EL PASO WATER UTILITIES – PUBLIC SERVICE BOARD

ADDENDUM NO. 2

July 19, 2023

PUMPING SYSTEMS FURNISH, INSTALLATION AND MAINTENANCE PHASE 4

BID No. 47-23

RECEIPT OF THIS ADDENDUM MUST BE
ACKNOWLEDGED IN WRITING TO EL PASO WATER UTILITES

EL PASO WATER UTILITES

Mirtha Solis
Senior Purchasing Agent*
El Paso Water Utilities
July 19, 2023

ENGINEER OF RECORD

07/18/2023

Horacio Juarez, P.E.
Senior Project Manager
CDM Smith, Inc. (Firm No. F-3043)
July 18, 2023

*The Purchasing Agent's signature certifies that this Document shall become part of the Contract Documents for the referenced project. Her signature is not a representation that the content of this document is technically correct.

PART A – BIDDING REQUIREMENTS, CONTRACT FORMS AND CONDITIONS OF THE CONTRACT

Section No.	Item No. or Page	Location and Description of Changes
Seals Page	All	**DELETE** the Seals Page in its entirety and **REPLACE** with the attached. Added the Instrumentation and Control Specialist's P.E. Seal.

PART B – TECHNICAL SPECIFICATIONS

VOLUME 1

Section No.	Item No. or Page	Location and Description of Changes
01000	All	**DELETE** Section 01000 TABLE OF CONTENTS in its entirety and **REPLACE** with the attached. Updated list of specifications with this addendum's revisions.
01010	All	**DELETE** Section 01010 SUMMARY OF WORK in its entirety and **REPLACE** with the attached. Formatting corrections.
01010	APPENDIX	**INSERT** APPENDIX A attached to this addendum at the end of Section 01010. Added each well's location information which includes site addresses, coordinates, aerial view, and completion diagram.
01025	01025 – 3	In Section 01025 MEASUREMENT AND PAYMENT, PART 1 – GENERAL, Subsection 1.5 APPLICATIONS FOR PAYMENT, **DELETE** Item F.2. and **REPLACE** with the following: "2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation."
02527	02527 – 3	In Section 02527 CHEMICAL TREATMENT OF WELL, PART 3 – EXECUTION, Subsection 3.2. DISCHARGE OF FLUIDS; **DELETE** Item B. Not applicable to the scope of work included in this Bid.

02528	All	**DELETE** Section 02528 LINER INSTALLATION, in its entirety. Liner installation is not anticipated.
09911	All	**DELETE** Section 09911 Exterior Painting, in its entirety and **INSERT** revised Section 09911 attached to this addendum. Revised exterior painting specifications for applicable construction.
09974	All	**DELETE** Section 09974 Water Treatment Transmission System Coatings, in its entirety and **INSERT** revised Section 09974 attached to this addendum. Revised exterior painting specifications for applicable construction.
11214	11214-2	In Section 11214 VERTICAL TURBINE PUMPS, PART 1 – GENERAL, Subsection 1.3. RELATED WORK, **DELETE** Item B. and **REPLACE** with the following: "B. Painting and Coating requirements are included in Division 09"
11214	11214-8	In Section 11214 VERTICAL TURBINE PUMPS, PART 2 – PRODUCTS, Subsection 2.2. CONDITIONS OF OPERATION; **DELETE** Item C. Not applicable to the scope of work included in this Bid.
11214	11214-12	In Section 11214 VERTICAL TURBINE PUMPS, PART 2 – PRODUCTS, Subsection 2.5. PUMP DRIVE SYSTEM; **DELETE** Item D. and **REPLACE** with the following: "D. The electric motor shall be furnished with a non-reverse ratchet to prevent rotation in the reverse direction due to water receding into the pump column."
13701	All	**INSERT** Division 13 – SPECIAL CONSTRUCTION, Section 13701 MAGNETIC FLOW METERS attached in Addendum No. 2 after Section 11214. Included additional specifications for magnetic flow meters.
16150	All	**DELETE** Section 16150 LOW-VOLTAGE INDUCTION MOTORS TO 500 HP in its entirety and **REPLACE** with the attached. Formatting corrections.

16293	16293-12	In Section 16293 SOFT-START MOTOR CONTROLLERS (Extreme Duty), PART 3 – EXECUTION, Subsection 3.2. INSTALLATION, **DELETE** Item D. Not applicable to the scope of work included in this Bid.
16293	16293 – 16	In Section 16293 SOFT-START MOTOR CONTROLLERS (Extreme Duty), PART 3 – EXECUTION, **INSERT** Title "3.7 WIRING & CONDUIT SIZE TABLE" above the table. Formatting corrections.
16296	16296 – 3	In Section 16296 LOW VOLTAGE PULSE WIDTH MODULATED (PWM) VARIABLE FREQUENCY DRIVES, PART 1 – GENERAL, Subsection 1.8 PROJECT/SITE REQUIREMENTS, **DELETE** Item A. Not applicable to the scope of work included in this Bid.
16296	16296 – 13	In Section 16296 LOW VOLTAGE PULSE WIDTH MODULATED (PWM) VARIABLE FREQUENCY DRIVES, PART 3 – EXECUTION, **INSERT** Subsection 3.6 WIRING & CONDUIT SIZE TABLE as shown in the attachments in Addendum No. 2. Included a wiring and conduit size table for Variable Frequency Drives.

PART C - QUESTIONS AND ANSWERS

1. Question

   Will drawings be issued for this project? I only see the Front Ends and Specifications on the EPW website.

   Answer:

   No drawings in general will be issued for this project. Drawings will only be issued by a professional engineer if all the equipment is modified, removed, and replaced.

2. Question

Bid item 17 and 18 call for the flow meters to be installed that includes electrical and SCADA connection. All of the soft starters and VFDs will also have to be disconnected and connected to SCADA. Will the contractor have to wait for the SCADA section to disconnect and connect the SCADA wires as stated in 01110-7-1.8-B Owner will be responsible for disconnecting and connecting SCADA to each Well Site?

Answer:

The Owner's SCADA staff will be responsible for isolating all I/O from there central control system. Contractor to connect new equipment to SCADA under supervision of EPWater Instrumentation and Control Department.

3. Question

Are any road closures expected to be needed while performing this scope of work due to logistics of well sites and equipment set up?

Answer:

Road closures are not expected while performing this scope of work due to logistics of well sites and equipment set up. If road a closure is expected, a Traffic Control Plan (TCP) must be prepared and submitted by the contractor to the City of El Paso Street and Maintenance Department for review and approval before the road is closed. Any TCP requirements will be covered by a Change Order on an as needed basis.

4. Question

If some sites are on airport property, will we be required to get permits to access and drive on their property, be equipped with beacon lights, have escorts, etc?

Answer:

The El Paso International Airport (Airport) will require security badges to enter their property. EPWater will set up a meeting with the contractor and the airport staff to make arrangements for obtaining security badges. Contractor is responsible for following all airport security protocols as part of this project. EPWater staff will not be escorting Contractor personnel into the Airport property.

5. Question

What is the address for the temporary storage of removed well pump equipment?

Answer:

9841 Carnegie Ave (Existing EPWater Well 46A Site)

6. Question

   There is reference to painting in the specs and sections 09901 & 09910, (page 11214-2, 1.3 B.) but I am not finding these sections within the specifications document. Please provide if they apply to this work scope.

   Answer:

   See attached Sections 09911 and 09974 to this addendum for the revised painting and coating specifications.

7. Question

   How will EPW determine whether there is "biofouling" following a mineral acid well cleaning? Item E on page 02527-3

   Answer:

   Any chemical treatment, if required, will be determined by Owner/Engineer and will be negotiated through Bid Item No. 43 – Allowance for Owner Approved Items.

8. Question

   Will well construction and any reconstruction reports be provided for the wells that are to be serviced?

   Answer:

   Refer to Section 01010 - Appendix A attached in this addendum.

9. Question

   Will pump installation reports be provided for the equipment that is called to be removed from the wells?

   Answer:

   There are no pump installation reports available. Section 00300 - Bid Form on pages 00300-5 through 8 and Table 11214-1 on pages 11214-15 and 16 includes existing pump data based on historical information available. New pump duty points to be finalized as per pumping test of each well per Section 11214-1.2 E.

10. Question

    We will need specific discharge points identified for the test pumping water, pumping to waste water, pumped off and neutralized water following chemical treatment work.

    Answer:

    Any chemical treatment, if required, will be determined by Owner/Engineer, and upon approval, specific discharge paths will be identified.

11. Question

    Is there a volume limitation when pumping these wells onto the ground surface?

    Answer:

    There is no volume limitation however Contractor shall coordinate with Owner/Engineer to prevent flooding and property damage from excessive pumping.

12. Question

    What is meant by the discharge water is to be "blended back" page 02527-3, 3.2.B?

    Answer:

    See PART B – Technical Specifications in Addendum No. 2 for revision.

13. Question

    What is the wall thickness requirement for "bland casing" 02528-2?

    Answer:

    Liner installation is not anticipated and Section 02528 has been deleted. See PART B – Technical Specifications in Addendum No. 2 for revision.

14. Question

    What is the City's noise limit as referenced to in Test Pumping 02673-2?

    Answer:

    Please refer to the City of El Paso Noise Ordinance under Municipal Code Title 9 – Health and Safety, Chapter 9.40:
    https://library.municode.com/tx/el_paso/codes/code_of_ordinances?nodeId=TIT9HESA_CH9.40NO

15. Question

    What is an "FEP bearing" above static water level, 11214-12?

    Answer:

    A specialty bearing used for water lubricated pump installation.

16. Question

    Your motor specs reference both non-reverse ratchet and self release coupling, which do you want?

    Answer:

    All electric motors shall be supplied with a non-reverse ratchet to prevent rotation in the reverse direction due to water receding into the pump column. See PART B – Technical Specifications in Addendum No. 2 for revision.

17. Question

    The pump specs reference plotting the pump curves on the "system curves" with bid submittal. Please provide the system curve information.

    Answer:

    There is no system curve information for an individual Well pump. See PART B – Technical Specifications in Addendum No. 2 for revision.

18. Question

    Certain allowance work can be subcontracted out, is there a list of approved subcontractors that can do this work? Including specific capacity testing, booster stations, wastewater treatment plants, surface water treatment plants and lift stations. Should evidence of subcontractor qualifications for this work be included with the bid? If not, how will these requirements be evaluated as to competence and price?

    Answer:

    There is no list of approved subcontractors. All Bidders to demonstrate successful completion of at least three projects within the past five years either themselves or through a qualified Subcontractor(s) per item 4. (include Subcontractor name(s) and qualifications if satisfying this requirement by employing services of a qualified Subcontractor) under minimum project specific criteria shown under Section 00100 – Instructions to Bidders, page 00100-4. Owner/Engineer may require the successful Bidder to use a specific Subcontractor for certain specialized work only under Bid Item No. 43 – Allowance for Owner Approved Items.

19. Question

    Will the allowance order(s) work performed by subcontractors be subject to the 5% retainage?

    Answer:

    Yes, all work completed under this Contract will be subject to a 5% retainage amount for each progress payment per ARTICLE 5. PAYMENT PROCEDURES under Section 00500 - STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR ON THE BASIS OF A STIPULATED PRICE.

20. Question

    What will be the maximum # of wells allowed to be placed out of service at one time? How many per well field?

    Answer:

    Owner/Engineer to determine the allowed maximum number of wells to be placed out of service based on seasonal drought conditions.

21. Question

    For bid items #17 and 18 – Should the mag meters be provided with Zero Run capability? No exceptions?

    Answer:

    Magnetic flow meters are required to have a zero run capability due to limited space available at existing well sites. See PART B – Technical Specifications in Addendum No. 2 for Section 13701 Magnetic Flow Meter Specifications.

22. Question

    For bid items # 17 and 18 – Should the mag meters be provided with 4-20 ma or ethernet communication?

    Answer:

    Magnetic flow meters shall be provided with ethernet communication.

23. Question

    For bid items #17 and 18 – Do these items include incidentals for installation of mag meters including conduit, wiring, and integration to the existing SCADA system?

    Answer:

    Refer to the Section 01025 - Measurement and Payment for Bid Item Nos. 17 and 18. Furnishing and installation of magnetic flow meters as part of this Bid shall include conduit, wiring and any other incidentals required for integration to the existing SCADA system.

24. Question

    For Bid Items #4 and 8 – will the power for camera equipment be able to be taken from owner site or will contractor need to supply own generator power?

    Answer:

    Contractor shall be required to supply its own portable generator to power all Borehole Camera System equipment for conducting a well video survey.

25. Question

    Will ONLY ABB Soft Starter(s) be REQUIRED to be Extreme Duty? Will the other manufactures be required to also supply a Extreme Duty Soft Starter? Should include bypass, pilot lights, NEMA 4 enclosure? – no exceptions?

    Answer:

    All Soft Starters shall meet the requirements of SECTION 16293X - SOFT-START MOTOR CONTROLLERS (Extreme Duty).

26. Question

    Will Soft Starter(s) be REQUIRED to be Extreme Duty? Should it include bypass, pilot lights, NEMA 4 enclosure? – No exceptions?

    Answer:

    All Soft Starters shall meet the requirements of SECTION 16293X - SOFT-START MOTOR CONTROLLERS (Extreme Duty).

27. Question

    Will VFD(s) be REQUIRED to be ULH for generator back up sites? – no exceptions?

    Answer:

    Refer to Part 1, Subsection 1.8 PROJECT/SITE REQUIREMENTS under Section 16296 - Low Voltage Pulse Width Modulated (PWM) Variable Frequency Drives for requirements for new VFDs for Well sites with and without an onsite generator.

28. Question

    For bid item #16 – Will Vesconite bearings be acceptable for all spiders above water?

    Answer:

    Vesconite bearings will not be acceptable for spiders above water for a water lubricated well pump.

29. Question

    Is there a list of preferred brands of pumps for wells, boosters, and lift applications, waste water treatment plants and surface water treatment plants? If any brand that meets the spec is acceptable, what quality standards would the city like us to meet in qualifying any new vendor?

    Answer:

    There is no list of preferred brands for the pumps. However all well pumps provided under this Contract must meet the Specifications. There are no pump specifications for booster stations, lift stations, water and wastewater treatment plants and surface water treatment plants. Each pump to be procured under Bid Item No. 43 – Allowance for Owner Approved Items, shall be reviewed by Engineer to meet Owner's requirements for that application.

30. Question

    There is a generator at a site that contains 202 & 301, Does the generator feed both wells?

    Answer:

    The onsite generator provides power to both Wells 202 & 301 which are located within the same site.

31. Question

    Will the mag meters be furnished for the 12 wells, or will the wells be picked randomly by the owner? And if picked randomly, how can we know the exact cable length, piping modifications, etc.?

    Answer:

    The wells selected for the installation of the magnetic flow meters will be decided by the Owner/Engineer and will provide the Contractor the sizing modifications upon selection.

32. Question

Will a bid bond that states "5% of final bid price" be acceptable?

Answer:

All prospective Bidders shall bid meeting the bidding requirements as specified in the front end documents.

33. Question

Historically, the owner has not integrated the temperature and vibration sensors on any motors. Should the motors include temperature and vibration sensors?

Answer:

The motors provided shall not include temperature and vibration sensors.

34. Question

Section 16296 alludes to a "control scheme" but has no drawings of what that would specifically be. Can a drawing of that control drawing be issued?

Answer:

No control scheme drawings will be issued.

35. Question

Section 16296 requires the VFD manufacturer to do seismic calculations on the "fasteners" to be used for installation of the VFD. This is extremely expensive to do, and the drive manufacturer cannot control what an electrician will use to install the drive. How should bidders deal with this to maintain a competitive bid?

Answer:

Use manufacturers recommendations on the fasteners for seismic loading and Contractor must submit documentation during construction for Owner/Engineer approval of products.

36. Question

Section 16296 specifies the use of an input line reactor. It also requires the drive comply with IEE519. Is the use of an input line reactor considered compliance with IEE-519?

Answer:

See PART B – Technical Specifications in Addendum No. 2 for revision. This specification will not be used.

37. Question

Will Coating or painting be required for the site piping or other items? On all items or just new? Is there a painting schedule per site?

Answer:

See attached Sections 09911 and 09974 to this addendum for the revised painting and coating specifications.

END OF ADDENDUM NO 2

EL PASO WATER UTILITIES-PUBLIC SERVICE BOARD

BID NUMBER 47-23

PUMPING SYSTEMS, FURNISH, INSTALLATION AND MAINTENANCE PHASE 4

JULY 2023

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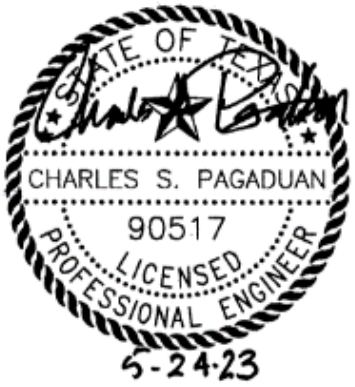

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EL PASO WATER UTILITIES
PUBLIC SERVICE BOARD

PUMPING SYSTEMS FURNISH, INSTALLATION AND MAINTENANCE PHASE 4

Bid Number 47-23

CITY OF EL PASO, TEXAS

TABLE OF CONTENTS

BIDDING REQUIREMENTS, CONTRACT FORMS,
AND CONDITIONS OF CONTRACT

TECHNICAL SPECIFICATIONS

END OF TABLE OF CONTENTS

SECTION 01010 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work performed by Owner.
5. Multiple Work Packages.
6. Work under Owner’s separate contracts.
7. Future work not part of this Project.
8. Contractor’s use of site and premises.
9. Coordination with occupants.
10. Work restrictions.
11. Specification and Drawing conventions.
12. Miscellaneous provisions.

B. Related Requirements:

1. Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 01730 “Execution” for coordination of Owner-installed products.

1.3 PROJECT INFORMATION

A. Project Identification: Pumping Systems Furnish, Installation and Maintenance Phase IV.

1. Project Location:

a. Well No. 16-C, Airport Well Field (El Paso, TX).
b. Well No. 21-B, Northeast Well Field (El Paso, TX).
c. Well No. 24-A, Northeast Well Field (El Paso, TX).
d. Well No. 207, Canutillo Well Field (El Paso, TX).
e. Well No. 301, Canutillo Well Field (El Paso, TX).
f. Well No. 404-B, Lower Valley Well Field (El Paso, TX).
g. Well No. 408-B, Lower Valley Well Field (El Paso, TX).
h. Well No. 510-A, Airport Well Field (El Paso, TX).
i. Well No. 525, Airport Well Field (El Paso, TX).

j. Well No. 601, KBH Well Field (El Paso, TX).
k. Well No. 606, KBH Well Field (El Paso, TX).
l. Well No. 614, KBH Well Field (El Paso, TX).

B. Owner: El Paso Water Utilities-Public Service Board, 1154 Hawkins Boulevard, El Paso, Texas 79925.

1. Owner's Representative:
Scott Reinert, P.E., P.G.
Water Resources Manager
1154 Hawkins Boulevard, El Paso, Texas 79925
Office: (915) 594-5579.

C. Engineer:

1. Engineer's Representative:

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D. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.

1. See Section 01310 "Project Management and Coordination." for requirements for using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. The work for this project includes rehabilitation activities for twelve (12) existing El Paso Water Wells. Furnish and install 12 well pumps, motors, soft starter/VFD motor controllers and associated equipment into the rehabilitated wells. This contract includes an allowance for expedited urgent well repairs. The allowance work under this project

may also include furnishing and installation of pumps, motors, and appurtenances for existing booster stations, wastewater lift stations, stormwater pump stations, water and wastewater treatment plants. This Bid will result in three (3) term agreements, with three (3) separate Phases of work; Phases 4, 5, and 6, with 12 wells to be assigned and worked within each Phase. Each Phase will be initiated via a Work Order, and each Phase of Work is dependent upon EPWater funds availability.

2. The Allowance portion of the Bid work shall not affect the schedule and milestones for the Well Maintenance and Pump Installation portion of the Contract. The schedule and milestones for the Allowance bid work will stand on its own. The schedule for the additional work under the Allowance bid item shall be submitted by the Contractor with his cost estimate for the additional work requested. The Schedule for the allowance portion shall be submitted by the Contractor and approved by the Owner/Engineer. Costs estimate and/or schedule can be rejected if it is not agreed by the Owner/Engineer.

B. Allowed Markups for Miscellaneous Owner Approved Allowance Items.

1. In case of a discrepancy between allowable markups mentioned above and GC11.07 “Change of Contract Price”, the maximum markups allowed in General Conditions (GC11.07) shall govern.

C. Price Escalation and De-Escalation:

1. PRICE ESCALATION: Price escalation shall not change contract ceiling. A Price Escalation may be considered under the following conditions:

   a. Prices must be firm for Work Order 1 period from award of the Contract.
   b. A request for a price increase must be accompanied by a Certified Letter from the contractor's supplier or other forms of evidence as deemed necessary by El Paso Water which includes the price increase to the contract. The price increase shall be effective within 14 calendar days from El Paso Water acceptance.
   c. El Paso Water reserves the right to cancel the contract resulting from this Bid Proposal and rebidding our requirements if the price escalation requested is above the current open market price. Cancellation of the contract will not affect any outstanding orders.
   d. All price increases accepted shall be effective for a Work Order period from the revised date of the Contract.

2. PRICE DE-ESCALATION: If the Contractor receives a price decrease from the supplier, the Contractor is responsible to notify El Paso Water within two working days of the price decrease and pass the price decrease on to the Utility. The price decrease will be effective upon receipt of the price reduction from the Contractor.

D. Type of Contract:

1. Project will be constructed under a single prime contract.

1.5 MECHANICAL & SUBSTANTIAL COMPLETION

A. Mechanical Completion of a well is defined where the Well has been rehabilitated, all pump bowl/motor/discharge head/starter and appurtenances have been furnished and installed and disinfected to place the well in service in manual mode by the owner to produce water at the estimated flow rate of the installed Well equipment.

B. Substantial Completion of the project is defined in EJCDC C-700 Article 14 – PAYMENTS TO CONTRACTOR AND COMPLETION, Part 14.04 *Substantial Completion*. In accordance with EJCDC C-700, the Engineer will conduct inspections/walkthroughs at the completion of each milestone included in the Contract.

1.6 DEFINITION OF MILESTONES

A. The interim milestones for this Contract are defined below. The construction schedule shall include these milestones along with the Notice to Proceed, Substantial Completion, and Final Completion.

1. Milestone No. 1 – Mechanical Completion for Four (4) Wells.

    a. Milestone No. 1 shall be two hundred and sixteen (216) calendar days from the NTP date. The Contractor shall furnish, install, start-up and testing of the new well pump equipment for a total of four (4) Owner selected wells from Bid Items 16 through 39. The furnishing & installation of the well pump equipment will be based on the results of the Owner approved well rehabilitation/maintenance activities for that well. The Contractor shall provide submittals for procurement of new well pump equipment as soon as the rehabilitation activity for that well is completed. To meet milestone no. 1, a total of four (4) Wells shall be tested, disinfected and mechanically completed to produce raw water. The wells shall be rehabilitated and accepted by the Owner before any well pump equipment is installed.

    b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 216-calendar day period, until work associated with furnishing, installing, start-up and testing of the new well pump equipment for a total of four (4) Owner selected wells from Bid Items 16 through 39 are complete and accepted by the Owner and/or Owner's representative.

2. Milestone No. 2 – Substantial Completion for Four (4) Wells.

    a. Milestone No. 2 shall be thirty (30) calendar days from the completion date of Milestone No. 1. Under Milestone No. 2, four (4) selected wells from Milestone No. 1 shall be complete in all respects including installation, startup and operation of all pump equipment, final grading, housekeeping and any other Contract requirements.

    b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 246-calendar day period, until work associated with furnishing, installing, start-up, testing and operation of the all new well pump equipment, final grading,

housekeeping and any other Contract requirements for a total of four (4) Owner selected wells from Bid Items 16 through 39 are complete and accepted by the Owner and/or Owner's representative.

3. Milestone No. 3 – Mechanical Completion for Eight (8) Wells

    a. Milestone No. 3 shall be three hundred and six (306) calendar days from the NTP date. The Contractor shall furnish, install, start-up and testing of the new well pump equipment for a total of eight (8) Owner selected wells from Bid Items 16 through 39. The furnishing & installation of the well pump equipment will be based on the results of the Owner approved well rehabilitation/maintenance activities for that well. The Contractor shall provide submittals for procurement of new well pump equipment as soon as the rehabilitation activity for that well is completed. To meet milestone no. 3, a total of eight (8) wells shall be tested, disinfected and mechanically completed to produce raw water.
    b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 306-calendar day period, until work associated with furnishing, installing, start-up and testing of the new well pump equipment for a total of eight (8) Owner selected wells from Bid Items 16 through 39 are complete and accepted by the Owner and/or Owner's representative.

4. Milestone No. 4 – Substantial Completion for Eight (8) Wells.

    a. Milestone No. 4 shall be thirty (30) calendar days from the completion date of Milestone No. 3. Under Milestone No. 4, eight (8) selected wells from Milestone No. 1 and 3 shall be complete in all respects including installation, startup and operation of all pump equipment, final grading, housekeeping and any other Contract requirements.
    b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 336-calendar day period, until work associated with furnishing, installing, start-up, testing and operation of the all new well pump equipment, final grading, housekeeping and any other Contract requirements for a total of four (4) Owner selected wells from Bid Items 16 through 39 are complete and accepted by the Owner and/or Owner's representative.

5. Milestone No. 5 – Mechanical Completion for Twelve (12) Wells.

    a. Milestone No. 5 shall be three hundred and ninety-six (396) calendar days from the NTP date. The Contractor shall furnish, install, start-up and testing of the new well pump equipment for a total of Twelve (12) Owner selected wells from Bid Items 16 through 39. The furnishing & installation of the well pump equipment will be based on the results of the Owner approved well rehabilitation/maintenance activities for that well. The Contractor shall provide submittals for procurement of new well pump equipment as soon as the rehabilitation activity for that well is completed. To meet milestone no. 5, a total of Twelve (12) wells shall be tested, disinfected and mechanically completed to produce raw water.
    b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 396-calendar day period, until work associated with furnishing, installing,

start-up and testing of the new well pump equipment for a total of Twelve (12) Owner selected wells from Bid Items 16 through 39 are complete and accepted by the Owner and/or Owner's representative.

6. Milestone No. 6 – Substantial Completion.

   a. Within four hundred and twenty-six (426) calendar days of receiving the Notice to Proceed, the Work is to be substantially completed as defined in General Conditions.
   b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 426-calendar day period, until work associated with furnishing, installing, start-up, testing and operation under all Bid Items including all allowance work is complete and accepted by the Owner and/or Owner's representative.

7. Final Completion.

   a. Within four hundred and fifty-six (456) calendar days of receiving the Notice to Proceed, the Contractor shall complete the project.
   b. Due to scheduling requirements of this project, liquidated damages shall be assessed against the Contractor awarded for this project for every calendar day after the 456-calendar day period, until the Contractor submits closing documents and is accepted by the Owner and/or Owner's representative. Closing documents that do not meet the requirements of the Contract Documents and not accepted by the Owner will not be used to meet this Milestone.

1.7 NOTIFICATIONS

A. The Contractor shall give notice to the Owner's Representative via email for the specific operations as follows:

1. Forty-eight (48) hours advance notice of intent to start any pump pulling operations.
2. Forty-eight (48) hours advance notice of intent to disconnect electrical service.
3. Twenty-four (24) hours advance notice of intent to conduct down-hole well video.
4. Twenty-four (24) hours' notice of intent to conduct brushing of well.
5. Twenty-four (24) hours advance notice of intent to conduct specific capacity test.
6. Forty-eight (48) hours advance notice of intent to start installation of new well equipping.
7. Forty-eight (48) hours advance notice of intent to reconnect electrical service.
8. Twenty-four (24) hours advance notice of intent to "bump" motor to verify direction of rotation.
9. Seventy-two (72) hours advance notice of intent to chlorinate well.
10. Twenty-four (24) hours advance notice of intent to run well to obtain a bacteriological sample.
11. If operations are suspended by the Contractor for any reason, notice shall be given immediately via email or phone call at that time stating the reason for the suspension; notice shall be given when work is resumed.
12. Notify within (48) hours of completion of rehabilitation/maintenance activities for a Well.
13. Notify within (48) hours for the completion of the Well.

1.8 WORK PERFORMED BY OWNER

A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

B. Owner will be responsible for disconnecting and connecting SCADA to each Well Site.

C. The contractor will not be responsible for delays caused by EPWater SCADA staff.

D. Owner shall video tape each well site prior to contractor entering the site.

1.9 CONTRACTOR'S USE OF SITE AND PREMISES

A. Unrestricted Use of Site: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1. Limits on Use of Site: Confine construction operations to the Well boundary, in coordination with the Owner.
2. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
    a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

D. Well Site Security: Well site must be secured and locked at the end of each working day. If contractor fails to lock and secure site each day and vandalism or equipment is stolen at site, Contractor will replace all vandalized or stolen equipment and will have to replace vandalize and stolen equipment with new equipment at the contractor's expense.

1.10 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy site and existing building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.11 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.

1. Weekend Hours: To be authorized by Engineer.
2. Early Morning Hours: To be authorized by Engineer.
3. Hours for Utility Shutdowns: To be authorized by Engineer.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:

1. Notify Engineer and Owner not less than 48 hours in advance of proposed utility interruptions.
2. Obtain Engineer's written permission before proceeding with utility interruptions.

D. Smoking and Controlled Substance Restrictions: Use of tobacco products and other controlled substances on Project site is not permitted.

E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

1.13 MISCELLANEOUS PROVISIONS

A. Contractor to assume full responsibility for security of all his/her and his/her subcontractors' materials and equipment stored on the site.

B. If directed by the Engineer, move any stored items which interfere with operations of Owner or other contractors.

C. Use of Owner property as a lay down yard is allowed at location designated by the Owner. Obtain and pay for use of additional storage or work areas if needed to perform the Work.

D. The Contractor to make its own provisions for water and power supply for all construction and testing needs. Coordinate with EPWater for the use of an EPWater meter for construction water and with El Paso Electric Company for power.

E. The Contractor shall provide a portable toilet for use by all employees at the project site. Location of the toilet shall be approved by Owner. The location of portable toilet shall be in compliance with TCEQ and/or shall be no closer than 100 feet from the Well. Contractor must provide a well-equipped mobile cleaning station at all times as contractor moves from well site to well site. No expectations will be allowed. Keep the site free of trash and construction materials at all times. Place oil mats or oil absorption material to prevent contaminating the site when pulling or installing well equipment. No exceptions will be allowed.

1.14 PROJECT MANAGEMENT SOFTWARE

A. The project will utilize Procore's online project management software for construction submittal reviews, request for information (RFIs), etc.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01010

SECTION 01010

APPENDIX A

EPWU WELL 16C

Address:	6600 Fred Wilson
Date Drilled:	2012
Wellfield:	Airport
Source:	Hueco
Latitude:	31°49'33" N
Longitude:	106°23'46" W
UTM North:	
UTM East:	
Elevation:	
Total Depth:	834
Blank-1:	16
Blank-2:	
Screen-1:	16
Screen-2:	
Screen Intervals:	Blank Casing from +1.5 to 600.75;800 to 200. SS Screen from 600 to 800
Remarks:	Gravel pack collapsed on 16B. Redrilled as 16C
TWDB State Number:	49-13-6##
Remarks:	on line February 2014
019 Production Ranking:	73 of 145 active wells
Remarks:	TCEQ Letter of Approval for Use, 4/27/2017

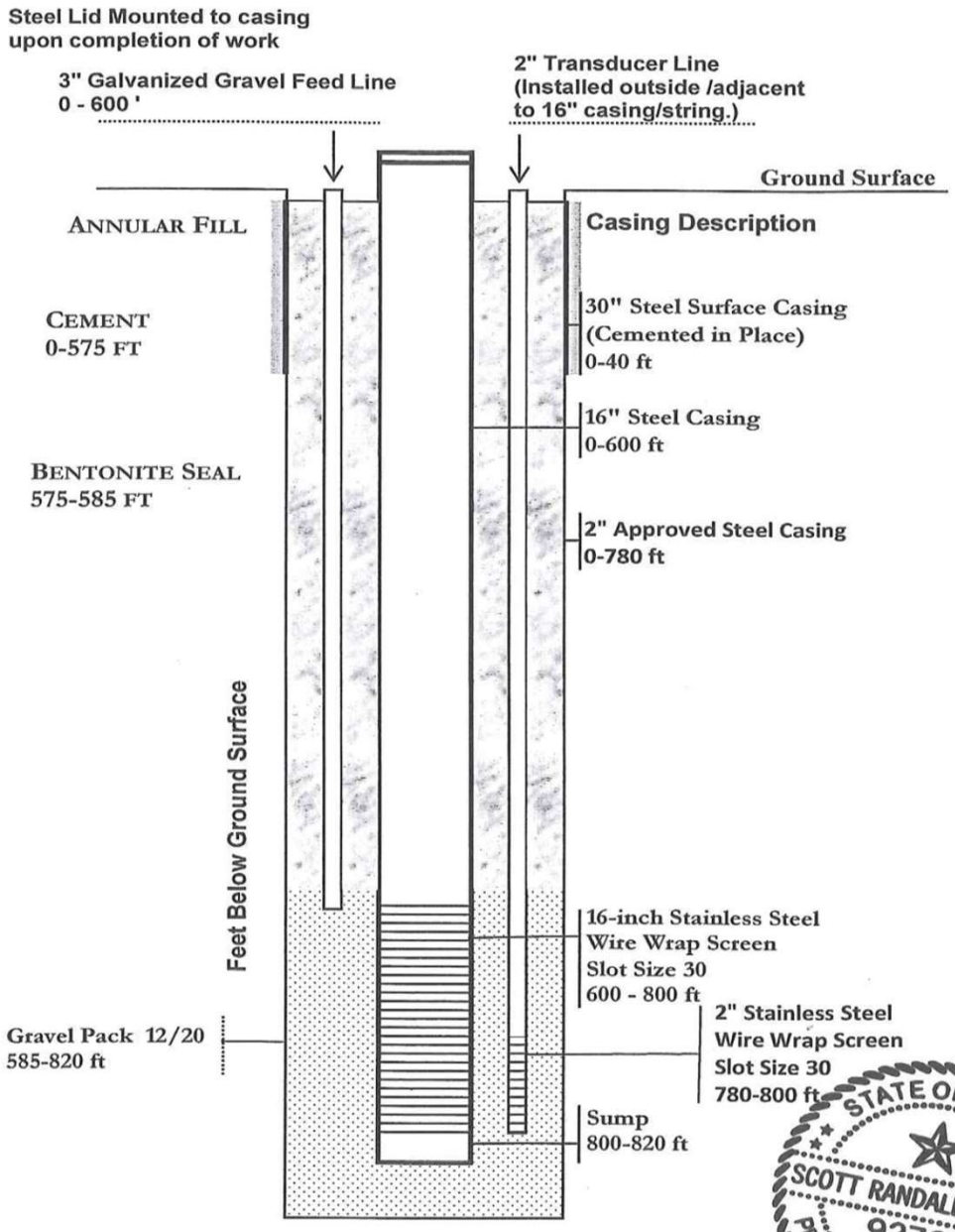
EPWU WELL 16C

Figure 1. Map showing location of El Paso Water Utilities Well No. 16c.

JOHN SHOMAKER & ASSOCIATES, INC.

EPWU WELL 16C

Well Completion Diagram
EPWU WELL NO. 16B



EPWU WELL 16C

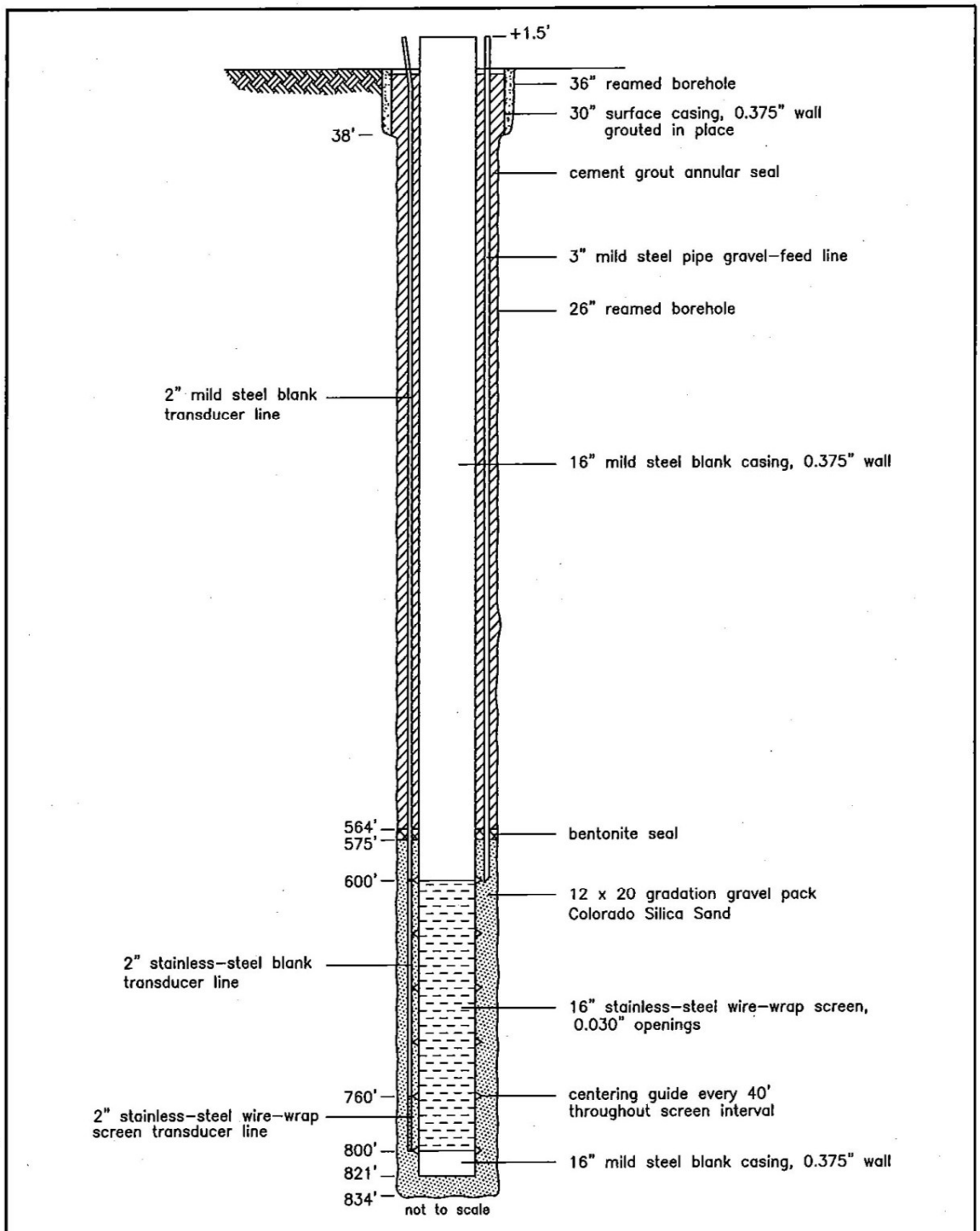


Figure 2. Well completion diagram of El Paso Water Utilities Well No. 16c.

JOHN SHOMAKER & ASSOCIATES, INC.

02/07/2012

Table 4. Summary of lithology of El Paso Water Utilities 16b

depth (ft bgl)	description of cuttings
0-40	36-inch auger-no samples collected
40-90	sandy clay; clay, tan, soft to medium; sand, fine, rounded, variety of colors and lithologies but mostly quartz, 20 to 30%
90-110	gravelly sand; sand, fine to coarse, sub-rounded, variety of colors and lithologies; gravel, chips to 20 mm, sub-rounded to sub-angular, variety of colors and lithologies, 10 to 30%
110-210	clay; tan, soft, silt, 5 to 20%
210-220	gravelly clay; clay, soft, brown and white, caliche, reacts to HCl; gravel, caliche, claystone, siltstone, angular chips to 10 mm, 25%
220-260	clay; tan, medium, silty
260-290	gravelly sand; sand, fine to coarse, sub-rounded to sub-angular, variety of colors and lithologies; gravel, chips to 15 mm, sub-angular, variety of colors and lithologies, 20 to 30%
290-310	clay; tan, medium, silty
310-340	silt; brown, sand as above, 20 to 40%
340-450	silty clay; clay, tan, soft; silt, brown, 5 to 30%
450-480	gravelly clay; clay, tan, medium; gravel, sandstone, angular chips to 20 mm, 5 to 10%
480-500	clay; tan, dense, silty
500-600	clay; tan, soft to dense, silty
600-630	clay; tan, with some sandstone and gravel chips to 8 mm, < 20%
630-830	clay; tan, soft to dense, silty, 0 to 15%

ft bgl - feet below ground level

Month	Day	Year		Date	LS Elevation	Static Elevation	Static Level
1	6	2012	2012.02	6-Jan-2012	3914	3532.80	381.20
7	24	2012	2012.56	24-Jul-2012	3914	3554.27	359.73
6	21	2013	2013.47	21-Jun-2013	3914	3520.87	393.13
6	10	2014	2014.44	10-Jun-2014	3914	3521.64	392.36
4	21	2017	2017.30	21-Mar-2017	3914	3523.8	390.2
4	23	2020	2020.31	23-Apr-2020	3914	3520.7	393.3

EPWater WELL 21B

Address:	5001 Hercules
Date Drilled:	2012
Wellfield:	Mesa Nevins
Source:	Hueco
Latitude:	31°51'20" N
Longitude:	106°25'22" W
UTM North:	
UTM East:	
Elevation:	
Total Depth:	1170
Blank-1:	16
Blank-2:	
Screen-1:	16
Screen-2:	
Screen Intervals:	Blank Screen from +1.5 to 565;605-710;850-980;1080-1115; &1135-1155. SS Screen from 565-605;710-850;980-1080; & 1115-1135
Remarks:	On line, March 2013
Video Survey Report:	Yes
TWDB State Number:	49-13-2##
019 Production Ranking:	57 of 145 active wells
Remarks:	TCEQ Letter of Approval for Use, 4/27/2017

EPWater WELL 21B

EPWater WELL 21B

EPWater WELL 21B

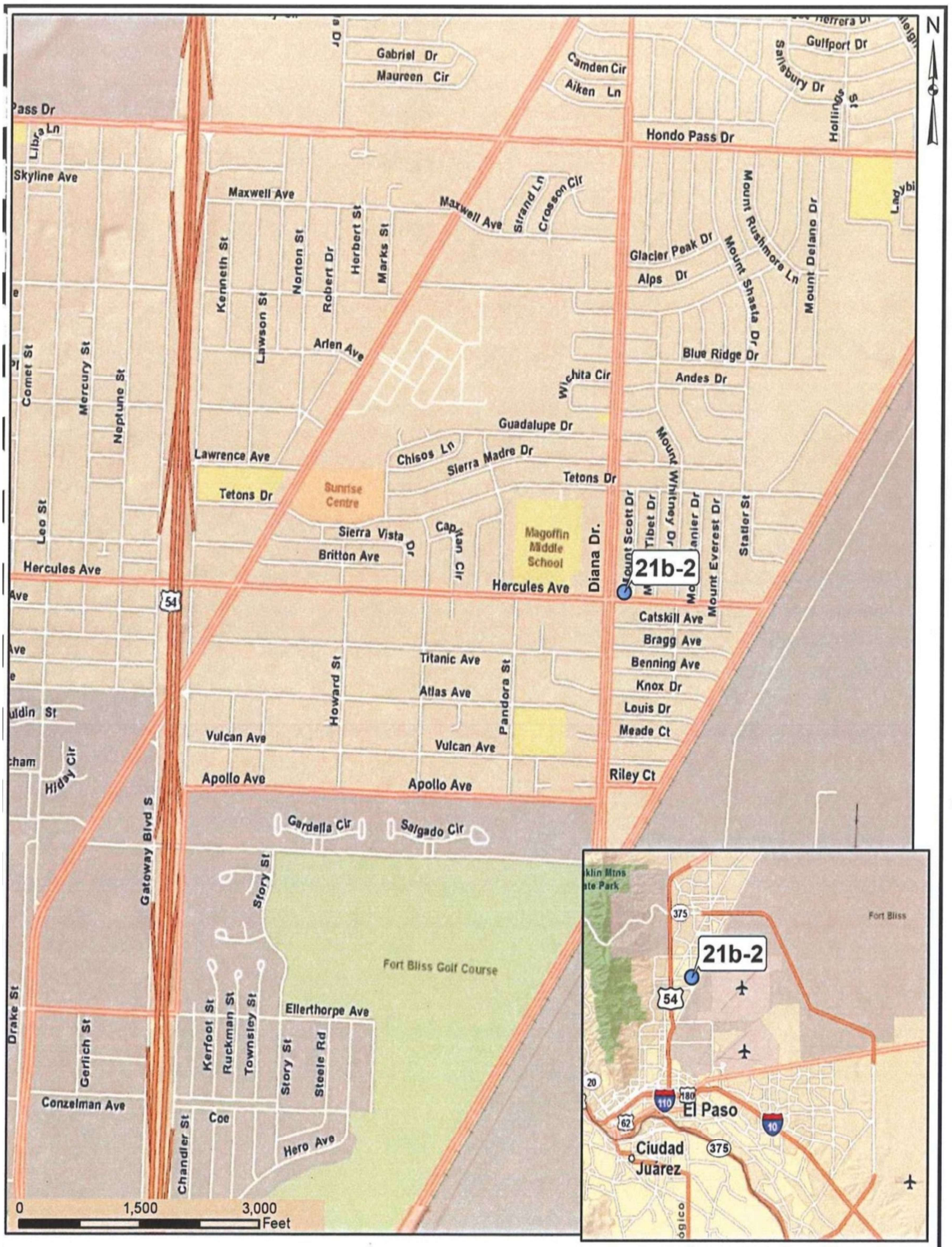
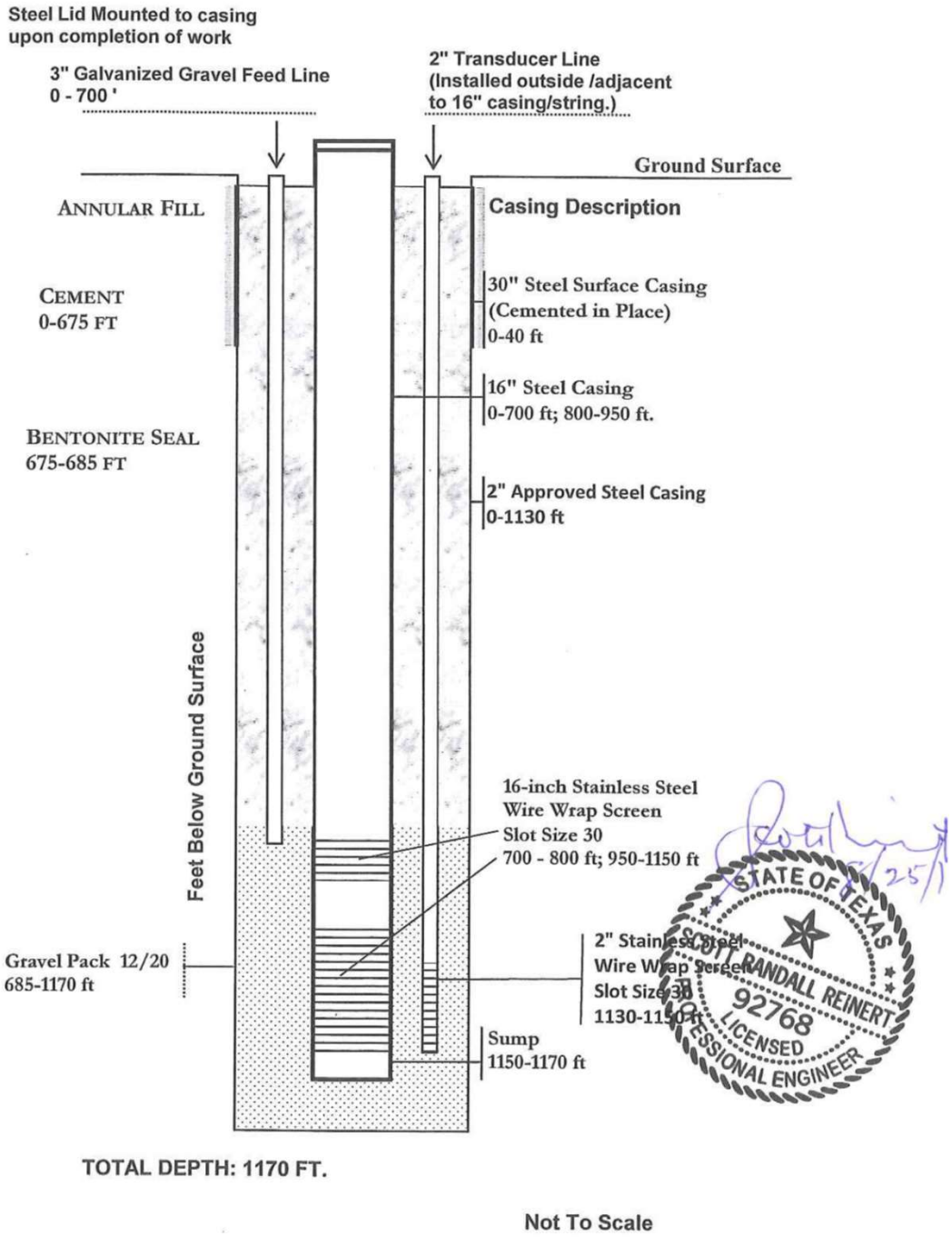


Figure 1. Map showing location of El Paso Water Utilities Well No. 21b-2.

JOHN SHOMAKER & ASSOCIATES, INC.

EPWater WELL 21B

Well Completion Diagram
EPWU WELL NO. 21B



TOTAL DEPTH: 1170 FT.

Not To Scale

EPWater WELL 21B

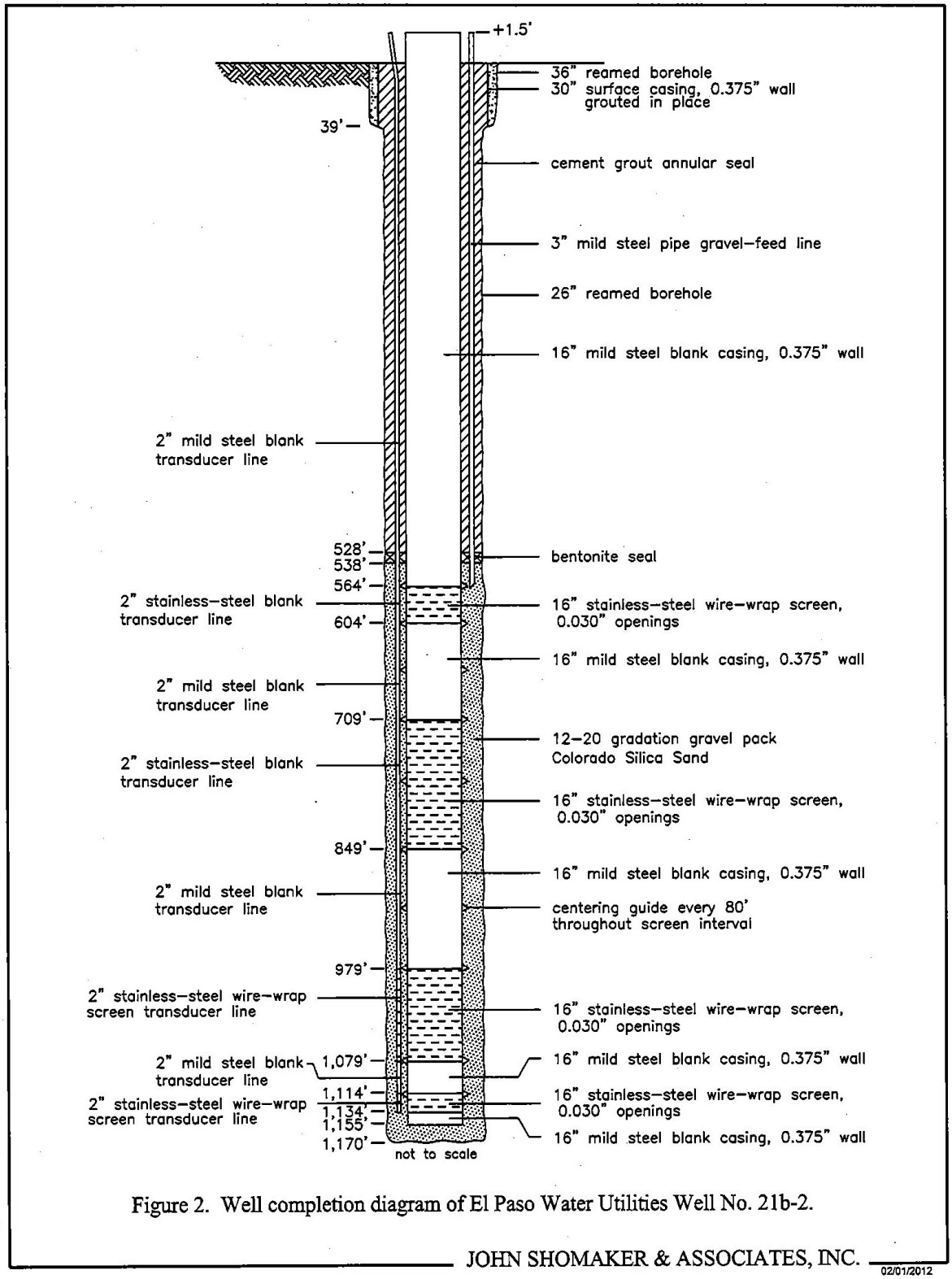


Figure 2. Well completion diagram of El Paso Water Utilities Well No. 21b-2.

JOHN SHOMAKER & ASSOCIATES, INC.

02/01/2012

Table 5. Summary of lithology of El Paso Water Utilities 21b

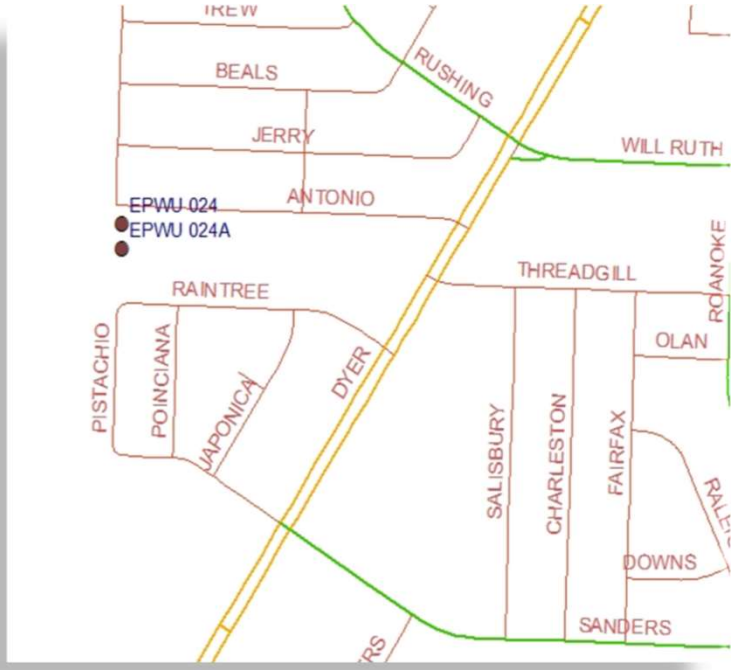
depth (ft bgl)	description of cuttings
0-40	no samples collected
40-50	gravelly sand, chips to 30 mm, variety of lithology and color
50-110	clay, tan
110-170	sand, fine to coarse, variety of lithology and color (mostly arkosic), with clay from 0 to 15%
170-230	clay, tan
230-260	sand, with gravel and/or clay to 15%
260-350	clay, tan, with varying amounts of silt from 0 to 25%
350-370	sandy silt, silt, tan, sand, fine to medium, rounded, 25%
370-430	clay, tan, with varying amounts of silt from 10 to 30%
430-440	silty clay, silt, tan, clay 10%
440-720	clay, tan, with varying amounts of silt from 0 to 40%
720-740	sandy silt, silt, tan, sand, fine, rounded, 30%
740-990	clay, tan, with varying amounts of silt from 10 to 20%
990-1,000	sandy clay, clay, brown, dense, silt and fine sand, 40%
1,000-1,170	clay, tan, with varying amounts of silt from 0 to 40%

ft bgl - feet below ground level

Month	Day	Year		Date	LS Elevation	Static Elevation	Static Level
10	27	2011	2011.81	27-Oct-11	3880	3699.00	322.27
7	25	2012	2012.56	25-Jul-12	3880	3692.21	329.06
7	3	2013	2013.50	3-Jul-13	3880	3690.56	330.71
7	17	2015	2015.54	17-Jul-15	3880	3535.56	344.44
5	16	2016	2016.37	16-May-16	3880	3560.29	319.71
7	10	2018	2018.52	10-Jul-18	3880	3551.38	328.62
4	16	2020	2020.29	16-Apr-20	3880	3556.97	323.03

EPWater Well Number: 24A

Address:	5100 Antonio Ave.
Date Drilled:	2004
Wellfield:	Mesa Nevins
Aquifer:	Hueco Bolson
Latitude:	31 88 47
Longitude:	106 42 29
UTM North:	
UTM East:	
Elevation:	3925
Total Depth:	870
Blank-1:	16
Blank-2:	N/A
Screen-1:	16
Screen-2:	
Screen Interval:	From 650 - 850
Remarks:	
Remarks:	
TWDB State Number:	JL-49-05-811
019 Production Ranking:	15th of 145 active wells



EPWater Well Number: 24A

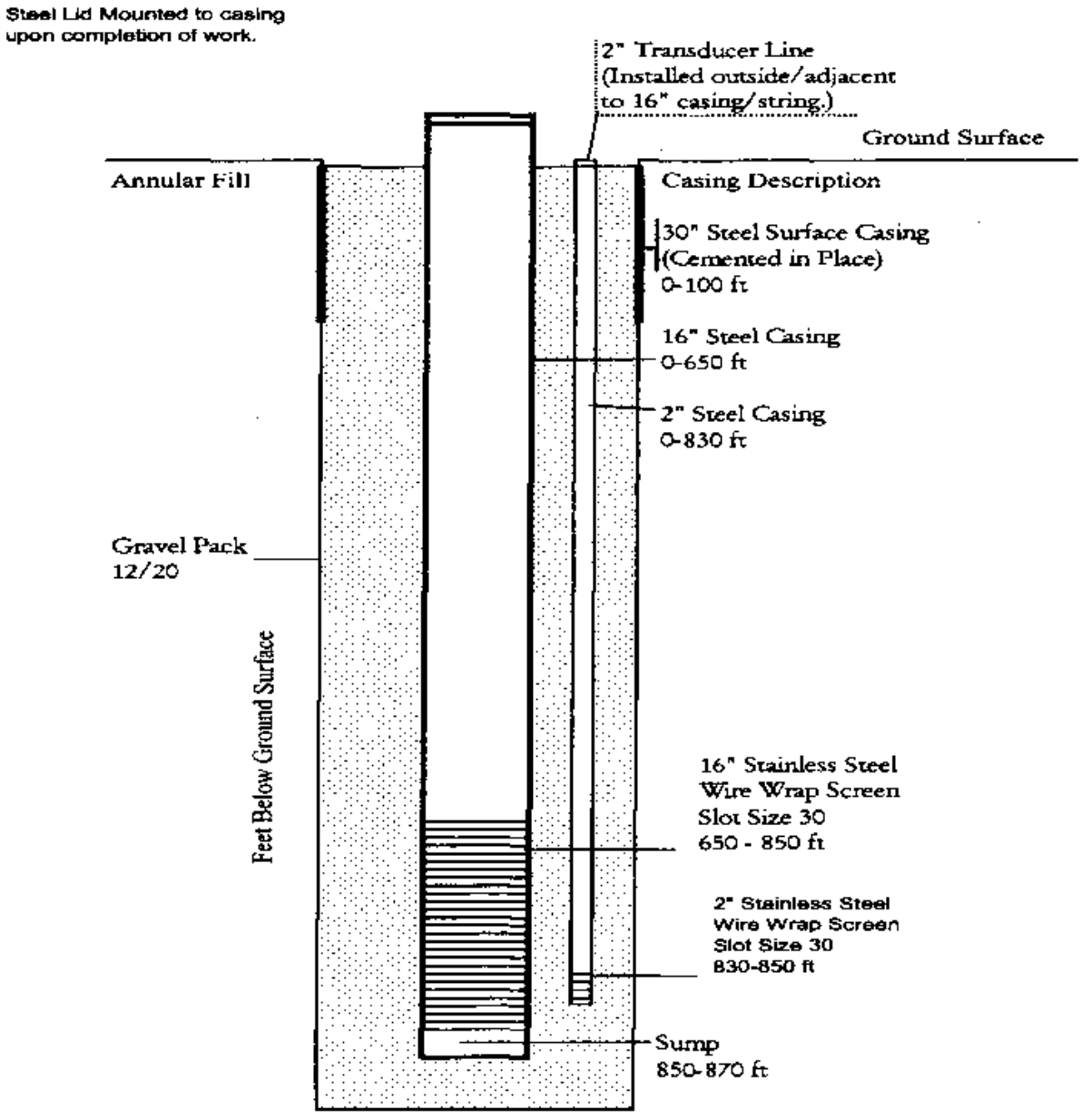
EPWater Well Number: 24A

EPWater Well Number: 24A

EPWater Well Number: 24A

EPWater Well Number: 24A

Well Completion Diagram
EPWU Well Nos. 24A and 40A

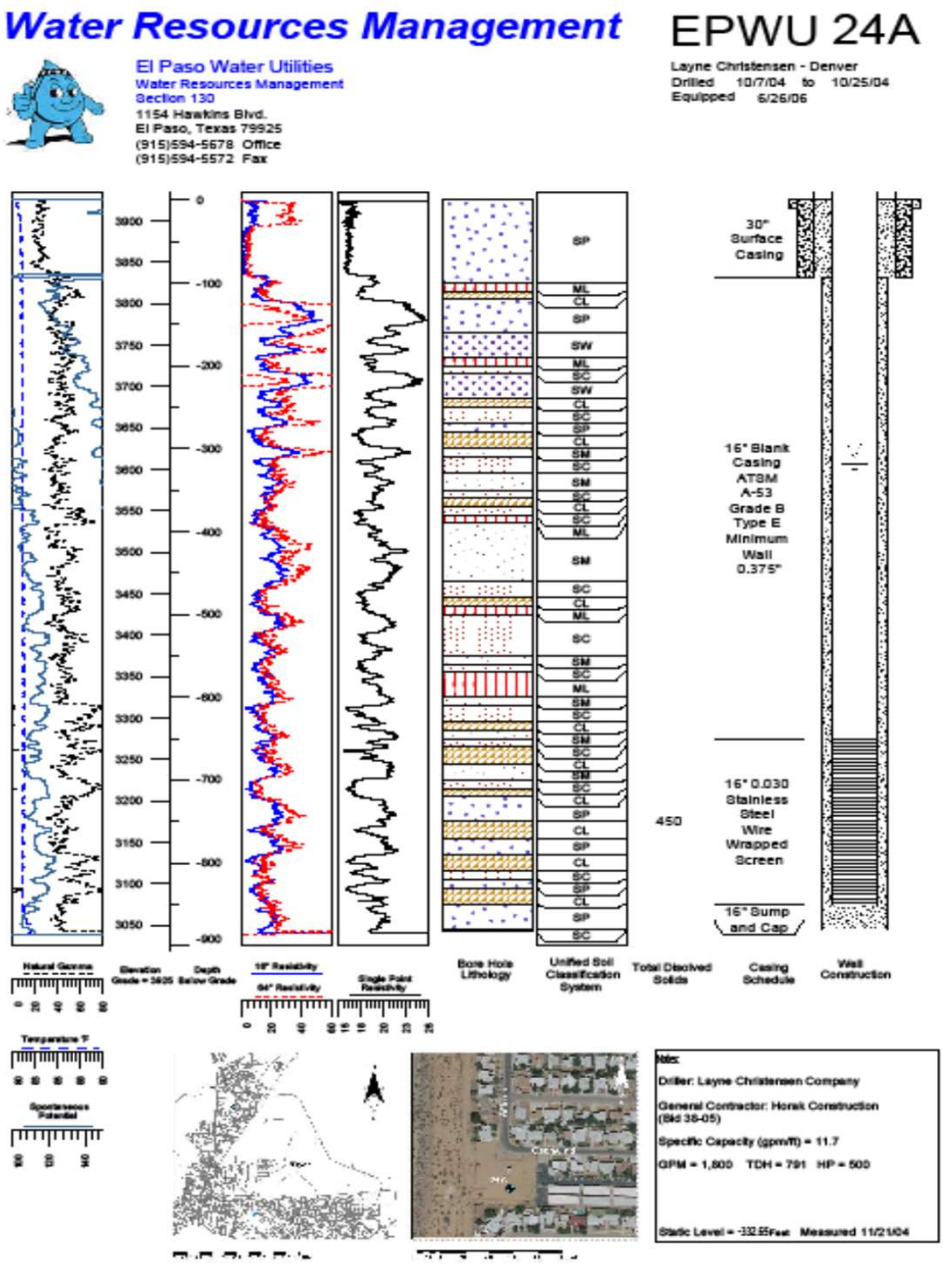


TOTAL DEPTH: 880 FT.

Not To Scale

Well Completion Diagram
APPENDIX 2

EPWater Well Number: 24A



EPWU Well 24A
Water Level

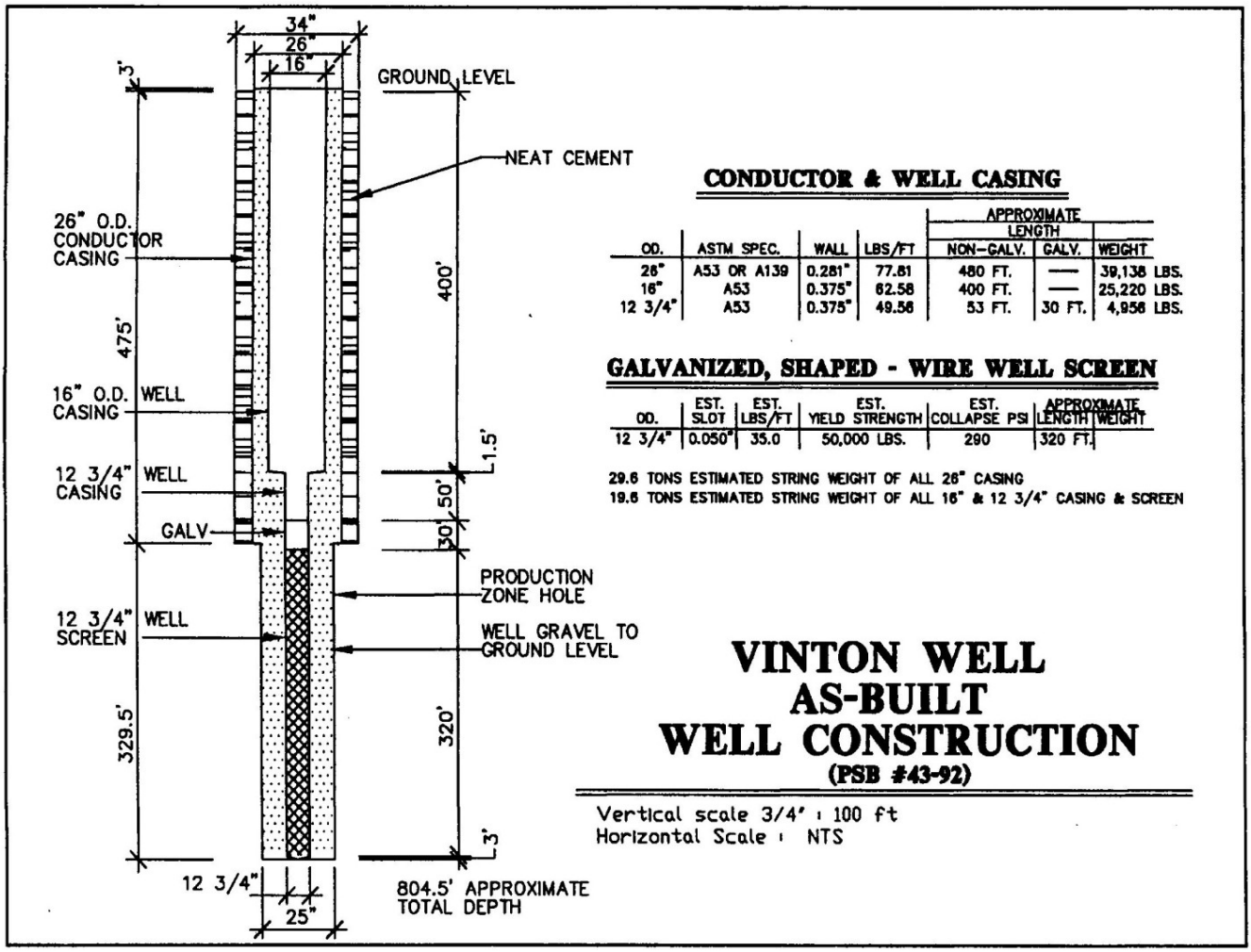
Date	LS Elevation	Static Elevation	Static Level	Comments
17-Nov-04	3910	3583.05	326.95	
7-Jan-06	3910	3588.25	321.75	
31-Dec-07	3910	3589.24	320.76	
16-Dec-08	3910	3579.75	330.25	
26-May-09	3910	3591.13	318.87	
26-May-11	3910	3589.08	320.92	
21-Jun-13	3910	3566.34	343.66	
16-May-16	3910	3562.12	347.88	
10-Jul-18	3910	3560	350	
16-Apr-20	3910	3567.67	342.33	

EPWU Well Number: 207

Address:	
Date Drilled:	1992
Wellfield:	Canutillo--Deep
Aquifer:	Mesilla Bolson
Latitude:	31 57 29.74
Longitude:	106 36 13.21
UTM North:	3536744.607
UTM East:	348444.289
Elevation:	3782
Total Depth:	804
Blank-1:	16
Blank-2:	12.75
Screen-1:	12.75
Screen-2:	N/A
Screen Interval:	From 482'-802'.
TWDB State Number:	JL-49-04-495
Comment	Abandoned

EPWU Well Number: 207

EPWU Well Number: 207



CONDUCTOR & WELL CASING

OD.	ASTM SPEC.	WALL	LBS/FT	APPROXIMATE LENGTH NON-GALV.	APPROXIMATE LENGTH GALV.	WEIGHT
26"	A53 OR A139	0.281"	77.81	480 FT.	—	39,138 LBS.
16"	A53	0.375"	62.58	400 FT.	—	25,220 LBS.
12 3/4"	A53	0.375"	49.56	53 FT.	30 FT.	4,956 LBS.

GALVANIZED, SHAPED - WIRE WELL SCREEN

OD.	EST. SLOT	EST. LBS/FT	EST. YIELD STRENGTH	EST. COLLAPSE PSI	APPROXIMATE LENGTH	APPROXIMATE WEIGHT
12 3/4"	0.050"	35.0	50,000 LBS.	290	320 FT.	

29.6 TONS ESTIMATED STRING WEIGHT OF ALL 26" CASING
19.6 TONS ESTIMATED STRING WEIGHT OF ALL 16" & 12 3/4" CASING & SCREEN

VINTON WELL AS-BUILT WELL CONSTRUCTION

(PSB #43-92)

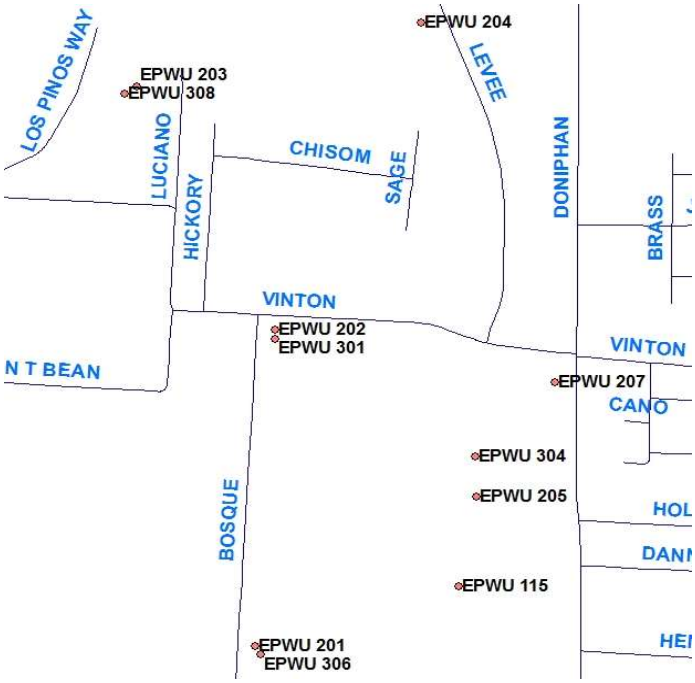
Vertical scale 3/4" = 100 ft
Horizontal Scale = NTS

EPWU Well 207
Water Level

Date	LS Elevation	Static Elevation	Static Level
20-Nov-92	3782	3720.34	61.66

EPW Well Number: 301

Address:	394 Vinton Road
Date Drilled:	1957
Wellfield:	Canutillo--Intermediate
Aquifer:	Mesilla Bolson
Latitude:	31 57 32
Longitude:	106 36 43.71
UTM North:	3536841.248
UTM East:	347644.876
Elevation:	3779
Total Depth:	550
Blank-1:	18
Blank-2:	N/A
Screen-1:	18
Screen-2:	N/A
Screen Interval:	From 291'-550'.
TWDB State Number:	JL-49-04-107
9 Production Ranking:	7th of 145 active wells



EPW Well Number: 301

EPW Well Number: 301

WELL DATA

WELL NUMBER 301

PUMP DATA

Make LAYNE-BOWLER

Type

Stages 7

Tubing

Shaft 2-11/16"

Column

Serial Number 25208

Setting

O. D. Bowls

Capacity GPM 2000

Feet Head 230

MOTOR DATA

Make GENERAL ELECTRIC

Volts 440

Amps 236

Type K

Motor H.P. 200

Speed 1180 RPM

Cycles - Phase 60 - 3 PHASE

Serial Number URJ 725014

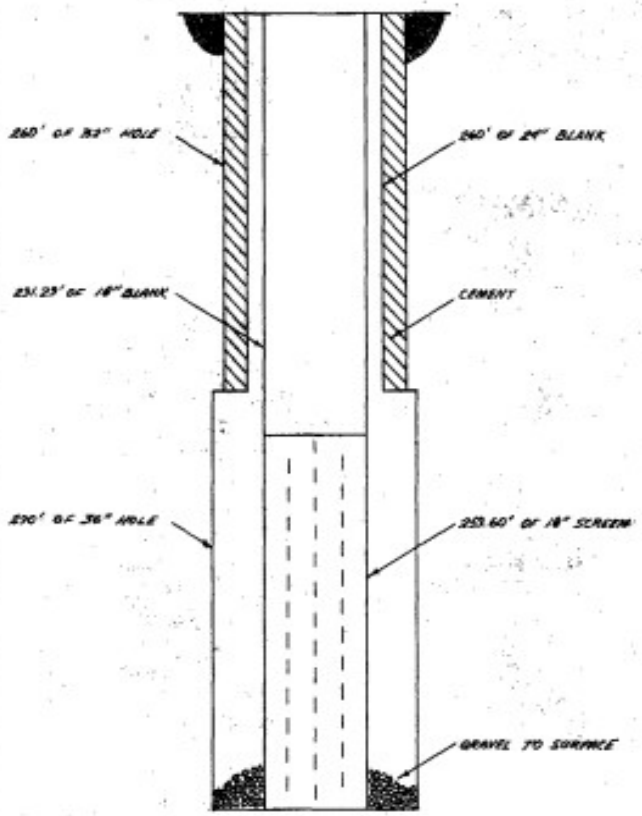
Date Installed

SCALE

Vertical 1" = 100'

Horizontal 1/2" = 1'

MATERIALS



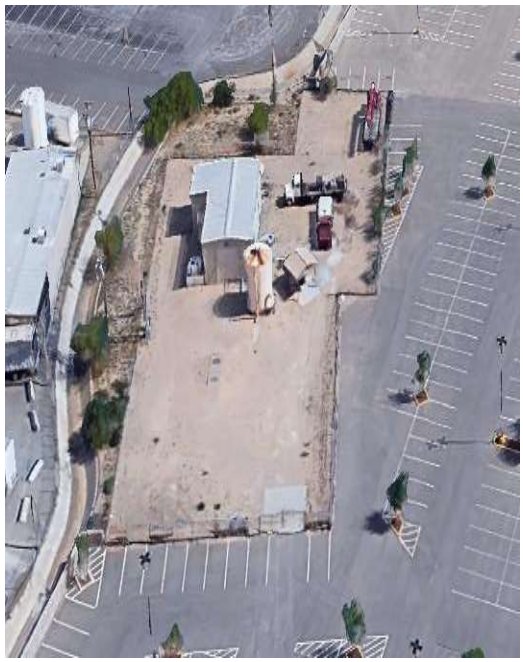
P.S.B. FORM 2002 - 5665

EPWU Well 301
Water Level

Date	LS Elevation	Static Elevation	Static Level	Comments
31-Oct-58	3779	3770.29	8.71	
28-Nov-62	3779	3746.35	32.65	
27-Nov-63	3779	3756.63	22.37	
23-Nov-64	3779	3754.27	24.73	
28-Nov-66	3779	3742.82	36.18	
22-Jan-69	3779	3756.36	22.64	
26-Jan-71	3779	3748.50	30.50	
4-Oct-72	3779	3734.44	44.56	
22-Jan-74	3779	3756.33	22.67	
27-Jan-75	3779	3759.12	19.88	
22-Jan-76	3779	3750.18	28.82	
19-Jan-79	3779	3751.56	27.44	
7-Jan-80	3779	3754.68	24.32	
30-Dec-81	3779	3748.52	30.48	
6-Dec-82	3779	3743.61	35.39	
30-Nov-83	3779	3725.32	53.68	
1-Dec-87	3779	3743.70	35.30	
26-Feb-02	3779			Pump set w/o measuring line.
14-Jan-08	3779	3717.45	61.55	
13-Jul-10	3779	3700.97	78.03	
20-May-11	3779	3724.96	54.04	
1-Jul-14	3779	3609.5	169.5	
29-Jun-15	3779	3703.22	75.78	
1-Jun-16	3779	3709.25	69.75	

EPWater Well 404B

Address:	898 Pendale Rd.
Date Drilled:	2012
Wellfield:	Lower Valley
Source:	Hueco
Latitude:	31°43'17" N
Longitude:	106°19'12" W
UTM North:	
UTM East:	
Elevation:	
Total Depth:	428
Blank-1:	16
Blank-2:	
Screen-1:	16
Screen-2:	
Screen Intervals:	Blank casing from +1.5-200 & 400-420. SS Screen from 200-400.
Video Survey Report:	Yes
TWDB State Number:	49-22-2##
019 Production Ranking:	88 of 145 active wells
Remarks:	TCEQ Letter of Approval for Use, 4/26/2017



EPWater Well 404B

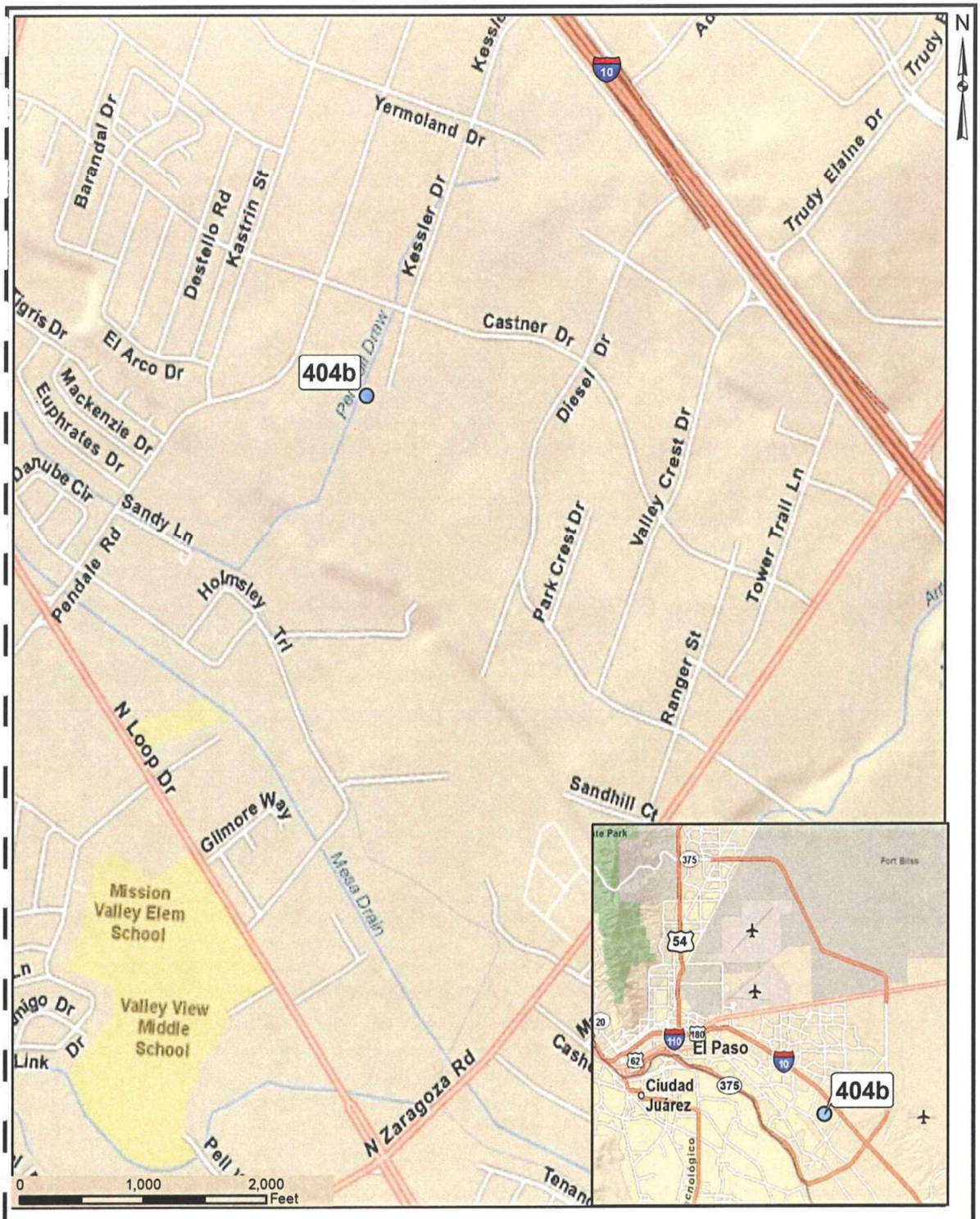
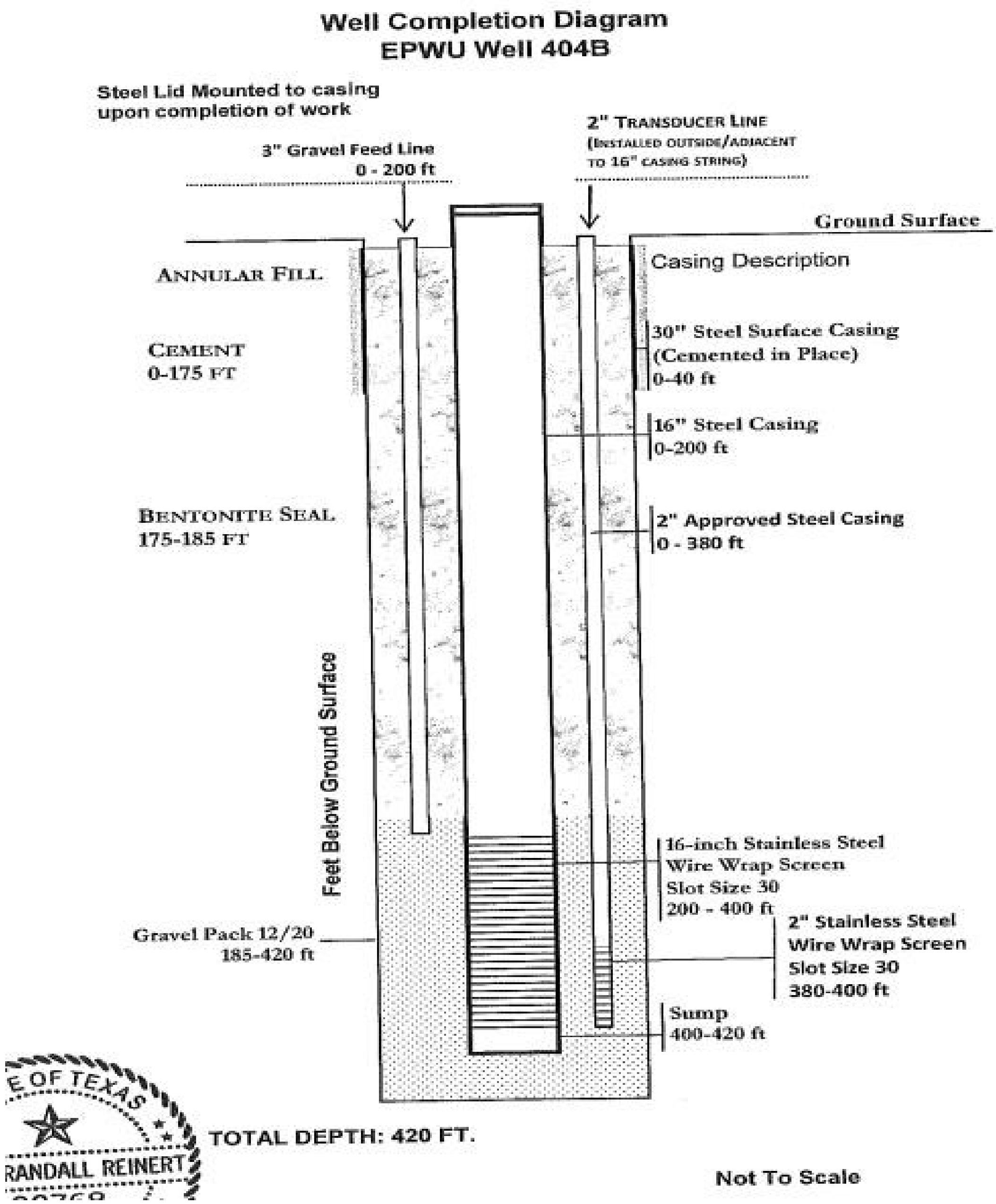


Figure 1. Map showing location of El Paso Water Utilities Well No. 404b.

JOHN SHOMAKER & ASSOCIATES, INC.

EPWater Well 404B



EPWater Well 404B

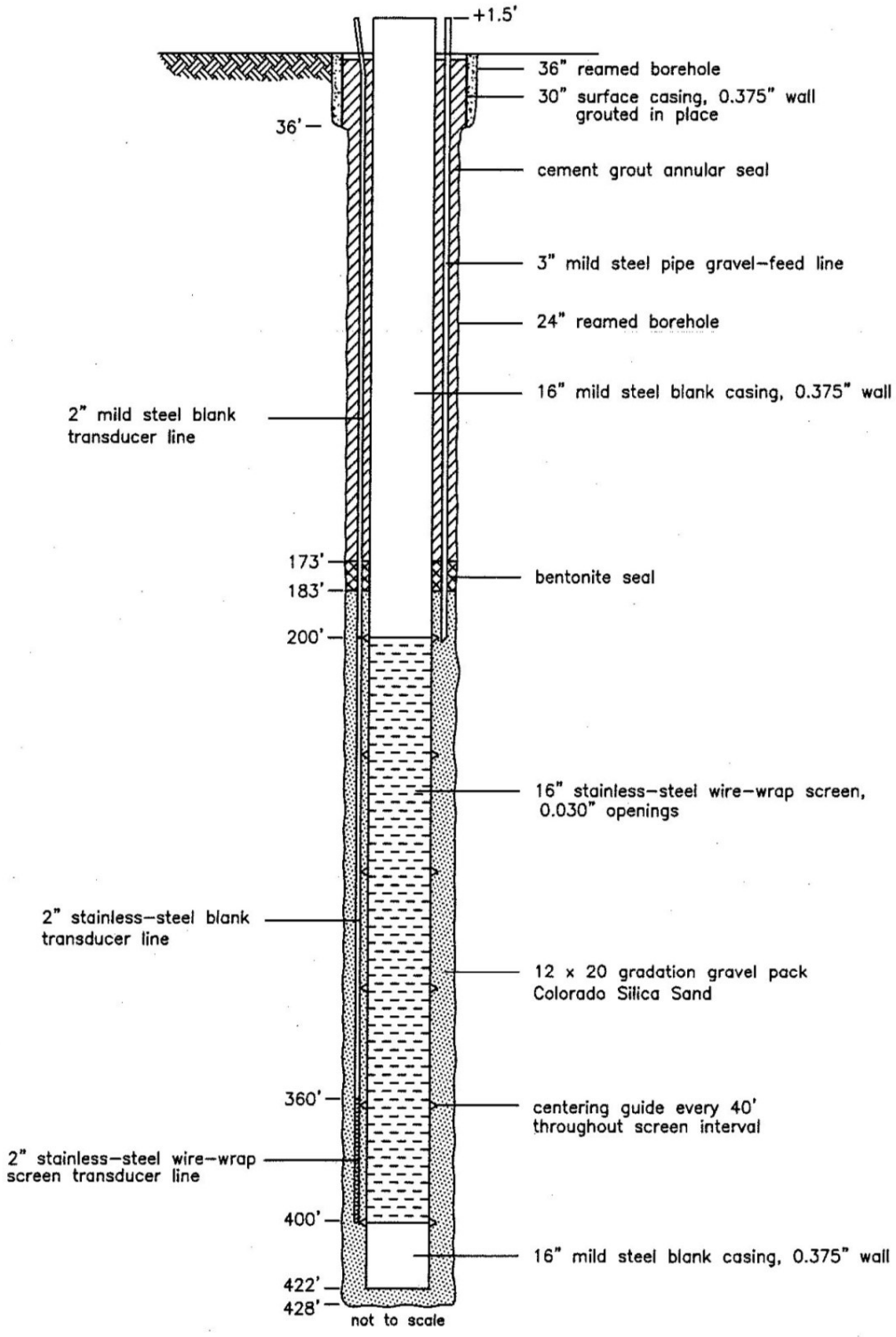


Figure 2. Well completion diagram of El Paso Water Utilities Well No. 404b.

JOHN SHOMAKER & ASSOCIATES, INC.

02/07/2012

Table 4. Summary of lithology of El Paso Water Utilities Well No. 404b

depth (ft bgl)	description of cuttings
0-40	36-inch auger, no samples collected
40-80	gravelly sand; sand, fine to coarse, subrounded, mostly arkosic with some mafics; gravel of same composition, chips to 10 mm
80-140	sandy clay; sand, arkosic, with minor fine gravels; clay tan, silt to 20%
140-150	clay; tan, silty
150-240	sandy/silty clay; clay, tan; fine sand and silt to 25%
240-260	clay; tan, silty
260-310	clayey sand; sand to 20%; clay, brown, dense
310-320	clay; brown, dense
320-410	clayey silt; silt and fine sand; clay, brown, dense, 20 to 30%
410-428	clay; brown, dense

ft bgl - feet below ground level

EPWater Well 408B

Address:	671 S. Glenwood
Date Drilled:	14-Nov-12
Wellfield:	Lower Valley
Source:	Hueco
Latitude:	31°45'16" N
Longitude:	106°25'16" W
UTM North:	
UTM East:	
Elevation:	
Total Depth:	465
Blank-1:	16
Blank-2:	
Screen-1:	16
Screen-2:	
Screen Interval	Blank casing from +1.5-240 & 440-460. SS Screen from 240-440.
Remarks:	TCEQ Letter of Approval for Use, 4/27/2017
TWDB State Number:	49-13-8##
19 Production Ranking:	36 of 145 active wells

EPWater Well 408B

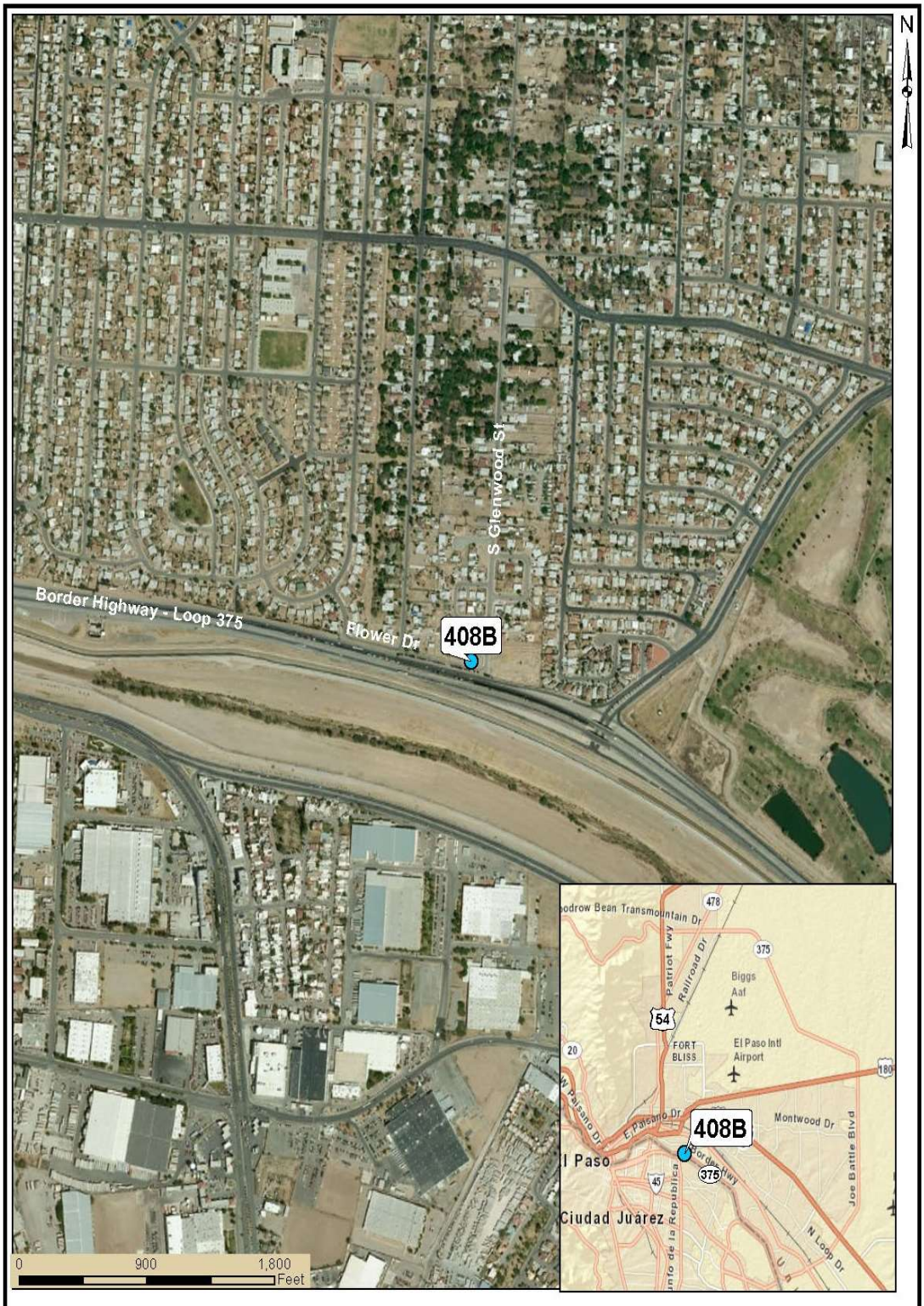
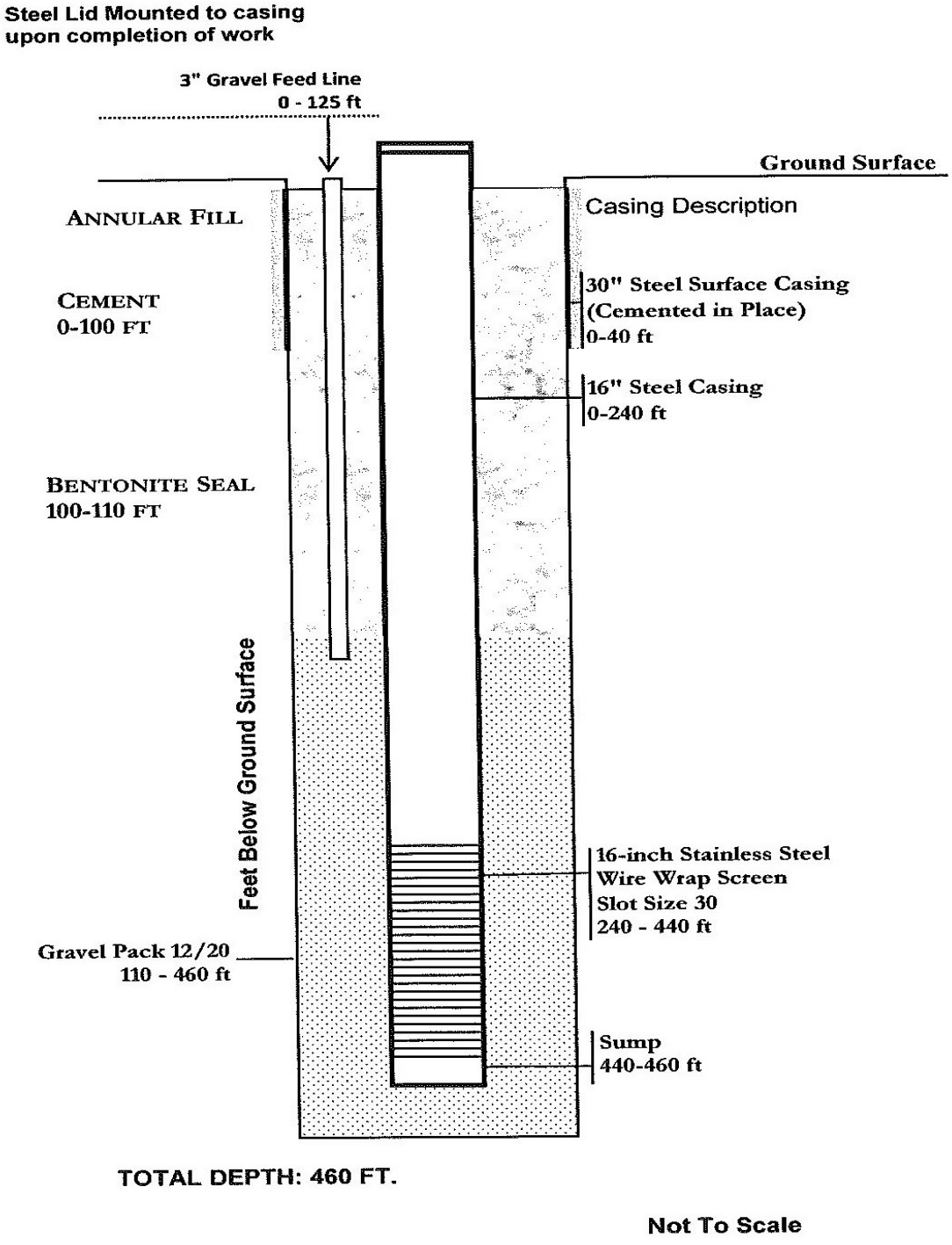


Figure 1. Map showing location of El Paso Water Utilities Well No. 408B.

JOHN SHOMAKER & ASSOCIATES, INC.

EPWater Well 408B

Well Completion Diagram
EPWU Well 408B



TOTAL DEPTH: 460 FT.

Not To Scale

EPWater Well 408B

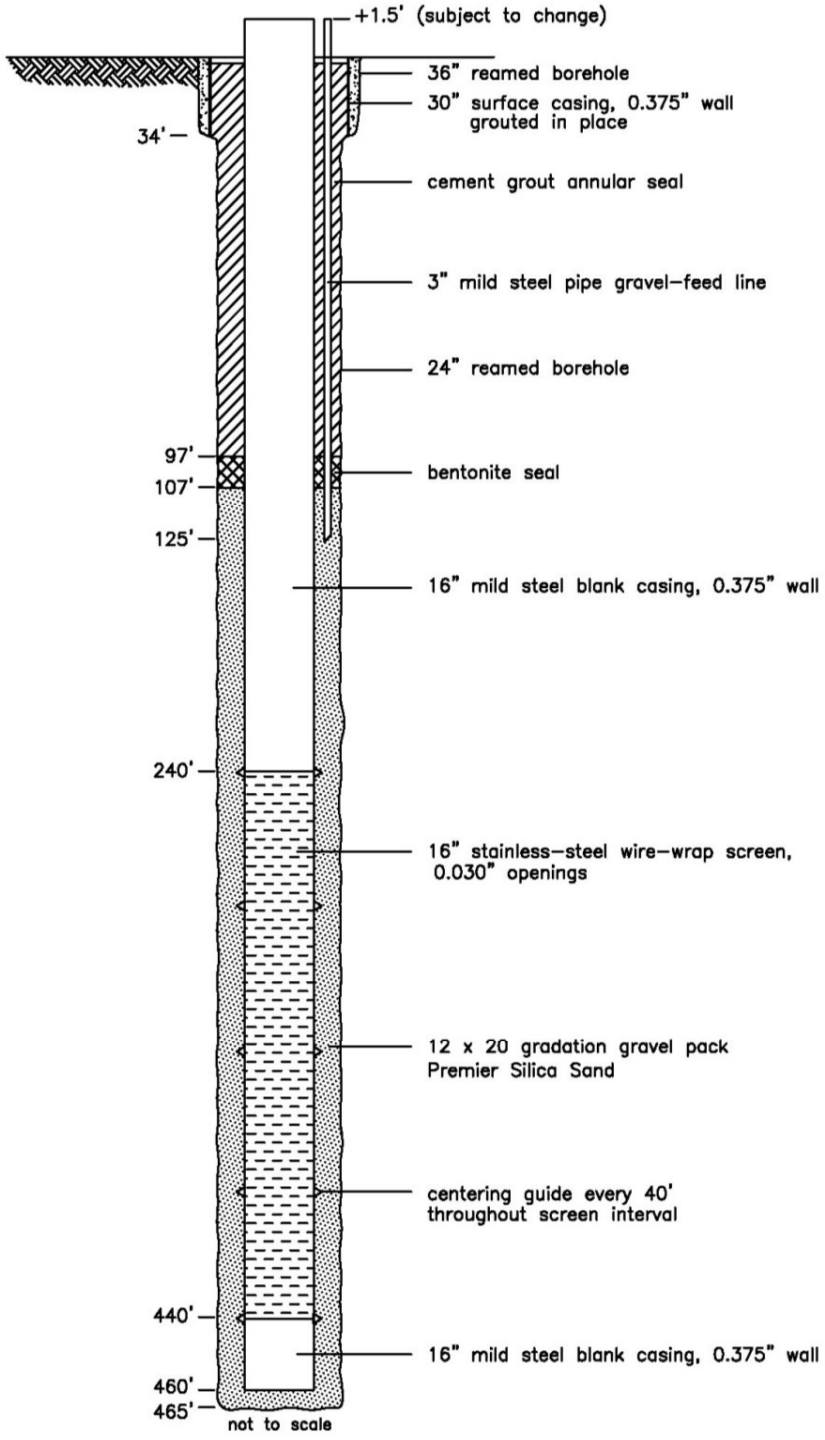


Figure 2. Well completion diagram of El Paso Water Utilities Well No. 408B.

JOHN SHOMAKER & ASSOCIATES, INC.

01/04/2013

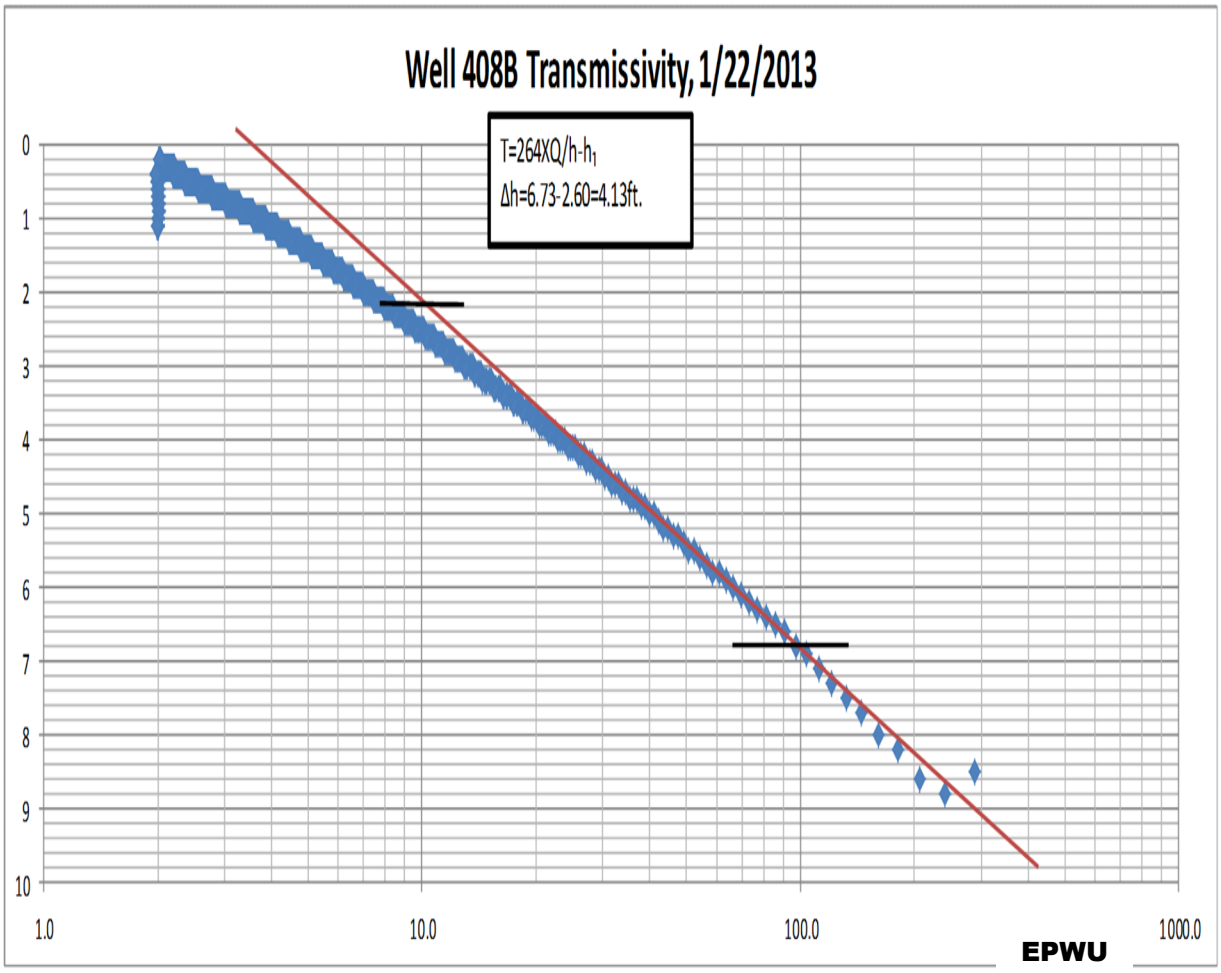
EPWater Well 408B

Table 4. Summary of lithology of El Paso Water Utilities Well No. 408B

depth (ft bgl)	description of cuttings
0-40	36-inch auger-no samples collected
40-100	sandy clay and clayey sand; sand, fine to very coarse, angular to rounded, variety of lithologies; clay, brown, medium to high plasticity
100-110	sand; medium to coarse, sub-angular to sub-rounded, variety of lithologies (20 percent mafic lithologies)
110-270	sandy clay, silty sandy clay, and clayey sand; clay, brown, low to high plasticity; sand, very fine to coarse, sub-angular to sub-rounded
270-280	sandy silt; silt, tan; sand, very fine
280-460	sandy clay, silty sandy clay, and sandy silty clay; clay, brown and reddish-brown, low to high plasticity; sand, very fine to medium, sub-angular to sub-rounded

ft bgl - feet below ground level

EPWater Well 408B

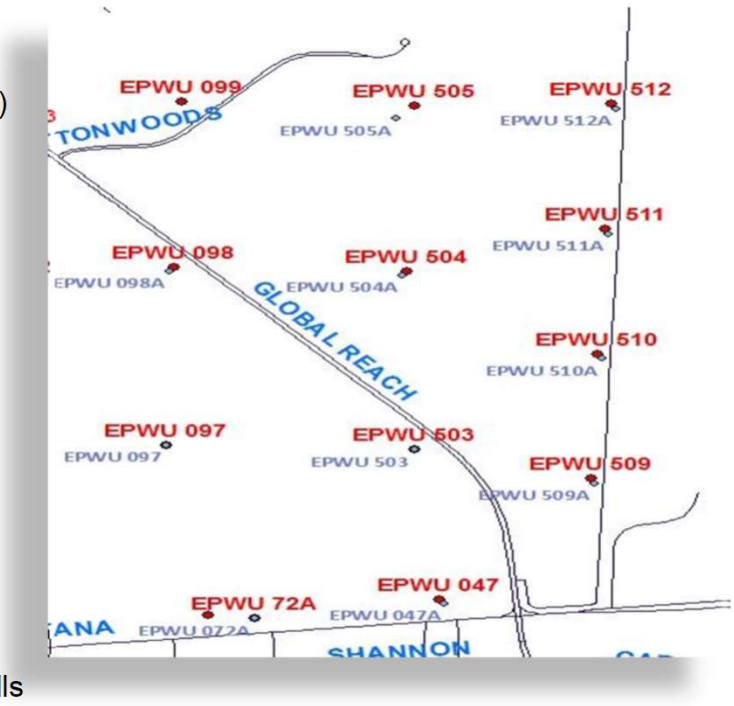


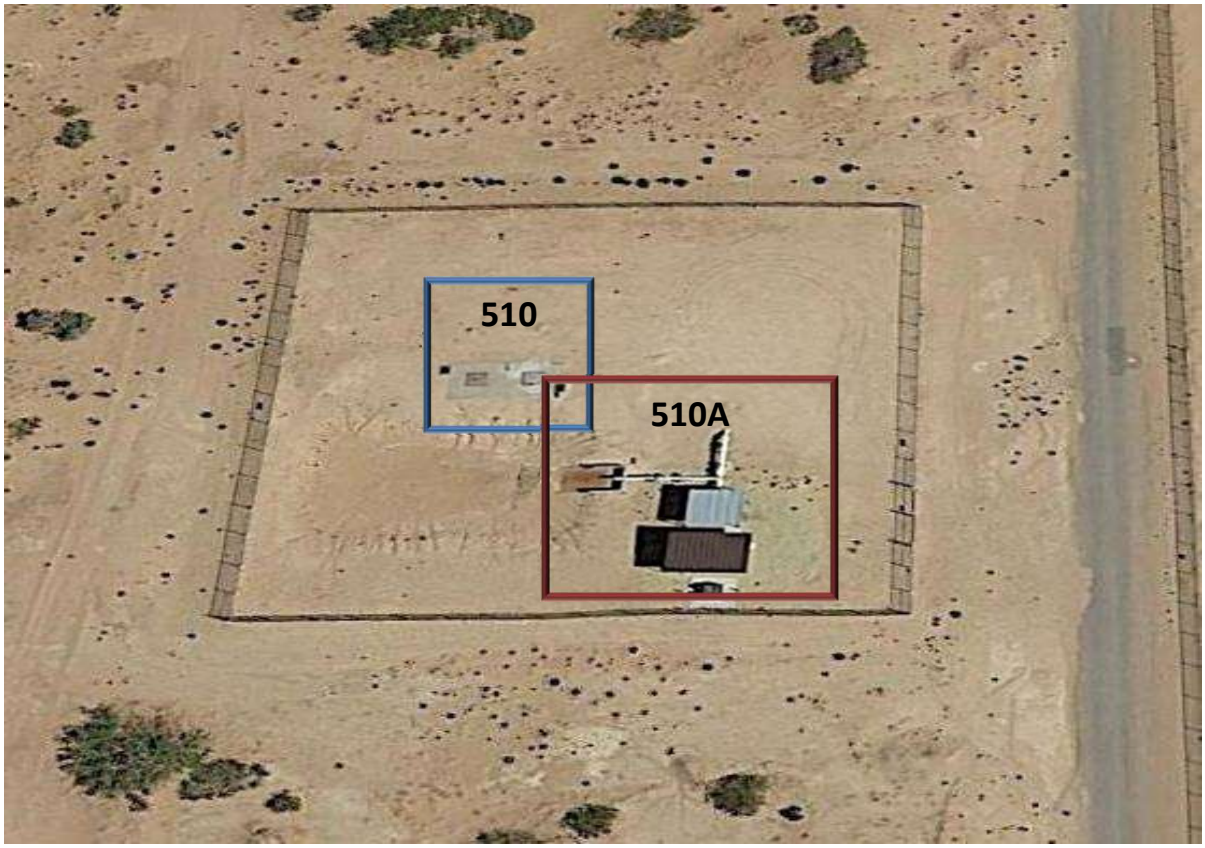
Month	Day	Year		Date	LS Elevation	Static Elevation	Static Level
1	22	2013	2013.06	22-Jan-13	3695	3551.54	143.46
6	19	2013	2013.46	19-Jun-13	3695	3550.72	144.28
6	24	2015	2015.48	24-Jun-15	3695	3545.58	149.42
8	30	2017	2017.66	30-Aug-17	3695	3541.52	153.48
4	13	2020	2020.28	13-Apr-20	3695	3542.2	152.8

Remarks

EPW Well Number: 510A

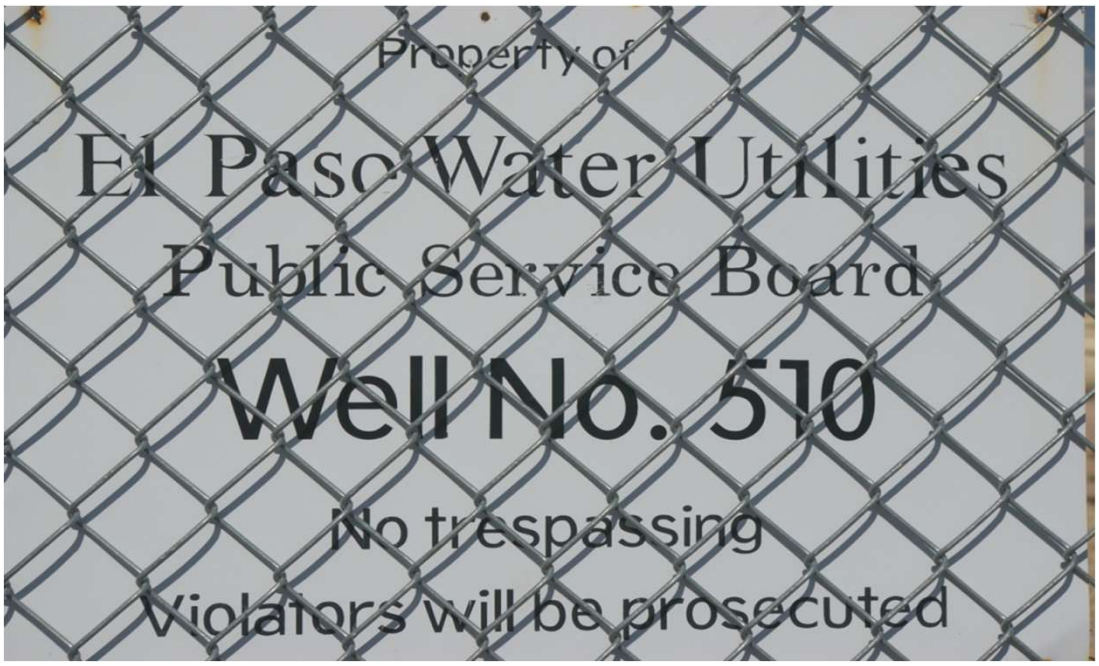
Address:	10300 Montana
Date Drilled:	2006
Wellfield:	KBH (formerly with Airport)
Aquifer:	Hueco Bolson
Latitude:	31 48 34
Longitude:	106 19 49
UTM North:	
UTM East:	
Elevation:	3975
Total Depth:	940
Blank-1:	18
Blank-2:	N/A
Screen-1:	18
Screen-2:	N/A
Screen Interval:	From 700'-850'.
Video Survey Rpt.:	Yes
TWDB State Number:	JL-49-14-526
19 Production Ranking:	119 of 145 active wells





EPW Well Number: 510A

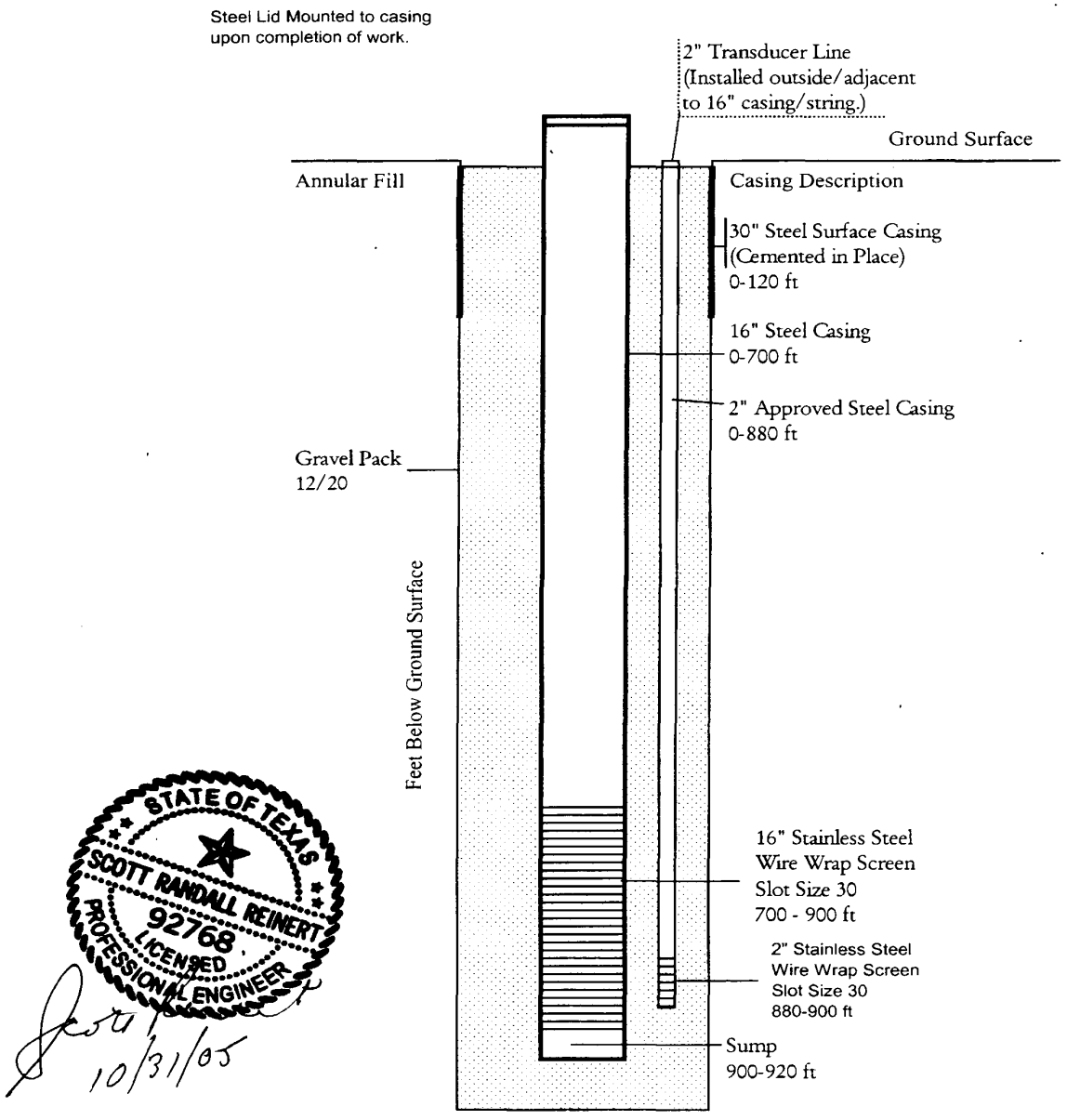
EPW Well Number: 510A



EPW Well Number: 510A

EPW Well Number: 510A

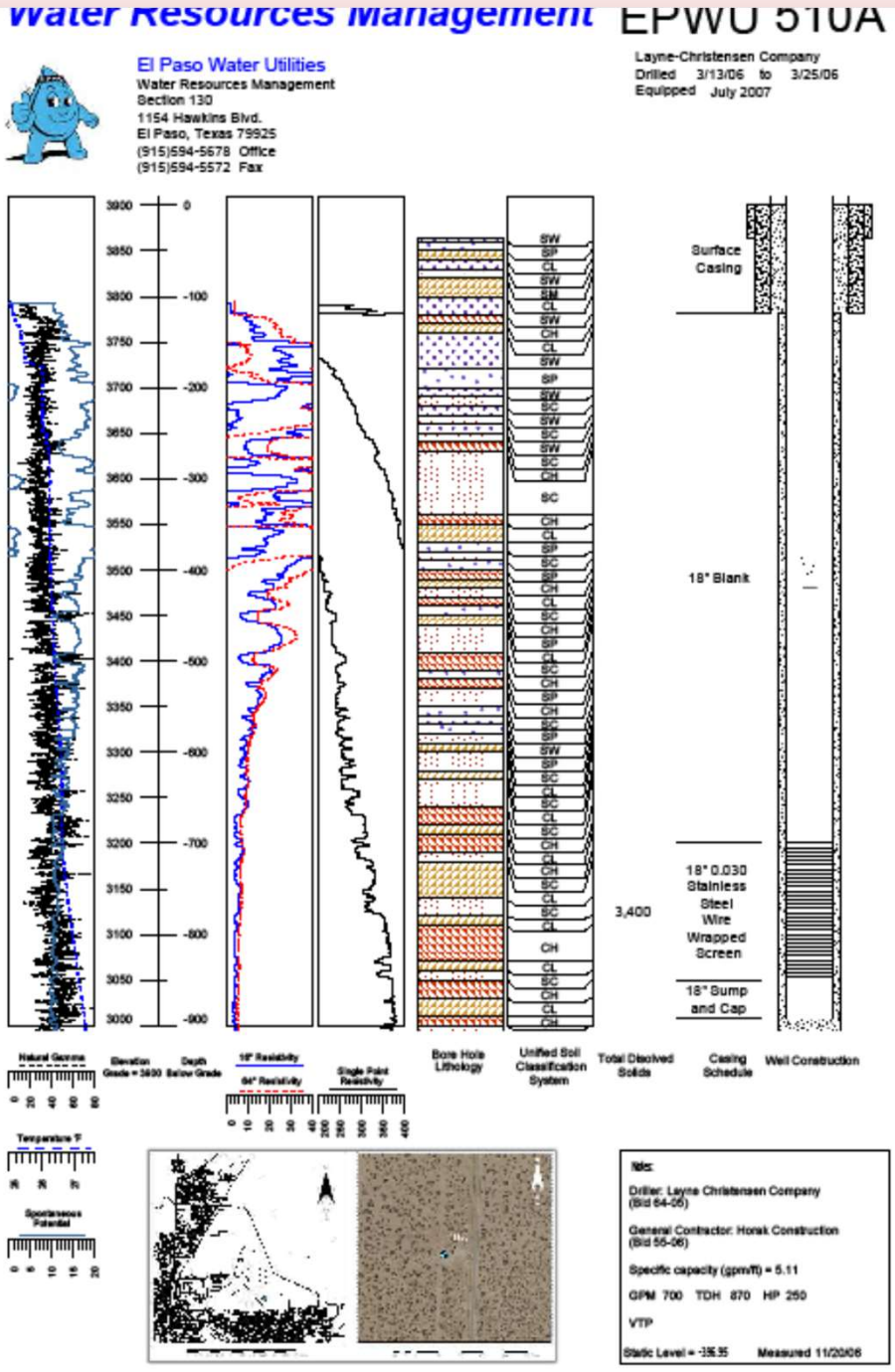
WELL COMPLETION DIAGRAM
AIRPORT REPLACEMENT WELLS
LONE STAR G.C. WELL



TOTAL DEPTH: 920 FT.

Not To Scale

EPW Well Number: 510A



Pump Curves

ALPHA SW
WELL # 510A
RATED FOR 700 GPM @ 878' AT 1770 RPM

PUMP DATA SHEET 07/20/06
60CYVER081005 Vers: 08112005
National Pump Company

Powered By

PUMP-FLO

Selection list: —

Pump: J11LC (15 stages)
Type: VERT.TURBINE
Synch speed: 1800 rpm
Impeller:
Speed: 1770 rpm
Dia: 8.7225 in
Curve no.: CVJ11L4P6CY

Specific Speeds:
Ns: 2104
Nss: 11977

Dimensions:
Suction: 8 in
Discharge: 8 in

Pump Limits:
Temperature: 180 °F
Pressure: 350 psi g
Sphere size: 0.75 in
Power: — hp
Eye area: — in²

Motor:
Standard: NEMA
Enclosure: ODP
Sizing criteria: Max Power on Design Curve
Size: 200 hp
Speed: 1800
Frame: 445T

Search Criteria:
Flow: 700 US gpm
Head: 878 ft

Fluid: Water at 60 °F
SG: 1
Viscosity: 1.105 cP
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

NPSHa: — ft

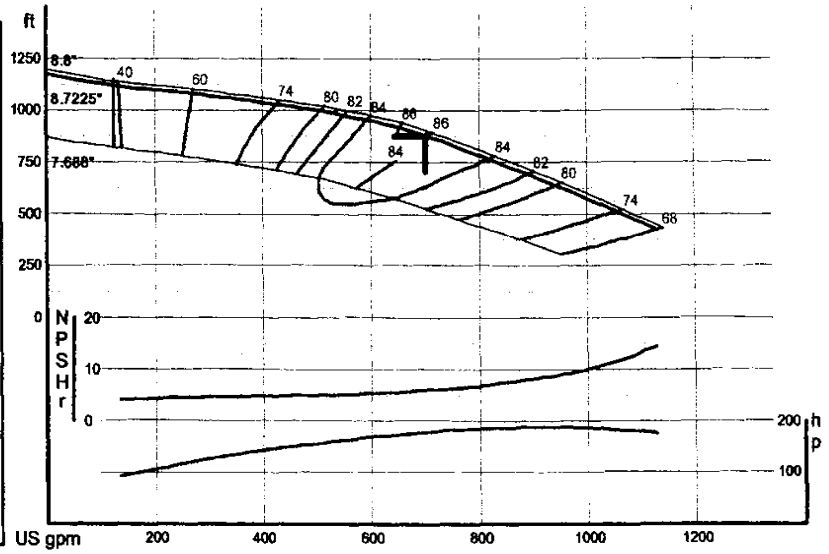
Advanced Criteria: none specified

Warning List:
Pump shutoff dP exceeds limit for the pump.

— Data Point —
Flow: 700 US gpm
Head: 878 ft
Eff: 86%
Power: 180 hp
NPSHr: 6.15 ft

– Design Curve –
Shutoff Head: 1177 ft
Shutoff dP: 509 psi
Min Flow: 125 US gpm
BEP: 86% eff
@ 679 US gpm
NOL Pwr: 189 hp
@ 938 US gpm

– Max Curve –
Max Pwr: 196 hp
@ 950 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power hp	NPSHr ft
840	1770	741	83	188	7.53
700	1770	878	86	180	6.15
560	1770	972	82	166	5.33
420	1770	1031	74	148	4.98
280	1770	1078	61	124	4.66

PUMP-FLO 2004 NOTE: INCLUDED COLUMN LOSS AND DISCHARGE HEAD LOSS TO THE TDH GIVEN ON BID FORM

EPW Well 525

Address:	503 George Perry
Date Drilled:	26-Jan-12
Wellfield:	Montana-McRae
Source:	Hueco
Latitude:	31°49'14" N
Longitude:	106°21'47" W
UTM North:	
UTM East:	
Elevation:	
Total Depth:	827
Blank-1:	16
Blank-2:	
Screen-1:	16
Screen-2:	
Screen Intervals:	Blank casing from +1.5-600 & 800-820.
	SS Screen from 600-800
Remarks:	On Line, May, 2013
TWDB State Number:	49-14-4##
19 Production Ranking:	32 of 145 active wells

EPW Well 525

EPW Well 525

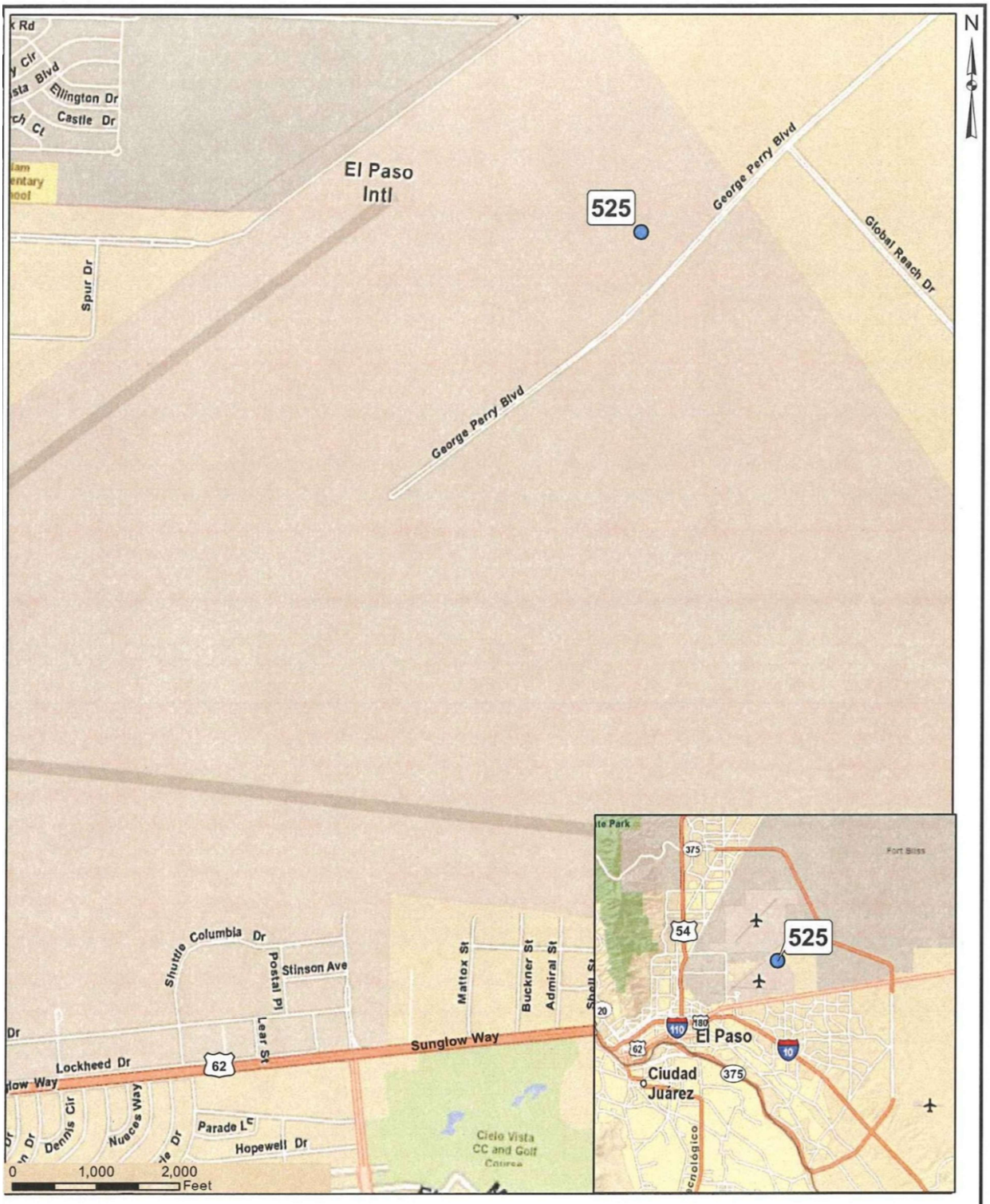
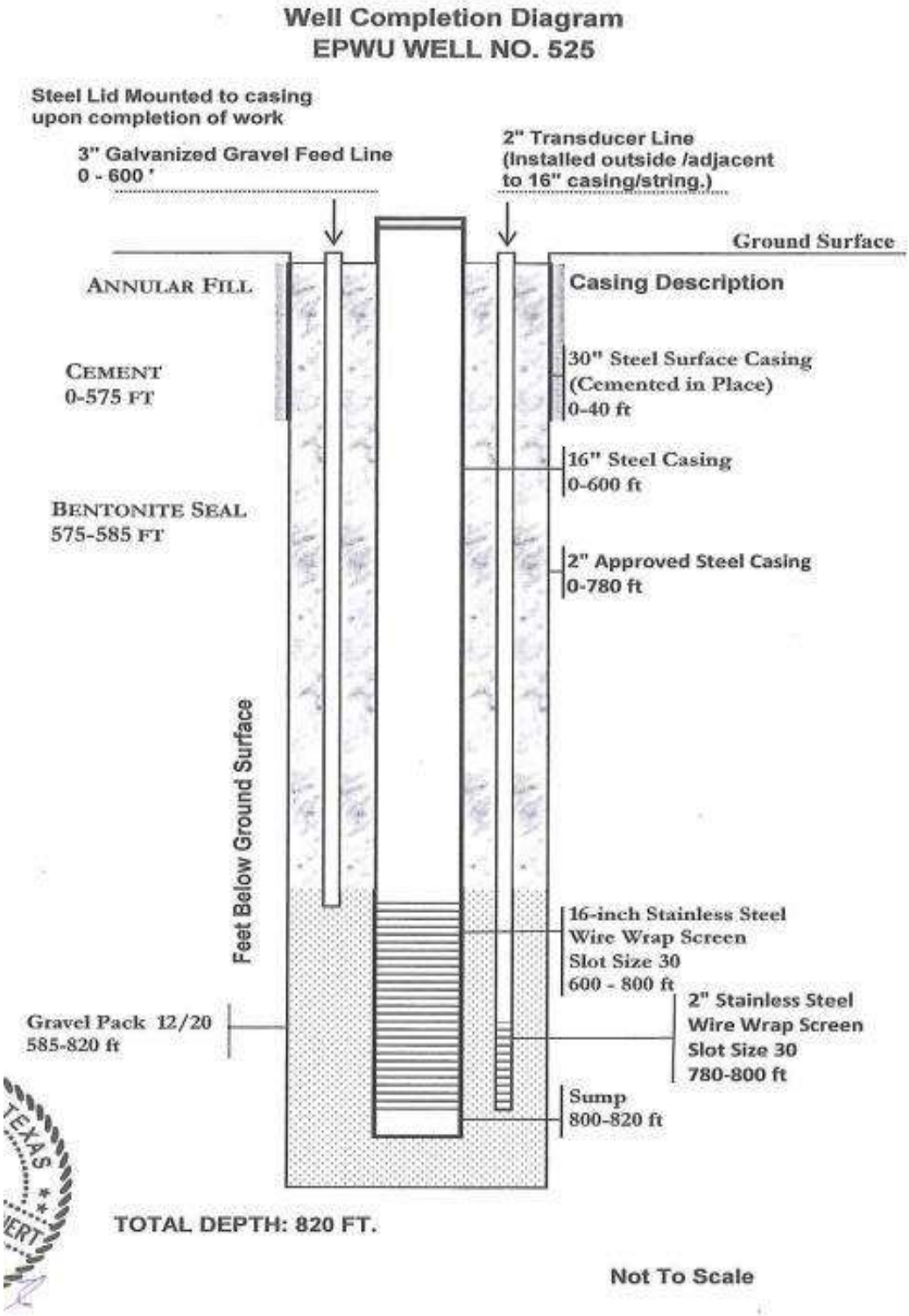


Figure 1. Map showing location of El Paso Water Utilities Well No. 525.

JOHN SHOMAKER & ASSOCIATES, INC.

EPW Well 525


Well Completion Diagram
EPWU WELL NO. 525
Steel Lid Mounted to casing upon completion of work
3" Galvanized Gravel Feed Line 0 - 600 '
2" Transducer Line (Installed outside /adjacent to 16" casing/string.)
Ground Surface
ANNULAR FILL
CEMENT 0-575 FT
BENTONITE SEAL 575-585 FT
Casing Description
30" Steel Surface Casing (Cemented in Place) 0-40 ft
16" Steel Casing 0-600 ft
2" Approved Steel Casing 0-780 ft
Feet Below Ground Surface
16-inch Stainless Steel Wire Wrap Screen Slot Size 30 600 - 800 ft
2" Stainless Steel Wire Wrap Screen Slot Size 30 780-800 ft
Gravel Pack 12/20 585-820 ft
Sump 800-820 ft
TOTAL DEPTH: 820 FT.
Not To Scale

EPW Well 525

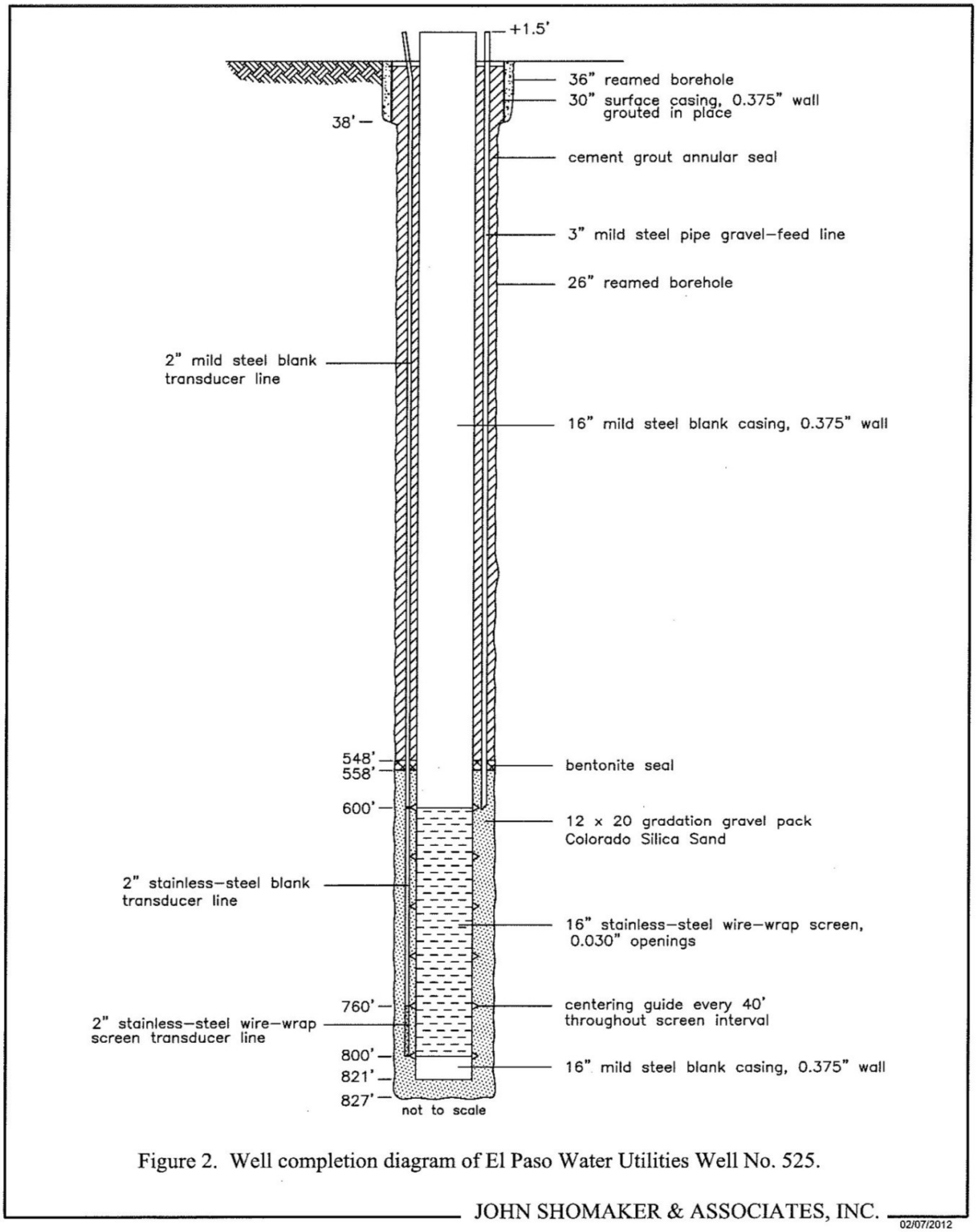


Figure 2. Well completion diagram of El Paso Water Utilities Well No. 525.

JOHN SHOMAKER & ASSOCIATES, INC.

02/07/2012

Table 4. Summary of lithology of El Paso Water Utilities Well No. 525

depth (ft bgl)	description of cuttings
0-40	36-inch auger-no samples collected
40-50	sand; fine to coarse, sub-rounded, alluvial, variety of colors and lithologies, quartz, feldspars, mafics
50-80	clay; tan to brown, dense; sand and silt <10%, few caliche frags, white, react to HCl
80-100	gravelly sand; sand, fine to coarse, sub-rounded, alluvial, variety of colors and lithologies, quartz, feldspars, mafics; gravel, chips to 20 mm, angular, few unbroken faces are rounded and caliche coated
100-190	clay; brown, dense; sand and silt <10%, few caliche frags, white, react to HCl;
190-230	gravel and clay; gravel, gravel, chips to 20 mm, angular, few unbroken faces are rounded and caliche coated; clay, brown dense, 40%
230-310	clay; tan to brown, dense; silt 10 to 40%
310-350	sandy silt; silt, tan; sand, fine, rounded, mostly quartz, 30 to 50%
350-700	clay; brown, medium dense, silt 0 to 20%
700-720	sandy clay; clay, tan, dense, silty; sand, fine to coarse, sub-rounded, variety of colors and lithologies, 20%
720-760	silty clay; clay, tan, dense; silt, tan, 20 to 30%
760-790	silty clay; clay, gray, dense; silt, tan, 20 to 40%
790-830	silty clay; clay, tan, dense; silt, tan, 10 to 30%

ft bgl - feet below ground level

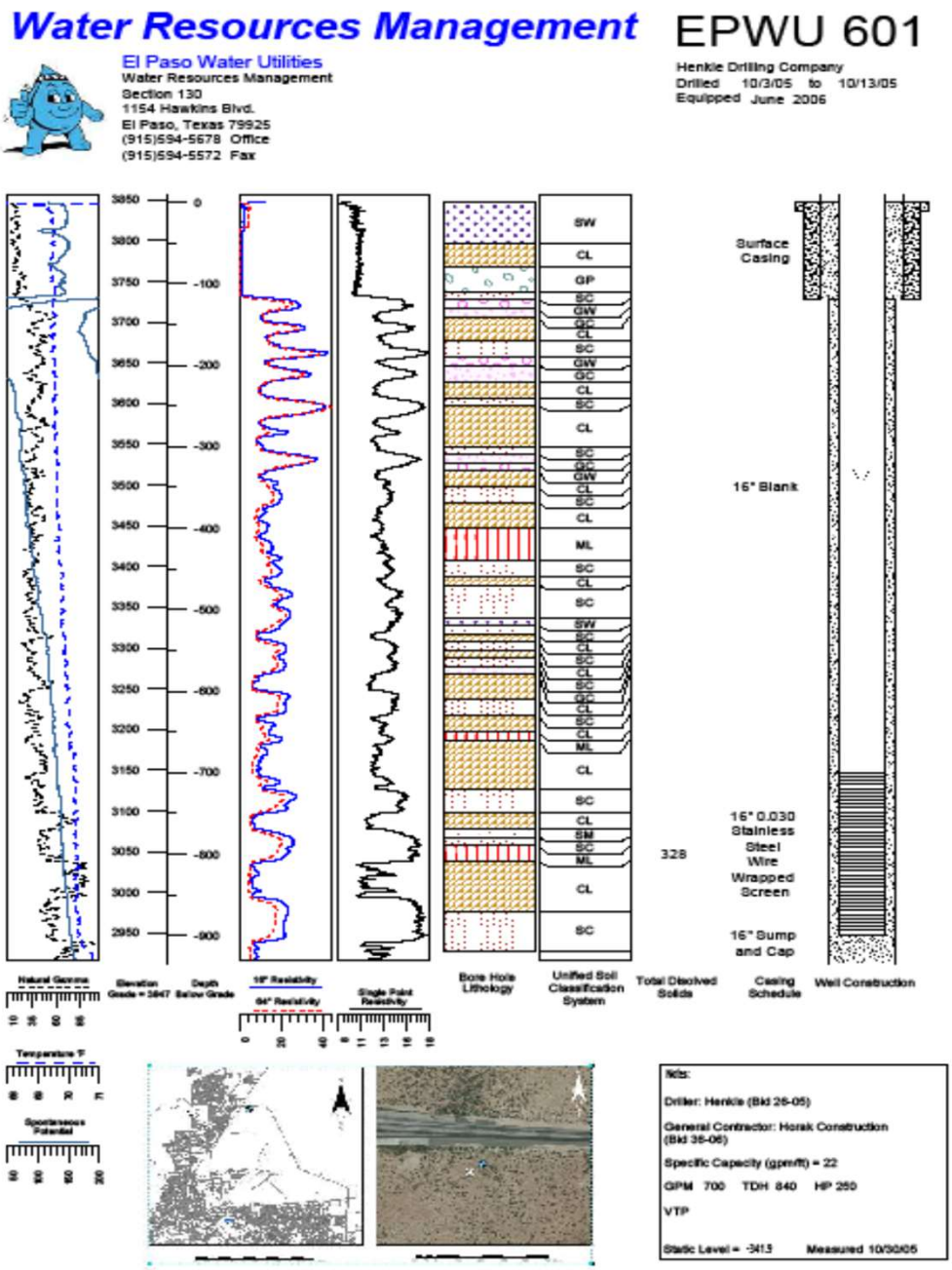
Month	Day	Year		Date	LS Elevation	Static Elevation	Static Level
3	14	2012	2012.20	14-Mar-12	3957	3540.30	416.70
7	27	2012	2012.57	27-Jul-12	3957	3572.65	384.35
4	3	2013	2013.25	3-Apr-13	3957	3533.50	423.50
8	12	2015	2015.61	12-Aug-15	3957	3558.59	398.41

EPWU Well Number: 601

Address:	6400 Purple Heart Mem. Hwy
Date Drilled:	2005
Wellfield:	Blend Wells
Aquifer:	Hueco Bolson
Latitude:	31 53 54
Longitude:	106 22 58
UTM North:	
UTM East:	
Elevation:	3928
Total Depth:	931'
Blank-1:	16
Blank-2:	N/A
Screen-1:	16
Screen-2:	N/A
Screen Interval:	From 700-900 ft
TWDB State Number:	JL-49-05-922
19 Production Ranking:	126 out of 145 active wells

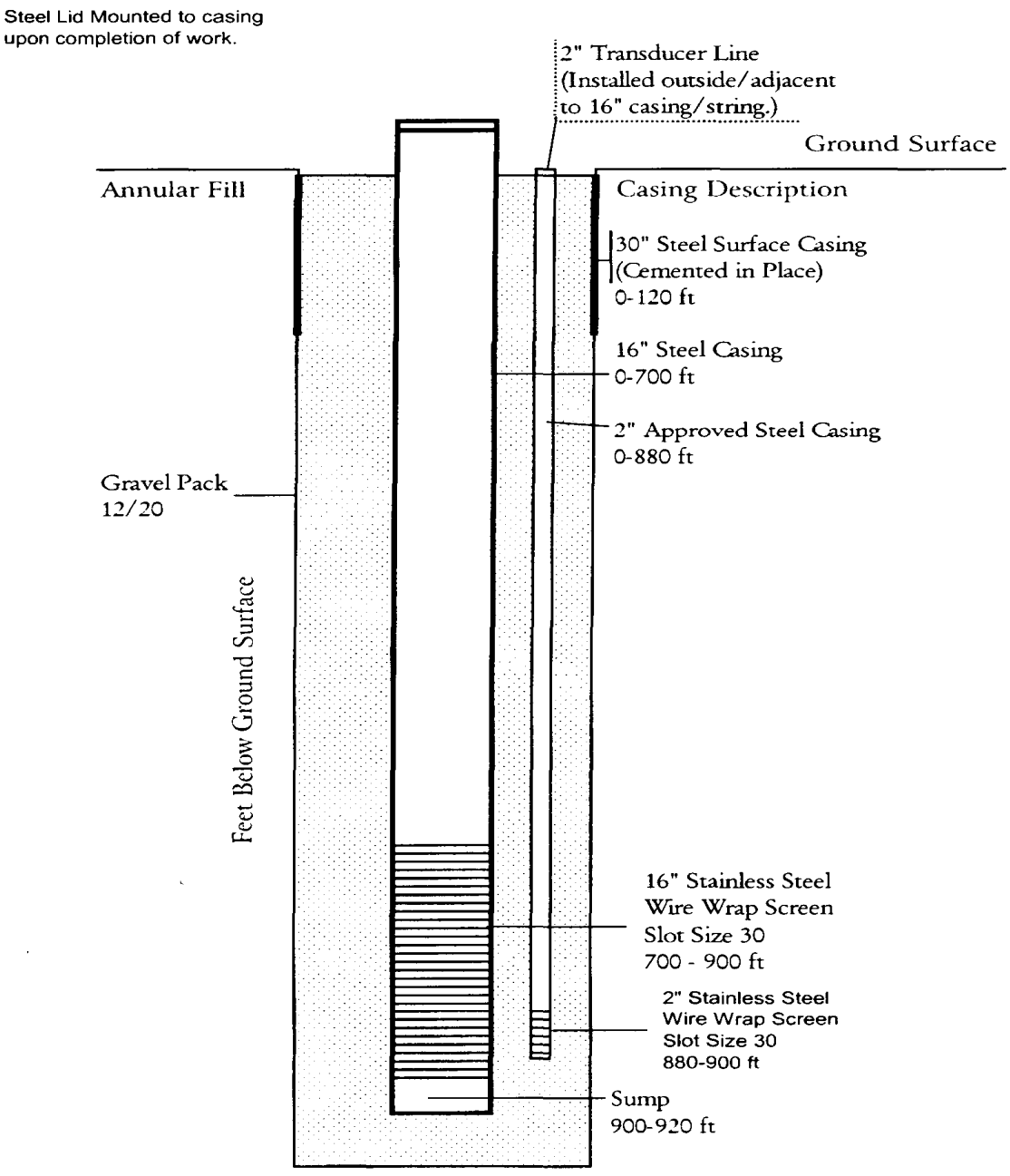
EPWU Well Number: 601

EPWU Well Number: 601



EPWU Well Number: 601

WELL COMPLETION DIAGRAM
EPWU/FT BLISS BLEND WELLS



TOTAL DEPTH: 920 FT.

Not To Scale

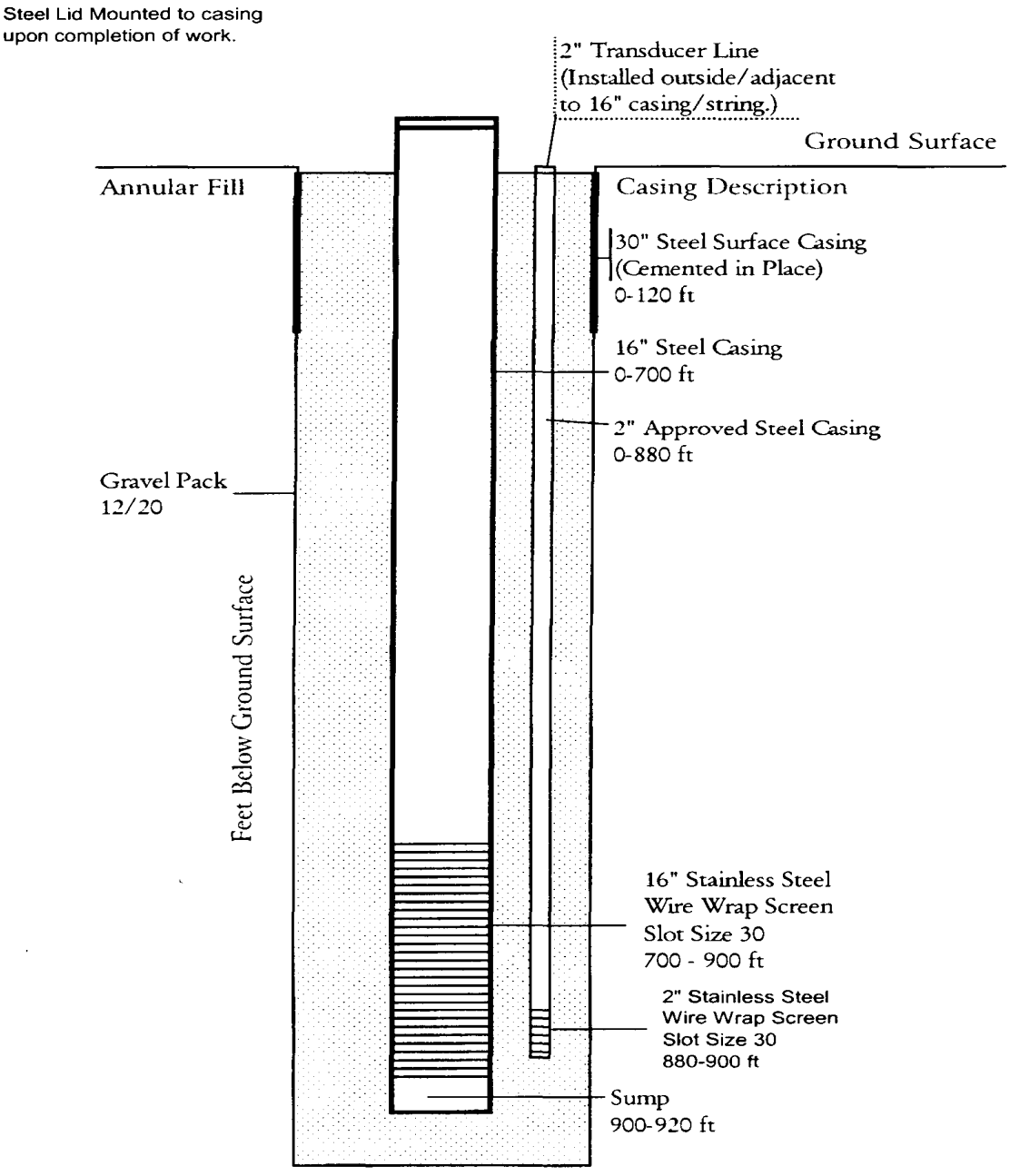
EPWU Well Number: 606

Address:	7000 Purple Heart Mem. Hwy
Date Drilled:	2005
Wellfield:	Blend Wells
Aquifer:	Hueco Bolson
Latitude:	31 53 40
Longitude:	106 21 25
UTM North:	
UTM East:	
Elevation:	3693
Total Depth:	936
Blank-1:	16
Blank-2:	N/A
Screen-1:	16
Screen-2:	N/A
Screen Interval:	From 700-900 ft
TWDB State Number:	JL-49-06-712
19 Production Ranking:	121 of 145 active wells

EPWU Well Number: 606

EPWU Well Number: 606

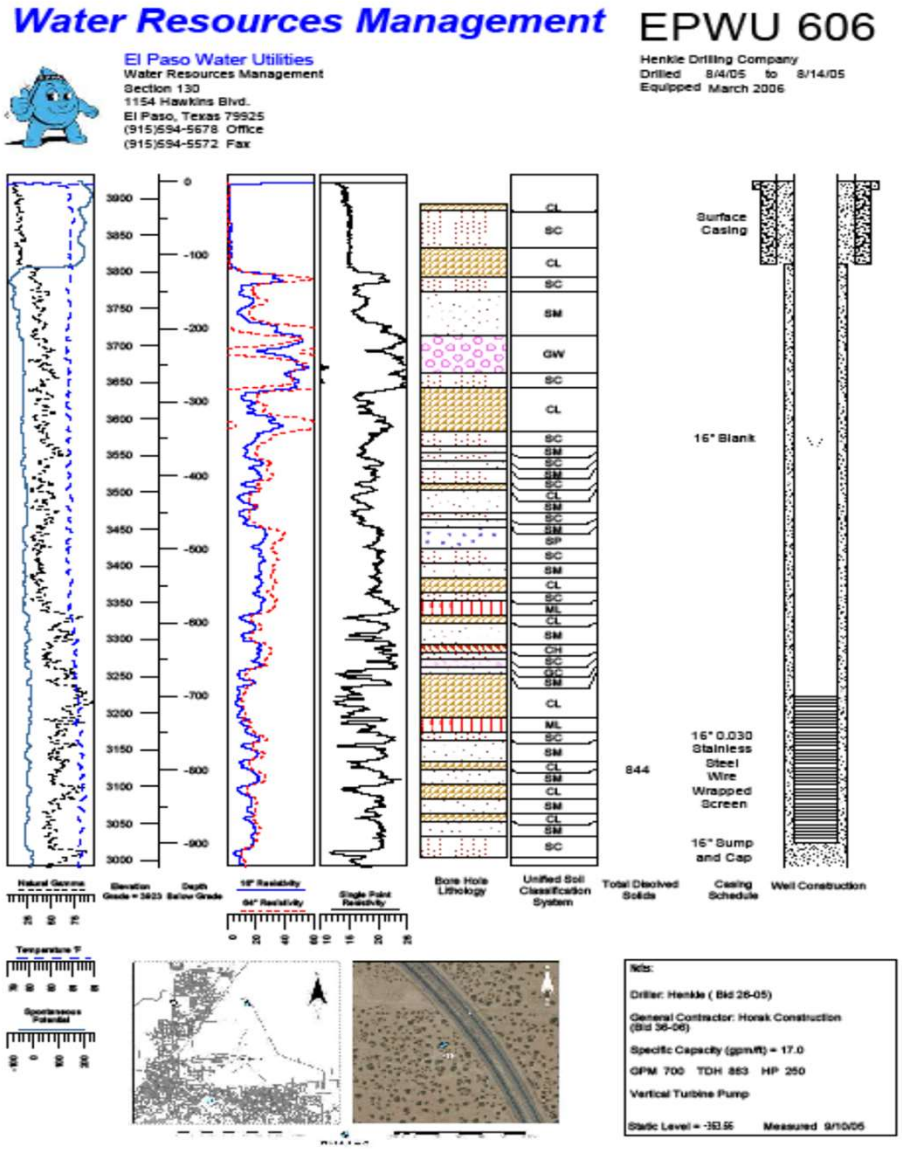
WELL COMPLETION DIAGRAM
EPWU/FT BLISS BLEND WELLS



TOTAL DEPTH: 920 FT.

Not To Scale

EPWU Well Number: 606



EPWU Well 606
Water Level

Date	LS Elevation	Static Elevation	Static Level
2-Sep-05	3969	3604.87	364.00
23-Jan-09	3969	3592.50	376.37
1-Jul-09	3969	3604.07	364.8
7-Jul-10	3969	3595.94	372.93
15-Jun-11	3969	3595.72	373.15

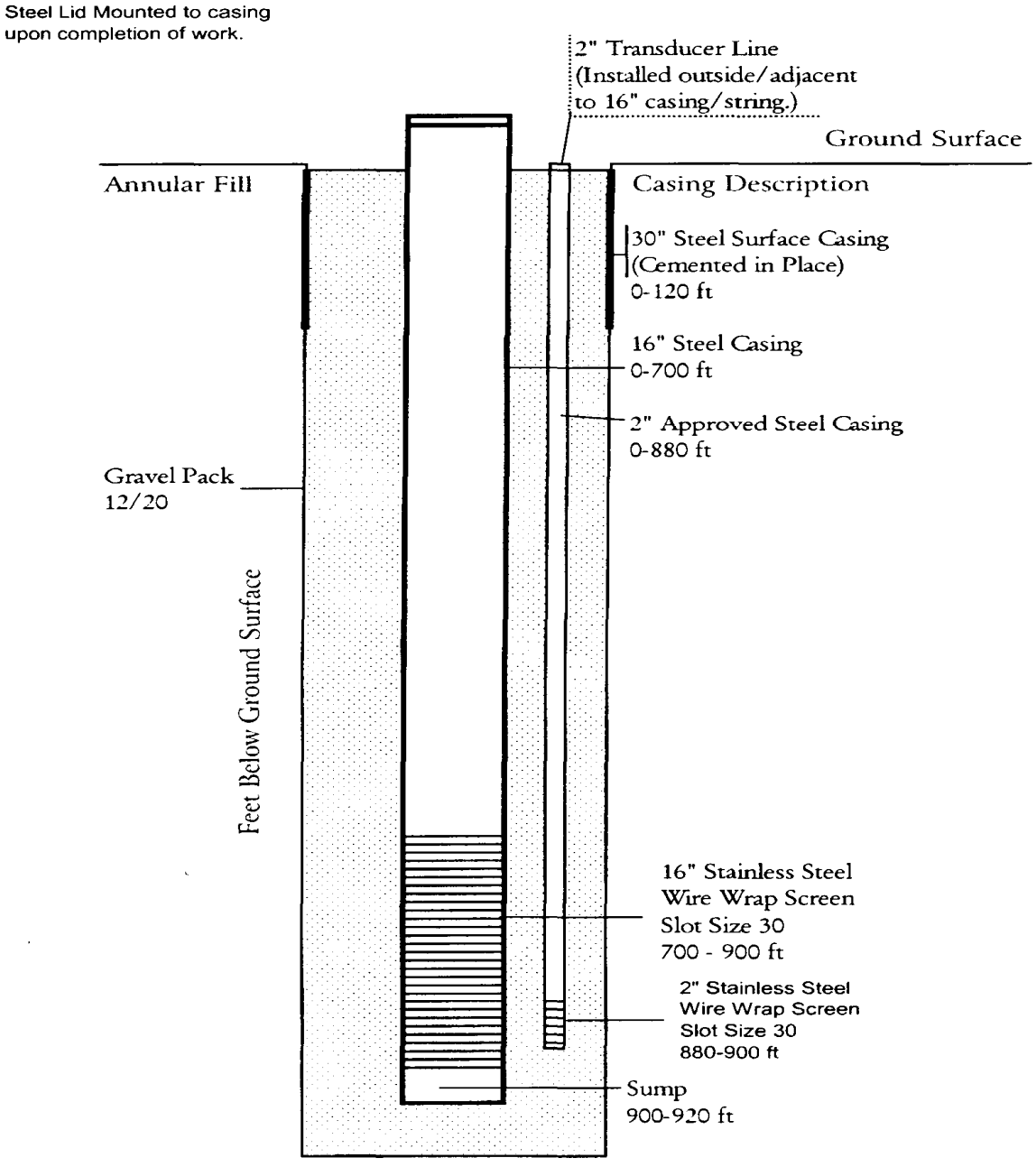
EPWU Well Number: 614

Address:	Purple Heart Mem. Hwy
Date Drilled:	2006
Wellfield:	Blend Wells
Aquifer:	Hueco Bolson
Latitude:	31 51 30
Longitude:	106 20 09
UTM North:	
UTM East:	
Elevation:	3970
Total Depth:	929'
Blank-1:	16
Blank-2:	N/A
Screen-1:	16
Screen-2:	N/A
Screen Interval:	From 700-900 ft
TWDB State Number:	JL-49-14-114

EPWU Well Number: 614

EPWU Well Number: 614

WELL COMPLETION DIAGRAM
EPWU/FT BLISS BLEND WELLS



TOTAL DEPTH: 920 FT.

Not To Scale

EPWU Well Number: 614

Pump Curves

ALPHA SW
WELL # 614
RATED FOR 700 GPM @ 808' AT 1770 RPM

PUMP DATA SHEET 07/20/06
60CYVER081005 Vers: 08112005
National Pump Company

Powered By PUMP-FLO

Selection list: —

Pump: J11LC (14 stages)
Type: VERT.TURBINE
Synch speed: 1800 rpm
Impeller:
Speed: 1770 rpm
Dia: 8.6925 in
Curve no.: CVJ11L4P6CY

Specific Speeds:
Ns: 2104
Nss: 11977

Dimensions:
Suction: 8 in
Discharge: 8 in

Pump Limits:
Temperature: 180 °F
Pressure: 350 psi g
Sphere size: 0.75 in
Power: — hp
Eye area: — in²

Motor:
Standard: NEMA
Enclosure: ODP
Sizing criteria: Max Power on Design Curve
Size: 200 hp
Speed: 1800
Frame: 445T

Search Criteria:
Flow: 700 US gpm
Head: 808 ft

Fluid: Water at 60 °F
SG: 1
Viscosity: 1.105 cP
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

NPSHa: — ft

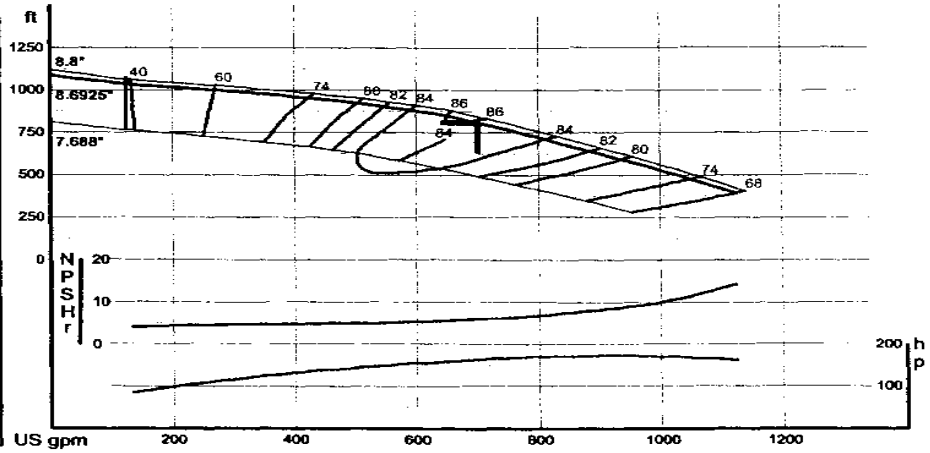
Advanced Criteria: none specified

Warning List:
Pump shutoff dP exceeds limit for the pump.

— Data Point —
Flow: 700 US gpm
Head: 808 ft
Eff: 86%
Power: 166 hp
NPSHr: 6.17 ft

– Design Curve –
Shutoff Head: 1090 ft
Shutoff dP: 471 psi
Min Flow: 125 US gpm
BEP: 86% eff
@ 677 US gpm
NOL Pwr: 175 hp
@ 934 US gpm

– Max Curve –
Max Pwr: 183 hp
@ 950 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power hp	NPSHr ft
840	1770	682	83	173	7.55
700	1770	808	86	166	6.17
560	1770	898	83	153	5.33
420	1770	955	74	137	4.98
280	1770	998	61	115	4.66

PUMP-FLO 2004 NOTE: INCLUDED COLUMN LOSS AND DISCHARGE HEAD LOSS TO THE TDH GIVEN ON BID FORM

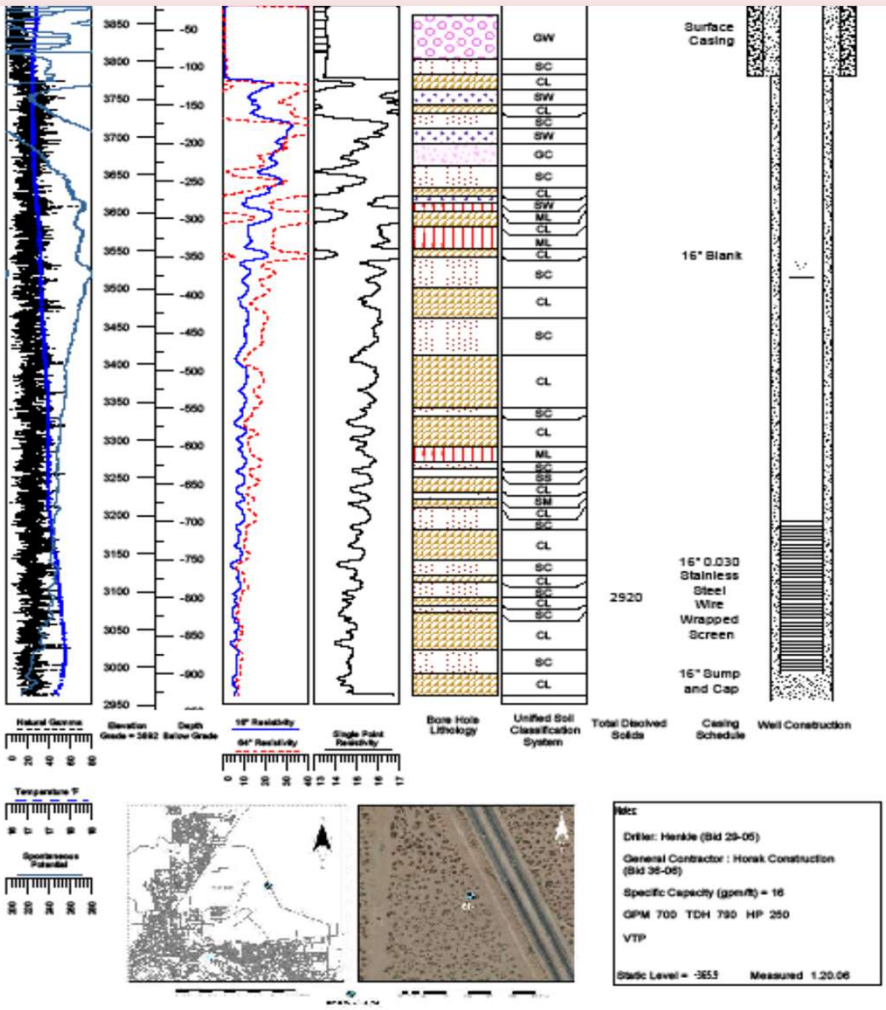
Water Resources Management

El Paso Water Utilities
Water Resources Management
Section 130
1154 Hawkins Blvd.
El Paso, Texas 79925
(915)594-5678 Office
(915)594-5572 Fax

EPWU 614

Henkle Drilling Company
Drilled 11.27.05 to 12.8.05
Equipped March 2007

EPWU Well Number: 614



SECTION 09911 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Primers.
2. Finish coatings.
3. Floor sealers and paints.

B. Related Requirements:

1. Section 09974 "Water Treatment System Coatings" for shop priming transmission coatings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include preparation requirements and application instructions.
2. Indicate VOC content.

B. Samples: For each type of topcoat product.

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product Schedule: Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As indicated in a color schedule.

2.3 PRIMERS

A. Water-Based, Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, exterior ferrous metals subject to mildly corrosive environments.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

B. Surface-Tolerant Metal Primer: Corrosion-resistant, solvent-based metal primer formulated for use on structural steel and metal fabrications that have been minimally prepared.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

C. Alkyd Metal Primer: Corrosion-resistant, solvent-based, alkyd primer formulated for use on prepared ferrous metals subject to industrial and light marine environments.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

D. Epoxy Metal Primer: Corrosion-resistant, solvent-based, two-component epoxy primer formulated for use on prepared, exterior ferrous- and galvanized-metal surfaces.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

E. Vinyl Wash Primer: Two-component, vinyl butyral/phosphoric acid, wash primer formulated for use over cleaned metal surfaces and zinc-rich primers as a tie coat for subsequent corrosion-resistant primers or finish coatings.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

2.4 FINISH COATINGS

A. Quick-Drying Alkyd Enamel, Gloss: Solvent-based, alkyd or modified-alkyd enamel formulated for quick-drying capabilities and for use on exterior, primed, metal and dimensionally stable wood surfaces.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal.

5. Gloss Level: Manufacturer's standard gloss finish

B. High-Build Epoxy Paint, Low Gloss: High-solids, two-component epoxy; formulated for use on exterior concrete, masonry, and primed-metal surfaces.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal;

5. Gloss and Sheen Level: Manufacturer's standard low-gloss finish.

C. Exterior, Water-Based, Light Industrial Coating, Low Sheen: Corrosion-resistant, water-based, pigmented, emulsion coating formulated for resistance to blocking (sticking of two painted surfaces), water, alkalis, moderate abrasion, and mild chemical exposure and for use on exterior, primed, wood and metal surfaces.

1. PPG Paints; PPG Industries, Inc;
2. Sherwin-Williams Company (The);
3. Tnemec, Inc.(TN);
4. Or equal;

5. Gloss and Sheen Level: Manufacturer's standard low-sheen finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Fiber-Cement Board: 12 percent.
3. Masonry (Clay and Concrete Masonry Units): 12 percent.
4. Wood: 15 percent.
5. Portland Cement Plaster: 12 percent.
6. Gypsum Board: 12 percent.

C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.

D. Exterior Gypsum Board Substrates: Verify that finishing compound is dry and sanded smooth.

E. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.

F. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.

1. SSPC-SP 2.
2. SSPC-SP 3.

3. SSPC-SP 7/NACE No. 4.

4. SSPC-SP 11.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
2. Sand surfaces that will be exposed to view, and remove sanding dust.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

A. Apply paints in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
4. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed to view:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Tanks that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
3. Allow empty paint cans to dry before disposal.

4. Collect waste paint by type and deliver to recycling or collection facility.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Water-Based, Light Industrial Coating System:

   a. Prime Coat: Alkyd metal primer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Exterior, water-based, light industrial coating, low sheen.

2. Water-Based, Light Industrial Coating over Epoxy System:

   a. Prime Coat: Epoxy metal primer.
   b. Intermediate Coat: High-build epoxy paint, low gloss.
   c. Topcoat: Exterior, water-based, light industrial coating, low sheen.

3. Alkyd System:

   a. Prime Coat: Alkyd metal primer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Exterior alkyd enamel, semigloss.

4. Quick-Drying Enamel System:

   a. Prime Coat: Quick-drying, alkyd metal primer.
   b. Intermediate Coat: Matching topcoat.
   c. Topcoat: Quick-drying alkyd enamel, semigloss.

B. Bituminous-Coated Substrates:

1. Latex System:

    a. Prime Coat: Water-based, rust-inhibitive primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Exterior latex paint, flat.

2. Latex Aggregate System:

    a. Prime Coat: As recommended in writing by topcoat manufacturer.
    b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
    c. Topcoat: Textured latex coating, flat.

3. Alkyd System:

    a. Prime Coat: Water-based, rust-inhibitive primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Exterior alkyd enamel, semigloss.

4. Aluminum Paint System:

    a. Prime Coat: Water-based, rust-inhibitive primer.
    b. Intermediate Coat: Matching topcoat.
    c. Topcoat: Aluminum paint.

END OF SECTION 09911

SECTION 09974 – WATER TREATMENT TRANSMISSION SYSTEM COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and application of high-performance coating systems on the following substrates:

1. Exterior Substrates:

    a. Steel.
    b. Ductile or cast iron.
    c. Stainless steel.

2. Interior Substrates:

    a. Steel.
    b. Ductile or cast iron.

B. Related Requirements:
1. Section 09911 "Exterior Painting" for general field painting.

1.3 DEFINITIONS

A. MPI Gloss Levels: Following define gloss levels according to ASTM D 523:

1. MPI Gloss Level 1 - Traditional Matte or Flat Finish: Maximum five units at 60 degrees and 10 units at 85 degrees.
2. MPI Gloss Level 2 - Velvet-Like Finish: Maximum 10 units at 60 degrees and 10 to 35 units at 85 degrees.
3. MPI Gloss Level 3 - Traditional Eggshell-Like Finish: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
4. MPI Gloss Level 4 - Satin-Like Finish: 20 to 35 units at 60 degrees and minimum 35 units at 85 degrees.
5. MPI Gloss Level 5 - Traditional Semi-Gloss Finish: 35 to 70 units at 60 degrees.
6. MPI Gloss Level 6 - Traditional Gloss: 70 to 85 units at 60 degrees.
7. MPI Gloss Level 7 - High Gloss: Minimum 85 units at 60 degrees.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on actual substrate material to be coated, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Use same designations indicated on Drawings and in Water Transmission System Coating Schedule. Include color designations and product runs (batch numbers).

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Engineer will select one surface to represent surfaces and conditions for application of each coating system. Engineer will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Engineer at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Engineer specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.
3. Deliver materials on site in factory sealed containers from the manufacturer. Do not use materials from previous jobs.

1.8 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are within the coatings manufacturer's recommendations.

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point and rising; or to damp or wet surfaces.

C. Lead Paint: It is not expected that lead paint will be encountered in the Work.

1. If suspected lead paint is encountered, do not disturb; immediately notify Engineer and Owner.

D. Lead Paint: Lead paint may be present in buildings and structures to be painted. A report on the presence of lead paint is on file for review and use. Examine report to become aware of locations where lead paint is present.

1. Do not disturb lead paint or items suspected of containing hazardous materials.

2. Work associated with preparation for painting of substrates known to include lead paint and lead based paint abatement shall be provided in accordance with EPA Renovation, Repair and Painting Rule, additional requirements of authorities having jurisdiction.

E. Do not apply exterior coatings in snow, rain, fog, mist, and in conditions that do not meet the manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Carboline Company (CAR).
2. PPG Paints (PPG).
3. The Sherwin-Williams Company (SWC).

4. Tnemec Company, Inc. (TNE).

2.2 HIGH-PERFORMANCE COATINGS

A. Material Compatibility:

1. Each coating system within indicated substrates uses compatible material with one another, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. Topcoat manufacturer recommends products in writing for use in each coating system coat and on indicated substrate.
3. Use products from same manufacturer for each coat in coating system.

B. Colors: As selected by Engineer from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, both coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

1. Application of coating indicates acceptance of surfaces and conditions.
2. Recoating of Previously Coated Surfaces: Verify conditions and compatibility between new and existing high-performance coating products.

C. Proceed with coating application only after unsatisfactory conditions have been corrected. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be coated.

1. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
2. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed.
3. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by manufacturer but not less than the following:
1. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
2. SSPC-SP 10/NACE No. 2, "Near White Blast Cleaning."
3. SSPC-SP 6/NACE No. 3, "Power Tool Cleaning."
4. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
5. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
6. NAPF 500-03, "Surface Preparation Standard for Ductile Iron Pipe and Cast Ductile Iron Fittings."

3.3 APPLICATION

A. Apply high-performance coatings in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

E. Film Thickness: Apply paint in wet film thickness (WFT) recommended by high-performance manufacturer to achieve specified dry film thickness (DFT) for each coat of paint. Since DFT varies among manufacturers, this reference is not included in Article "Water Transmission System Coating Schedule."

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

A. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

B. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Engineer, and leave in an undamaged condition.

C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 WATER TRANSMISSION SYSTEMS COATING SCHEDULE

A. Protection of submerged valves and pumps, penstocks, and piping, including buried yard piping:

1. Steel Substrates:

a. Coal-tar Epoxy Polyamide System: Pipeline Exterior Coating.

1) Direct to Metal Coat: (MPI Gloss Level 4).

a) CAR: Bitumastic 300M.
b) PPG: Sigmashield 880.
c) SWC: Targuard Epoxy.
d) TNE: Series 46H-413.

b. Solvent Free Aromatic Polyurethane System, NSF/ANSI 61-600 certified, Meets AWWA C222: Pipeline Exterior Coating.

1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

a) CAR: Polyclad 777 Series.
b) PPG: Raven Aquataflex 505.
c) SWC: Poly Cote 110.
d) TNE: Series 406.

c. Solvent Free Aromatic Polyurethane Hybrid, NSF/ANSI 61-600 certified, Meets AWWA C222: Pipeline Interior Coating.

1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

a) CAR: Polyclad 767.
b) PPG: Raven Aquataflex 505.
c) SWC: Poly Cote 115.
d) TNE: Series 406.

2. Ductile Iron or Cast-Iron Substrates:

a. Coal-tar Epoxy Polyamide System: Pipeline Exterior Coating.

1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

a) CAR: Bitumastic 300M.
b) PPG: Amercoat 78HB.
c) SWC: Targuard Epoxy.
d) TNE: Series 46H-413.

b. Solvent Free Aromatic Polyurethane System: Meets AWWA C222, Pipeline Exterior Coating.

1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

a) CAR: Polyclad 777 Series.
b) PPG: Raven Aquataflex 505.
c) SWC: Poly Cote 110.
d) TNE: Series 406.

c. 100% Solids Elastomeric Urethane, NSF/ANSI 61-600 certified: Pipeline Interior Coating.

1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

a) CAR: Polyclad 767.
b) PPG: Raven Aquataflex 505.
c) SWC: Poly Cote 115.
d) TNE: Series 264.

3. Stainless Steel Substrates: Exterior protection of buried yard piping.

    a. 100% Solids Amine Cured Epoxy System: Meets AWWA C210, SSPC-SP-16, 3 mils DFT minimum blast profile.

        1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

            a) CAR: Plasite 4500S.
            b) PPG: Novaguard 810ER.
            c) SWC: Duraplate UHS.
            d) TNE: Series 22.

    b. 100% Solids Reinforced Epoxy System: Meets AWWA C210, SSPC-SP-16, 3 mils DFT minimum blast profile.

        1) Direct to Metal Coat: (MPI Gloss Level 5 or 6).

            a) CAR: Plasite 4500S.
            b) PPG: Novaguard 810ER.
            c) SWC: Duraplate 6000.
            d) TNE: Series 142.

END OF SECTION 09974

DIVISION 11:	SPECIAL CONSTRUCTION	No. of Pages
13701	MAGNETIC FLOW METERS	6

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SECTION 13701 - MAGNETIC FLOW METERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. General provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes magnetic flow meters.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each Magnetic Flow Meter, submit test reports performed by manufacturer and witnessed by a qualified testing agency.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. One flow indicating transmitter for each type of flow element provided.

1.5 QUALITY ASSURANCE

A. Provide components compatible with functions required to form complete working system.

B. Ensure that materials of construction of wetted parts are compatible with process liquid.

C. Materials in Contact with Potable Water: Certified to NSF 61 and NSF 372.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace instruments that fail(s) in materials or workmanship within specified warranty period.

1. Warranty Period: Provide next day on-site service covering parts and labor for 2 year(s) from date of substantial completion. Perform on-site service is to be performed by an authorized representative of the manufacturer.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Furnish sensors, field preamplifiers, signal conditioners, offset and span adjustments, amplifiers, transducers, transmitters, control devices, interconnecting cables, and unit conversions and algorithms as required for application.

2.2 MAGNETIC FLOW METERS

A. Manufacturers:

1. Manufacturers and their products are subject to compliance with requirements. Provide one of the following:

    a. Endress+Hauser Proline Promag W 400 Electromagnetic Flowmeter 0 x DN (nominal diameter) inlet and 0 x DN outlet runs,
    b. Or approved equal.

B. General:

1. Low-frequency, electromagnetic induction-type flow meter, producing a linear signal directly proportional to flow rate, consisting of flow tube, signal cable, and transmitter.

C. Type:

1. Between-flange mounting.
2. Comply with AWWA M33.

D. Performance and Design Criteria:

1. Process Fluid: Raw Water.
2. Flow Rate Range: 500-2,000 gpm, flow rate for each well site to be approved by Engineer before ordering.
3. Accuracy: Plus or minus 0.5 percent of actual flow rate over a 30:1 range, within velocity limits of 0.1 to 10 ft/sec.
4. Size: 8” or 12”, as approved by Engineer for each well site.
5. Flow Tubes:

    a. Body Material: Type 304 stainless-steel.

6. Liner: To be suitable for application and compatible with the process fluid and according to manufacturer’s recommendation.
7. Flanges: ANSI 150lb or DIN PN 16. Stainless steel flanges shall be used n all SS process pipes.
8. Flange Material: Stainless steel or Carbon steel as required by the piping system.

9. Environment: For meters with remote mounted transmitters, meters below grade to be suitable for submergence for up to 48 hours to a depth of 30 feet. Meters above grade to be NEMA 4X (IP65).

E. Electrodes:

1. Type 316 stainless steel standard minimum requirements. All electrodes to be compatible with raw water.

F. Accessories:

1. Integral level compensation to allow accurate measurement of flow in pipes between 10% to 100% fill level.
2. Provide automatic, nonmechanical electrode cleaning system without taking meter out of service.
3. Provide manufacturer cable between transmitter and receiver.
4. Furnish stainless-steel grounding rings, wires, and gaskets as recommended by the manufacturer. All materials must be suitable for the process and surrounding pipe.

2.3 TRANSMITTERS

A. Manufacturer: Same manufacturer as meter.

B. Transmitter Output:

1. 4- to 20-mA DC analog signal.

C. Housing: NEMA 4X (IP65), suitable for surface or pipe stand mounting.

D. Display:

1. Touch-screen programming, functioning through enclosure window without opening enclosure.
2. Size: Four lines by 16 characters.
3. Type: Backlit digital display.
4. User-selectable engineering units.
5. Readout of diagnostic error messages.

E. Control Power:

1. 120VAC, single phase, 60 Hz.
2. Wire in accordance with Section 16052 “Equipment Wiring Connections.”
3. Provide local transformers as required.

F. Mounting:

1. Mounting: Integral or remote mounting as approved by Engineer.
2. Remote Mounting Locations Less Than 4 feet above Grade: Provide stainless-steel mounting posts.

G. Transmitter Communication Interface: HART.

H. Required Accessories:

1. A fully configurable and locally viewable totalizer integral to the transmitter.
2. Current signal output simulation.
3. Empty pipe detection.
4. Self-diagnostics.
5. Signal Cable: Provided by flow meter manufacturer.
6. Automatic zero adjust.
7. Field validation package that compares current operational status to a factory baseline to verify meter performance. Furnish field verification hardware and software tools and compatible transmitters as required.
8. Provide bi-directional flow indication, and transmission by means of a relay output or a second analog output.
9. For outdoor installations, provide sunshield of sturdy, corrosion- and UV-resistant material.

2.4 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing of meters according to AWWA M6.

B. Owner Inspection:

1. Make completed flow meter available for inspection at manufacturer's factory prior to packaging for shipment.
2. Notify Owner at least seven days before inspection is allowed.

C. Owner Witnessing:

1. Allow witnessing of factory inspections and tests at manufacturer's test facility.
2. Notify Owner at least seven days before inspections and tests are scheduled.

D. Certificate of Compliance:

1. If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.
2. Specified shop tests are not required for Work performed by approved manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, roofs, and process area for suitable conditions where magnetic flow meters will be installed.

B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with NECA 1.

B. Wiring Method:

1. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures:

1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

3.3 IDENTIFICATION (NOT USED)

3.4 FIELD QUALITY CONTROL

A. Perform the tests and inspections in accordance with the following:

B. Magnetic flow meters will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks' according to manufacturer's written instructions.

2. The start-up services include calibration, oversight of installations of the sensor, and start-up of the sensor/transmitter in order to provide reliable measurement at the instrument. Work with the integrator to verify the transmitter sends correct information to the control system (i.e., that the scaling and units are the same at the instrument and on the control system's operator interface/PLC). Submit an instrument calibration report in order to document the calibration procedure of the instruments.

3.6 MAINTENANCE SERVICE

A. Vendor Maintenance Service: Beginning at Substantial Completion, ensure maintenance service includes 12 months' full maintenance by manufacturer's authorized service representative. Include annual preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Provide manufacture's authorized replacement parts and supplies.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

B. While starting up the instruments, the manufacturer to provide training to the Owner's instrumentation technicians as follows:

1. How to calibrate, install, troubleshoot, read the diagnostics, and maintain the sensor and transmitter.
2. Provided 1 time and last up to 2 hours in the field.

END OF SECTION 13701

SECTION 16150 – LOW-VOLTAGE INDUCTION MOTORS TO 500 HP

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single- and three-phase motors for application on process equipment provided under other Sections.

B. The manufacturer of the driven equipment shall provide the associated motor.

C. Related Requirements:

1. Section 16056, “Grounding and Bonding for Electrical Systems”.
2. Section 16070, “Identification for Electrical Systems”.
3. Section 16296, “Low Voltage Pulse Width Modulated (PWM) Variable Frequency Drive”.

1.3 DEFINITIONS

A. NETA ATS: Acceptance Testing Specification.

B. VFC: Variable-frequency motor controller. See VFD.

C. VFD: Variable-frequency drive. Used interchangeably with the term VFC.

1.4 SUBMITTALS

A. Product Data: For each type and rating of motor indicated.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.
2. Include nameplate data, compliance with specified standards, electrical ratings and characteristics, physical dimensions, frame size, weights, mechanical performance data, support points and the following:

a. Descriptive bulletins, including full description of insulation system.
b. Bearing design data.
c. Efficiency at 1/2, 3/4 and full load.
d. Power factor at 1/2, 3/4 and full load.

e. Conduit entry points and sizes.
f. Special features and accessories (i.e. space heaters, temperature detectors, etc.).
g. Power factor correction capacitor rating and type (when required).

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Qualifications Statements:

1. Submit qualifications for manufacturer and testing agency.

1.5 QUALITY ASSURANCE

A. Electric motors driving identical equipment shall be identical.

B. Motors shall be listed under UL recognized component file as applicable.

C. Motor manufacturer to maintain a documented ISO 9001 quality assurance program implementing suitable procedures and controls to monitor all aspects of production and testing.

D. When electrically driven equipment differs from that indicated, adjust the motor size, wiring and conduit systems, disconnect devices, and circuit protection to accommodate the equipment actually installed.

E. Testing Agency Qualifications: Member company of NETA or NICET.

1.6 DELIVERY, STORAGE AND HANDLING

A. Ship motor fully assembled, capable of being lifted in one piece. Comply with Section 01600, "Product Requirements" for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on site in manufacturer's original packaging and inspect for damage.

C. Storage:

1. Store materials according to manufacturer instructions.
2. Energize motors furnished with space heaters to prevent condensation throughout the storage and construction period. Perform periodic motor insulation resistance tests per manufacturer’s storage recommendations.
3. For extended outdoor storage, remove motors from equipment and store separately.
4. Maintain bearings during storage and construction period, and periodically rotate the motor shaft per manufacturer’s storage recommendations.
5. Lubricate per manufacturer’s recommendations and inspect purged grease for water, rust, or other contaminants.

D. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Provide additional protection according to manufacturer instructions.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of motors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three-years from date of Substantial Completion for inverter duty motors.
2. Warranty Period: Five-years from date of Substantial Completion for constant speed severe-duty motors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Nidec (US Motors).
2. ABB (Baldor-Reliance).
3. TECO-Westinghouse.
4. Toshiba.
5. WEG.
6. General Electric.
7. Or equal.

2.2 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in equipment schedules or Sections.

B. Comply with the latest revision of the following as applicable:

1. NEMA MG 1, “Motors and Generators”.

C. Unless otherwise noted, all motors ½ through 100 horsepower shall be rated 230/460 Volt, three-phase, 60 Hertz A.C.; motors 125 horsepower and above shall be rated 460 Volt, three-phase, 60 Hertz; and motors below ½ horsepower shall be rated 115/230 Volt, single phase, 60 Hertz A.C.

D. Duty: Continuous duty at ambient temperature of 45 deg C and at altitude of 4000feet above sea level.

E. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

F. Horsepower rating: Size for operation within the full load nameplate rating without applying the service factor, throughout the full range of mechanical or hydraulic operating condition.

G. Specific motor application data such as Hp, rpm, enclosure type, accessories, etc., are specified under the detailed driven mechanical equipment specification.

H. Nameplates: Engrave or emboss on 316 stainless steel fastened to the motor frame with stainless steel screws or drive pins with information per NEMA MG 1.

I. Space heater: Include 120-volt space heater for moisture control on all motors rated 50 horsepower and larger.

J. Service Factor: 1.15 service factor on sine wave power and 1.0 service factor on VFD power in a 45 degrees C ambient, unless otherwise noted.

K. Motors and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

L. Enclosures: Conform to one of the NEMA standard enclosure designs as specified under the detailed driven mechanical equipment specification. If no enclosure type is specified, provide TEFC (Totally Enclosed Fan Cooled) enclosures.

M. Motors connected to VFCs: Inverter duty rated and comply with NEMA MG 1, Part 31. First or second torsional critical speed shall be outside the operating speed range for all VFC controlled motors.

N. Three-phase motors:

1. Description: NEMA MG 1, Design B, medium induction motor.

2. Efficiency: Meet or exceed requirements for NEMA MG 1, Part 12 for Premium Efficient motors 1 HP and larger.
3. Service Factor: 1.15.
4. Multispeed Motors: Variable torque.

    a. For motors with 2:1 speed ratio, consequent pole, single winding.
    b. For motors with other than 2:1 speed ratio, separate winding for each speed.

5. Rotor: Random-wound, squirrel cage.
6. Code Letter Designation:

    a. Motors 15 HP and Larger: NEMA starting Code F or Code G.

7. Accessories: Where specified herein, or under process mechanical specification.

2.3 THREE PHASE MOTOR CONSTRUCTION

A. Enclosure and Frame:

1. NEMA enclosure type as specified in the process equipment specification.
2. NEMA frame for the associated horsepower.

3. Motor frames: Cast iron or welded heavy plate steel construction, stiff enough to withstand the rotating forces and torques generated and designed to limit or avoid any undesirable harmonic resonances.
4. Provide a threaded, forged steel, shouldered eyebolt blind tapped into the motor frame for lifting on all frames 254T and larger.
5. Condensate drain openings: Locate drain holes at the low points in the end brackets to allow removal of accumulated moisture from enclosures. Provide corrosion resistant, breather drain plugs for severe-duty motors.
6. Hardware: Hex head, SAE Grade 5 or better, plated for corrosion protection.
7. Nameplates: Engraved or embossed stainless steel plates fastened to the motor frame with stainless steel screws or drive pins. Clearly indicate all items of information listed in the applicable part of NEMA MG 1.
8. Main terminal box: Fabricated steel or cast iron, sized per the NEC for number and size of conduit connections and conductor bending and terminations as indicated on the Drawings. Split box top to bottom with capability to rotate entry point to any quadrant. Provide gaskets between the box and motor frame and between box and its cover. Include ground lug for equipment grounding conductor termination.
9. Bearing housings: Provide machined surfaces for attaching a magnet mounted accelerometer to monitor the motor vibration in the vertical, horizontal, and axial directions at each bearing housing.
10. Frame grounding: provide motor frame grounding pad or threaded stud where supplemental grounding to frame is indicated on the drawings.

B. Windings:

1. Copper.
2. Insulation rating: Class F.
3. Temperature rise: Class B at 1.0 SF, Class F at 1.15 SF.
4. Insulation: Non-hygroscopic, epoxy encapsulated windings for enclosure types WP I and WP II. Provide upgraded insulation by additional dips and bakes to increase moisture resistance for totally enclosed designs. Provide vacuum pressure impregnated (VPI) epoxy insulation for moisture resistance for outdoor motors.
5. Provide chemical and humidity resistance insulation system when IEEE 841 motors are specified.
6. Provide winding surge withstand capability per NEMA 1, Part 31 for VFC driven motors.
7. Provide specified temperature sensing devices for VFC driven equipment. If not specified, provide a winding temperature detector per the accessories paragraph.

C. Motor leads: Non-wicking type, minimum Class F temperature rating and permanently numbered for identification.

D. Stator: Built up core using high grade, low loss silicon steel laminations keyed or dovetailed to the stator frame and securely held in place at each end.

E. Rotor:

1. Forged or rolled steel shaft, machined, smooth finished, with sufficient strength for operation including 25 percent overspeed condition.
2. Shaft end coordinated with driven equipment coupling.
3. Entire assembly coated with protective coating.

4. Inpro seals on both ends of the shaft to prevent grease leakage and entrance of foreign materials, such as water and dirt, into the bearing area while running, coasting, or at rest. Severe duty motors to have improved sealing per IEEE 841.
5. Vertical Motor Shafts:

    a. Provide hollow shaft and P flange mounting to allow driven shaft to extend through provide for vertical pump applications.
    b. Coupling for connecting the motor shaft to the driven shaft is located in the top of the motor.

6. Rotor Core:

    a. Solid, built-up stack of fully processed and coated, high-grade, low-loss silicon steel laminations.
    b. Die cast aluminum or fabricated copper bard or their respective alloys.
    c. Rotors on frames 213T and above to be keyed to shaft and rotating assembly dynamically balanced.

7. Rotor Assembly:

    a. Coated with corrosion resistant epoxy insulating varnish or other protective coating, thermally stable, statically and dynamically balanced.
    b. Balance weights securely attached to the rotor resistance ring by welding or similar permanent method.

F. Horizontal Bearings: roller type, grease lubricated.

1. Bearings: Anti-friction open or single-shield, vacuum-degassed steel ball or roller bearings, electric motor quality, designed for 45 degrees C maximum temperature rise. Metric size bearings are not acceptable.
2. Life: L 10 life of 100,000 hours for direct coupled applications and 26,000 hours for belted applications based. IEEE 841 motors, L 10 life increased to 150,000 and 50,000 hours respectively.
3. Shaft seals: Provide to prevent grease leakage and the entrance of foreign materials, such as water and dirt, into the bearing area while running, coasting, or at rest.
4. Shaft currents: Provide mitigation per process equipment specification.
5. Comply with ABMA and refer to process equipment specification for stricter or additional requirements.

G. Vertical Bearings: per manufacturer, thrust type.

1. Bearings: Manufacturer's standard design, constructed with thrust bearings on top to allow inspection and/or replacement without requiring complete disassembly of motor, of type and size to satisfy thrust loading requirements.
2. Life: Rated for an in-service L 10 life of 100,000 hours, designed to support the weight of the rotor plus, if required, the weight of the rotating driven equipment parts and the hydraulic thrust created by the driven equipment, with a 40 degrees C maximum temperature rise. Metric bearings are not acceptable.
3. Shaft seals: Provide to prevent grease leakage and the entrance of foreign materials, such as water and dirt, into the bearing area while running, coasting, or at rest.
4. Shaft currents: Provide mitigation per process equipment specification.

5. Comply with ABMA and refer to process equipment specification for stricter or additional requirements.

2.4 THREE PHASE MOTOR ACCESSORIES

A. Space heaters: Silicone rubber strip type, accessible for inspection, rated 120 Volt, single phase, designed to prevent condensation inside the enclosure when the motor is idle, with leads brought out to a separate terminal box. Emboss the heater wattage and voltage on the motor nameplate.

B. Winding temperature switch: Three embedded bi-metallic temperature thermostat switches with normally closed contacts and leads terminating in the main conduit box.

1. Provide for motors up to 150 HP.

C. Winding temperature relay: Three embedded PTC thermistors with epoxy-encapsulated 115 VAC, single phase, solid state control relay with dual Form C contacts. Wire thermistor leads brought out to separate terminal box on the motor frame.

1. Provide for motors greater than 150 HP up to 300 HP.

D. Winding temperature RTDs: Six 100 Ohm platinum (PT 100), three-wire resistance-type temperature detectors (RTDs) embedded in the stator windings, two per phase, symmetrically installed between stator coils where highest temperature will occur. RTD leads brought out to separate terminal box on the motor frame. One RTD set in each phase to be operational and one RTD set to be spare.

1. Provide for motors greater than 300 HP.

E. Bearing temperature sensing:

1. RTD: Provide three replaceable 100 Ohm platinum (PT 100) three-wire RTD's, with spring loaded tip. Mount RTD as close as possible to outer surface of each bearing. RTD includes conduit connection head, terminal block, and cabling brought out to a common terminal box.

a. Provide for motors greater than 300 HP.

F. Inverter Duty: Motors connected to Variable Frequency Drive Controllers shall be designed for inverter duty and shall comply with the following:

1. Motor shaft currents: insulate the ODE bearing and provide a shaft grounding ring. Insulate bearing probes to prevent shorting out bearing insulation.
2. Shaft grounding rings: maintenance free, circumferential micro fiber type, AEGIS™ SGR by electro Static Technology or equal to discharge shaft currents to ground.

G. Vibration Sensors: Provide three vibration sensors for motors greater than 150 HP. Provide machined surfaces at each bearing housing for attaching a magnetic mounted accelerometer in order to monitor motor vibration in vertical, horizontal and axial directions. Coordinate with the supplier of the machine monitoring equipment.

H. Anti-Backspin Device: Provide shaft mounted, mechanical non-reverse ratchet rated at 100 percent of motor full load torque for immediate protection against reversing due to phase reversals or from backspin at shutdown.

2.5 SOURCE QUALITY CONTROL

A. Section 01400 - Quality Requirements: Requirements for testing, inspection, and analysis.

B. Factory Testing: Prior to shipment perform manufacturer's standard tests in accordance with NEMA MG 1 and IEEE 112.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Upon delivery of motor and prior to unloading, inspect equipment for damage.

B. Comply with DELIVERY, STORAGE, AND HANDLING article within this specification.

3.2 INSTALLATION

A. Prepare rigid foundation or mounting surface to minimize vibration and maintain alignment between motor and load shaft.

B. Install the motors per manufacturer's installation instructions.

C. Anchor motor base to load bearing surface with grade 5 steel bolts or better.

D. Align the motor shaft with driven equipment according to manufacturer's written instructions. Adjust axial position of motor frame with respect to load shaft.

E. Accurately adjust flexible couplings for direct drive according to machine manufacturer's guidelines. Check alignment to minimize vibrations. Coupling spacing shall be according to coupling manufacturer guidelines.

F. Install motor branch circuit conduits and conductors in accordance with NEC and local code requirements. Connect motors to rigid conduit system by a short section of liquid-tight flexible conduit to isolate the conduit system from motor vibration. Where motors are installed outdoors, bring conduit into bottom of motor terminal box to avoid standing water at connection point.

G. Terminate the motor leads as shown on the connection diagrams using products intended for vibration applications.

H. Ground equipment according to Section 16056, "Grounding and Bonding for Electrical Systems."

I. Tighten electrical connections and terminals according to manufacturers' published torque values.

J. Install conduit and wiring between motor auxiliary devices and associated indicators, controllers and protective devices in accordance to installation drawings.

K. Connect devices sensitive to electromagnetic interferes such as RTD's, thermistors, thermal protector switches, vibration sensors with shielded instrumentation wiring per installation drawings.

L. Comply with NECA 1.

M. Seismic Bracing: Equipment mounting hardware and seismic calculations shall conform to Seismic Zone 1 requirements.

3.3 IDENTIFICATION

A. Comply with requirements for identification specified in Section 16070, "Identification for Electrical Systems." Identify field-installed conductors, interconnecting wiring, and components.

3.4 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until motors are ready to be energized and placed into service.

B. Lubrication and Shaft Rotation: Lubricate parts and rotate shaft periodically according to manufacturer’s written instructions until motors are ready to be energized and placed into service.

3.5 FIELD QUALITY CONTROL

A. Perform inspections and tests Inspect and test according to the Inspection and Test Procedures for Rotating Machinery state in NETA Acceptance Testing Specification paragraph 7.15.1. Options tests are not required unless called for within the process equipment specification.

B. Perform the following infrared (thermographic) scan tests and inspections, for all motors 250 hp and larger, and prepare reports:

1. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each motor exterior for detection of hot spots in stator or bearings.
2. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each motor 11 months after date of Substantial Completion.
3. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

C. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Motors will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies the motor and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.6 STARTUP AND ADJUSTMENT

A. Complete installation and startup checks according to manufacturer's written instructions. Confirm motor is structurally, mechanically, and electrically ready for start-up. Checks include support system, vibration isolation, alignment, lubrication system, and cleanliness.

B. Start-up motor in accordance with process equipment specification.

C. Verify correct phase rotation at motor with driven equipment uncoupled. Correction for phase rotation to be made in the motor terminal box.

D. Prepare inspection and test reports.

3.7 DEMONSTRATION / SYSTEM FUNCTION TESTS

A. Run motor for system testing as required in motor controller and driven equipment specifications.

B. Confirm correct operation of all protective and metering devices.

C. Measure voltage and motor running current and evaluate relative to load conditions and nameplate full load amperes. Corrective action is required for any current imbalance 10 percent or greater.

D. Prepare driven equipment system testing report. Include results of all tests and check made, meter readings and recordings, and summary adjustments made. Clearly identify any discrepancies and concerns.

END OF SECTION 16150

4. On restoration of power after a power failure, the drive shall automatically reset to be controlled by a remote start/stop dry contact and a 4-20 mA signal from the plant SCADA system or via network communication system.

3.5 CLEANING

A. Remove all rubbish and debris from inside and around the equipment. Remove dirt, dust, or concrete spatter from the interior and exterior of the equipment using brushes, vacuum cleaner, or clean, lint-free rags. Do not use compressed air.

B. Replace all cabinet ventilation filters upon commencement of the Contract warranty period.

3.6 WIRING & CONDUIT SIZE TABLE

WIRE AND CONDUIT SIZE

HP	FLA	CB	Wire and Conduit
75 (Power Source to VFD)		150/3	3#1, 1#6 G, 1-1/2"C
75 (VFD to Pump)	96	-	3#1, 1#6 G, 1-1/2"C
100 (Power Source to VFD)		175/3	3#2/0, #6G, 2"C
100 (VFD to Pump)	124	-	3#2/0, #6G, 2"C
125 (Power Source to VFD)		225/3	3#4/0, #4G, 2"C
125 (VFD to Pump)	156	-	3#3/0, #6G, 2"C
150 (Power Source to VFD)		250/3	3#250kcmil, #4G, 2-1/2"C
150 (VFD to Pump)	180	-	#4/0, #4G, 2"C
175 (Power Source to VFD)		350/3	3#500kcmil, #2G, 3"C
175 (VFD to Pump)	240*	-	3#350kcmil, #4G, 2-1/2"C
200 (Power Source to VFD)		350/3	3#500kcmil, #2G, 3"C
200 (VFD to Pump)	240	-	3#350kcmil, #4G, 2-1/2"C

225 (Power Source to VFD)		450/3	2-2"C each with 3#4/0, #2G
225 (VFD to Pump)	302*	-	3#500kcmil, #2G, 3"C
250 (Power Source to VFD)		450/3	2-2"C each with 3#4/0, #2G
250 (VFD to Pump)	302	-	3#500kcmil, #2G, 3"C
275 (Power Source to VFD)		500/3	2-3"C each with 3#250kcmil, #2G
275 (VFD to Pump)	361*	-	2-2"C each with 3#4/0, #2G
300 (Power Source to VFD)		500/3	2-3"C each with 3#250kcmil, #2G
300 (VFD to Pump)	361	-	2-2"C each with 3#4/0, #2G
350 (Power Source to VFD)		600/3	2-3"C each with 3#350kcmil, #1G
350 (VFD to Pump)	414	-	2-3"C each with 3#350kcmil, #1G
500 (Power Source to VFD)		1000/3	3-3"C each with 3#500kcmil, #2/0G
500 (VFD to Pump)	590	-	2-3"C each with 3#500kcmil, #1/0G

* NEC Table 430.250 does not include FLA for the indicated size. The next higher motor size is used per NEC. (The table assumes NEC full load amp values. Motors that are rated for less than 1800RPM may have higher ampacities than what the NEC lists, and therefore the tables would not be applicable.)

END OF SECTION 16296