Pipeline in accordance with the Drawings and Specifications. The Pipeline shall carry **POTABLE WATER**, and Licensee shall not use the Pipeline to carry any other material or use the Premises for any other purpose.

5. Alterations. Except as set forth in this License, Licensee may not make any alterations to the Premises or permanently affix anything to the Premises or any buildings or other structures adjacent to the Premises without Licensor's prior written consent.

COMPENSATION

6. License Fee. Licensee shall pay Licensor, prior to the Effective Date, the sum of three thousand and No/100 Dollars ($3000) as compensation for the use of the Premises.

7. Costs and Expenses.

   7.1 For the purpose of this License, "cost" or "costs" "expense or expenses" includes, but is not limited to, actual labor and material costs including all assignable additives, and material and supply costs at current value where used.

   7.2 Licensee agrees to reimburse Licensor (pursuant to the terms of **Section 8** below) for all costs and expenses incurred by Licensor in connection with Licensee's use of the Premises or the presence, construction and maintenance of the Pipeline, including but not limited to the furnishing of Licensor's flaggers and any vehicle rental costs incurred. Licensee shall bear the cost of flagger services and other safety measures provided by Licensor, when deemed necessary by Licensor's representative. Flagging costs shall include, but not be limited to, the

following: pay for at least an eight (8) hour basic day with time and one-half or double time for overtime, rest days and holidays (as applicable); vacation allowance; paid holidays (as applicable); railway and unemployment insurance; public liability and property damage insurance; health and welfare benefits; transportation; meals; lodging and supervision. Negotiations for railway labor or collective bargaining agreements and rate changes authorized by appropriate Federal authorities may increase flagging rates. Flagging rates in effect at the time of performance by the flaggers will be used to calculate the flagging costs pursuant to this **Section 7**.

8. Payment Terms. All invoices are due thirty (30) days after the date of invoice. In the event that Licensee shall fail to pay any monies due to Licensor within thirty (30) days after the invoice date, then Licensee shall pay interest on such unpaid sum from the due date until paid at an annual rate equal to the lesser of (i) the prime rate last published in *The Wall Street Journal* in the preceding December plus two and one-half percent (2-1/2%), or (ii) the maximum rate permitted by law.

LICENSOR'S RESERVED RIGHTS

9. Reserved Rights of Use. Licensor excepts and reserves the right, to be exercised by Licensor and any other parties who may obtain written permission or authority from Licensor:

9.1 to maintain, use, operate, repair, replace, modify and relocate any utility, power or communication pipe/lines/cables and appurtenances (other than the Pipeline) and other facilities or structures of like character upon, over, under or across the Premises existing as of the Effective Date;

9.2 to construct, maintain, renew, use, operate, change, modify and relocate any tracks or additional facilities, structures and related appurtenances upon, over, under or across the Premises; or

9.3 to use the Premises in any manner as Licensor in its sole discretion deems appropriate, provided Licensor uses all commercially reasonable efforts to avoid material interference with the use of the Premises by Licensee for the purpose specified in **Section 4** above.

10. Right to Require Relocation. If at any time during the term of this License, Licensor shall desire the use of its rail corridor in such a manner as would, in Licensor's reasonable opinion, be interfered with by the Pipeline, Licensee shall, at its sole expense, within thirty (30) days after receiving written notice from Licensor to such effect, make such changes in the Pipeline as in the sole discretion of Licensor may be necessary to avoid interference with the proposed use of Licensor's rail corridor, including, without limitation, the relocation of the Pipeline, or the construction of a new pipeline to replace the Pipeline. Notwithstanding the foregoing, Licensee agrees to make all emergency changes and minor adjustments, as determined by Licensor in its sole discretion, to the Pipeline promptly upon Licensor's request.

LICENSEE'S OPERATIONS

11. Construction and Maintenance of the Pipeline.

11.1 Licensee shall notify Licensor's Roadmaster, at 811 Roundhouse Rd Gallup, NM 87301, telephone (505) 722-2755, at least ten (10) business days prior to installation of the Pipeline and prior to entering the Premises for any subsequent maintenance thereon. In the event of emergency, Licensee shall notify Licensor of Licensee's entry onto the Premises at the telephone number above as soon as practicable and shall promptly thereafter follow up with written notice of such entry.

11.2 Licensee's on-site supervisors shall retain/maintain a fully executed copy of this License at all times while on the Premises.

11.3 While on the Premises, Licensee shall use only public roadways to cross from one side of Licensor's tracks to the other.

11.4 Any contractors or subcontractors performing work on the Pipeline or entering the Premises on behalf of Licensee shall be deemed servants and agents of Licensee for purposes of this License.

11.5 Under no conditions shall Licensee be permitted to conduct any tests, investigations or any other activity using mechanized equipment and/or machinery, or place or store any mechanized equipment, tools or other materials, within twenty-five (25) feet of the centerline of any railroad track on the Premises unless Licensee has obtained prior written approval from Licensor. Licensee shall, at its sole cost and expense, perform all activities on and about the Premises in such a manner as not at any time to be a source of danger to or interference with (i) the existence or use of present or future tracks, roadbeds, or property of Licensor, (ii) the safe operation and activities of Licensor or existing third parties, or (iii) the rights or interests of third parties. If ordered to cease using the Premises at any time by Licensor's personnel due to any hazardous condition, Licensee shall immediately do so. Notwithstanding the foregoing right of Licensor, the parties agree that Licensor has no duty or obligation to monitor Licensee's use of the Premises to determine the safe nature thereof, it being solely Licensee's responsibility to ensure that Licensee's use of the Premises is safe. Neither the exercise nor the failure by Licensor to exercise any rights granted in this Section will alter the liability allocation provided by this License.

11.6 Licensee shall, at its sole cost and expense, construct and maintain the Pipeline in such a manner and of such material that it will not at any time be a source of danger to or interference with (i) the existence or use of present or future tracks, roadbeds, or property of Licensor, (ii) the safe operation and activities of Licensor or existing third parties, or (iii) the rights or interests of third parties. The construction of the Pipeline shall be completed within one (1) year of the Effective Date, and any subsequent maintenance shall be completed within one (1) year of initiation. Within fifteen (15) days after completion of the construction of the Pipeline or the performance of any subsequent maintenance thereon, Licensee shall, at Licensee's own cost and expense, restore the Premises to substantially their state as of the Effective Date, unless otherwise approved in advance by Licensor in writing. On or before expiration or termination of this License for any reason, Licensee shall, at its sole cost and expense, surrender the Premises to Licensor pursuant to the terms and conditions set forth in Section 26 hereof.

11.7 Licensor may direct one or more of its field engineers to observe or inspect the construction and/or maintenance of the Pipeline at any time for compliance with the Drawings and Specifications and Legal Requirements (defined below). If ordered at any time to halt construction or maintenance of the Pipeline by Licensor's personnel due to non-compliance with the Drawings and Specifications or any other hazardous condition, Licensee shall immediately do so. Notwithstanding the foregoing right of Licensor, the parties agree that Licensor has no

duty or obligation to observe or inspect, or to halt work on, the Pipeline, it being solely Licensee's responsibility to ensure that the Pipeline is constructed and maintained in strict accordance with the Drawings and Specifications and in a safe and workmanlike manner in compliance with all terms hereof. Neither the exercise of, nor the failure by Licensor to exercise, any right granted by this Section will alter in any way the liability allocation provided by this License. If at any time Licensee shall, in the sole judgment of Licensor, fail to properly perform its obligations under this **Section 11**, Licensor may, at its option and at Licensee's sole expense, arrange for the performance of such work as it deems necessary for the safety of its operations and activities. Licensee shall promptly reimburse Licensor for all costs and expenses of such work, pursuant to the terms of **Section 8**. Licensor's failure to perform any obligations of Licensee shall not alter the liability allocation hereunder.

12. Boring and Excavation.

12.1 Prior to Licensee conducting any boring, excavation, or similar work on or about any portion of the Premises, Licensee shall explore the proposed location for such work with hand tools to a depth of at least three (3) feet below the surface of the ground to determine whether pipelines or other structures exist below the surface, provided, however, that in lieu of the foregoing, Licensee shall have the right to use suitable detection equipment or other generally accepted industry practice (*e.g.*, consulting with the Underground Services Association) to determine the existence or location of pipelines and other subsurface structures prior to drilling or excavating with mechanized equipment. Licensee may request information from Licensor concerning the existence and approximate location of Licensor's underground lines, utilities, and pipelines at or near the vicinity of the proposed Pipeline by contacting Licensor's Telecommunications Helpdesk at least thirty (30) business days prior to installation of the Pipeline. Upon receiving Licensee's timely request, Licensor will provide Licensee with the information Licensor has in its possession regarding any existing underground lines, utilities, and pipelines at or near the vicinity of the proposed Pipeline and, if applicable, identify the location of such lines on the Premises pursuant to Licensor's standard procedures. Licensor does not warrant the accuracy or completeness of information relating to subsurface conditions of the Premises and Licensee's operations will be subject at all times to the liability provisions herein.

12.2 For all bores greater than 26-inch diameter and at a depth less than 10.0 feet below bottom of rail, a soil investigation will need to be performed by Licensee and reviewed by Licensor prior to construction. This study is to determine if granular material is present, and to prevent subsidence during the installation process. If the investigation determines in Licensor's reasonable opinion that granular material is present, Licensor may select a new location for Licensee's use, or may require Licensee to furnish for Licensor's review and approval, in its sole discretion, a remedial plan to deal with the granular material. Once Licensor has approved any such remedial plan in writing, Licensee shall, at its sole cost and expense, carry out the approved plan in accordance with all terms thereof and hereof.

12.3 Any open hole, boring, or well constructed on the Premises by Licensee shall be safely covered and secured at all times when Licensee is not working in the actual vicinity thereof. Following completion of that portion of the work, all holes or borings constructed on the Premises by Licensee shall be:

12.3.1 filled in to surrounding ground level with compacted bentonite grout; or

12.3.2 otherwise secured or retired in accordance with any applicable Legal Requirement. No excavated materials may remain on Licensor's property for more than ten (10) days, but must be properly disposed of by Licensee in accordance with applicable Legal Requirements.

LIABILITY AND INSURANCE

13. Liability and Indemnification.

13.1 For purposes of this License: (a) "**Indemnitees**" means Licensor and Licensor's affiliated companies, partners, successors, assigns, legal representatives, officers, directors, shareholders, employees, and agents; (b) "**Liabilities**" means all claims, liabilities, fines, penalties, costs, damages, losses, liens, causes of action, suits, demands, judgments, and expenses (including, without limitation, court costs, reasonable attorneys' fees, costs of investigation, removal and remediation, and governmental oversight costs) environmental or otherwise; and (c) "**Licensee Parties**" means Licensee or Licensee's officers, agents, invitees, licensees, employees, or contractors, or any party directly or indirectly employed by any of them, or any party they control or exercise control over.

13.2 **TO THE FULLEST EXTENT PERMITTED BY LAW, LICENSEE SHALL, AND SHALL CAUSE ITS CONTRACTOR TO, RELEASE, INDEMNIFY, DEFEND AND HOLD HARMLESS INDEMNITEES FOR, FROM, AND AGAINST ANY AND ALL LIABILITIES OF ANY NATURE, KIND, OR DESCRIPTION DIRECTLY OR INDIRECTLY ARISING OUT OF, RESULTING FROM, OR RELATED TO (IN WHOLE OR IN PART):**

13.2.1 **THIS LICENSE, INCLUDING, WITHOUT LIMITATION, ITS ENVIRONMENTAL PROVISIONS,**

13.2.2 **ANY RIGHTS OR INTERESTS GRANTED PURSUANT TO THIS LICENSE,**

13.2.3 **LICENSEE'S OCCUPATION AND USE OF THE PREMISES,**

13.2.4 **THE ENVIRONMENTAL CONDITION AND STATUS OF THE PREMISES CAUSED BY OR CONTRIBUTED TO BY LICENSEE, OR**

13.2.5 **ANY ACT OR OMISSION OF ANY LICENSEE PARTY.**

13.3 **THE FOREGOING OBLIGATIONS OF LICENSEE SHALL NOT APPLY TO THE EXTENT LIABILITIES ARE PROXIMATELY CAUSED BY THE GROSS NEGLIGENCE OR WILLFUL MISCONDUCT OF ANY INDEMNITEE, BUT SHALL APPLY TO ALL OTHER LIABILITIES, INCLUDING THOSE ARISING FROM OR ATTRIBUTED TO ANY OTHER NEGLIGENCE OF ANY INDEMNITEE.**

13.4 **TO THE FULLEST EXTENT PERMITTED BY LAW, NOTWITHSTANDING THE LIMITATION IN SECTION 13.3, LICENSEE NOW AND FOREVER WAIVES ANY AND ALL CLAIMS THAT BY VIRTUE OF ENTERING INTO THIS LICENSE, LICENSOR IS A GENERATOR, OWNER, OPERATOR, ARRANGER, OR TRANSPORTER FOR THE PURPOSES OF THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT, AS AMENDED ("CERCLA") OR OTHER ENVIRONMENTAL LAWS (DEFINED BELOW). LICENSEE WILL INDEMNIFY, DEFEND, AND HOLD THE INDEMNITEES HARMLESS FROM ANY AND ALL SUCH CLAIMS REGARDLESS OF THE NEGLIGENCE OF THE INDEMNITEES. NOTHING IN THIS LICENSE IS MEANT BY EITHER PARTY TO CONSTITUTE A WAIVER OF ANY INDEMNITEE'S COMMON CARRIER DEFENSES AND THE LICENSE SHOULD NOT BE SO CONSTRUED. IN THE EVENT ANY AGENCY OR COURT CONSTRUES THE LICENSE TO BE A WAIVER OF ANY INDEMNITEE'S COMMON CARRIER DEFENSES, LICENSEE AGREES TO INDEMNIFY, HOLD HARMLESS, AND DEFEND INDEMNITEES FOR ANY LIABILITIES RELATED TO THAT CONSTRUCTION OF THIS LICENSE. IN NO EVENT AS BETWEEN LICENSOR AND LICENSEE AS TO USE OF THE PREMISES AS CONTEMPLATED BY THIS LICENSE SHALL LICENSOR BE RESPONSIBLE TO LICENSEE FOR THE ENVIRONMENTAL CONDITION OF THE PREMISES.**

13.5 **IF ANY EMPLOYEE OF ANY LICENSEE PARTY ASSERTS THAT HE OR SHE IS AN EMPLOYEE OF ANY INDEMNITEE, TO THE FULLEST EXTENT PERMITTED BY LAW, LICENSEE SHALL, AND SHALL CAUSE ITS CONTRACTOR TO, RELEASE, INDEMNIFY, DEFEND, AND HOLD THE INDEMNITEES HARMLESS FROM AND AGAINST ANY LIABILITIES ARISING OUT OF OR RELATED TO (IN WHOLE OR IN PART) ANY SUCH ASSERTION INCLUDING, BUT NOT LIMITED TO, ASSERTIONS OF EMPLOYMENT BY AN INDEMNITEE RELATED TO THE FOLLOWING OR ANY PROCEEDINGS THEREUNDER: THE FEDERAL EMPLOYERS' LIABILITY ACT, THE SAFETY APPLIANCE ACT, THE LOCOMOTIVE INSPECTION ACT, THE OCCUPATIONAL SAFETY AND HEALTH ACT, THE RESOURCE CONSERVATION AND RECOVERY ACT, AND ANY SIMILAR STATE OR FEDERAL STATUTE. LICENSEE'S OBLIGATIONS UNDER THIS SECTION 13.5 ARE REGARDLESS OF ANY NEGLIGENCE, INTENTIONAL ACTS, OR STRICT LIABILITY OF ANY INDEMNITEE RELATED TO SUCH CAUSES OF ACTION.**

13.6 Upon written notice from Licensor, Licensee agrees to assume the defense of any lawsuit or other proceeding brought against any Indemnitee by any entity, relating to any matter covered by this License for which Licensee has an obligation to assume liability for and/or save and hold harmless any Indemnitee. Licensee shall pay all costs and expenses incident to such defense, including, but not limited to, reasonable attorneys' fees, investigators' fees, litigation and appeal expenses, settlement payments, and amounts paid in satisfaction of judgments.

14. Personal Property Risk of Loss. **ALL PERSONAL PROPERTY, INCLUDING, BUT NOT LIMITED TO, FIXTURES, EQUIPMENT, OR RELATED MATERIALS UPON THE PREMISES WILL BE AT THE RISK OF LICENSEE ONLY, AND NO INDEMNITEE WILL BE LIABLE FOR ANY DAMAGE THERETO OR THEFT THEREOF, WHETHER OR NOT DUE IN WHOLE OR IN PART TO THE NEGLIGENCE OF ANY INDEMNITEE.**

15. Insurance. Licensee shall, at its sole cost and expense, procure and maintain during the life of this License the following insurance coverage:

General Liability Insurance as provided for by law, pursuant to Section 41-4-19 N.M.SA 1978 Compo (as revised) the "Maximum Liability" of the New Mexico Tort Claims Act":

15.1 In any action for damages against a governmental entity or public employee while acting within the scope of the employee's duties as provided in the Tort Claims Act, the liability shall not exceed:

a: the sum of two hundred thousand dollars ($200,000.00) for each legally described real property for damage to or destruction of that legally described property arising out of a single occurrence:

b. the sum of three hundred thousand dollars ($300,000.00) for all past and future medical and medically related expenses arising out of a single occurrence; and

c. the sum of four hundred thousand dollars ($400,000.00) to any person for any number of claims arising out of a single occurrence for all damages other than real property damage and medical and medically related expenses as permitted under the Tort Claims Act.

Workers Compensation and Employers Liability Insurance coverage shall be provided in accordance with Section 52-1-1 et. Seq. N.M.SA 1978 Compo (as revised). The New Mexico workers Compensation Act.

Railroad Protective Liability. Insurance. In lieu of providing a Railroad Protective Liability Policy, Licensee may participate in Licensor's Blanket Railroad Protective Liability Insurance Policy available to Licensee or its contractor. The limits of coverage are the same as above. The cost is $500.

The City of Gallup elects to participate in Licensor's Blanket Policy during installation and/or construction of the Electric Supply Line for a total cost of $1,150.00

Other Requirements:
Where allowable by law, all policies (applying to coverage listed above) shall contain no exclusion for punitive damages and certificates of insurance shall reflect that no exclusion exists.

Licensee agrees to waive its right of recovery against Licensor for all claims and suits against Licensor. In addition, its insurers, through policy endorsement, waive their right of subrogation against Licensor for all claims and suits. The certificate of insurance must reflect waiver of subrogation endorsement. Licensee further waives its right of recovery, and its insurers also waive their right of subrogation against Licensor for loss of its owned or leased property or property under its care, custody or control.

Licensee's insurance policies through policy endorsement must include wording which states that the policy shall be primary and non-contributing with respect to any insurance carried by Licensor. The certificate of insurance must reflect that the above wording is included in evidenced policies.

All policy(ies) required above (excluding Workers Compensation and if applicable, Railroad Protective) shall include a severability of interest endorsement and shall name Licensor and Jones Lang LaSalle Global Services -RR, Inc. as an additional insured with respect to work performed under this agreement. Severability of interest and naming Licensor and Jones Lang LaSalle Global Services -RR, Inc. as additional insureds shall be indicated on the certificate of insurance.

Licensee is not allowed to self-insure without the prior written consent of Licensor. If granted by Licensor, any deductible, self-insured retention or other financial responsibility for claims shall be covered directly by Licensee in lieu of insurance. Any and all Licensor liabilities that would otherwise, in accordance with the provisions of this Agreement, be covered by Licensee's insurance will be covered as if Licensee elected not to include a deductible, self-insured retention, or other financial responsibility for claims.

Prior to commencing the Work, Licensee shall furnish to Licensor an acceptable certificate(s) of insurance including an original signature of the authorized representative evidencing the required coverage, endorsements, and amendments and referencing the contract audit/folder number if available. The policy(ies) shall contain a provision that obligates the insurance company(ies) issuing such policy(ies) to notify Licensor in writing at least 30 days prior to any cancellation, non-renewal, substitution or material alteration. This cancellation provision shall be indicated on the certificate of insurance. Upon request from Licensor, a certified duplicate original of any required policy shall be furnished.

Any insurance policy shall be written by a reputable insurance company acceptable to Licensor or with a current Best's Guide Rating of A-and Class VII or better, and authorized to do business in the state(s) in which the service is to be provided.

Licensee WARRANTS that this License has been thoroughly reviewed by Licensee's insurance agent(s)/broker(s), who have been instructed by Licensee to procure the insurance coverage required by this Agreement. Allocated Loss Expense shall be in addition to all policy limits for coverages referenced above.

Not more frequently than once every five years, Licensor may reasonably modify the required insurance coverage to reflect then-current risk management practices in the railroad industry and underwriting practices in the insurance industry.

If any portion of the operation is to be subcontracted by Licensee, Licensee shall require that the subcontractor shall provide and maintain insurance coverages as set forth herein, naming Licensor as an additional insured, and shall require that the subcontractor shall release, defend and indemnify Licensor to the same extent and under the same terms and conditions as Licensee is required to release, defend and indemnify Licensor herein.

Failure to provide evidence as required by this section shall entitle, but not require, Licensor to terminate this License immediately. Acceptance of a certificate that does not comply with this section shall not operate as a waiver of Licensee's obligations hereunder.

The fact that insurance (including, without limitation, self-insurance) is obtained by Licensee shall not be deemed to release or diminish the liability of Licensee including, without limitation, liability under the indemnity provisions of this License, Damages recoverable by Licensor shall not be limited by the amount of the required insurance coverage,

For purposes of this section, Licensor shall mean "Burlington Northern Santa Fe LLC", "BNSF Railway Company" and the subsidiaries, successors, assigns and affiliates of each.

COMPLIANCE WITH LAWS, REGULATIONS, AND ENVIRONMENTAL MATTERS

16. Compliance with Laws, Rules, and Regulations.

16.1 Licensee shall observe and comply with any and all laws, statutes, regulations, ordinances, orders, covenants, restrictions, or decisions of any court of competent jurisdiction ("**Legal Requirements**") relating to the construction, maintenance, and use of the Pipeline and the use of the Premises.

16.2 Prior to entering the Premises, Licensee shall and shall cause its contractor(s) to comply with all of Licensor's applicable safety rules and regulations. Licensee must ensure that each of its employees, contractors, agents or invitees entering upon the Premises completes the safety training program at the Website "www.contractororientation.com" (the "**Safety Orientation**") within one year prior to entering upon the Premises. Additionally, Licensee must ensure that each and every employee of Licensee, its contractors, agents and invitees possess a card certifying completion of the Safety Orientation prior to entering upon the Premises. Licensee must renew the Safety Orientation annually.

16.3 Licensee shall obtain on or before the date it or its contractor enters the Premises, any and all additional rights-of way, easements, licenses and other agreements relating to the grant of rights and interests in and/or access to the Premises (collectively, the "**Rights**") and such other rights, licenses, permits, authorizations, and approvals (including without limitation, any necessary local, state, federal or tribal authorizations and environmental permits) that are necessary in order to permit Licensee to construct, maintain, own and operate the Pipeline and otherwise to perform its obligations hereunder in accordance with the terms and conditions hereof.

16.4 Licensee shall either require that the initial stated term of each such Rights be for a period that does not expire, in accordance with its ordinary terms, prior to the last day of the term of this License or, if the initial stated term of any such Right expires in accordance with its ordinary terms on a date earlier than the last day of the term of this License, Licensee shall, at its cost, exercise any renewal rights thereunder, or otherwise acquire such extensions, additions and/or replacements as may be necessary, in order to cause the stated term thereof to be continued until a date that is not earlier than the last day of the term of this License.

16.5 Upon the expiration or termination of any Right that is necessary in order for Licensee to own, operate or use the Pipeline in accordance with the terms and conditions of this License, this License thereby shall automatically expire upon such expiration or termination of the Right.

17. Environmental.

17.1 Licensee shall strictly comply with all federal, state and local environmental Legal Requirements and regulations in its use of the Premises, including, but not limited to, the Resource Conservation and Recovery Act, as amended (RCRA), the Clean Water Act, the Oil Pollution Act, the Hazardous Materials Transportation Act, and CERCLA (collectively referred to as the "**Environmental Laws**"). Licensee shall not maintain a treatment, storage, transfer or disposal facility, or underground storage tank, as defined by Environmental Laws on the Premises. Licensee shall not release or suffer the release of oil or hazardous substances, as defined by Environmental Laws on or about the Premises.

17.2 Licensee covenants that it will not handle or transport "hazardous waste" or "hazardous substances", as "hazardous waste" and "hazardous substances" may now or in the future be defined by any federal, state, or local governmental agency or body through the Pipeline on Licensor's property. Licensee agrees periodically to furnish Licensor with proof, satisfactory to Licensor that Licensee is in compliance with the provisions of this Section.

17.3 Licensee shall give Licensor immediate notice to Licensor's Resource Operations Center at (800) 832-5452 of any known (i) release of hazardous substances on, from, or affecting the Premises, (ii) violation of Environmental Laws, or (iii) inspection or inquiry by governmental authorities charged with enforcing Environmental Laws with respect to Licensee's use of the Premises. Licensee shall use the best efforts to promptly respond to any release on, from, or affecting the Premises. Licensee also shall give Licensor immediate notice of all measures undertaken on behalf of Licensee to investigate, remediate, respond to or otherwise cure such release or violation.

17.4 In the event that Licensor has notice from Licensee or otherwise of a release or violation of Environmental Laws arising in any way with respect to the Pipeline which occurred or may occur during the term of this License, Licensor may require Licensee, at Licensee's sole risk and expense, to take timely measures to investigate, remediate, respond to or otherwise cure such release or violation affecting the Premises or Licensor's right-of-way.

17.5 Licensee shall promptly report to Licensor in writing any conditions or activities upon the Premises known to Licensee which create a risk of harm to persons, property or the environment and shall take whatever action is necessary to prevent injury to persons, property, or the environment arising out of such conditions or activities; provided, however, that Licensee's reporting to Licensor shall not relieve Licensee of any obligation whatsoever imposed on it by this License. Licensee shall promptly respond to Licensor's request for information regarding said conditions or activities.

DISCLAIMER OF WARRANTIES

18. No Warranties.

18.1 **LICENSOR'S DUTIES AND WARRANTIES ARE LIMITED TO THOSE EXPRESSLY STATED IN THIS LICENSE AND SHALL NOT INCLUDE ANY IMPLIED DUTIES OR IMPLIED WARRANTIES, NOW OR IN THE FUTURE. NO REPRESENTATIONS OR WARRANTIES HAVE BEEN MADE BY LICENSOR OTHER THAN THOSE CONTAINED IN THIS LICENSE. LICENSEE HEREBY WAIVES ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, WITH**

RESPECT TO THE PREMISES OR WHICH MAY EXIST BY OPERATION OF LAW OR IN EQUITY, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY, HABITABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

18.2 **LICENSOR MAKES NO WARRANTY, REPRESENTATION OR CONDITION OF ANY KIND, EXPRESS OR IMPLIED, CONCERNING (A) THE SCOPE OF THE LICENSE OR OTHER RIGHTS GRANTED HEREUNDER TO LICENSEE OR (B) WHETHER OR NOT LICENSEE'S CONSTRUCTION, MAINTENANCE, OWNERSHIP, USE OR OPERATION OF THE PIPELINE WILL VIOLATE OR INFRINGE UPON THE RIGHTS, INTERESTS AND ESTATES OF THIRD PARTIES, INCLUDING, WITHOUT LIMITATION, ANY LEASES, USE RIGHTS, EASEMENTS AND LIENS OF ANY THIRD PARTY.**

19. Disclaimer of Warranty for Quiet Enjoyment. **LICENSOR DOES NOT WARRANT ITS TITLE TO THE PREMISES NOR UNDERTAKE TO DEFEND LICENSEE IN THE PEACEABLE POSSESSION OR USE THEREOF. NO COVENANT OF QUIET ENJOYMENT IS MADE.**

20. Eviction at Risk of Licensee. In case of the eviction of Licensee by anyone owning, claiming title to, or claiming any interest in the Premises, or by the abandonment by Licensor of the affected rail corridor, Licensor shall not be liable (i) to refund Licensee any compensation paid hereunder, except for the pro-rata part of any recurring charge paid in advance, or (ii) for any damage Licensee sustains in connection with the eviction.

LIENS AND TAXES

21. Liens and Charges. Licensee shall promptly pay and discharge any and all liens arising out of any construction, alterations or repairs done, suffered or permitted to be done by Licensee on Premises. Licensor is hereby authorized to post any notices or take any other action upon or with respect to Premises that is or may be permitted by law to prevent the attachment of any such liens to Premises; provided, however, that failure of Licensor to take any such action shall not relieve Licensee of any obligation or liability under this **Section 21** or any other Section of this License.

22. Taxes. Licensee shall pay when due any taxes, assessments or other charges (collectively, "**Taxes**") levied or assessed by any governmental or quasi-governmental body upon the Pipeline or any other improvements constructed or installed on the Premises by or for Licensee (collectively, the "**Improvements**") or any Taxes levied or assessed against Licensor or the Premises that are attributable to the Improvements.

DEFAULT, TERMINATION, AND SURRENDER

23. Default and Termination. In addition to and not in limitation of Licensor's right to terminate for failure to provide evidence of insurance as required pursuant to the terms of **Section 15**, the following events are also deemed to be events of default pursuant to which Licensor has the right to terminate as set forth below:

23.1 If default shall be made in any of Licensee's covenants, agreements, or obligations contained in this License and Licensee shall fail to cure said default within thirty (30) days after written notice is provided to Licensee by Licensor, or in case of any assignment or transfer of this License in violation of **Section 26** below, Licensor may, at its option, terminate this License by serving five (5) days' notice in writing upon Licensee. Notwithstanding the foregoing, Licensor shall have the right to terminate this License immediately in the event Licensee fails to provide evidence of insurance as required in **Section 15**.

23.2 Should Licensee not comply fully with the obligations of **Section 17** regarding the handling or transporting of hazardous waste or hazardous material, notwithstanding anything contained in any other provision of this License, Licensor may, at its option, terminate this License by serving five (5) days' notice of termination upon Licensee.

23.3 Any waiver by Licensor of any default or defaults shall not constitute a waiver of the right to terminate this License for any subsequent default or defaults, nor shall any such waiver in any way affect Licensor's ability to enforce any Section of this License. The remedy set forth in this **Section 23** shall be in addition to, and not in limitation of, any other remedies that Licensor may have at law or in equity.

23.4 In addition to and not in limitation of Licensor's rights to terminate this License for failure to provide evidence of insurance or occurrence of defaults as described above, this License may be terminated by Licensor, at any time, by serving thirty (30) days' written notice of termination upon Licensee.

23.5 This License may be terminated by Licensee upon execution of Licensor's then-current Mutual Termination Letter Agreement. Upon expiration of the time specified in such notice, this License and all rights of Licensee shall absolutely cease.

24. Surrender of the Premises.

24.1 On or before expiration or termination of this License for any reason, Licensee shall, at its sole cost and expense:

24.1.1 if so directed by Licensor in writing, remove the Improvements, the Pipeline and all appurtenances thereto, or, at the sole discretion of Licensor, fill and cap or otherwise appropriately decommission the Pipeline with a method satisfactory to Licensor;

24.1.2 report and restore any damage to the Premises or Licensor's other property arising from, growing out of, or connected with Licensee's use of the Premises;

24.1.3 remedy any unsafe conditions on the Premises created or aggravated by Licensee; and

24.1.4 leave the Premises in substantially the condition which existed as of the Effective Date of this License.

24.2 Upon any expiration or termination of this License, if Licensee fails to surrender the Premises to Licensor or if Licensee fails to complete its obligations under **Section 24.1** above (the "**Restoration Obligations**"), Licensee shall have a limited license to enter upon the Premises solely to the extent necessary for Licensee to complete the Restoration Obligations, and all liabilities and obligations of Licensee hereunder shall continue in effect until the Premises are surrendered and the Restoration Obligations are completed. Neither termination nor expiration shall release Licensee from any liability or obligation under this License, whether of indemnity or otherwise, resulting from any acts, omissions or events happening prior to the date of termination, or, if later, the date when Licensee surrenders the Premises and all of the Restoration Obligations are completed.

24.3 If Licensee shall fail within thirty (30) days after the date of such termination of its tenancy to complete the Restoration Obligations, then Licensor may, at its election (i) either remove the Pipeline and the Improvements or otherwise restore the Premises, and in such event Licensee shall, within thirty (30) days after receipt of bill therefor, reimburse Licensor for cost incurred, (ii) upon written notice to Licensee may take and hold the Pipeline and the Improvements and personal property as its sole property, without payment or obligation to Licensee therefor, or (iii) specifically enforce Licensee's obligation to restore and/or pursue any remedy at law or in equity against Licensee for failure to so restore. Further, in the event Licensor has consented to the Pipeline and the Improvements remaining on the Premises following termination, or in the event Licensor has elected to purchase the same as provided herein, Licensee shall, upon request by Licensor, provide a Bill of Sale in a form acceptable to Licensor conveying the Pipeline and the Improvements to Licensor.

MISCELLANEOUS

25. Successors and Assigns. All provisions contained in this License shall be binding upon, inure to the benefit of, and be enforceable by the respective successors and assigns of Licensor and Licensee to the same extent as if each such successor and assign was named a party to this License.

26. Assignment.

26.1 Licensee may not sell, assign, transfer, or hypothecate this License or any right, obligation, or interest herein (either voluntarily or by operation of law, merger, or otherwise) without the prior written consent of Licensor, which consent may not be unreasonably withheld or delayed by Licensor. Any attempted assignment by Licensee in violation of this **Section 26** shall be a breach of this License and, in addition, shall be voidable by Licensor in its sole and absolute discretion.

26.2 For purposes of this **Section 26**, the word "assign" shall include without limitation (a) any sale of the equity interests of Licensee following which the equity interest holders of Licensee immediately prior to such sale own, directly or indirectly, less than 50% of the combined voting power of the outstanding voting equity interests of Licensee, (b) any sale of all or substantially all of the assets of (i) Licensee and (ii) to the extent such entities exist, Licensee's parent and subsidiaries, taken as a whole, or (c) any reorganization, recapitalization, merger or consolidation involving Licensee. Notwithstanding the foregoing, any reorganization, recapitalization, merger or consolidation following which the equity interest holders of Licensee immediately prior to such reorganization, recapitalization, merger or consolidation own, directly or indirectly, at least 50% of the combined voting power of the outstanding voting equity interests of Licensee or any successor thereto or the entity resulting from such reorganization, recapitalization, merger or consolidation shall not be deemed an assignment. THIS LICENSE SHALL NOT RUN WITH THE LAND WITHOUT THE EXPRESS WRITTEN CONSENT OF LICENSOR, SUCH CONSENT TO BE IN LICENSOR'S SOLE DISCRETION.

26.3 Notwithstanding the provisions of **Section 26.1** above or anything contained in this License to the contrary, in the event Licensee sells, assigns, transfers, or hypothecates this License or any interest herein in contravention of the provisions of this License (a "**Purported Assignment**") to another party (a "**Purported Transferee**"), the Purported Transferee's enjoyment of the rights and privileges granted under this License shall be deemed to be the Purported Transferee's agreement to be bound by all of the terms and provisions of this License, including but not limited to the obligation to comply with the provisions of **Section 15** above concerning insurance requirements. In addition to and not in limitation of the foregoing, Licensee, for itself, its successors and assigns, shall indemnify, defend and hold harmless Licensor for all Liabilities of any nature, kind or description of any person or entity directly or indirectly arising out of, resulting from or related to (in whole or in part) a Purported Assignment.

26.4 The provisions of this **Section 26** shall survive the expiration or earlier termination of this License.

27. Notices. Any notice, invoice, or other writing required or permitted to be given hereunder by one party to the other shall be in writing and the same shall be given and shall be deemed to have been served and given if (i) placed in the United States mail, certified, return receipt requested, or (ii) deposited into the custody of a nationally recognized overnight delivery service, addressed to the party to be notified at the address for such party specified below, or to such other address as the party to be notified may designate by giving the other party no less than thirty (30) days' advance written notice of such change in address.

If to Licensor: Jones Lang LaSalle Brokerage, Inc.
4300 Amon Carter Blvd., Suite 100
Fort Worth, TX 76155
Attn: Permits/Licenses

with a copy to: BNSF Railway Company
2500 Lou Menk Dr. – AOB3
Fort Worth, TX 76131
Attn: Senior Manager Real Estate

If to Licensee: City of Gallup, New Mexico
P.O. Box 1270 Gallup, Nm 87301
Attn: Mr. Lance Allgood

28. Survival. Neither termination nor expiration will release either party from any liability or obligation under this License, whether of indemnity or otherwise, resulting from any acts, omissions or events happening prior to the date of termination or expiration, or, if later, the date when the Pipeline and the Improvements are removed and the Premises are restored to its condition as of the Effective Date.

29. Recordation. It is understood and agreed that this License shall not be placed or allowed to be placed on public record.

30. Applicable Law. All questions concerning the interpretation or application of provisions of this License shall be decided according to the substantive laws of the State of Texas without regard to conflicts of law provisions.

31. Severability. To the maximum extent possible, each provision of this License shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this License shall be prohibited by, or held to be invalid under, applicable law, such provision shall be ineffective solely to the extent of such prohibition or invalidity, and this shall not invalidate the remainder of such provision or any other provision of this License.

32. Integration. This License is the full and complete agreement between Licensor and Licensee with respect to all matters relating to Licensee's use of the Premises, and supersedes any and all other agreements between the parties hereto relating to Licensee's use of the Premises as described herein. However, nothing herein is intended to terminate any surviving obligation of Licensee or Licensee's obligation to defend and hold Licensor harmless in any prior written agreement between the parties.

33. Joint and Several Liability. In the event that Licensee consists of two or more parties, all the covenants and agreements of Licensee herein contained shall be the joint and several covenants and agreements of such parties.

34. Waiver. The waiver by Licensor of the breach of any provision herein by Licensee shall in no way impair the right of Licensor to enforce that provision for any subsequent breach thereof.

35. Interpretation.

35.1 This License shall be interpreted in a neutral manner, and not more strongly for or against any party based upon the source of the draftsmanship; both parties hereby agree that this License shall not be subject to the principle that a contract would be construed against the party which drafted the same. Article titles, headings to sections and paragraphs and the table of contents (if any) are inserted for convenience of reference only and are not intended to be a part or to affect the meaning or interpretation hereof. The Exhibits referred to herein shall be construed with and as an integral part of this License to the same extent as if they were set forth verbatim herein.

35.2 As used herein, "include", "includes" and "including" are deemed to be followed by "without limitation" whether or not they are in fact followed by such words or words of like import; "writing", "written" and comparable terms refer to printing, typing, lithography and other means of reproducing words in a visible form; references to any person are also to that person's successors and permitted assigns; "hereof", "herein", "hereunder" and comparable terms refer to the entirety hereof and not to any particular article, section, or other subdivision hereof or attachment hereto; references to any gender include references to the masculine or feminine as the context requires; references to the plural include the singular and vice versa; and references to this License or other documents are as amended, modified or supplemented from time to time.

36. Counterparts. This License may be executed in multiple counterparts, each of which shall, for all purposes, be deemed an original but which together shall constitute one and the same instrument, and the signature pages from any counterpart may be appended to any other counterpart to assemble fully executed documents, and counterparts of this License may also be exchanged via email or electronic facsimile machines and any email or electronic facsimile of any party's signature shall be deemed to be an original signature for all purposes.

37. Licensor's Representative. Jones Lang LaSalle Brokerage, Inc. is acting as representative for BNSF Railway Company.

38. New Mexico Anti-Indemnification Statute. In conformance with and limited to the applicable effect of NMSA 1978, §56-7-1 (2005), New Mexico's Anti-Indemnification Statute, insofar as this License shall be adjudicated a "construction contract" as defined in NMSA §56-7-1 and insofar as the indemnity provisions set forth in any of the preceding sections or any rider, amendment or addendum hereto, to indemnify any Indemnitee, or the agents or employees of any Indemnitee, or any legal entity for whose negligence, acts or omissions any of them may be liable, from liability, claims, damages, losses or expenses, including reasonable attorney fees, arising out of, in whole or in part, the negligence of any Indemnitee, or of the agents or employees of any Indemnitee, or of any legal entity for whose negligence, acts or omissions any of them may be liable for, such indemnity provisions shall be only to the extent that the liability, damages, losses or costs are caused by, or arise out of, the acts or omissions of Licensor or its officers, employees or agents.

END OF PAGE – SIGNATURE PAGE FOLLOWS

This License has been duly executed by the parties hereto as of the date below each party's signature; to be effective, however, as of the Effective Date.

LICENSOR:

BNSF Railway Company, a Delaware corporation

By: Jones Lang LaSalle Brokerage, Inc.
4300 Amon Carter Blvd., Suite 100
Fort Worth, TX 76155

By: _____

Name: _____

Title: _____

Date: _____

LICENSEE:

City of Gallup, New Mexico, a New Mexico corporation
P.O. Box 1270
Gallup, NM 87301

By: _____

Name: Lawrence Algood

Title: Director of Water & Wastewater

Date: 9-11-2013

TRACKING NO. 12-46427

MAP REF. 134038

EXHIBIT "A"

ATTACHED TO CONTRACT BETWEEN

BNSF RAILWAY COMPANY

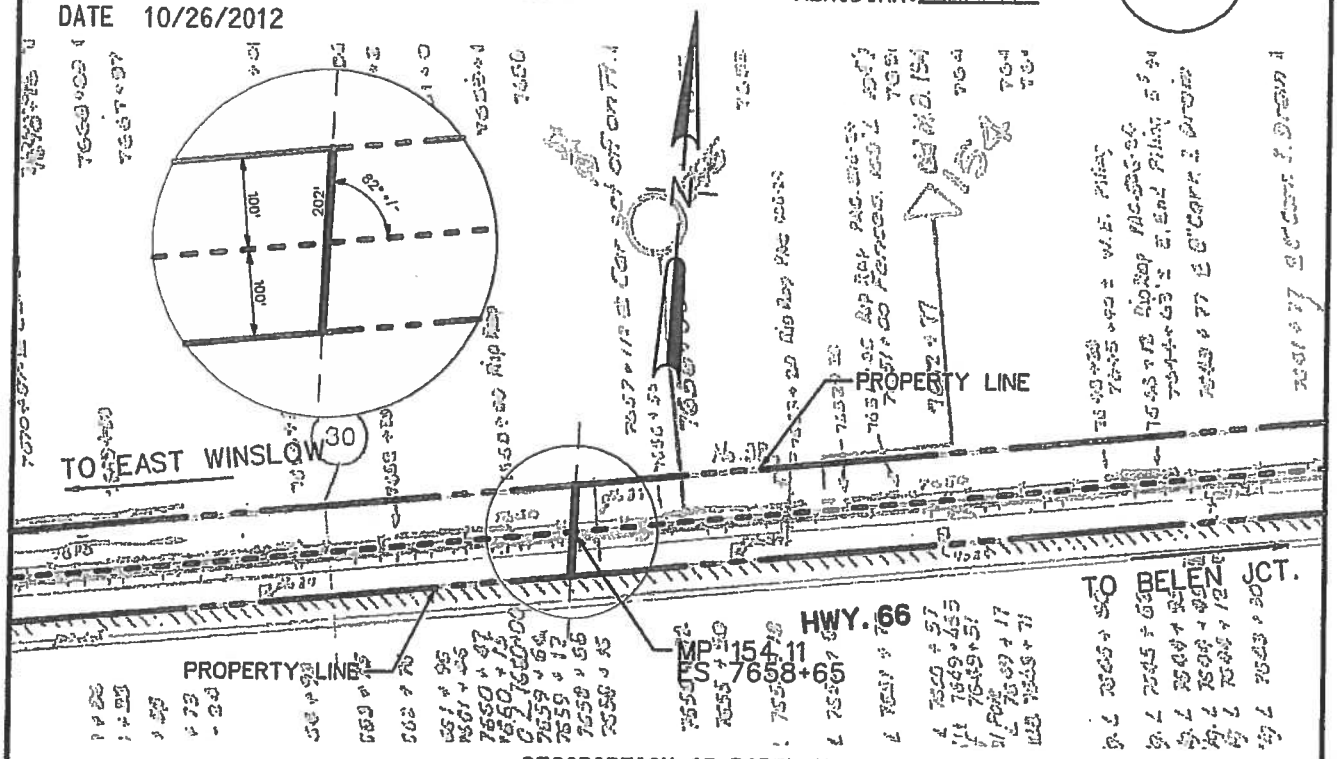
AND

CITY OF GALLUP, NEW MEXICO

SCALE: 1 IN. = 400 FT.
SOUTHWEST DIV.
GALLUP SUBDIV. L.S. 7200
DATE 10/26/2012

SECTION: 18
TOWNSHIP: 15N
RANGE: 17W
MERIDIAN: NMPM

AT&SF RY
NM-13
37



DESCRIPTION OF PIPELINE
PIPELINE SHOWN BOLD

	CARRIER PIPE	CASING PIPE		CARRIER PIPE	CASING PIPE
SIZE:	12"	23"	LENGTH ON R/W:	202'	202'
CONTENTS:	POTABLE WATER		WORKING PRESSURE:	125 PSI	
PIPE MATERIAL:	DUCTILE IRON	STEEL	BURY: BASE/RAIL TO TOP OF CASING		23.2'
SPECIFICATION/GRADE:	CLASS 350	A-36	BURY: NATURAL GROUND		8.8'
WALL THICKNESS:	0.31"	0.50"	BURY: ROADWAY DITCHES		8.8'
COATING:	-	-	CATHODIC PROTECTION		YES

VENTS: NUMBER - SIZE - HEIGHT OF VENT ABOVE GROUND -
NOTE: CASING TO BE JACKED

AT GALLUP
COUNTY OF MCKINLEY STATE OF NM STK

DRAWING NO. 1-56244