

EXHIBIT A
SPECIAL PROVISIONS



CITY OF FLAGSTAFF
SOLIERE AVENUE WATER TRANSMISSION MAIN
CITY OF FLAGSTAFF PROJECT NO. WA-3374/03-
22001

PREPARED BY

TURNER ENGINEERING INC.
CONSULTING CIVIL ENGINEERING

528 West Aspen Avenue
Flagstaff, Arizona 86001

Ph: (928) 779-1814

email pturner@teiaz.com

Project Number 10622

November 16, 2022



Paul W. Turner

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NEW PART 000
INTRODUCTION

Modifications to the MAG Specifications, Arizona Department of Transportation Specifications (A.D.O.T.), and the preceding City of Flagstaff's Amendments to MAG STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION – Amended February 2022 EDITION (Hereinafter known as Exhibit A) are made in these Special Provisions and take precedence over aforementioned Specifications for Public Works Construction. Where there is no conflict between MAG Specifications, A.D.O.T. Specifications and the City of Flagstaff's Revisions of MAG Standard Specifications for Public Works Construction these Special Provisions are to be construed as being additions to the Specifications. In cases of conflict between the other Specifications and the Special Provisions, the Special Provisions are to be construed as supplanting only the conflicting portions of the other Specifications.

MAG UNIFORM STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (LATEST EDITION) AND EXHIBIT A ARE HEREBY AMENDED TO INCLUDE THE FOLLOWING:

PART 100
GENERAL CONDITIONS

BIDDING REQUIREMENTS AND CONDITIONS

SECTION 103

AWARD AND EXECUTION OF CONTRACT

103.6 CONTRACTOR'S INSURANCE:

103.6.1 General: (add the following after the first sentence)

No additional payment shall be made for compliance with insurance requirements and certificates.

SECTION 104
SCOPE OF WORK

104.1: WORK TO BE DONE:

104.1.2 Maintenance of Traffic: (add the following)

The Contractor is responsible for preparing, submitting and obtaining approval of a complete traffic control plan satisfactory to the Transportation Engineer. A permit shall not be issued until approval is granted from the City of Flagstaff, Transportation Department. Detailed traffic control plans shall include provisions for access to all adjacent properties within the project area. If absolutely necessary, and by approval of the Engineer, the Contractor may temporarily limit vehicular and pedestrian traffic to properties through advance written notice and verbal confirmation of the affected property owner, and occupant(s). Any temporary limit to access shall be as short as possible. Traffic Control Plan & Implementation are pursuant to Exhibit A. Finalization of the traffic control plan(s) will be done prior to issuance of the Right-of-Way Permit through the City's Transportation Engineering Section.

104.2 ALTERATION OF WORK:

104.2.3 Due to Extra Work: (add the following)

In addition to the Contract Allowance in Exhibit A in 104.2.3, this adds a second Contract Allowance. Due to the fact the water transition main does cross several franchise utilities. An effort has been made to avoid conflict with those utilities. However, not all potential conflicts have been potholed. The potential for vertical and/or horizontal adjustments may be required to avoid conflicts with other utilities. The Pipe Relocation Contingency shall be used to compensate the Contractor for efforts required to make the vertical and/or horizontal connections or adding other appurtenances (such as an air/vac relief valve assembly) if not already shown on the Plans. The Pipe Relocation Contingency Bid Item is a fixed amount in the Bid Schedule and has the same stipulations as 104.2.3 in Exhibit A.

**SECTION 105
CONTROL OF WORK**

105.12 MAINTENANCE DURING CONSTRUCTION: (add the following)

Maintenance shall also include dust control and abatement both during working hours and off hours (weekends). This may include watering, sweeping and general cleanup. The cost of this maintenance work during the construction duration shall be per the Bid Schedule.

**SECTION 107
LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC**

107.9 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE: (add the following)

Survey monuments and property corners shall be identified, protected and not disturbed except as noted on the Plans. All costs associated with protecting or re-establishing disturbed survey monuments and property corners shall be the sole responsibility of the Contractor. Re-establishing all monuments and property corners shall be performed by a current Licensed Arizona Surveyor pursuant to the Arizona State Board of Technical Registration and all applicable State Statutes. Monuments and property corners shall be in place and visible prior to final acceptance of the Project.

107.9.1 Coordination of Service Interruption and Hours of Operation: (add new sub section)

The work affecting adjacent properties services including emergency services, trash and recycling pick-up and mail delivery shall be coordinated with those property owners, occupants, renters, lessees (herein after called owners) being affected. The Contractor shall notify those owners two weeks prior to any interruption in service. Service interruptions shall be coordinated with the affected owners. This may mean that the Contractor will have to do their work during the night or on a weekend or both. This effort and cost shall be included in work of those items that require service interruption.

107.9.2 Erosion and Sediment Control and SWPPP: (new subsection added)

An erosion and sediment control plan sheet is contained within the Plans. The Contractor is required to follow the instructions for obtaining authorization to discharge stormwater from construction activities under the AZPDES Construction General Permit --- AZG2013-001 or the most current revision thereto. For specific information about the program or the permit, visit their website at <http://www.azdeq.gov/enviro/water/permits/cgp.html>. This effort will include, but not be limited to, a Notice of Intent (NOI), preparation and maintenance of the SWPPP and a Notice of Termination (NOT). The cost of this effort shall be paid Lump Sum per the Bid Schedule.

107.11 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES: (add the following)

All franchise utilities will be asked to attend the preconstruction meeting. The Contractor shall perform required utility potholes. It shall be the Contractor's responsibility to determine the exact location of the utilities prior to any construction operations and to notify the respective utility and

the city's project manager at least two (2) working days prior to commencing any work on the project. Note: To assist the Contractor's investigation of existing utilities we have a preliminary layout of what was determined in the field. This is not to construed as ALL of the utilities. Adams Trenching, Inc. provided the information to us. See attached Appendix D.

The Contractor shall protect existing water, sewer, electric, gas, telephone, cable TV, and fiber optic lines where construction crosses lines. Main line and electric, telephone, cable TV, other components and service lines may not be shown on the plans or may not be accurately shown on the plans. It is the Contractor's responsibility to determine their location in the field. (Call Blue Stake, 1 (800) STAKE-IT). Protection or repair of existing main or service lines damaged by the Contractor is incidental to the work causing such damage. In the event that there is a physical conflict between an existing main or service line and the work, the Contractor shall immediately notify the Engineer of the conflict. The Engineer will make a determination as to how the conflict will be resolved. Any Extra Work required as a result of an unforeseen main or service conflict will be ordered and paid for in accordance with Section 104.2.3. Locations of underground utilities shown on the plans are to be regarded as approximately only. The Contractor shall perform utility potholes in advance of the trenching or excavation operations to determine the actual locations of underground utilities which may affect the proposed work as called out on the plans. The Contractor shall contact all utility companies prior to commencing any work and shall be responsible for scheduling and coordinating his work activities accordingly to avoid conflicts and delays with utilities. Delays due to the lack of early coordination with utilities shall not warrant an increase in contract time.

107.11.1 Payment: (new subsection)

No additional payment shall be made for the utility pothole work. This cost shall be included in the price bid for the construction or installation of items to which such measures are incidental or appurtenant.

**SECTION 108
COMMENCEMENT, PROSECUTION AND PROGRESS**

108.4.1 Weekly Construction Meetings: (new subsection added)

The Contractor's Responsible Person-in-Charge shall attend weekly construction meetings and be knowledgeable about daily operations. The Contractor shall update the current schedule to include the past work and the worked planned for the next two weeks. In addition to the schedule, the Contractor shall keep a log of problems, issues, complaints, safety, traffic or pedestrian issues, delays, material testing results, inspection results and notes, any service disruptions and duration, access disruptions and duration, field orders or changes, or any items related to Project that the Engineer considers necessary. This log shall be updated weekly and be available for review by the Engineer at the weekly construction meetings. The Contractor shall prepare meeting agendas and meeting minutes. Meeting agendas shall be distributed to the Engineer two working days prior to the meeting. Minutes shall be distributed within four working days of the meeting. No separate measurement or payment shall be made for weekly construction meetings. Weekly construction meetings shall be considered incidental to the work.

108.5 LIMITATION OF OPERATIONS: (add the following)

Notwithstanding anything to contrary, the Contractor shall be prepared to perform some work during nights, weekends and/or both. This applies to connecting mains to mains and services and associated work. It also applies to work in and around roadway intersections. Night time work is to be considered incidental to those bid items requiring night time work and no additional compensation will be paid to the Contractor. The Contractor is hereby made aware of the additional inspection and testing cost and should include such costs in the bid items requiring night time, weekends and/or both (See Exhibit A, 108.5). Night time or weekend work shall be done at the request of the Engineer and requires the approval of the Engineer.

The project limits are within and near a residential neighborhood. The contractor will take careful consideration to the residents and owners and their personal property while performing the project work. The contractor will have a designated public relations person on staff that will speak and interact with the residents and owners when necessary. This person will conduct themselves in a professional manner and will not be compensated by the City's contract. It will be considered incidental to the project work and included in the overall project bid amount. No separate payment will be made by the City of Flagstaff.

**SECTION 109
MEASUREMENTS AND PAYMENTS**

109.2 SCOPE OF PAYMENT: (add the following)

The form for submitting pay requests shall be NSPE form C620. The successful Bidder shall be provided this form in Excel© electronic version upon request at no cost. No additional payment will be made to the contractor for using this form An Adobe© copy is attached as Appendix C for reference.

**PART 300
STREETS AND RELATED WORK**

**SECTION 301
SUB-GRADE PREPARATION**

301.1 DESCRIPTION: (add the following)

Sub-grade preparation shall be, in addition to the above, per the Analysis and Recommendations to include, but not be limited to: Site preparation, earthwork factors, fill and backfill, utility installation, slabs-on-grade, corrosion protection, and permanent Cut/Fill Slope Limitations shall all be per the Geotechnical Evaluation prepared by Western Technologies, Inc. Project number 2529JW101 dated November 06, 2019 and Addendum No. 1 dated December 12, 2019. The Geotechnical Evaluation and Addendum No. 1 are attached as Appendix B.

301.3 RELATIVE COMPACTION: (add the following paragraph)

Additional compaction requirements and soil treatment shall be per the Geotechnical Evaluation prepared by Western Technologies, Inc. Project number 2529JW101 dated November 06, 2019 and Addendum No. 1 dated December 12, 2019. The Geotechnical Evaluation and Addendum No. 1 are attached as Appendix A.

**SECTION 336
PAVEMENT MATCHING AND SURFACING REPLACEMENT**

336.2 MATERIALS AND CONSTRUCTION METHODS:

336.2.3 Temporary Pavement Replacement: (Add the following paragraphs)

All pavement cuts are to be paved with temporary or final permanent pavement within two (2) working days of backfilling the excavation. Temporary surfaces shall be maintained so that a

smooth surface is available at all times for all traffic and is maintained to be free from ruts, depressions, holes, mounds and loose material.

Except as otherwise provided, pavement shall be maintained in a safe and reasonably smooth condition until final pavement replacement is completed or ordered by the Engineer. Temporary paving removed shall be hauled from the job site and disposed of legally by the Contractor at no additional cost to the project. All costs for temporary paving installation, maintenance, and removal shall be included in the contract unit prices for that respective bid item of construction, and no extra compensation will be made to the Contractor.

336.2.4 Permanent Pavement Replacement and Adjustments:

336.2.4.2 Adjustments: (add the following to the first paragraph)

In addition to adjustments in the new pavement, above, the Contractor shall adjust all other construction related components to final grade pursuant to the City of Flagstaff's applicable Engineering Standards and Details. This work shall be considered incidental to the bid item requiring the adjustment or replacement.

336.4 MEASUREMENT: (replace first sentence to read)

No measurement for pavement and surface replacement shall be made. This shall include, but not be limited to, asphalt, concrete, pads, driveways, alleys, ramps or any other hard or soft permanent surface. The quantity of surface replacement in this SECTION shall be included in the bid item requiring replacement. Furthermore, delete (A), (B), (C), (D), (F) and (G).

336.5 PAYMENT: (replace first sentence to read)

No direct payment for quantity of pavement or surfacing replacement will be made for replacement over pipes, valves, blow-offs, air-relief components, services, water meters, thrust blocks or any other component of the water, sewer, or storm drain system, including irrigation systems replacement, or reconstruction. This shall include traffic signal controls, wires, and appurtenances. The cost for pavement or surface replacement shall be included in the bid item requiring pavement or surface replacement. Payment for replacements over other work shall be included in the cost of constructing that work, in accordance with the applicable standard details and specifications.

336.5 PAYMENT: (add the following)

-Revise the 5th sentence

Furthermore, no direct payment shall be made for pavement and surface replacement to repair or replace any existing pavement outside of the trench neat line that was damaged by the Contractor's or Subcontractor's work to install the water mains and associated appurtenances.

(replace the third sentence to read)

Since no direct payment for pavement or surface replacement will be made, the replacement cost of any existing pavement markings that have been obscured, obliterated or removed by construction activities shall be included in the bid item requiring pavement or surface replacement except as provided in the plans. This shall include obliteration or damage of pavement markings due to construction activities and construction traffic.

**SECTION 340
CONCRETE CURB, GUTTER, SIDEWALK, SIDEWALK RAMPS, DRIVEWAY AND ALLEY
ENTRANCE**

340.3 CONSTRUCTION METHODS:

(add the following paragraph)

Curb, gutter, sidewalk, FUTS, driveway aprons, driveways, and handicapped sidewalk ramps shall be constructed on 3" of A.B.C. or as shown on the plans, placed in accordance with M.A.G. Section 310. The cost for the A.B.C. and placement as specified shall be included in the respective bid item.

**PART 600
WATER AND SEWER**

**SECTION 601
TRENCH EXCAVATION, BACKFILLING AND COMPACTION**

601.1 DESCRIPTION: (add the following)

Storm drain pipes shall be included in this PART 600.

602.2 EXCAVATION:

601.2.3 Trench Grade: (add the following)

Elevation stakes are required for all water pipes that have grades shown on the Plans.

601.2.11 Dewatering: (add a new subsection)

Any water encountered during the operation shall be disposed of by the Contractor in a manner that will not damage public or private property or create a nuisance or health problem. The cost of furnishing pumps, pipes, disposal and equipment for dewatering shall be considered incidental to the work and not additional payment shall be made. If water is encountered notify the Engineer immediately.

601.6 PAVEMENT REPLACEMENT AND SURFACE RESTORATION: (add a new subsection)

601.6.5 Permanent Pavement Replacement:

Permanent pavement replacement shall be included in the cost of the items requiring pavement removal, including pavement damaged by construction as determined by the Engineer.

601.7 PAYMENT: (add the following to the first sentence after temporary pavement)

and permanent pavement. (See **336.2.4 Permanent Pavement Replacement and Adjustments** above in these Special Provisions also.)

**SECTION 611
WATER, SEWER AND STORM DRAIN TESTING**

611.1 HYDROSTATIC TESTING: (amend as follows)

Hydrostatic Testing: (modify (A) and (B) as follows)

(A) **Pressure Testing:** Minimum prescribed test pressure shall be at least 200 psi for ALL pipes.

(B) **Testing Allowance/Makeup Water:** Allowable leakage for ALL pipes shall be per TABLE 9-6 on Page 133 and 134 of the "Engineering Design and Construction Standards & Specifications for New Infrastructure" 2022 Edition.

**SECTION 630
TAPPING SLEEVES, VALVES AND VALVE BOXES ON WATER LINES**

630.3 GATE VALVES: (amend as follows)

630.3.1 General: (replace the 4th sentence with the following)

All valves shall be class 250 or higher as necessary to withstand the required test pressure of 200 psi.

(add as follows) Valves shall be class 250, epoxy coated resilient seat.

630.4 TAPPING SLEEVES AND VALVES:

630.4.2 Tapping Sleeves: (amend as follows)

Replace the time for testing at 200 psi from 30 minutes to two hours.

(add as follows) All tapping sleeves shall be City of Flagstaff stainless steel.

630.5 BUTTERFLY VALVES: (amend as follows)

Section (A) subsection (2) replace with (2) Valves shall be Class 250B or higher to withstand the required test pressure of 200 psi.

**PART 700
MATERIALS**

**SECTION 750
IRON WATER PIPE AND FITTINGS**

750.2 DUCTILE IRON WATER PIPE: (add the following)

All ductile iron water pipe 6" to 12" in diameter shall be Class 350. All ductile iron water pipe larger than 12" diameter shall be Class 250. All pipe shall be Polyethylene coated or cement mortar lined. Test pressure shall be 200 psi for two hours for all pipe.

APPENDIX B

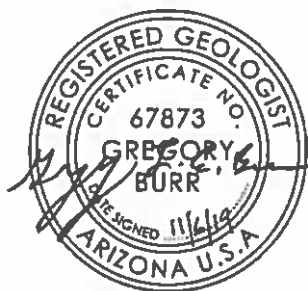
GEOTECHNICAL EVALUATION REPORT

COF SOLIERE AVENUE WATER TRANSMISSION MAIN

Falcon Road to Elk Run Street
Flagstaff, Arizona
WT Reference No. 2529JW101

PREPARED FOR:

Turner Engineering, Inc.
528 West Aspen Avenue
Flagstaff, Arizona 86001
Attn: Mr. Paul Turner, P.E., C.F.M.
Attn: Mr. Duke MacArthur, P.E.
November 6, 2019



Gregory L. E. Burr, R.G.
Geotechnical Project Manager



Craig P. Wiedeman, P.E.
Senior Geotechnical Engineer





**Western
Technologies Inc.**
The Quality People
Since 1955

2400 East Huntington Drive
Flagstaff, Arizona 86004-8934
(928) 774-8700 • fax 774-6469

November 6, 2019

Turner Engineering, Inc.
528 West Aspen Avenue
Flagstaff, Arizona 86001

Attn: Mr. Paul Turner, P.E., C.F.M.
Mr. Duke MacArthur, P.E.

Re: Geotechnical Evaluation
COF Soliere Avenue Water Transmission Main
Falcon Road to Elk Run Street
Flagstaff, Arizona

Job No. 2529JW101

Western Technologies Inc. has completed the geotechnical evaluation for the proposed water transmission main to be located in Flagstaff, Arizona. This study was performed in general accordance with our proposal number 2528PW209R dated September 9, 2019. The results of our study, including the boring location diagram, laboratory test results, boring logs, and the geotechnical recommendations are attached.

We have appreciated being of service to you in the geotechnical engineering phase of this project and are prepared to assist you during the construction phases as well. If design conditions change, or if you have any questions concerning this report or any of our testing, inspection, design and consulting services, please do not hesitate to contact us. We look forward to working with you on future projects.

Sincerely,
WESTERN TECHNOLOGIES, INC.
Geotechnical Engineering Services

A handwritten signature in black ink that reads "Gregory L. E. Burr".

Gregory L. E. Burr, R.G.
Geotechnical Project Manager

Copies to: Addressee (emailed)

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**GEOTECHNICAL EVALUATION
COF SOLIERE WATER TRANSMISSION MAIN
FALCON ROAD TO ELK RUN STREET
FLAGSTAFF, ARIZONA
JOB NO. 2529JW101**

1.0 PURPOSE

This report contains the results of our geotechnical evaluation for the proposed water transmission main. The alignment runs along the northern side of Soliere Avenue from directly west of Falcon Road to directly east of Elk Run Street. The purpose of these services is to evaluate the subsurface soil conditions along the alignment, and provide information and recommendations for the water transmission main, including:

- anticipated excavation conditions
- earthwork, including backfill placement, and suitability of existing soils for backfill materials
- lateral earth pressures
- corrosivity
- existing pavement thickness

Results of the field exploration, field tests, and laboratory testing program are presented in the Appendices.

2.0 PROJECT DESCRIPTION

Based on the information provided by Mr. Duke MacArthur, P.E., the proposed project will consist of approximately 5,340 linear feet of water transmission main to be installed. The project will consist of a 12-inch diameter line located along the northern side of Soliere Avenue. We understand that the pipe invert will be about 4 feet below the existing site grades. Borings were located in the general areas requested, and adjusted for existing utilities. Should any of our information or assumptions not be correct, we request that the Client notify WT immediately.

3.0 SCOPE OF SERVICES

3.1 Field Exploration

Ten borings were drilled to depths ranging from about 5 to 15 feet below existing site grades at the approximate locations shown on the attached boring location diagram. Logs of the borings are presented in Appendix A. Subsoils encountered during drilling were examined visually and sampled at selected depth intervals.

A field log was prepared for each boring. These logs contain visual classifications of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Final logs, included in Appendix A, represent our interpretation of the field logs and include modifications based on laboratory observations and tests of the field samples. The final logs describe the materials encountered, their thicknesses, and the locations where samples were obtained. The Unified Soil Classification System was used to classify soils. The soil classification symbols appear on the boring logs and are briefly described in Appendix A.

3.2 Laboratory Analyses

Laboratory analyses were performed on representative soil samples to aid in material classification and to estimate pertinent engineering properties of the on-site soils for preparation of this report. Testing was performed in general accordance with applicable ASTM and Arizona methods. The following tests were performed and the results are presented in Appendix B.

- Water content
- Dry density
- Remolded expansion potential
- Gradation
- Plasticity
- Soluble salts/sulfates/chlorides
- Corrosivity (ASTM A674)

Test results were utilized in the development of the recommendations contained in this report.

3.3 Analyses and Report

This geotechnical evaluation report includes a description of the project, a discussion of the field and laboratory testing programs, a discussion of the subsurface conditions, and design recommendations as required to satisfy the purpose previously described.

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. We are available to discuss the scope of such studies with you.

4.0 SITE CONDITIONS

4.1 Surface

Soliere Avenue is a two-lane, asphalt paved collector-type street with concrete vertical curb, gutter and sidewalk located along the southern side of the alignment. The northern side of the alignment is mostly a gravel covered shoulder, except for the western end starting at the western intersection with Fox Lair Drive, where it changes to a concrete vertical curb and gutter with guard rail along the area where the street climbs a hill up to the Fourth Street intersection. The asphalt pavement and concrete curbs, gutters and sidewalks were all in fair to good condition. Residences and two churches are located along the southern side of the street, and the Interstate 40 right-of-way is located along the northern side of the street. Surface drainage along the roadway appears to be generally fair to good.

4.2 Subsurface

As presented on the boring logs, subgrade soils varied in soil type and condition along the alignment. In general, the soils were more fine-grained and softer in the lower elevations along the middle portions of the alignment, and more granular and dense in the higher elevations along the eastern and western ends of the alignment. Subgrade soils included medium dense to dense Silty SANDS and GRAVELS with non-plastic fines; loose Clayey SANDS with low plasticity fines; and firm to stiff, low plasticity Sandy CLAYS with variable amounts of gravel. Refusal to auger penetration occurred on LIMESTONE in all but three

of the borings at depths of about 5 to 9 feet below the existing site grades. Refusal may result from hard cemented and/or welded material, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Special drilling procedures are needed to determine the character, integrity and continuity of the refusal materials. However, based on our previous experience on several other projects in the vicinity of the alignment, we consider it likely that refusal occurred on differentially weathered LIMESTONE that can change quickly, both horizontally and vertically, from soil-like consistencies to hard rock conditions. Groundwater was not encountered in any boring at the time of exploration. The following existing pavement section thicknesses and depth to rock were measured at the locations explored:

Boring No.	Asphalt Thickness (in.)	Base Course Thickness (in.)	Depth to Rock (ft.)
1	7	27	5
2	7	27	6
3	6.25	28	8
4	7	27	9
5	5.5	30	7
6	6.5	29	not encountered
7	7	29	not encountered
8	7	29	not encountered
9	8	28	5
10	7	29	7

The logs in Appendix A show details of the subsurface conditions encountered during the field exploration. The boring logs included in this report are indicators of subsurface conditions only at the specific location and date noted. Variations from the field conditions represented by the borings may become evident during construction. If variations appear, we should be contacted to re-evaluate our recommendations.

5.0 GEOTECHNICAL PROPERTIES

5.1 Laboratory Tests

Laboratory test results (Appendix B) indicate that the soils tested exhibit low to no plasticity, and low to no expansion potential when recompacted, confined by loads approximating pavement loads, and saturated in accordance with standard Arizona test methods.

5.2 Field Tests

Site soils and subsurface rock conditions were variable, and exhibited low to high resistance to penetration using the standard penetration test method (ASTM D1586) and test method ASTM D3550. Plate A-2 in Appendix A, as well as the boring logs, describe soil consistency and relative density based on the blow counts recorded during sampling. The soil consistency and relative density give an indication of the drilling effort required to advance a hollow-stem auger through the soils, as well as providing a relative indicator of excavation effort required.

6.0 RECOMMENDATIONS

6.1 General

Recommendations contained in this report are based on our understanding of the project criteria described in Section 2.0, **PROJECT DESCRIPTION**, and the assumption that the soil and subsurface conditions are those disclosed by the explorations. Others may change the plans, final elevations, and pipeline alignment during design or construction. Substantially different subsurface conditions from those described herein may be encountered or become known between our explorations. Any changes in the project criteria or subsurface conditions shall be brought to our attention in writing.

Based on our explorations, the subsurface conditions should be expected to be variable along the pipeline alignment, with differentially weathered limestone and variable weathered to hard rock conditions. Additional excavation effort and use of heavy duty equipment should be anticipated for these conditions.

6.2 Soil Corrosivity

The chemical test results indicate that the site soils are negligibly corrosive to concrete. However, in order to be consistent with standard local practice and for reasons of material availability, we recommend that Type II portland cement be used for all concrete on and below grade.

The laboratory test results indicate that the on-site soils exhibit low to moderate corrosive potential to ductile iron pipe. This information should be used as an aid in choosing the construction materials that will be in contact with these soils and corrosion protection

methods. Pipe and material manufacturers' representatives should be contacted regarding the specific corrosivity resistance for their particular product.

6.3 Lateral Design Criteria for Thrust Blocks

For thrust block design, lateral loads may be resisted using a soil bearing pressure of 2000 pounds per square foot (psf). Any fill against or around thrust blocks should be compacted to densities specified herein under **Placement and Compaction**.

6.4 Materials

All trench backfill, aggregate base course and pavement materials should meet the current City of Flagstaff specifications. Frozen soils should not be used as fill or backfill.

6.5 Placement and Compaction

All trench backfill should be placed and compacted in accordance with the current City of Flagstaff specifications for trench backfill. Fill soils should not be placed over frozen ground. All fill soils placed around and below thrust blocks, where applicable, should be compacted to a minimum of 95 percent of the maximum density as determined by ASTM D698. On-site and imported soils with low expansive potential and aggregate base course materials should be compacted with a moisture content in the range of 3 percent below to 3 percent above optimum.

7.0 ADDITIONAL SERVICES

The recommendations provided in this report are based on the assumption that a sufficient schedule of tests and observations will be performed during construction to verify compliance. Retaining the geotechnical engineer who developed your report to provide construction observation is the best way to verify compliance, and to help you manage the risks associated with unanticipated conditions.

8.0 LIMITATIONS

This report has been prepared assuming the project criteria described in Section 2.0. If changes in the project criteria occur, or if different subsurface conditions are encountered or become

known, the conclusions and recommendations presented herein shall become invalid. In any such event, contact WT to assess the effect that such variations may have on our conclusions and recommendations. If WT is not retained for the construction observation and testing services to determine compliance with this report, our professional responsibility is accordingly limited.

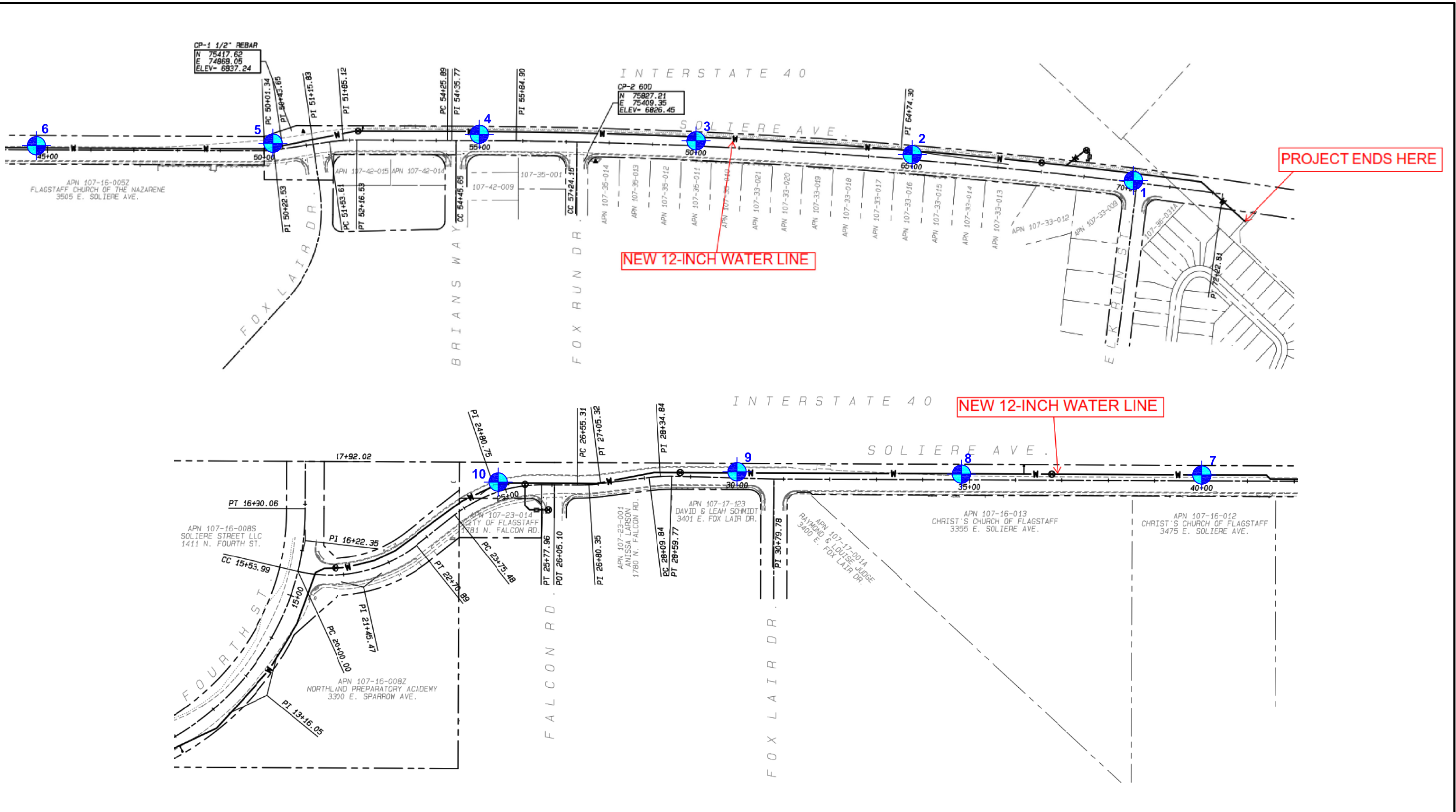
The recommendations presented are based entirely upon data derived from a limited number of samples obtained from widely spaced borings. The attached logs are indicators of subsurface conditions only at the specific locations and times noted. This report assumes the uniformity of the geology and soil structure between borings, however variations can and often do exist. Whenever any deviation, difference or change is encountered or becomes known, WT should be contacted.

This report is for the exclusive benefit of our client alone. There are no intended third-party beneficiaries of our contract with the client or this report, and nothing contained in the contract or this report shall create any express or implied contractual or any other relationship with, or claim or cause of action for, any third party against WT.

This report is valid until the earlier of one year from the date of issuance, a change in circumstances, or discovered variations. After expiration, no person or entity shall have any right to rely on this report without the express written authorization of WT.

9.0 CLOSURE


We prepared this report as an aid to the designers of the proposed project. The comments, statements, recommendations and conclusions set forth in this report reflect the opinions of the authors. These opinions are based upon data obtained at the location of the borings, and from laboratory tests. Work on your project was performed in accordance with generally accepted standards and practices utilized by professionals providing similar services in this locality. No warranty, express or implied, is made.




PROJECT ENDS HERE

NEW 12-INCH WATER LINE

NEW 12-INCH WATER LINE

 Not to Scale

 Approximate Test Boring Location

Geotechnical
Environmental
Inspections
Materials



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COF SOLIERE AVENUE WATER TRANSMISSION MAIN	
Boring Location Diagram	
Western Technologies Inc.	
Job No.: 2529JW101	Plate: 1

Allowable Soil Bearing Capacity	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material.
Backfill	A specified material placed and compacted in a confined area.
Base Course	A layer of specified aggregate material placed on a subgrade or subbase.
Base Course Grade	Top of base course.
Bench	A horizontal surface in a sloped deposit.
Caisson/Drilled Shaft	A concrete foundation element cast in a circular excavation which may have an enlarged base (or belled caisson).
Concrete Slabs-On-Grade	A concrete surface layer cast directly upon base course, subbase or subgrade.
Crushed Rock Base Course	A base course composed of crushed rock of a specified gradation.
Differential Settlement	Unequal settlement between or within foundation elements of a structure.
Engineered Fill	Specified soil or aggregate material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer.
Existing Fill	Materials deposited through the action of man prior to exploration of the site.
Existing Grade	The ground surface at the time of field exploration.
Expansive Potential	The potential of a soil to expand (increase in volume) due to absorption of moisture.
Fill	Materials deposited by the actions of man.
Finished Grade	The final grade created as a part of the project.
Gravel Base Course	A base course composed of naturally occurring gravel with a specified gradation.
Heave	Upward movement.
Native Grade	The naturally occurring ground surface.
Native Soil	Naturally occurring on-site soil.
Rock	A natural aggregate of mineral grains connected by strong and permanent cohesive forces. Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation.
Sand and Gravel Base Course	A base course of sand and gravel of a specified gradation.
Sand Base Course	A base course composed primarily of sand of a specified gradation.
Scarify	To mechanically loosen soil or break down existing soil structure.
Settlement	Downward movement.
Soil	Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water.
Strip	To remove from present location.
Subbase	A layer of specified material placed to form a layer between the subgrade and base course.
Subbase Grade	Top of subbase.
Subgrade	Prepared native soil surface.



COARSE-GRAINED SOILS
LESS THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVEL OR WELL-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE
GP	POORLY-GRADED GRAVEL OR POORLY-GRADED GRAVEL WITH SAND, LESS THAN 5% FINES	
GM	SILTY GRAVEL OR SILTY GRAVEL WITH SAND, MORE THAN 12% FINES	
GC	CLAYEY GRAVEL OR CLAYEY GRAVEL WITH SAND, MORE THAN 12% FINES	
SW	WELL-GRADED SAND OR WELL-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE
SP	POORLY-GRADED SAND OR POORLY-GRADED SAND WITH GRAVEL, LESS THAN 5% FINES	
SM	SILTY SAND OR SILTY SAND WITH GRAVEL, MORE THAN 12% FINES	
SC	CLAYEY SAND OR CLAYEY SAND WITH GRAVEL, MORE THAN 12% FINES	

NOTE: Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e.g., SW-SM, GP-GC).

FINE-GRAINED SOILS
MORE THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
ML	SILT, SILT WITH SAND OR GRAVEL, SANDY SILT, OR GRAVELLY SILT	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50
CL	LEAN CLAY OF LOW TO MEDIUM PLASTICITY, SANDY CLAY, OR GRAVELLY CLAY	
OL	ORGANIC SILT OR ORGANIC CLAY OF LOW TO MEDIUM PLASTICITY	
MH	ELASTIC SILT, SANDY ELASTIC SILT, OR GRAVELLY ELASTIC SILT	SILTS AND CLAYS LIQUID LIMIT MORE THAN 50
CH	FAT CLAY OF HIGH PLASTICITY, SANDY FAT CLAY, OR GRAVELLY FAT CLAY	
OH	ORGANIC SILT OR ORGANIC CLAY OF HIGH PLASTICITY	
PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS

NOTE: Fine-grained soils may receive dual classification based upon plasticity characteristics (e.g. CL-ML).

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	Above 12 in.
COBBLES	3 in. – 12 in.
GRAVEL	No. 4 – 3 in.
Coarse	¾ in. – 3 in.
Fine	No. 4 – ¾ in.
SAND	No. 200 – No. 4
Coarse	No. 10 – No. 4
Medium	No. 40 – No. 10
Fine	No. 200 – No. 40
Fines (Silt or Clay)	Below No. 200

NOTE: Only sizes smaller than three inches are used to classify soils

CONSISTENCY

CLAYS & SILTS	BLOWS PER FOOT
VERY SOFT	0 – 2
SOFT	3 – 4
FIRM	5 – 8
STIFF	9 – 15
VERY STIFF	16 – 30
HARD	OVER 30

RELATIVE DENSITY

SANDS & GRAVELS	BLOWS PER FOOT
VERY LOOSE	0 – 4
LOOSE	5 – 10
MEDIUM DENSE	11 – 30
DENSE	31 – 50
VERY DENSE	OVER 50

NOTE: Number of blows using 140-pound hammer falling 30 inches to drive a 2-inch-OD (1½-inch ID) split-barrel sampler (ASTM D1586).

PLASTICITY OF FINE GRAINED SOILS

PLASTICITY INDEX	TERM
0	NON-PLASTIC
1 – 7	LOW
8 – 20	MEDIUM
Over 20	HIGH

DEFINITION OF WATER CONTENT

DRY
SLIGHTLY DAMP
DAMP
MOIST
WET
SATURATED



The number shown in "**BORING NO.**" refers to the approximate location of the same number indicated on the "Boring Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features.

"**DRILLING TYPE**" refers to the exploratory equipment used in the boring wherein **HSA = hollow stem auger**, and the dimension presented is the outside diameter of the HSA used.

"**N**" in "**BLOW COUNTS**" refers to a 2-inch outside diameter split-barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 18 inches is achieved or until refusal. The number of blows, or "blow count", of the hammer is recorded for each of three 6-inch increments totaling 18 inches. The number of blows required for advancing the sampler for the last 12 inches (2nd and 3rd increments) is defined as the Standard Penetration Test (SPT) "**N**"-Value. Refusal to penetration is considered more than 50 blows per 6 inches. (Ref. ASTM D1586). A double vertical line within the symbol indicates no sample recovery.

"**R**" in "**BLOW COUNTS**" refers to a 3-inch outside diameter ring-lined split barrel sampler driven into the ground with a 140 pound drop-hammer dropped 30 inches repeatedly until a penetration of 12 inches is achieved or until refusal. The number of blows required to advance the sampler 12 inches is defined as the "**R**" blow count. The "**R**" blow count requires an engineered conversion to an equivalent SPT N-Value. Refusal to penetration is considered more than 50 blows per foot. A double vertical line within the symbol indicates no sample recovery. A circle within the symbol indicates sample disturbance.

"**SAMPLE TYPE**" refers to the form of sample recovery, in which **N** = Split-barrel sample, **R** = Ring-lined sample, **G** = Grab sample.

"**DRY DENSITY (LBS/CU FT)**" refers to the laboratory-determined dry density in pounds per cubic foot.

"**WATER (MOISTURE) CONTENT**" (% of Dry Wt.) refers to the laboratory-determined water content in percent using the standard test method ASTM D2216.

"**USCS**" refers to the "Unified Soil Classification System" Group Symbol for the soil type as defined by ASTM D2487 and D2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted. Variations in subsurface conditions and characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the boring logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the boring location. The transition between materials is approximate and may be more or less gradual than indicated.

<p><i>Geotechnical Environmental Inspections Materials</i></p>  <p>Western Technologies Inc. The Quality People Since 1955 wt-us.com</p>	<p>BORING LOG NOTES</p>	<p>PLATE A-3</p>
--	--------------------------------	-----------------------------

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 1

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								BASE COURSE (27 inches thick)
		G				GM		Silty GRAVEL; with sand, tan, very dense, damp
		N		50/3"	5			Auger Refusal at 5 Feet on LIMESTONE
					10			
					15			

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-4

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 2

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
13.7	101	R	[Pattern]	22	5	GM	[Pattern]	ASPHALT (7 inches thick)
							[Pattern]	BASE COURSE (27 inches thick)
							[Pattern]	Silty GRAVEL; with sand, tan, medium dense to very dense, damp
		N	[Pattern]	50/6"				Auger Refusal at 6 Feet on LIMESTONE

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-5

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 3

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (6.25 inches thick)
								BASE COURSE (28 inches thick)
11.4	118	R		12		SM		Silty SAND; with gravel, tan/yellow, medium dense to very dense, damp to slightly damp
7.9	113	R		50/5"	5			
Auger Refusal at 8 Feet on LIMESTONE								

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 R- RING SAMPLE
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 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-6

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 4

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								BASE COURSE (27 inches thick)
18.3	105	R		14	5	CL-ML		Sandy Silty CLAY; trace to some gravel, dark brown, stiff to hard, moist to damp
12.1	113	R		33				color change to tan/pink
		N		refusal	10			Auger Refusal at 9 Feet on LIMESTONE
					15			

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG




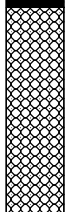

PLATE
A-7

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 5

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
8.7	119	R		14	5	CL		Sandy Lean CLAY; some gravel, brown/tan, stiff, slightly damp
		G						BASE COURSE (30 inches thick)
								ASPHALT (5.5 inches thick)
								Auger Refusal at 7 Feet on LIMESTONE

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-8

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 6

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (6.5 inches thick)
								BASE COURSE (29 inches thick)
		G				CL		Sandy Lean CLAY; some gravel, dark brown, firm, damp to moist
		R		8	5			
10.7	101	R		7	10			
21.1	90	R		5	15			
Boring Stopped at 15 Feet								

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-9

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 7

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								BASE COURSE (29 inches thick)
						CL		Sandy Lean CLAY; some gravel, dark brown, soft to firm, moist
18.5	91	R		4	5			
21.1	90	R		5	10			
					15			
Boring Stopped at 10 Feet								

- N- STANDARD PENETRATION TEST
- R- RING SAMPLE
- CA- CALIFORNIA MODIFIED SAMPLER
- G- GRAB SAMPLE
- B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-10

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 8

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								BASE COURSE (29 inches thick)
						SC		Clayey SAND; with gravel, brown, loose, damp to moist
15.7	96	R		5	5			
		G						
14.8	93	R		3	10			
		G						
23.2	86	R		9	15			
		G						
Boring Stopped at 15 Feet								

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG




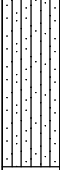

PLATE
A-11

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 9

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (8 inches thick)
								BASE COURSE (28 inches thick)
		G				SM		Silty SAND; with gravel, yellow/tan, very dense, damp
		N		refusal	5			Auger Refusal at 5 Feet on LIMESTONE
					10			
					15			

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-12

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 10

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
11.2	125	R		40	5	SM		ASPHALT (7 inches thick) BASE COURSE (29 inches thick) Silty SAND; with gravel, yellow/tan, very dense, damp
		G						
								Auger Refusal at 7 Feet on LIMESTONE

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NOTES: Groundwater Not Encountered



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PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101


BORING LOG

PLATE
A-13

Boring No.	Depth (ft)	USCS Class.	Particle Size Distribution (% Passing by Weight)							Atterberg Limits		Laboratory Compaction Characteristics			Remarks
			3"	¾"	#4	#10	#40	#200	2μ	LL	PI	Dry Density (pcf)	Optimum Moisture (%)	Method	
1	3-5	GM	100	94	61	49	37	25.8			NP				2
4	3-9	CL-ML		100	96	91	84	58.9		22	6				2
7	3-5	CL	100	99	89	81	71	60.0		28	8				2
10	3-5	SM	100	99	83	72	58	43.5			NP				2

NOTE: NP = Non-plastic
μ = microns (2μ = 0.002mm)

REMARKS
Classification / Particle Size / Moisture-Density Relationship
1. Visual
2. Laboratory Tested
3. Minus #200 Only
4. Test Method ASTM D698/AASHTO T99
5. Test Method ASTM D1557/AASHTO T180
6. From the ADOT Family of Curves

 Western Technologies Inc. The Quality People Since 1955 wt-us.com	PROJECT: SOLIERE AVENUE WATER TRANSMISSION MAIN JOB NO.: 2529JW101	PLATE B-1
	SOIL PROPERTIES	

Boring No.	Depth (ft.)	USCS Class.	Initial Dry Density (pcf)	Initial Water Content (%)	Compression Properties			Expansion Properties		Plasticity		Percent Passing #200	Soluble		Remarks
					Surcharge (ksf)	Total Compression (%)		Surcharge (ksf)	Expansion (%)	LL	PI		Salts (ppm)	Sulfate (ppm)	
						In-Situ	After Saturation								
1	3-5	GM	120.3	10.5				0.1	0						1,2
4	3-9	CL-ML	120.3	10.5				0.1	0						1,2
7	3-5	CL	116.1	11.5				0.1	1.1						1,2
10	3-5	SM	120.3	10.5				0.1	0						1,2

Notes: Initial Dry Density and Initial Water Content are in-situ values unless otherwise noted.
NP = Non-Plastic

Remarks

1. Compacted density (approx. 95% of ASTM D698 max. density at moisture content slightly below optimum.)
2. Submerged to approximate saturation.
3. Slight rebound after saturation.
4. Sulfate testing performed by an approved vendor (test reports attached).

*Geotechnical
Environmental
Inspections
Materials*

Western Technologies Inc.
 The Quality People
 Since 1955
 wt-us.com

PROJECT: SOLIERE WATER TRANSMISSION MAIN
JOB NO.: 2529JW101

PLATE
B-2

SOIL PROPERTIES

CORROSIVITY TEST RESULTS

The procedures for soil survey tests and observations can be found in Appendix X1.1 of ASTM A674-18 and includes five soil properties: earth resistivity • pH • redox potential • sulfides • moisture.


Boring 1 (3-5 feet):

<u>Analysis</u>	<u>Results</u>	<u>Points</u>
Resistivity (ohm-cm)	5912	0
pH	8.71	3
Redox Potential (mV)	+32	4
Sulfides	trace	2
Moisture	fair	1
Total Points		10

Boring 7 (3-5 feet):

<u>Analysis</u>	<u>Results</u>	<u>Points</u>
Resistivity (ohm-cm)	3146	0
pH	8.24	0
Redox Potential (mV)	+14	4
Sulfides	trace	2
Moisture	fair	1
Total Points		7

The test procedure states that if the sum of the points is less than 10, the soil is considered non-corrosive to ductile iron pipe and special protection against exterior corrosion is not necessary. This conclusion is limited to soil corrosion and does not include consideration of stray direct current.

<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p style="font-size: small; margin: 0;"><i>Geotechnical Environmental Inspections Materials</i></p>  <p style="font-size: small; margin: 0;">Western Technologies Inc. The Quality People Since 1955</p> <p style="font-size: x-small; margin: 0;">wt-us.com</p> </div> </div>	<p style="font-size: x-small; margin: 0;">PROJECT: SOLIERE AVENUE WATER TRANSMISSION MAIN JOB NO. 2529JW101</p>	PLATE B-3
	<p style="font-size: large; margin: 0;">SOIL PROPERTIES</p>	


CORROSIVITY TEST RESULTS

The procedures for soil survey tests and observations can be found in Appendix X1.1 of ASTM A674-18 and includes five soil properties: earth resistivity • pH • redox potential • sulfides • moisture.

Boring 10 (3-5 feet):

<u>Analysis</u>	<u>Results</u>	<u>Points</u>
Resistivity (ohm-cm)	5912	0
pH	8.50	0
Redox Potential (mV)	+20	4
Sulfides	trace	2
Moisture	fair	1
Total Points		7

The test procedure states that if the sum of the points is less than 10, the soil is considered non-corrosive to ductile iron pipe and special protection against exterior corrosion is not necessary. This conclusion is limited to soil corrosion and does not include consideration of stray direct current.

<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p style="font-size: small; margin: 0;"><i>Geotechnical Environmental Inspections Materials</i></p>  <p style="font-size: small; margin: 0;">Western Technologies Inc. The Quality People Since 1955 wt-us.com</p> </div> <div style="flex: 2; padding-left: 10px;"> <p style="font-size: x-small; margin: 0;">PROJECT: SOLIERE AVENUE WATER TRANSMISSION MAIN JOB NO. 2529JW101</p> </div> </div>	PLATE
	SOIL PROPERTIES



Soil Analysis Report

Western Technologies - Flagstaff
 Crockett Saline
 2400 East Huntington
 Flagstaff, AZ 86004-8934

Project: 2529JW101
 Date Received: 10/31/2019
 Date Reported: 11/4/2019
 PO Number: 2529P032

Lab Number: 930528-1	1 (3-5)
-----------------------------	----------------

<i>Soluble Salts, Sulfate & Chloride</i>	Method	Result	Units	Levels
Soluble Salts	ARIZ 237b SS	391	ppm	
Sulfate, SO4	ARIZ 733a	14	ppm	
Chloride, Cl	ARIZ 736b	<3	ppm	

Lab Number: 930528-2	4 (3-5)
-----------------------------	----------------

<i>Soluble Salts, Sulfate & Chloride</i>	Method	Result	Units	Levels
Soluble Salts	ARIZ 237b SS	405	ppm	
Sulfate, SO4	ARIZ 733a	75	ppm	
Chloride, Cl	ARIZ 736b	<3	ppm	



December 12, 2019

Turner Engineering, Inc.
528 West Aspen Avenue
Flagstaff, Arizona 86005

Attn: Mr. Paul Turner, P.E., C.F.M.

Attn: Mr. Duke MacArthur

Re: COF Soliere Avenue Water Transmission Main
Falcon Road to Elk Run Street
Flagstaff, Arizona

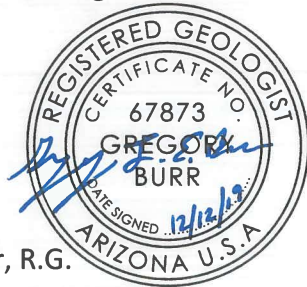
Job No. 2529JW101
Addendum No.1

In accordance with the request of Mr. Paul Turner, P.E., C.F.M. and Mr. Duke MacArthur, P.E. with Turner Engineering, Inc., we have reviewed our geotechnical evaluation report for the above referenced project. The purpose of the review was to provide corrected aggregate base course thickness based on additional field observations. Listed below are the corrected aggregate base course thicknesses and boring logs that have been revised to reflect the corrected aggregate base course thickness:

Boring No.	Asphalt Thickness (in.)	Base Course Thickness (in.)	Depth to Rock (ft.)
1	7	10	5
2	7	10	6
3	6.25	11	8
4	7	10	9
5	5.5	13	7
6	6.5	12	not encountered
7	7	12	not encountered
8	7	12	not encountered
9	8	11	5
10	7	12	7

This addendum should be attached to and become part of the original report. If you have any questions concerning this information, or require additional consultation, design, observation, or testing services, please contact us. We look forward to working with you on this and future projects.

Sincerely,
WESTERN TECHNOLOGIES INC.
Geotechnical Engineering Services



Gregory L. E. Burr, R.G.
Geotechnical Project Manager



Craig P. Wiedeman, P.E.
Senior Geotechnical Engineer

Copies to: Addressee (emailed)

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 1

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								AGGREGATE BASE COURSE (10 inches thick)
						GM		Silty GRAVEL; with sand, tan, very dense, damp
		G						
		N		50/3"	5			Auger Refusal at 5 Feet on LIMESTONE
					10			
					15			

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG






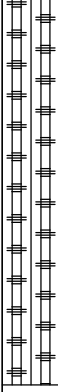
PLATE
A-4

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 2

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
13.7	101	R		22				ASPHALT (7 inches thick)
		G						AGGREGATE BASE COURSE (10 inches thick)
		N		50/6"	5	GM		Silty GRAVEL; with sand, tan, medium dense to very dense, damp
Auger Refusal at 6 Feet on LIMESTONE								

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG




PLATE
A-5

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 3

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (6.25 inches thick)
								AGGREGATE BASE COURSE (11 inches thick)
						SM		Silty SAND; with gravel, tan/yellow, medium dense to very dense, damp to slightly damp
11.4	118	R		12				
		G						
7.9	113	R		50/5"	5			
								Auger Refusal at 8 Feet on LIMESTONE
					10			
					15			

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-6

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 4

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								AGGREGATE BASE COURSE (10 inches thick)
						CL-ML		Sandy Silty CLAY; trace to some gravel, dark brown, stiff to hard, moist to damp
18.3	105	R	[Pattern]	14				
		G	[Pattern]		5			
12.1	113	R	[Pattern]	33				
								color change to tan/pink
		N	[Pattern]	refusal				Auger Refusal at 9 Feet on LIMESTONE
					10			
					15			

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: **SOLIERE AVENUE WATER MAIN**
 PROJECT NO.: 2529JW101

BORING LOG






PLATE
A-7

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 5

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
8.7	119	R		14	5	CL		Sandy Lean CLAY; some gravel, brown/tan, stiff, slightly damp
		G						AGGREGATE BASE COURSE (13 inches thick)
								ASPHALT (5.5 inches thick)
Auger Refusal at 7 Feet on LIMESTONE								

- N- STANDARD PENETRATION TEST
- R- RING SAMPLE
- CA- CALIFORNIA MODIFIED SAMPLER
- G- GRAB SAMPLE
- B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG








PLATE
A-8

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 6

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (6.5 inches thick)
								AGGREGATE BASE COURSE (12 inches thick)
						CL		Sandy Lean CLAY; some gravel, dark brown, firm, damp to moist
		G						
		R		8	5			
10.7	101	R		7	10			
21.1	90	R		5	15			
Boring Stopped at 15 Feet								

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: **SOLIERE AVENUE WATER MAIN**
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-9

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 7

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								AGGREGATE BASE COURSE (12 inches thick)
						CL		Sandy Lean CLAY; some gravel, dark brown, soft to firm, moist
18.5	91	R		4	5			
		G						
21.1	90	R		5	10			
								Boring Stopped at 10 Feet
					15			

- N- STANDARD PENETRATION TEST
- R- RING SAMPLE
- CA- CALIFORNIA MODIFIED SAMPLER
- G- GRAB SAMPLE
- B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: **SOLIERE AVENUE WATER MAIN**
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-10

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 8

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (7 inches thick)
								AGGREGATE BASE COURSE (12 inches thick)
						SC		Clayey SAND; with gravel, brown, loose, damp to moist
15.7	96	R		5	5			
14.8	93	R		3	10			
23.2	86	R		9	15			
Boring Stopped at 15 Feet								

- N- STANDARD PENETRATION TEST
- R- RING SAMPLE
- CA- CALIFORNIA MODIFIED SAMPLER
- G- GRAB SAMPLE
- B- BUCKET SAMPLE

NOTES: Groundwater Not Encountered



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: SOLIERE AVENUE WATER MAIN
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-11

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 9

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
								ASPHALT (8 inches thick)
								AGGREGATE BASE COURSE (11 inches thick)
						SM		Silty SAND; with gravel, yellow/tan, very dense, damp
		G						
		N		refusal	5			Auger Refusal at 5 Feet on LIMESTONE
					10			
					15			

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

N- STANDARD PENETRATION TEST
 R- RING SAMPLE
 CA- CALIFORNIA MODIFIED SAMPLER
 G- GRAB SAMPLE
 B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: **SOLIERE AVENUE WATER MAIN**
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-12

DATE DRILLED: 10-21-19
 LOCATION: See Location Diagram
 ELEVATION: Not Determined

BORING NO. 10

EQUIPMENT TYPE: CME-75
 DRILLING TYPE: 7"HSA
 FIELD ENGINEER: J. Quinlan

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT.	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
11.2	125	R		40	5	SM		ASPHALT (7 inches thick) AGGREGATE BASE COURSE (12 inches thick) Silty SAND; with gravel, yellow/tan, very dense, damp
		G						
								Auger Refusal at 7 Feet on LIMESTONE

- N- STANDARD PENETRATION TEST
- R- RING SAMPLE
- CA- CALIFORNIA MODIFIED SAMPLER
- G- GRAB SAMPLE
- B- BUCKET SAMPLE

NOTES: **Groundwater Not Encountered**



WESTERN TECHNOLOGIES INC.
 2400 Huntington Drive
 Flagstaff, AZ 86004-8934

PROJECT: **SOLIERE AVENUE WATER MAIN**
 PROJECT NO.: 2529JW101

BORING LOG

PLATE
A-13

APPENDIX C

Contractor's Application for Payment

Owner: _____	Owner's Project No.: _____
Engineer: _____	Engineer's Project No.: _____
Contractor: _____	Contractor's Project No.: _____
Project: _____	
Contract: _____	
Application No.: _____	Application Date: _____
Application Period: From _____ to _____	

1. Original Contract Price	\$	-
2. Net change by Change Orders	\$	-
3. Current Contract Price (Line 1 + Line 2)	\$	-
4. Total Work completed and materials stored to date (Sum of Column G Lump Sum Total and Column J Unit Price Total)	\$	-
5. Retainage		
a. _____ X \$ - Work Completed	\$	-
b. _____ X \$ - Stored Materials	\$	-
c. Total Retainage (Line 5.a + Line 5.b)	\$	-
6. Amount eligible to date (Line 4 - Line 5.c)	\$	-
7. Less previous payments (Line 6 from prior application)		
8. Amount due this application	\$	-
9. Balance to finish, including retainage (Line 3 - Line 4)	\$	-

Contractor's Certification

The undersigned Contractor certifies, to the best of its knowledge, the following:

(1) All previous progress payments received from Owner on account of Work done under the Contract have been applied on account to discharge Contractor's legitimate obligations incurred in connection with the Work covered by prior Applications for Payment;

(2) Title to all Work, materials and equipment incorporated in said Work, or otherwise listed in or covered by this Application for Payment, will pass to Owner at time of payment free and clear of all liens, security interests, and encumbrances (except such as are covered by a bond acceptable to Owner indemnifying Owner against any such liens, security interest, or encumbrances); and

(3) All the Work covered by this Application for Payment is in accordance with the Contract Documents and is not defective.

Contractor: _____

Signature: _____ **Date:** _____

Recommended by Engineer	Approved by Owner
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____
Approved by Funding Agency	
By: _____	By: _____
Title: _____	Title: _____
Date: _____	Date: _____

Progress Estimate - Unit Price Work

Contractor's Application for Payment

Owner: _____
 Engineer: _____
 Contractor: _____
 Project: _____
 Contract: _____

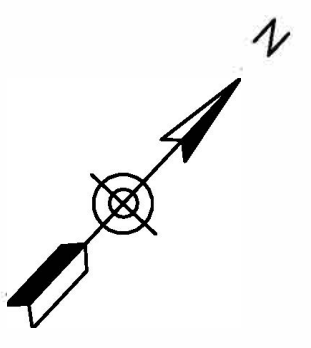
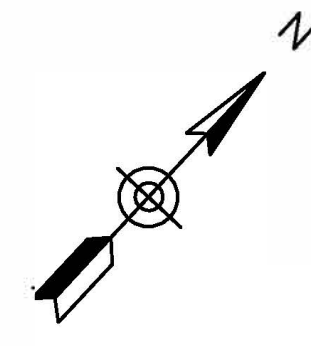
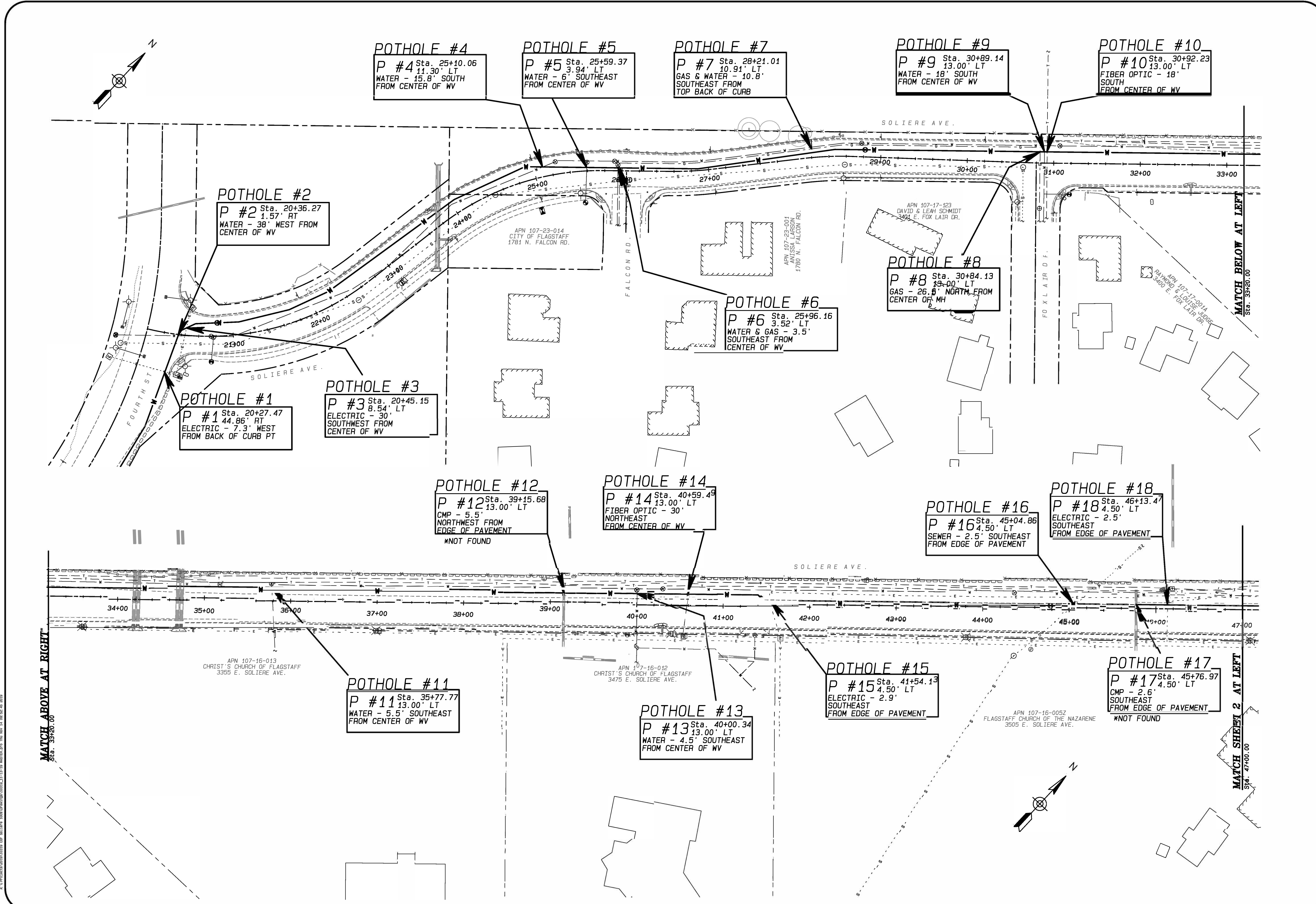
Owner's Project No.: _____
 Engineer's Project No.: _____
 Contractor's Project No.: _____

Application No.: _____ Application Period: From _____ to _____ Application Date: _____

A	B	C	D	E	F	G	H	I	J	K	L
Bid Item No.	Description	Contract Information				Work Completed		Materials Currently Stored (not in G) (\$)	Work Completed and Materials Stored to Date (H + I) (\$)	% of Value of Item (J / F) (%)	Balance to Finish (F - J) (\$)
		Item Quantity	Units	Unit Price (\$)	Value of Bid Item (C X E) (\$)	Estimated Quantity Incorporated in the Work	Value of Work Completed to Date (E X G) (\$)				
Original Contract											
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
					-		-		-		-
Original Contract Totals					\$	-		\$	-	\$	-

APPENDIX D

FOR INFORMATION ONLY, CONTRACTOR TO RELY ON THEIR OWN INVESTIGATION



TURNER ENGINEERING INC.
558 N. ASP ENAVE, FLAGSTAFF, ARIZONA 86001
TEL: 909-779-1814
FAX: 909-779-1814

PROJECT NO.: 10319
SCALE: N/A
DATE: 11/14/2019
DRAWN: DM
CHECKED: DM
VERT: N/A
HORIZ: 1" = 8'

**PRELIMINARY
NOT FOR
CONSTRUCTION**
(896 PLAN)

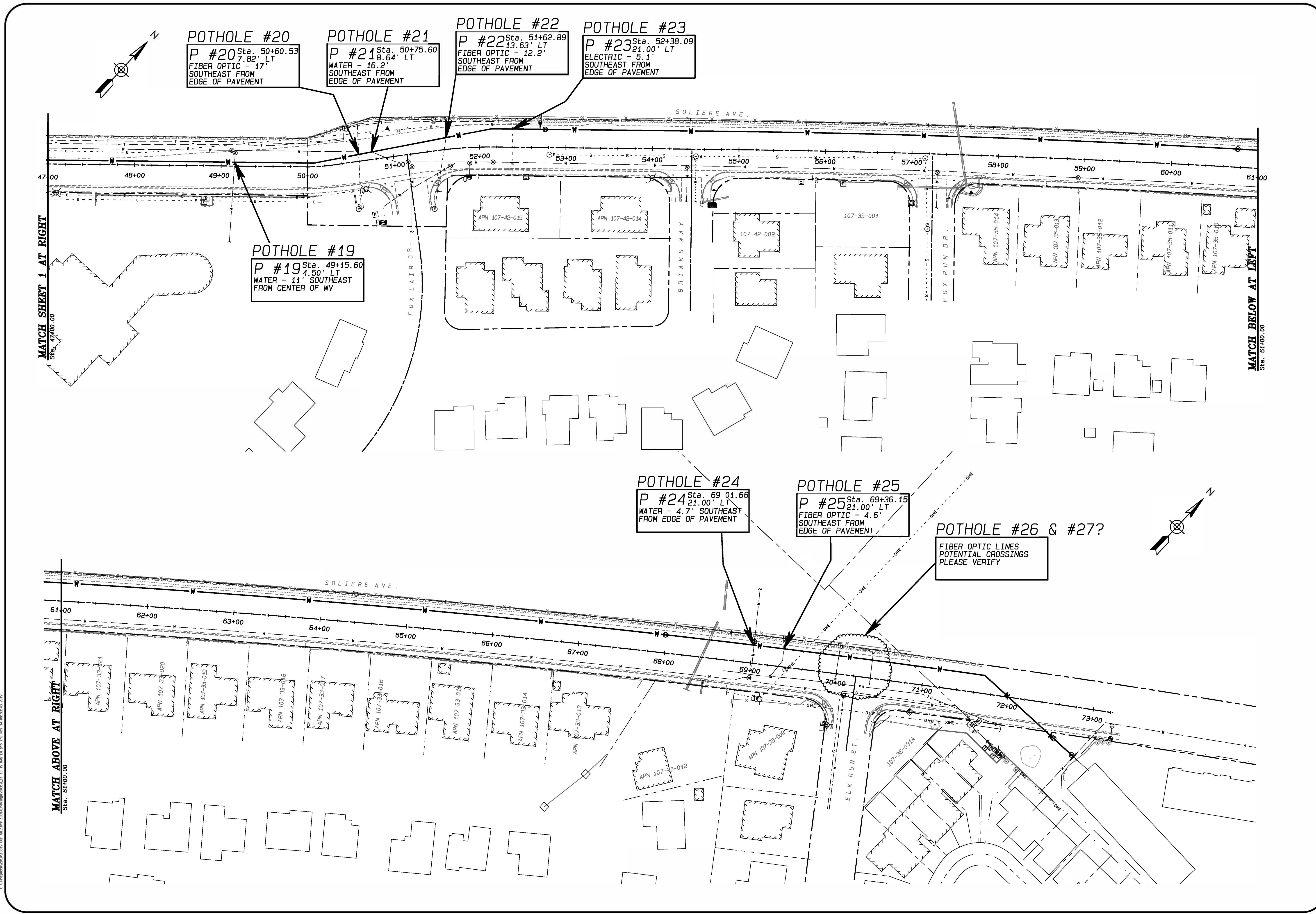
**CITY OF FLAGSTAFF
SOLIERE AVENUE WATER TRANSMISSION MAIN**

PO THOLING OVERVIEW MAP

SHEET:
1 OF **2**

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FOR INFORMATION ONLY, CONTRACTOR TO RELY ON THEIR OWN INVESTIGATION



POTHOLE #20
 P #20 Sta. 50+60.53
 7.82' LT
 FIBER OPTIC - 17'
 SOUTHEAST FROM
 EDGE OF PAVEMENT

POTHOLE #21
 P #21 Sta. 50+75.60
 8.64' LT
 WATER - 16.2'
 SOUTHEAST FROM
 EDGE OF PAVEMENT

POTHOLE #22
 P #22 Sta. 51+62.89
 13.63' LT
 FIBER OPTIC - 12.2'
 SOUTHEAST FROM
 EDGE OF PAVEMENT

POTHOLE #23
 P #23 Sta. 52+38.09
 21.00' LT
 ELECTRIC - 5.1'
 SOUTHEAST FROM
 EDGE OF PAVEMENT

POTHOLE #19
 P #19 Sta. 49+15.60
 4.50' LT
 WATER - 11.1'
 SOUTHEAST
 FROM CENTER OF WV

POTHOLE #24
 P #24 Sta. 69+01.66
 21.00' LT
 WATER - 4.7' SOUTHEAST
 FROM EDGE OF PAVEMENT

POTHOLE #25
 P #25 Sta. 69+36.15
 21.00' LT
 FIBER OPTIC - 4.6'
 SOUTHEAST FROM
 EDGE OF PAVEMENT

POTHOLE #26 & #27?
 FIBER OPTIC LINES
 POTENTIAL CROSSINGS
 PLEASE VERIFY

TURNER ENGINEERING INC. 558 N. ASPEN AVE., FLAGSTAFF, ARIZONA 86001 (928) 779-1814			
TEL PROJ. No.:	10319	SCALE:	
DESIGN: DM	CHECKED:	HORIZ: 1" = 60'	
DRAWN: DM	DATE:	11/14/2019	VERT: N/A

**PRELIMINARY
NOT FOR
CONSTRUCTION
(80% PLAN)**

**CITY OF FLAGSTAFF
SOLIERE AVENUE WATER TRANSMISSION MAIN**

POTHOLING OVERVIEW MAP
 SHEET:
 2 OF 2

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