

Form 3160-5
(June 2019)UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENTFORM APPROVED
OMB No. 1004-0137
Expires: October 31, 2021**SUNDRY NOTICES AND REPORTS ON WELLS**
Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

5. Lease Serial No. NMNM113970

6. If Indian, Allottee or Tribe Name

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator MARATHON OIL PERMIAN LLC

3a. Address 990 TOWN & COUNTRY BLVD, HOUSTON, TX 3b. Phone No. (include area code)
(000) 000-00004. Location of Well (Footage, Sec., T., R., M., or Survey Description)
SEC 1/T26S/R34E/NMP

7. If Unit of CA/Agreement, Name and/or No.

8. Well Name and No. MAMMOTH FEDERAL 26 34 1 WXY

9. API Well No. 3002546134

10. Field and Pool or Exploratory Area
WC 025 G 09 S263504N/WOLFCAMP11. Country or Parish, State
LEA/NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION				
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off	
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity	
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other	
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon		
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal		

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has detennined that the site is ready for final inspection.)

Marathon Oil Permian LLC. respectfully requests to make changes to the Approved APD for the above listed well. See attachment for a summary of the requested changes along with update well information such as a Revised C-102 Well Plat, Revised Directional Drilling Well Plan and Revised Drilling and Operations Plan.

Note: NO SURFACE CHANGES are being requested.

14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed)
MELISSA SZUDERA / Ph: (713) 296-3179

Title REGULATORY COMPLIANCE REPRESENTATIVE

Signature

Date

01/24/2022

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

CHRISTOPHER WALLS / Ph: (575) 234-2234 / Approved

Title Petroleum Engineer

Date

03/07/2022

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office CARLSBAD

Title 18 U.S.C Section 1001 and Title 43 U.S.C Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

GENERAL INSTRUCTIONS

This form is designed for submitting proposals to perform certain well operations and reports of such operations when completed as indicated on Federal and Indian lands pursuant to applicable Federal law and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local area or regional procedures and practices, are either shown below, will be issued by or may be obtained from the local Federal office.

SPECIFIC INSTRUCTIONS

Item 4 - Locations on Federal or Indian land should be described in accordance with Federal requirements. Consult the local Federal office for specific instructions.

Item 13: Proposals to abandon a well and subsequent reports of abandonment should include such special information as is required by the local Federal office. In addition, such proposals and reports should include reasons for the abandonment; data on any former or present productive zones or other zones with present significant fluid contents not sealed off by cement or otherwise; depths (top and bottom) and method of placement of cement plugs; mud or other material placed below, between and above plugs; amount, size, method of parting of any casing, liner or tubing pulled and the depth to the top of any tubing left in the hole; method of closing top of well and date well site conditioned for final inspection looking for approval of the abandonment. If the proposal will involve **hydraulic fracturing operations**, you must comply with 43 CFR 3162.3-3, including providing information about the protection of usable water. Operators should provide the best available information about all formations containing water and their depths. This information could include data and interpretation of resistivity logs run on nearby wells. Information may also be obtained from state or tribal regulatory agencies and from local BLM offices.

NOTICES

The privacy Act of 1974 and the regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.

AUTHORITY: 30 U.S.C. 181 et seq., 351 et seq., 25 U.S.C. 396; 43 CFR 3160.

PRINCIPAL PURPOSE: The information is used to: (1) Evaluate, when appropriate, approve applications, and report completion of subsequent well operations, on a Federal or Indian lease; and (2) document for administrative use, information for the management, disposal and use of National Resource lands and resources, such as: (a) evaluating the equipment and procedures to be used during a proposed subsequent well operation and reviewing the completed well operations for compliance with the approved plan; (b) requesting and granting approval to perform those actions covered by 43 CFR 3162.3-2, 3162.3-3, and 3162.3-4; (c) reporting the beginning or resumption of production, as required by 43 CFR 3162.4-1(c) and (d) analyzing future applications to drill or modify operations in light of data obtained and methods used.

ROUTINE USES: Information from the record and/or the record will be transferred to appropriate Federal, State, local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecutions in connection with congressional inquiries or to consumer reporting agencies to facilitate collection of debts owed the Government.

EFFECT OF NOT PROVIDING THE INFORMATION: Filing of this notice and report and disclosure of the information is mandatory for those subsequent well operations specified in 43 CFR 3162.3-2, 3162.3-3, 3162.3-4.

The Paperwork Reduction Act of 1995 requires us to inform you that:

The BLM collects this information to evaluate proposed and/or completed subsequent well operations on Federal or Indian oil and gas leases.

Response to this request is mandatory.

The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 8 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0137), Bureau Information Collection Clearance Officer (WO-630), 1849 C St., N.W., Mail Stop 401 LS, Washington, D.C. 20240

Additional Information

Location of Well

0. SHL: SESE / 835 FSL / 1255 FEL / TWSP: 26S / RANGE: 34E / SECTION: 1 / LAT: 32.0674346 / LONG: -103.4191776 (TVD: 0 feet, MD: 0 feet)

PPP: SWSE / 150 FSL / 1982 FEL / TWSP: 26S / RANGE: 34E / SECTION: 1 / LAT: 32.0655584 / LONG: -103.4215256 (TVD: 12602 feet, MD: 13055 feet)

BHL: NWNE / 150 FNL / 1986 FEL / TWSP: 26S / RANGE: 34E / SECTION: 1 / LAT: 32.0792422 / LONG: -103.4215409 (TVD: 12563 feet, MD: 17513 feet)

CONFIDENTIAL

Well Name: THUNDERBIRD 1-36 TB FED	Well Location: T26S / R34E / SEC 1 / SESE / 32.0674346 / -103.4191776	County or Parish/State: LEA / NM
Well Number: 14H	Type of Well: OIL WELL	Allottee or Tribe Name:
Lease Number: NMNM113970	Unit or CA Name:	Unit or CA Number:
US Well Number: 300254613400X1	Well Status: Approved Application for Permit to Drill	Operator: MARATHON OIL PERMIAN LLC

Notice of Intent

Sundry ID: 2653899

Type of Submission: Notice of Intent

Date Sundry Submitted: 01/26/2022

Date proposed operation will begin: 02/01/2022

Type of Action: APD Change

Time Sundry Submitted: 08:03

Procedure Description: Marathon Oil Permian LLC. respectfully requests to make changes to the Approved APD for the above listed well. See attachment for a summary of the requested changes along with update well information such as a Revised C-102 Well Plat, Revised Directional Drilling Well Plan and Revised Drilling and Operations Plan. Note: NO SURFACE CHANGES are being requested.

NOI Attachments

Procedure Description

BLM_SN_Sub_Att_Thunderbird_1_36_TB_Federal_14H_sub_01.26.2022_20220126080337.pdf

Conditions of Approval

Additional Reviews

Thunderbird_1_36_TB__Fed_14H_COA_20220307053236.pdf

Received by OCD: 6/20/2022 1:42:15 PM

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Well Name: THUNDERBIRD 1-36 TB FED	Well Location: T26S / R34E / SEC 1 / SESE / 32.0674346 / -103.4191776	County or Parish/State: LEA / NM
Well Number: 14H	Type of Well: OIL WELL	Allottee or Tribe Name:
Lease Number: NMNM113970	Unit or CA Name:	Unit or CA Number:
US Well Number: 300254613400X1	Well Status: Approved Application for Permit to Drill	Operator: MARATHON OIL PERMIAN LLC

Operator Certification

I certify that the foregoing is true and correct. Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction. Electronic submission of Sundry Notices through this system satisfies regulations requiring a submission of Form 3160-5 or a Sundry Notice.

Operator Electronic Signature: MELISSA SZUDERA	Signed on: JAN 24, 2022 02:18 PM
Name: MARATHON OIL PERMIAN LLC	
Title: REGULATORY COMPLIANCE REPRESENTATIVE	
Street Address: 990 TOWN & COUNTRY BLVD	
City: Houston	State: TX
Phone: (713) 296-3179	
Email address: mszudera@marathonoil.com	

Field Representative

Representative Name:		
Street Address:		
City:	State:	Zip:
Phone:		
Email address:		

BLM Point of Contact

BLM POC Name: CHRISTOPHER WALLS	BLM POC Title: Petroleum Engineer
BLM POC Phone: 5752342234	BLM POC Email Address: cwalls@blm.gov
Disposition: Approved	Disposition Date: 03/07/2022
Signature: Chris Walls	

PECOS DISTRICT DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Marathon Oil
LEASE NO.:	NMNM065441
LOCATION:	Section 1, T.26 S., R.34 E., NMPM
COUNTY:	Lea County, New Mexico

WELL NAME & NO.:	Thunderbird 1-36 TB Fed 14H
SURFACE HOLE FOOTAGE:	852'/S & 1230'/E
BOTTOM HOLE FOOTAGE:	100'/N & 1883'/E

COA

H2S	☐ Yes	☒ No	
Potash	☒ None	☐ Secretary	☐ R-111-P
Cave/Karst Potential	☒ Low	☐ Medium	☐ High
Cave/Karst Potential	☐ Critical		
Variance	☐ None	☒ Flex Hose	☐ Other
Wellhead	☐ Conventional	☒ Multibowl	☐ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP
Other	☒ Fluid Filled	☐ Cement Squeeze	☐ Pilot Hole
Special Requirements	☐ Water Disposal	☒ COM	☐ Unit

A. HYDROGEN SULFIDE

Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.

B. CASING

- The 13-3/8 inch surface casing shall be set at approximately **1141** feet (a minimum of **25 feet (Lea County)** into the Rustler Anhydrite and above the salt) and cemented to the surface.
 - a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
 - b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to

- include the lead cement)
- c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
- d. If cement falls back, remedial cementing will be done prior to drilling out that string.

Intermediate casing must be kept 50% fluid filled to meet BLM minimum collapse requirement.

1. The minimum required fill of cement behind the 9-5/8 inch intermediate casing is:
 - Cement to surface. If cement does not circulate see B.1.a, c-d above. **Excess calculate to 20 %. Additional cement maybe required.**

Wait on cement (WOC) time for a primary cement job is to include the tail cement slurry due to cave/karst.

Operator shall contact BLM before commencing

2. The minimum required fill of cement behind the 5-1/2 inch production casing is:
 - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification. **Excess calculate to -30 %. Additional cement maybe required.**

C. PRESSURE CONTROL

1. **Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).**
2. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **10,000 (10M) psi. Variance is approved to use a 5000 (5M) Annular which shall be tested to 5000 (5M) psi.**
 - a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

- e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

D. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Santa Fe Office, 301 Dinosaur Trail Santa Fe, New Mexico 87508, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

- a. Spudding well (minimum of 24 hours)
- b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
- c. BOPE tests (minimum of 4 hours)

☒ Eddy County

Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220,
(575) 361-2822

☒ Lea County

Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575)
393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
 - a. **In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like**

pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).

b. When the operator proposes to set surface casing with Spudder Rig

- **Notify the BLM when moving in and removing the Spudder Rig.**
 - **Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.**
 - **BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.**
2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.
 3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.
2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.
3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours.

WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements. The casing integrity test can be done (prior to the cement setting up) immediately after bumping the plug.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.
5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.
6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.
7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.
8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.
2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: The flex line must meet the requirements of API 16C. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.
3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.
4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

- a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
 - b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
 - c. Manufacturer representative shall install the test plug for the initial BOP test.
 - d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
 - e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
 - a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).
 - b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).
 - c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

- d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.
- e. The results of the test shall be reported to the appropriate BLM office.
- f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.
- g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.
- h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

ZS 022522

Marathon Oil Permian, LLC.

Summary of Changes for NOI Change to AAPD Sundry Submittal

Well Name: **Thunderbird 1-36 TB Federal 14H**
 APD ID Num: **10400032717**
 API Num: **3002546134**

		Approved NOI Sundry	NEW NOI Sundry
Well Name & Number		Thunderbird 1 TB Federal 14H	Thunderbird 1-36 TB Federal 14H
Lateral Length		SL	XXL
Target Formation		TB	TB
TVD		12442	12453
MD		17342	22703
Pool Name		Hardin Tank; Bone Spring	Hardin Tank; Bone Spring
Pool Code		96661	96661
Dedicated Acreage		160	320
SHL	FOOTAGE	852 FSL 1230 FEL	852 FSL 1230 FEL
	UL	P	P
	Q/Q	SESE	SESE
	S-T-R	1-26S-34E	1-26S-34E
	Latitude (NAD83)	32.06748203	32.06748203
	Longitude (NAD83)	-103.4190982	-103.4190982
FTP	FOOTAGE	100 FSL 1883 FEL	100 FSL 1883 FEL
	UL	O	O
	Q/Q	SWSE	SWSE
	S-T-R	1-26S-34E	1-26S-34E
	Latitude (NAD83)	32.06542013	32.06542013
	Longitude (NAD83)	-103.4212039	-103.4212039
LTP	FOOTAGE	100 FNL 1883 FEL	100 FNL 1883 FEL
	UL	B	B
	Q/Q	NWNE	NWNE
	S-T-R	1-26S-34E	36-26S-34E
	Latitude (NAD83)	32.07937945	32.09388872
	Longitude (NAD83)	-103.4212081	-103.4212195
Casing Stages		3	3
Surf Csg	Top MD	0	0
	Bottom MD	1200	1200
	Size, Weight, Grade Connection	10.75" 40.5# J55 STC	13.375" 54.5# J55 BTC
Int 1 Csg	Top MD	0	0
	Bottom MD	11500	11869
	Size, Weight, Grade Connection	7.625" 29.7# P110 BTC	9.625" 40# P110HC
Prod Csg	Top MD	0	0
	Bottom MD	17342	22703
	Size, Weight, Grade Connection	5.5" 20# P110 BTC	5.5" 23# P110 TLW

District I

1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

District II

811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

District III

1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

District IV

1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102

Revised August 1, 2011

Submit one copy to appropriate

District Office

☒ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-025-46134	² Pool Code 96661	³ Pool Name HARDIN TANK; BONE SPRING
⁴ Property Code	⁵ Property Name THUNDERBIRD 1-36 TB FEDERAL	⁶ Well Number 14H
⁷ OGRID No. 372098	⁸ Operator Name MARATHON OIL PERMIAN LLC	⁹ Elevation 3281'

¹⁰ Surface Location

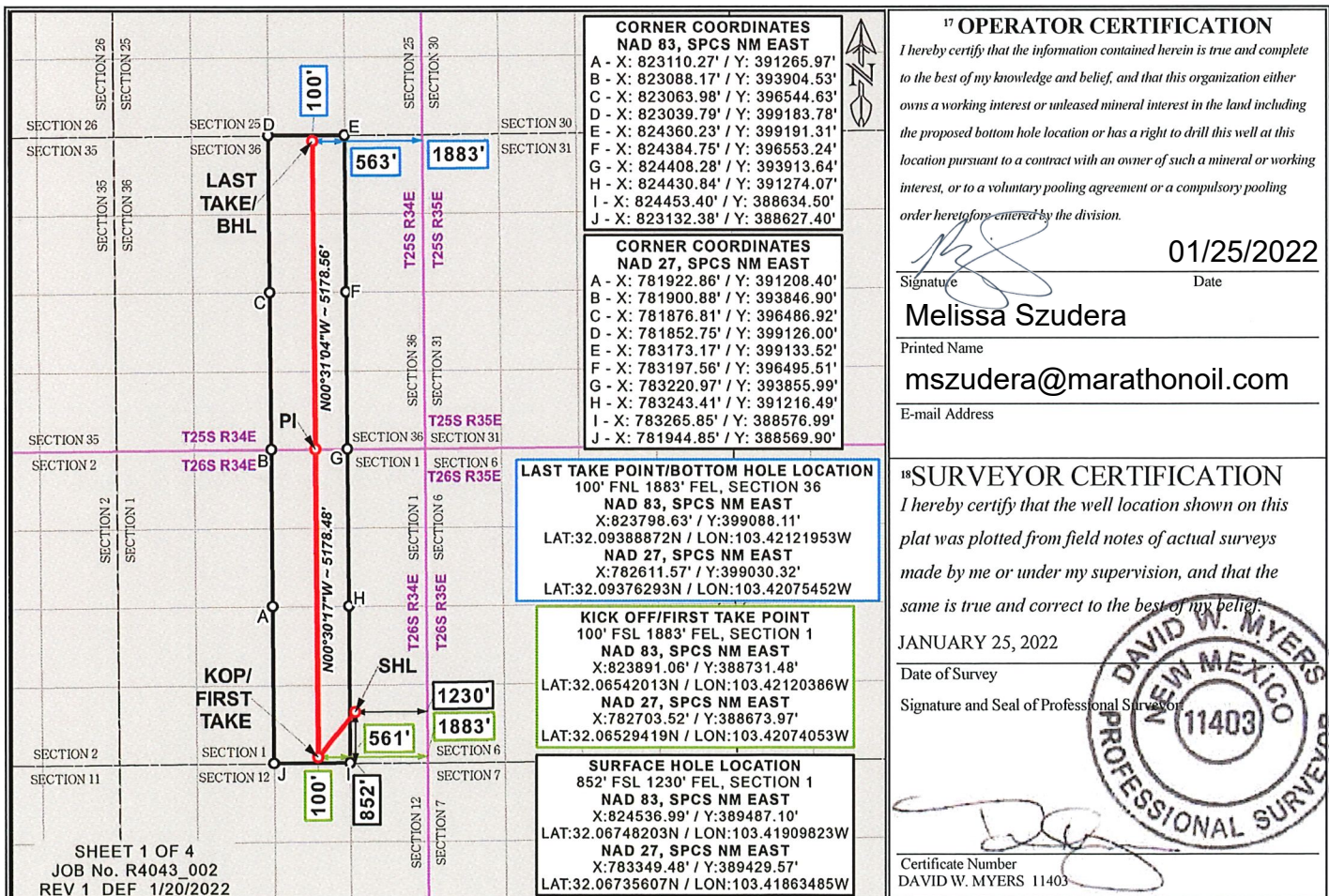
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	1	26S	34E		852	SOUTH	1230	EAST	LEA

¹¹ Bottom Hole Location If Different From Surface

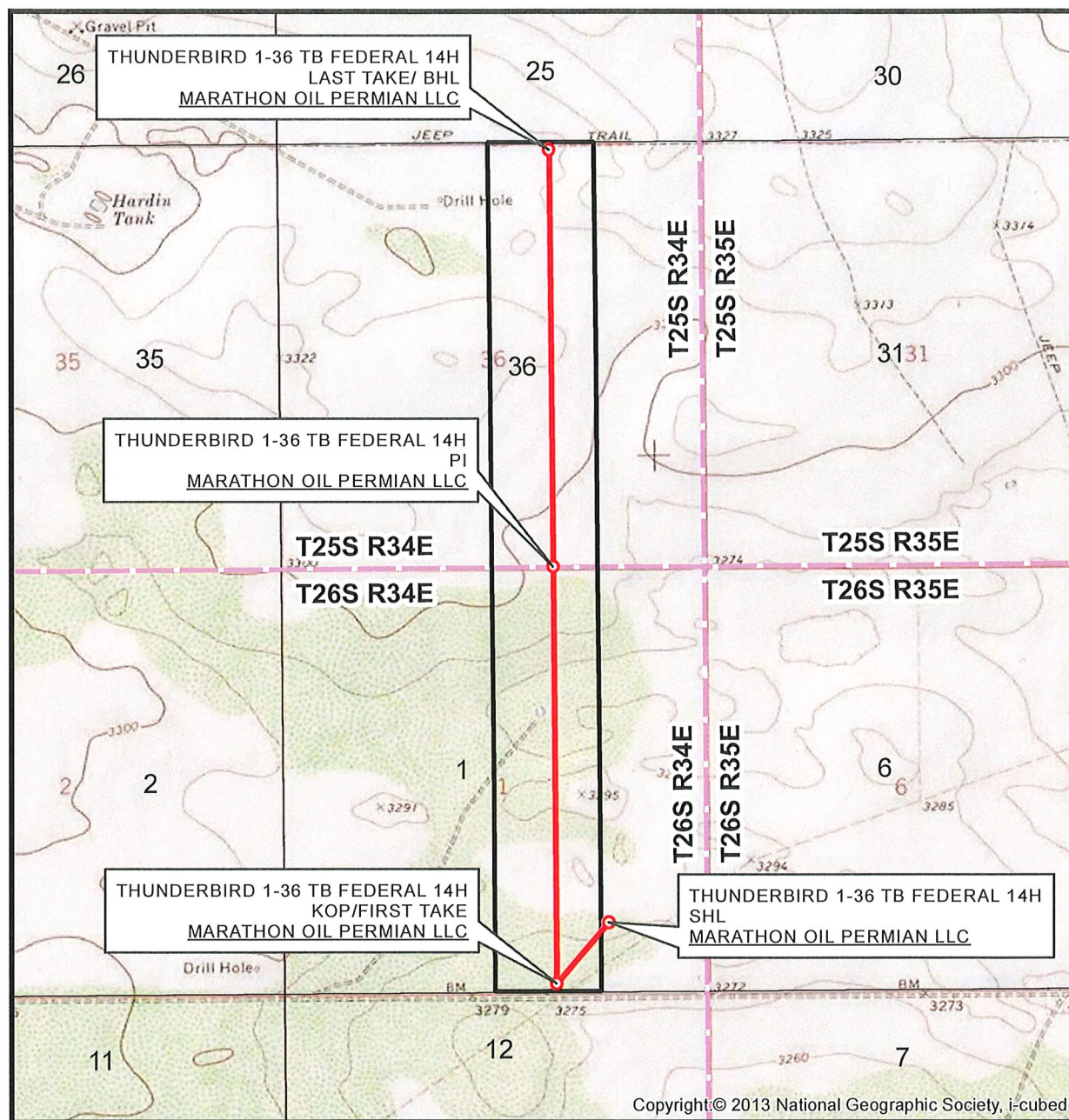
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	36	25S	34E		100	NORTH	1883	EAST	LEA

¹² Dedicated Acres 320.0	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
---	-------------------------------	----------------------------------	-------------------------

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



LOCATION VERIFICATION MAP



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SEC. 1 TWP. 26-S RGE. 34-E
 SURVEY: N.M.P.M.
 COUNTY: LEA
 OPERATOR: MARATHON OIL PERMIAN LLC
 DESCRIPTION: 852' FSL & 1230' FEL
 ELEVATION: 3281'
 LEASE: THUNDERBIRD 1-36 FEDERAL
 U.S.G.S. TOPOGRAPHIC MAP: ANDREWS PLACE, NM,TX.

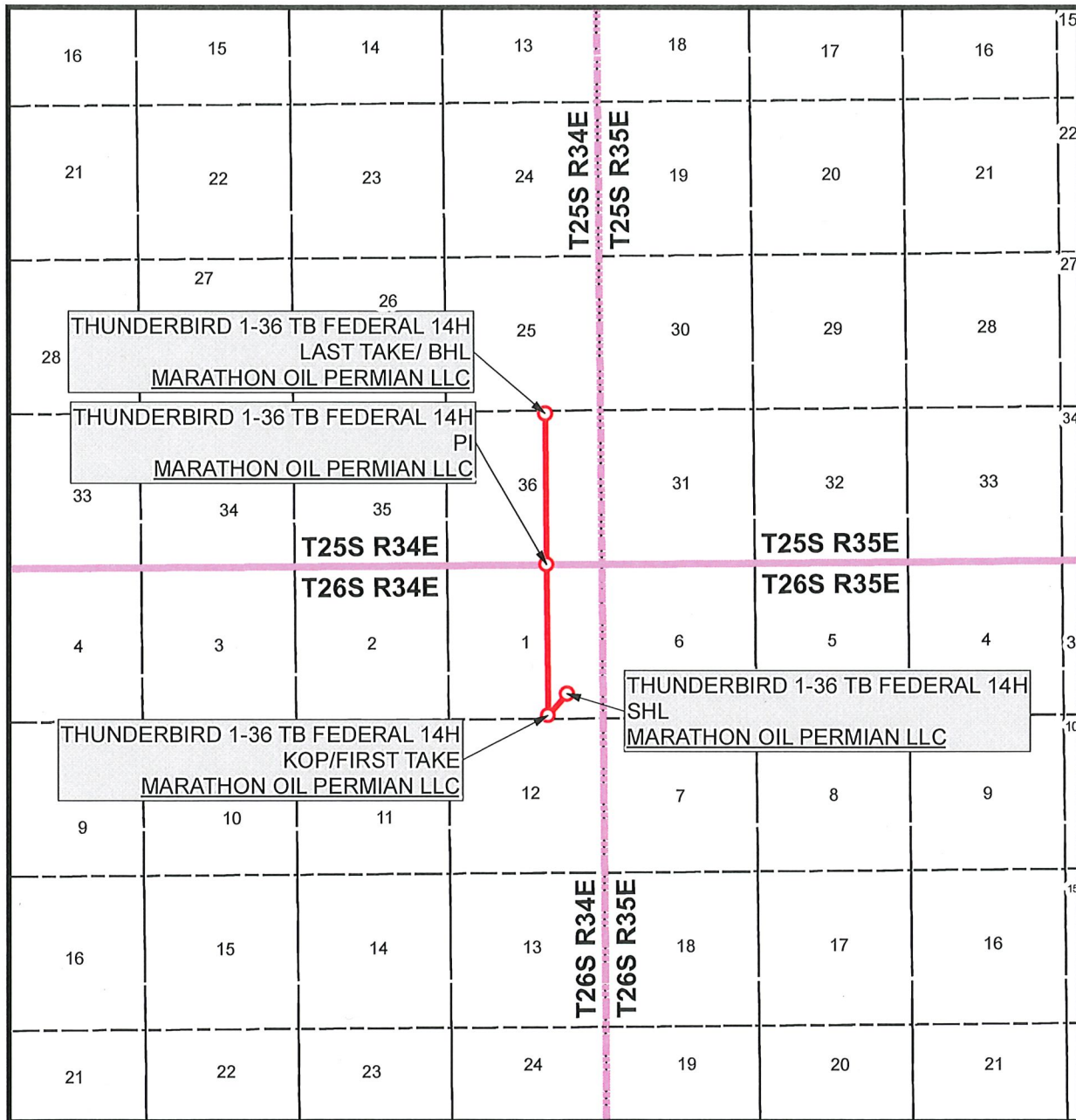
1" = 2,000'
 CONTOUR INTERVAL = 10'



SHEET 2 OF 4

PREPARED BY:
 R-SQUARED GLOBAL, LLC
 510 TRENTON ST., UNIT B,
 WEST MONROE, LA 71291
 318-323-6900 OFFICE
 JOB No. R4043_002

VICINITY MAP



SEC. 1 TWP. 26-S RGE. 34-E
 SURVEY: N.M.P.M.
 COUNTY: LEA
 OPERATOR: MARATHON OIL PERMIAN LLC
 DESCRIPTION: 852' FSL & 1230' FEL
 ELEVATION: 3281'
 LEASE: THUNDERBIRD 1-36 FEDERAL
 U.S.G.S. TOPOGRAPHIC MAP: ANDREWS PLACE, NM, TX.

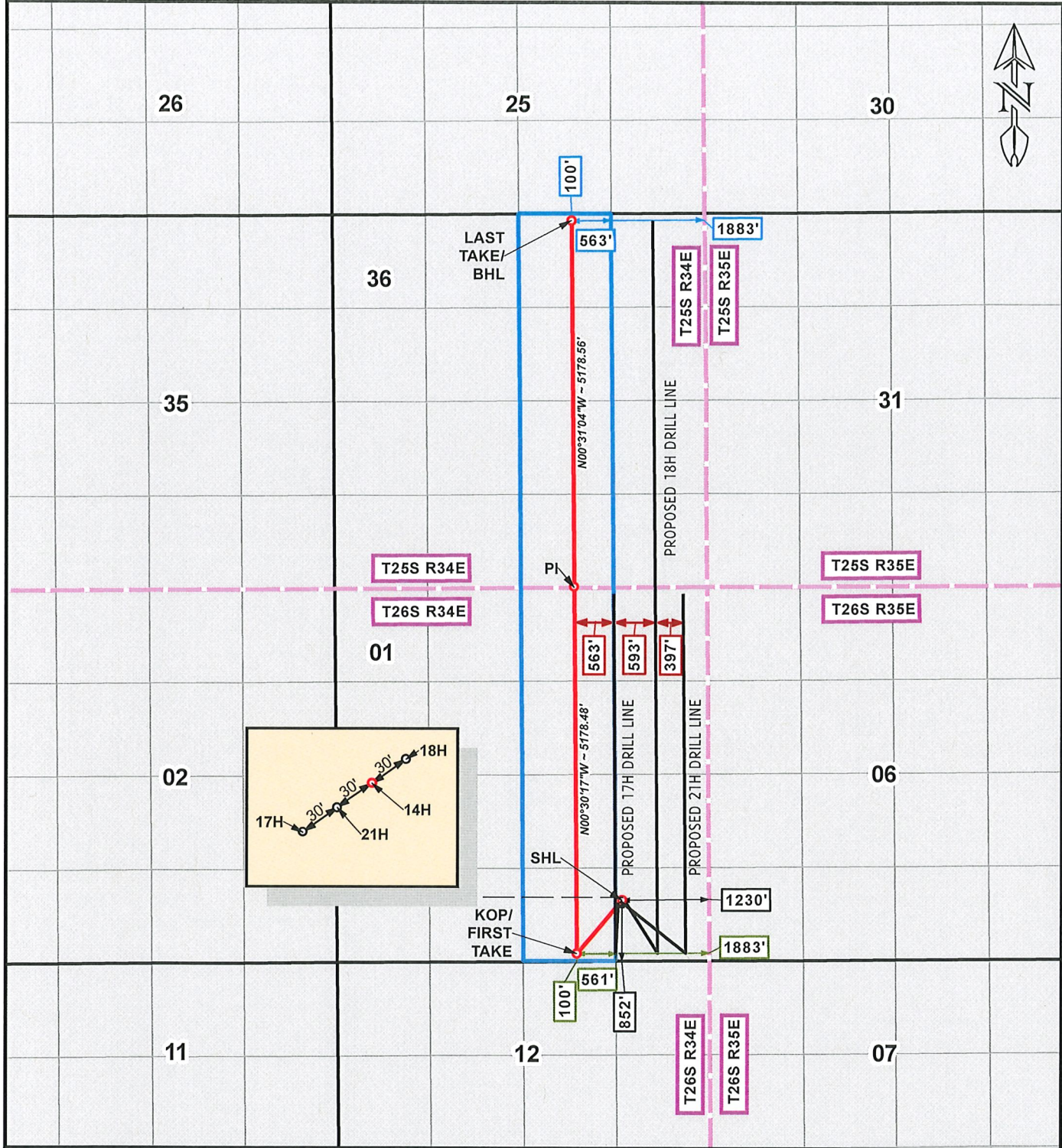
1" = 1 MILE



SHEET 3 OF 4

PREPARED BY:
 R-SQUARED GLOBAL, LLC
 510 TRENTON ST., UNIT B,
 WEST MONROE, LA 71291
 318-323-6900 OFFICE
 JOB No. R4043_002

JOB No. R4043_002 SECTION 36, T-25-S, R-34-E; SECTION 1, T-26-S, R-34-E, N.M.P.M., LEA COUNTY, NEW MEXICO



1,000 0 1,000 2,000

1 inch = 2,000 feet

LEGEND

SUBJECT WELL / DRILL LINE

SURVEY/SECTION LINE

LEASE LINE

OTHER WELLS / DRILL LINES

TOWNSHIP / RANGE LINE

●

DRILL LINE HOLES

R-SQUARED

R²

GLOBAL LLC

Marathon Oil

Permian LLC

WELL NAME

THUNDERBIRD 1-36

TB FEDERAL 14H

1

01/18/2022

DRILL LINE CHANGE

DEF

MWS

REV.

DATE

DESCRIPTION

BY

CHKD

SHEET 4 OF 4

DRAWN BY: DEF

DATE DRAWN: 1/20/2022

CHECKED BY: MWS

510 TRENTON ST., UNIT B,

WEST MONROE, LA 71291

(318) 323-6900

Released to Imaging: 6/29/2022 8:45:35 AM

MARATHON OIL PERMIAN, LLC.
DRILLING AND OPERATIONS PLAN

WELL NAME / NUMBER:

THUNDERBIRD 1-36 TB FEDERAL 14H

COUNTY:

LEA

STATE:

NEW MEXICO**1. GEOLOGIC FORMATIONS**

Formation	TVD (ft)	MD (ft)	Elevation (ft)	Lithologies	Mineral Resources	Producing Formation?
Rustler	816	846	2465	Anhydrite	Brine	No
Salado	1211	1241	2070	Salt/Anhydrite	Brine	No
Castile	3526	3556	-245	Salt/Anhydrite	Brine	No
Base of Salt (BX)	5096	5126	-1815	Anhydrite	Brine	No
Lamar	5279	5309	-1998	Sandstone/Shale	None	No
Bell Canyon	5303	5333	-2022	Sandstone	Oil	No
Cherry Canyon	6306	6336	-3025	Sandstone	Oil	No
Brushy Canyon	7832	7862	-4551	Sandstone	Oil	No
Bone Spring Lime	9392	9422	-6111	Limestone	None	No
Upper Avalon Shale	9427	9457	-6146	Shale	Oil	Yes
1st Bone Spring Sand	10424	10454	-7143	Sandstone	Oil	Yes
2nd Bone Spring Carbonate	10653	10683	-7372	Limestone/Shale	None	No
2nd Bone Spring Sand	10971	11001	-7690	Sandstone	Oil	Yes
3rd Bone Spring Carbonate	11505	11535	-8224	Limestone	Oil	No
3rd Bone Spring Sand	12072	12102	-8791	Sandstone	Oil	Yes
Wolfcamp	12513	12543	-9232	Sandstone/Shale/Carbonates	Natural Gas / Oil	Yes
Wolfcamp A	12688	12718	-9407	Sandstone/Shale/Carbonates	Natural Gas / Oil	Yes

2. BLOWOUT PREVENTION

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
12.25	13 5/8"	5000	Annular	X	70% of working pressure
			BOP Stack	X	5000
8.75	13 5/8"	10000	Annular	X	70% of working pressure
			BOP Stack	X	10000

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe and Blind rams will be operationally checked on each trip out of the hole. Not to exceed more than once per day. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock, full opening safety valve / inside BOP and choke lines and choke manifold. See attached schematics.

Y	Formation integrity test will be performed per Onshore Order #2.
Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and
N	Are anchors required by manufacturer?
Y	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. See attached schematic.

3. CASING PROGRAM

String Type	Hole Size	Csg Size	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Weight (lbs/ft)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
Surface	17.5	13.375	0	1200	0	1200	3281	2081	54.5	J-55	BTC	2.5	1.76	4.34
Intermediate	12.25	9.625	0	11869	0	11780	3281	-8499	40	P-110HC	BTC	1.16	1.15	2.18
Production	8.75	5.500	0	22703	0	12453	3281	-9172	23	P-110	TLW	1.91	1.24	1.98

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3 rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2 nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

4. CEMENT

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity (sks)	Yield (ft3/sks)	Density (ppg)	Slurry Volume (ft3)	Excess (%)	Cement Type	Additives
Surface	Lead	--	0	960	393	2.12	12.5	834	25	Class C	LCM
Surface	Tail	--	960	1200	157	1.33	14.8	208	25	Class C	Accelerator
Intermediate	Lead	--	0	10800	757	5.53	10.2	4185	25	Class C	Extender, Accelerator
Intermediate	Tail	--	10800	11869	303	1.38	13.8	419	25	Class H	Retarder
Production	Tail	--	11200	22703	1340	1.45	13.5	1942	25	Class H	Extender, Fluid Loss, Dispersant

Stage tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. Stage tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Pilot hole depth: N/A TVD/MD

KOP: N/A TVD/MD

Plug Top	Plug Bottom	Excess (%)	Quantity (sx)	Density (ppg)	Yield (ft3/sks)	Water gal/sk	Slurry Description and Cement Type

Attach plugging procedure for pilot hole: N/A

5. CIRCULATING MEDIUM

Top Depth	Bottom Depth	Mud Type	Min. Weight (ppg)	Max Weight (ppg)
0	1200	Water Based Mud	8.4	8.8
1200	11869	Brine or Oil Based Mud	9.2	10.2
11869	22703	Oil Based Mud	10.5	12.5

Losses or gains in the mud system will be monitored visually/manually as well as with an electronic PVT. The necessary mud products for additional weight and fluid loss control will be on location at all times.

6. TEST, LOGGING, CORING

List of production tests including testing procedures, equipment and safety measures:

GR from TD to surface (horizontal well - vertical portion of hole)

List of open and cased hole logs run in the well:

GR while drilling from Intermediate casing shoe to TD.

Coring operation description for the well:

No coring is planned at this time.

Mud Logger: None.

DST's: None.

Open Hole Logs: GR while drilling from Intermediate casing shoe to TD.

7. PRESSURE

ANTICIPATED BOTTOM HOLE PRESSURE:	8,094 psi
ANTICIPATED BOTTOM HOLE TEMPERATURE:	195 °F
ANTICIPATED ABNORMAL PRESSURE:	N
ANTICIPATED ABNORMAL TEMPERATURE:	N

POTENTIAL HAZARDS:

A. H2S detection equipment will be in operation after drilling out the surface casing shoe until the production casing has been cemented. Breathing equipment will be on location from drilling out the surface shoe until production casing is cemented. If H2S is encountered the operator will comply with Onshore Order #6.

B. No abnormal temperatures or pressures are anticipated. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well. Adequate flare lines will be installed off the mud/gas separator where gas may be flared safely.

C. No losses are anticipated at this time.

D. All personnel will be familiar with all aspects of safe operation of equipment being used to drill this well.

8. OTHER

AUXILIARY WELL CONTROL AND MONITORING EQUIPMENT

A Kelly cock will be in the drill string at all times.

A full opening drill pipe stabbing valve having the appropriate connections will be on the rig floor unobstructed and readily accessible at all times.

Hydrogen Sulfide detection equipment will be in operation after drilling out the surface casing shoe until the production casing is cemented. Breathing equipment will be on location upon drilling the surface casing shoe until total depth is reached. If Hydrogen Sulfide is encountered , measured amounts and formations will be reported to the BLM

ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS

Road and location construction will begin after the BLM has approved the APD. Anticipated spud date will be as soon as possible after BLM approval and as soon as a rig will be available. Move in operations and drilling is expected to take 30 days.



TEC-LOCK WEDGE

5.500" 23 LB/FT (.415"Wall)

BENTELER P110 CY

Pipe Body Data

Nominal OD:	5.500	in
Nominal Wall:	.415	in
Nominal Weight:	23.00	lb/ft
Plain End Weight:	22.56	lb/ft
Material Grade:	P110 CY	
Mill/Specification:	BENTELER	
Yield Strength:	125,000	psi
Tensile Strength:	130,000	psi
Nominal ID:	4.670	in
API Drift Diameter:	4.545	in
Special Drift Diameter:	None	in
RBW:	87.5 %	
Body Yield:	829,000	lbf
Burst:	16,510	psi
Collapse:	16,910	psi

Connection Data

Standard OD:	5.950	in
Pin Bored ID:	4.670	in
Critical Section Area:	6.457	in ²
Tensile Efficiency:	97.4 %	
Compressive Efficiency:	100 %	
Longitudinal Yield Strength:	807,000	lbf
Compressive Limit:	829,000	lbf
Internal Pressure Rating:	16,510	psi
External Pressure Rating:	16,910	psi
Maximum Bend:	101.5	°/100ft

Operational Data

Minimum Makeup Torque:	16,400	ft*lbf
Optimum Makeup Torque:	20,500	ft*lbf
Maximum Makeup Torque:	44,300	ft*lbf
Minimum Yield:	49,200	ft*lbf
Makeup Loss:	5.97	in

Notes Operational Torque is equivalent to the Maximum Make-Up Torque



Generated on Mar 12, 2019



Technical Data Sheet

9 5/8" 40.00 lbs/ft. P110HC - BTC

Mechanical Properties

Minimum Yield Strength	psi.	110,000
Maximum Yield Strength	psi.	140,000
Minimum Tensile Strength	psi.	125,000

Dimensions

		Pipe	BTC	LTC	STC
Outside Diameter	in.	9.625	10.625	-	-
Wall Thickness	in.	0.395	-	-	-
Inside Diameter	in.	8.835	-	-	-
Standard Drift	in.	-	-	-	-
Alternate Drift	in.	8.750	-	-	-
Plain End Weight	lbs/ft.	-	-	-	-
Nominal Linear Weight	lbs/ft.	40.00	-	-	-

Performance

		Pipe	BTC	LTC	STC
Minimum Collapse Pressure	psi.	4,230	-	-	-
Minimum Internal Yield Pressure	psi.	7,910	7,910	-	-
Minimum Pipe Body Yield Strength	lbs.	1,260 x 1,000	-	-	-
Joint Strength	lbs.	-	1,266 x 1,000	-	-

Make-Up Torques

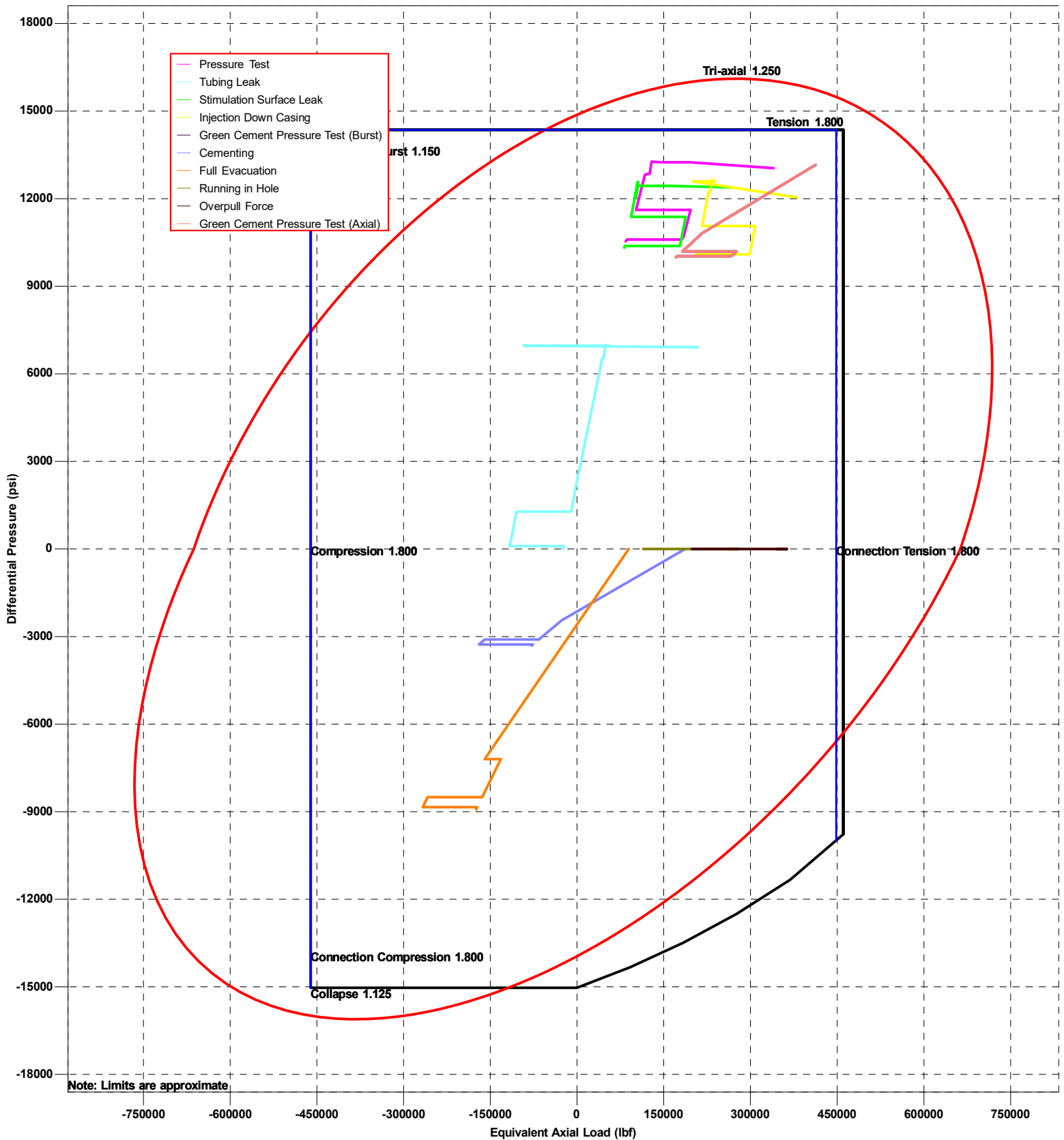
		Pipe	BTC	LTC	STC
Make-Up Loss	in.	-	4.81	-	-
Optimum Make-Up Torque	ft/lbs.	-	-	-	-
Maximum Operational Make-Up Torque	ft/lbs.	-	-	-	-

Disclaimer: The content of this Technical Data Sheet is for general information only and does not guarantee performance and/or accuracy, which can only be determined by a professional expert with the specific installation and operation parameters. Information printed or downloaded may not be current and no longer in control by Axis Pipe and Tube. Anyone using the information herein does so at his or her own risk. To verify that you have the latest technical information, please contact Axis Pipe and Tube Technical Sales +1 (979) 599-7600, www.axispipeandtube.com

File: Basis of Design Red Hills TB & WA -New Design *

Date: December 07, 2021 Page: 1

Design Limits (5 1/2" Production Casing - Section 1)

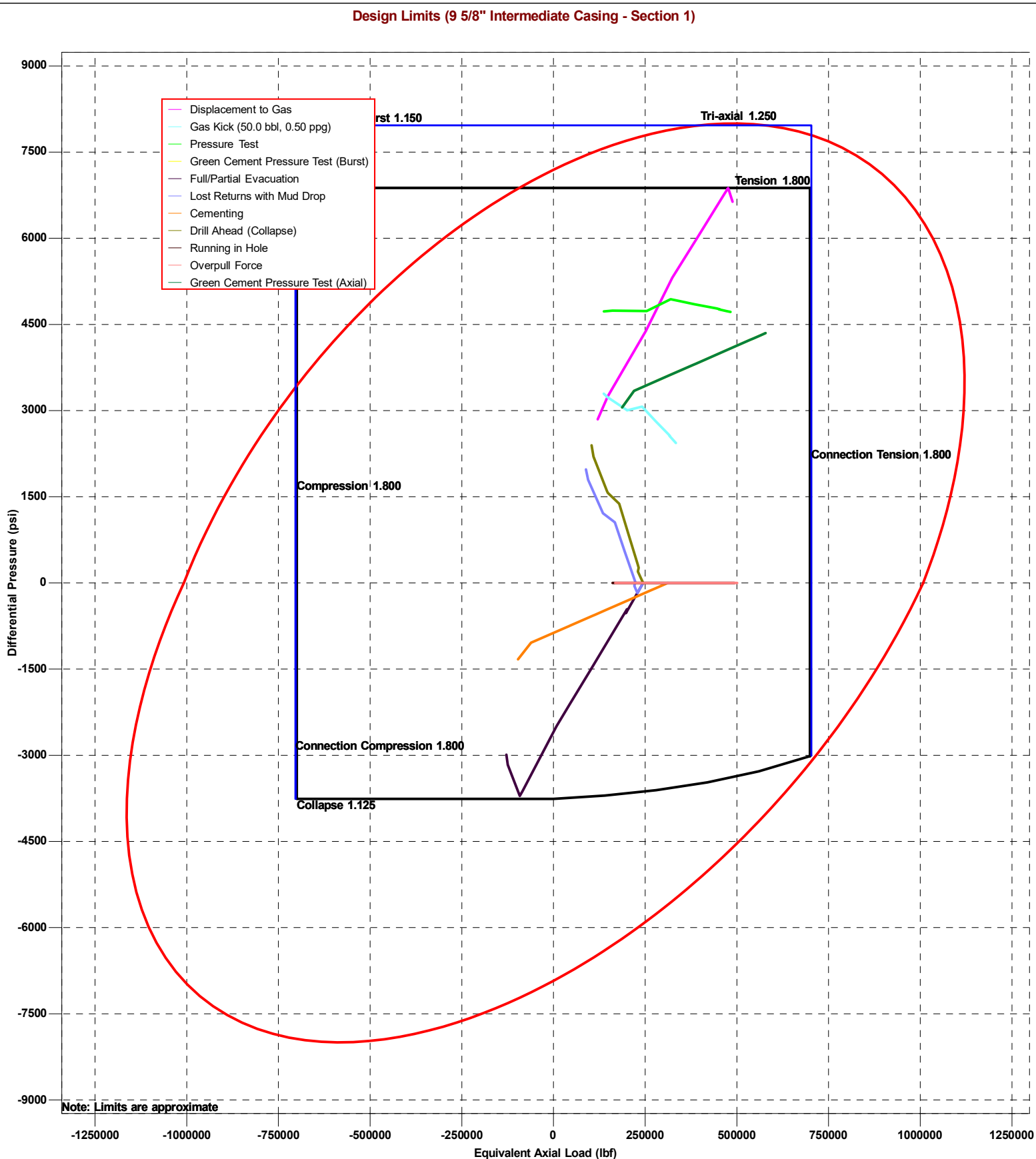


RED HILLS 3 CSG + LINER

StressCheck 5000.16.1.02 Build 14

Marathon Oil Permian, LLC.

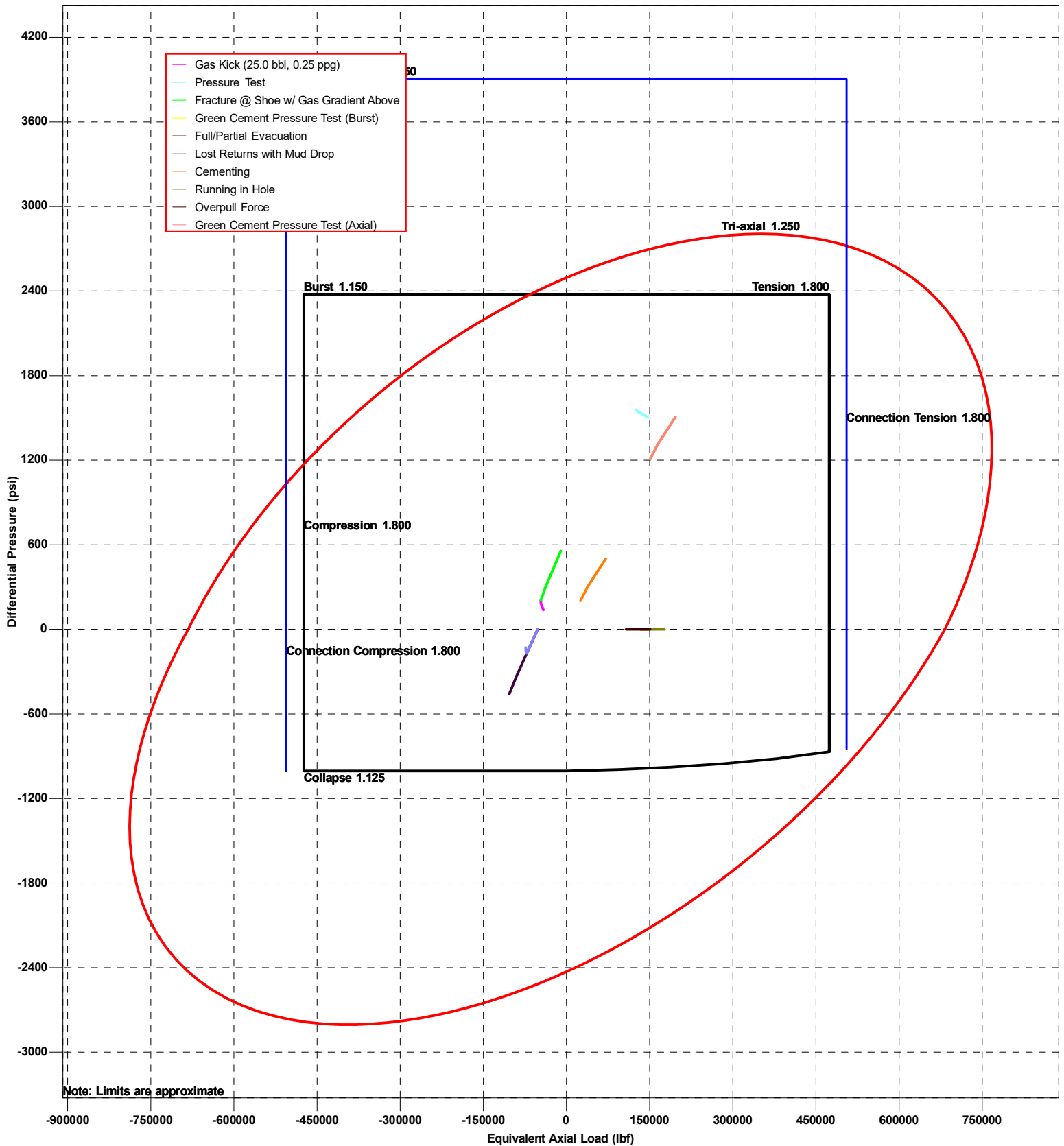
Casing Attachment | Page 3 of 5



File: Basis of Design Red Hills TB & WA -New Design *

Date: December 07, 2021 Page: 1

Design Limits (13 3/8" Surface Casing - Section 1)

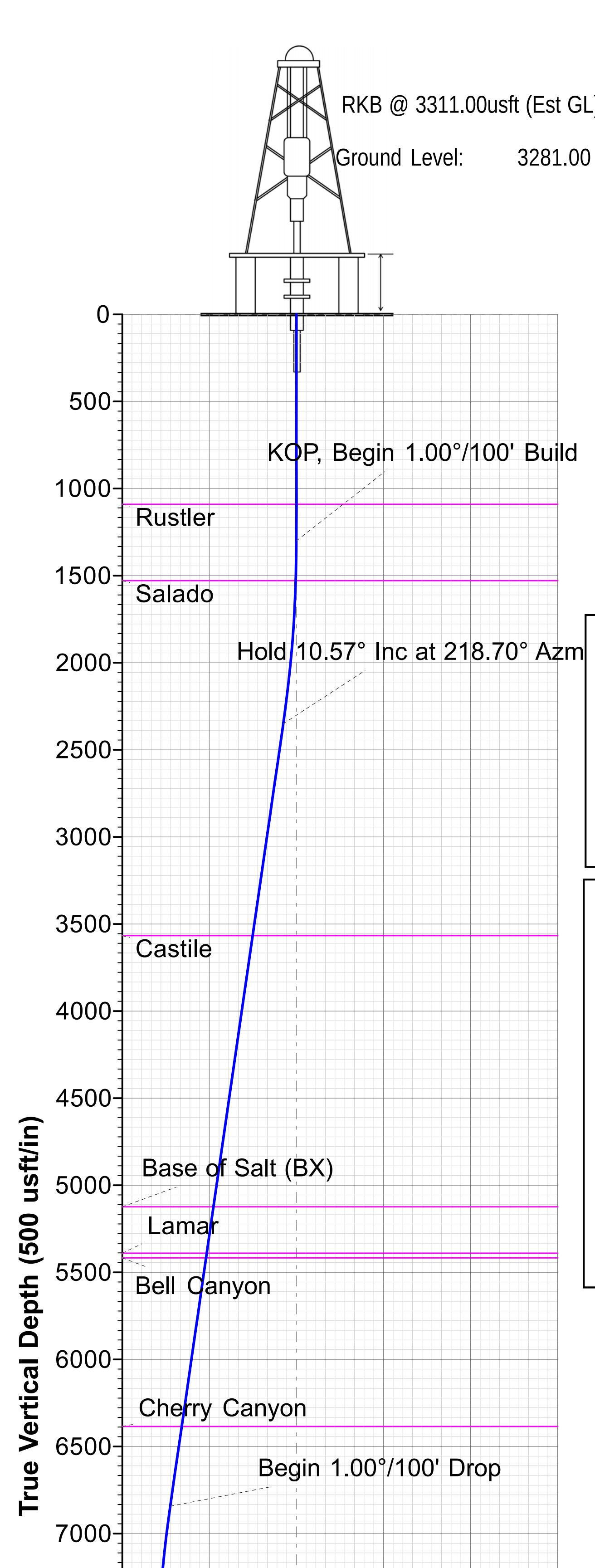
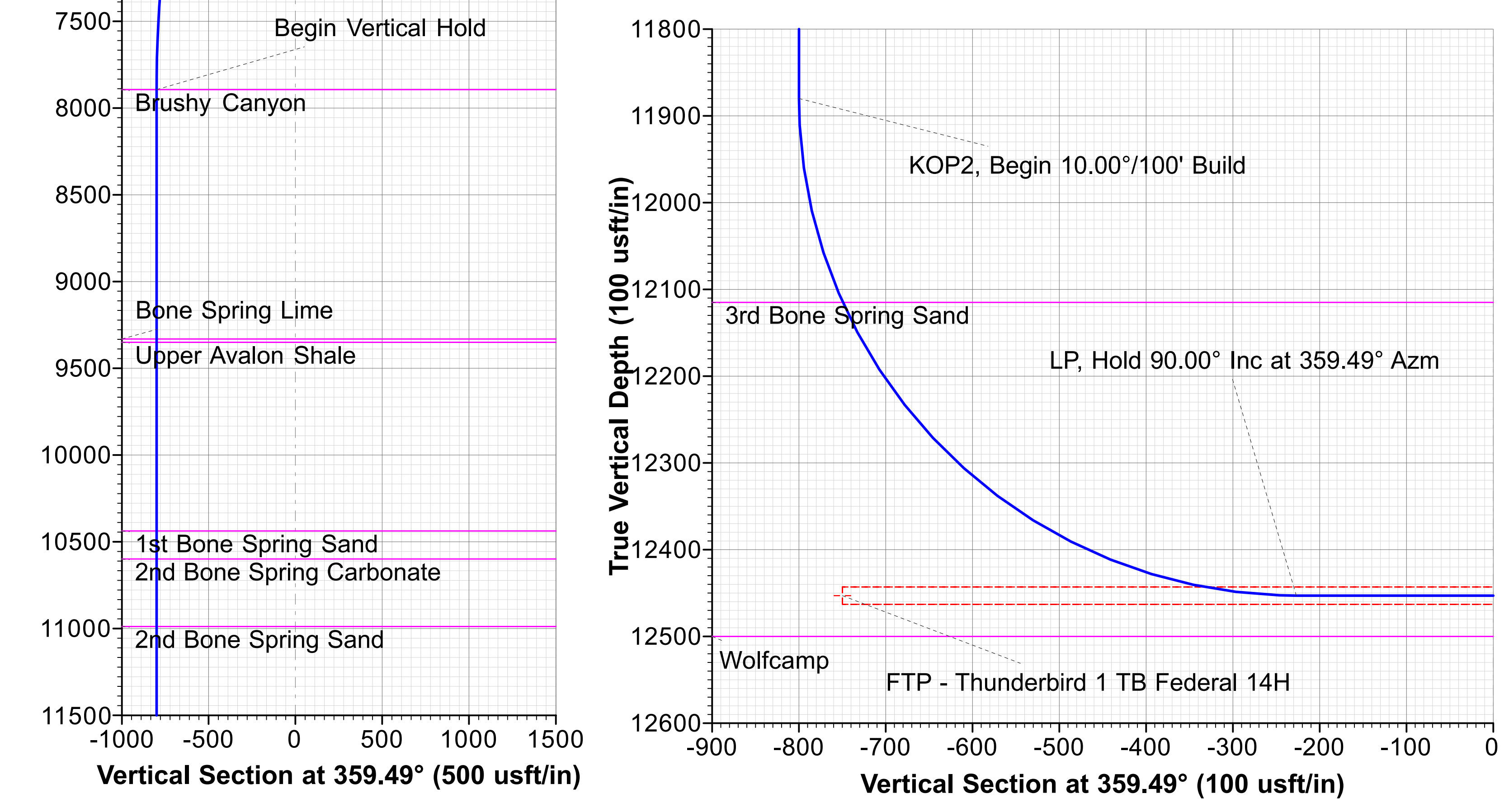
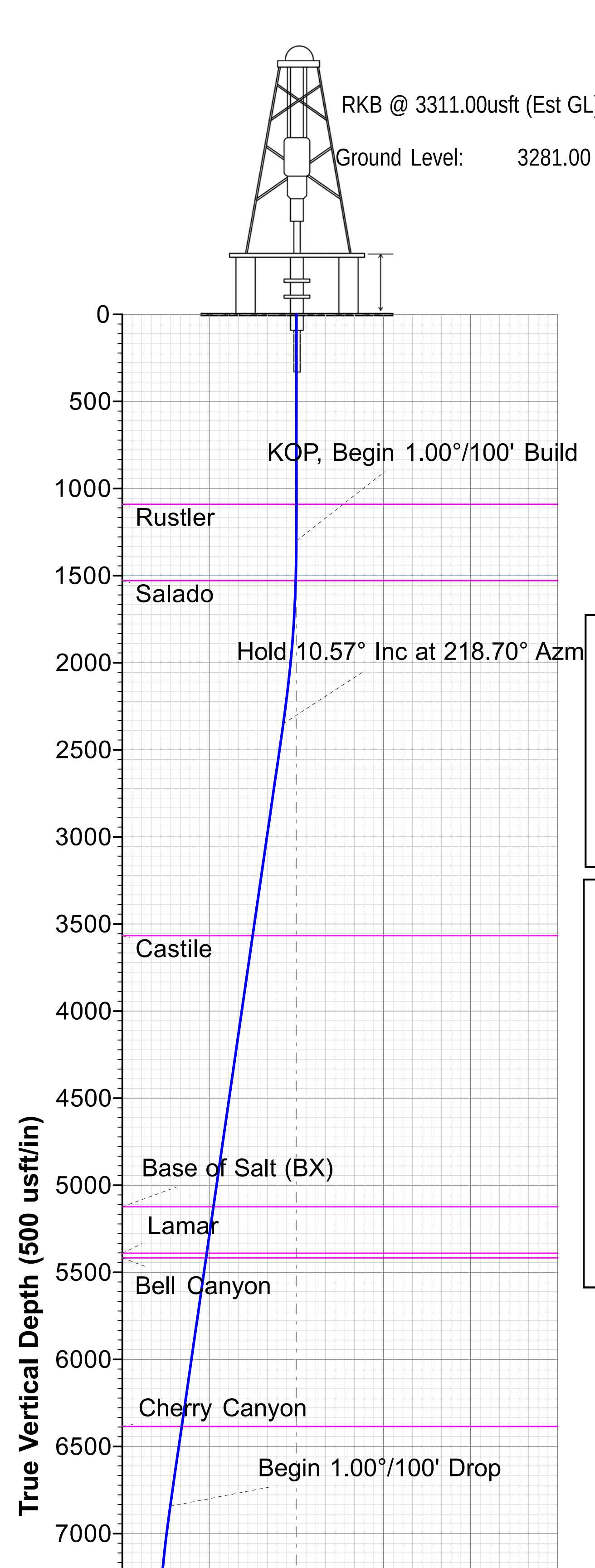
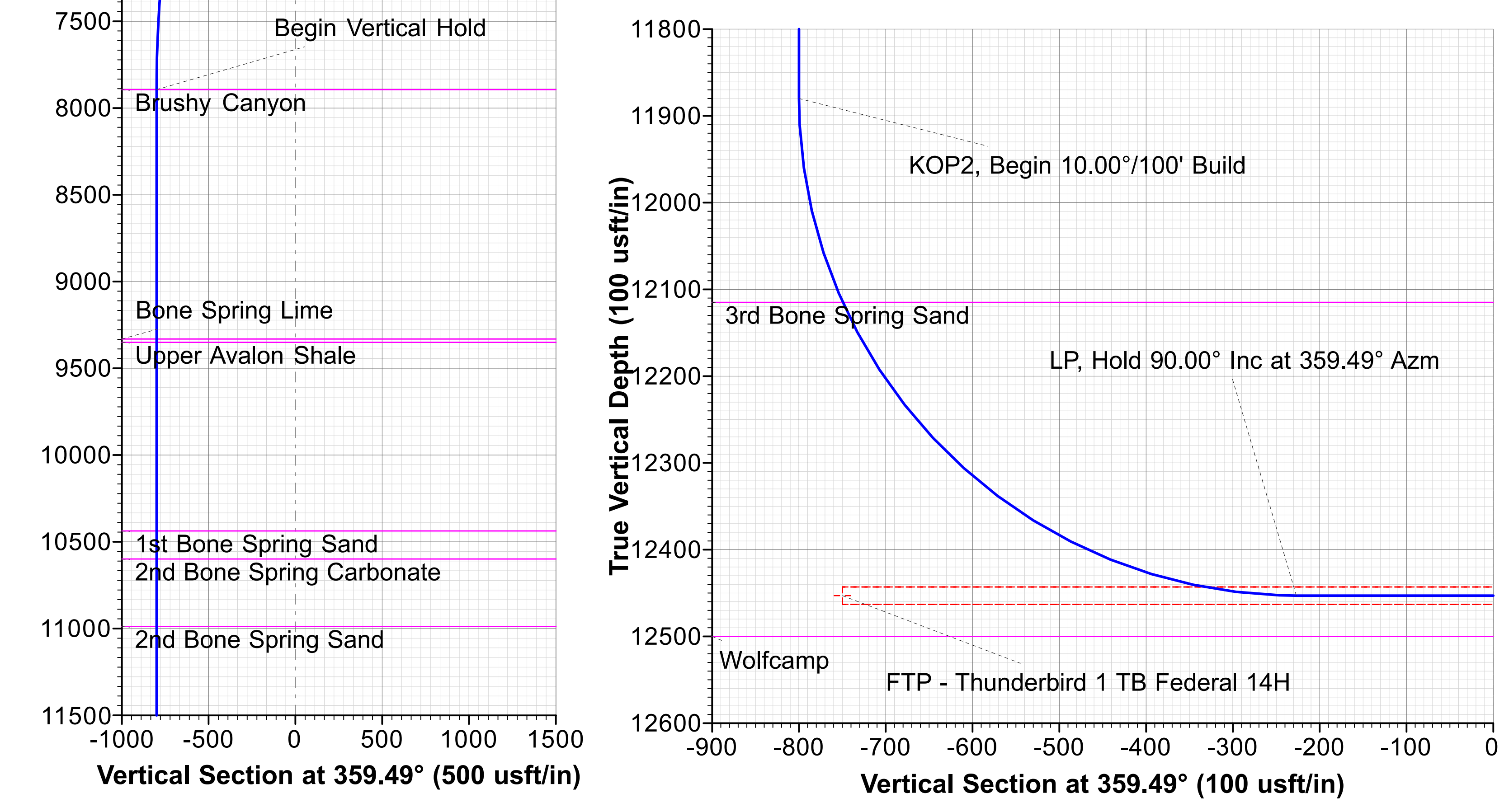
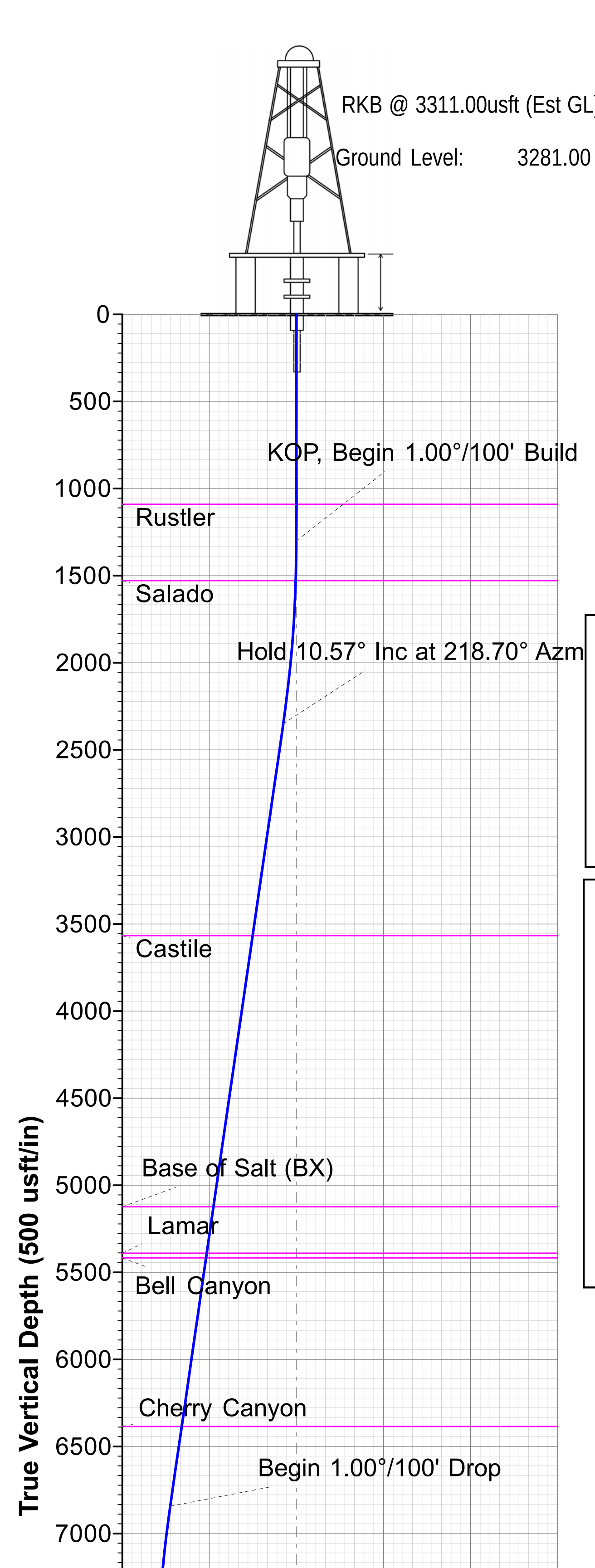
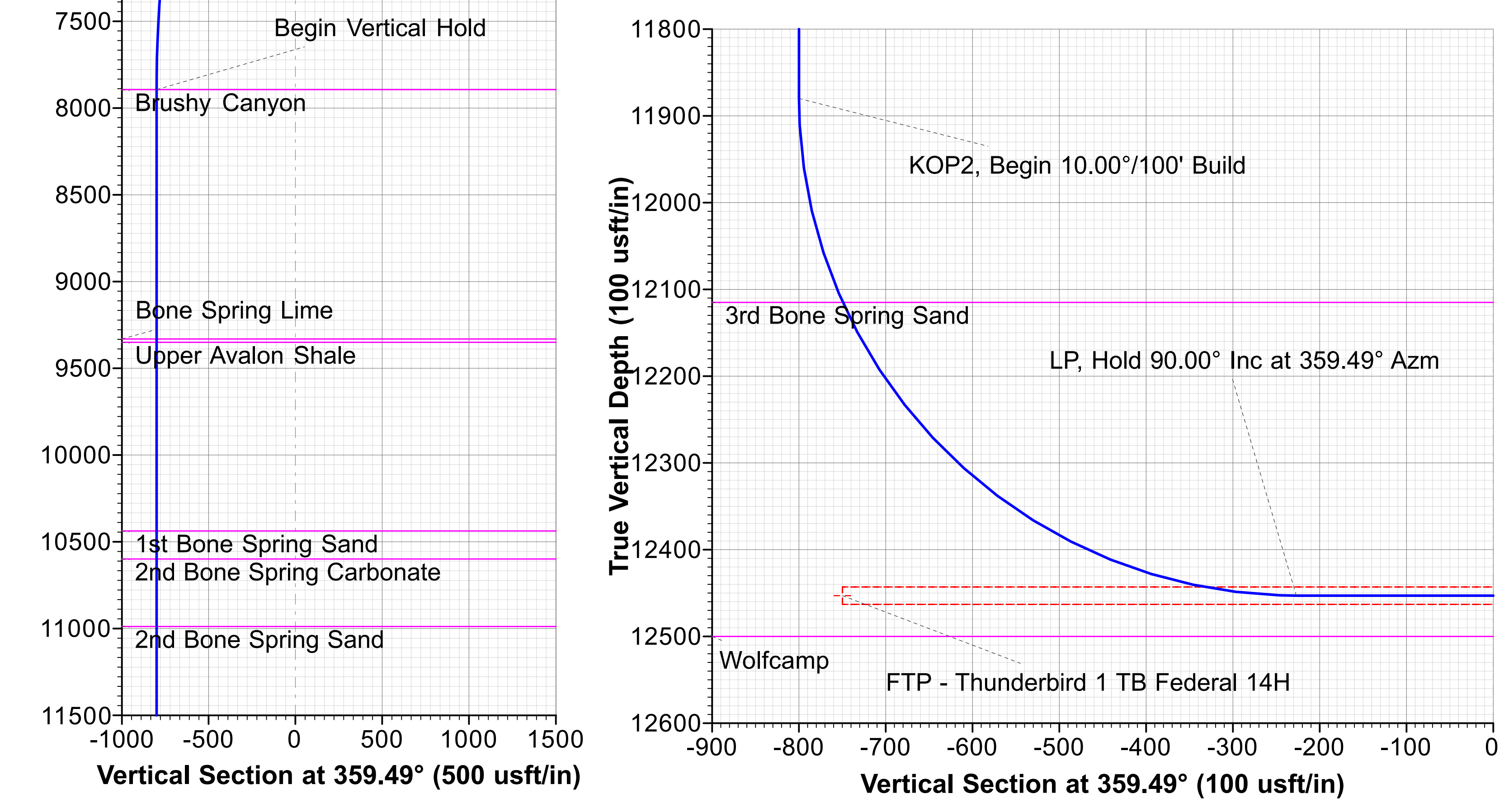
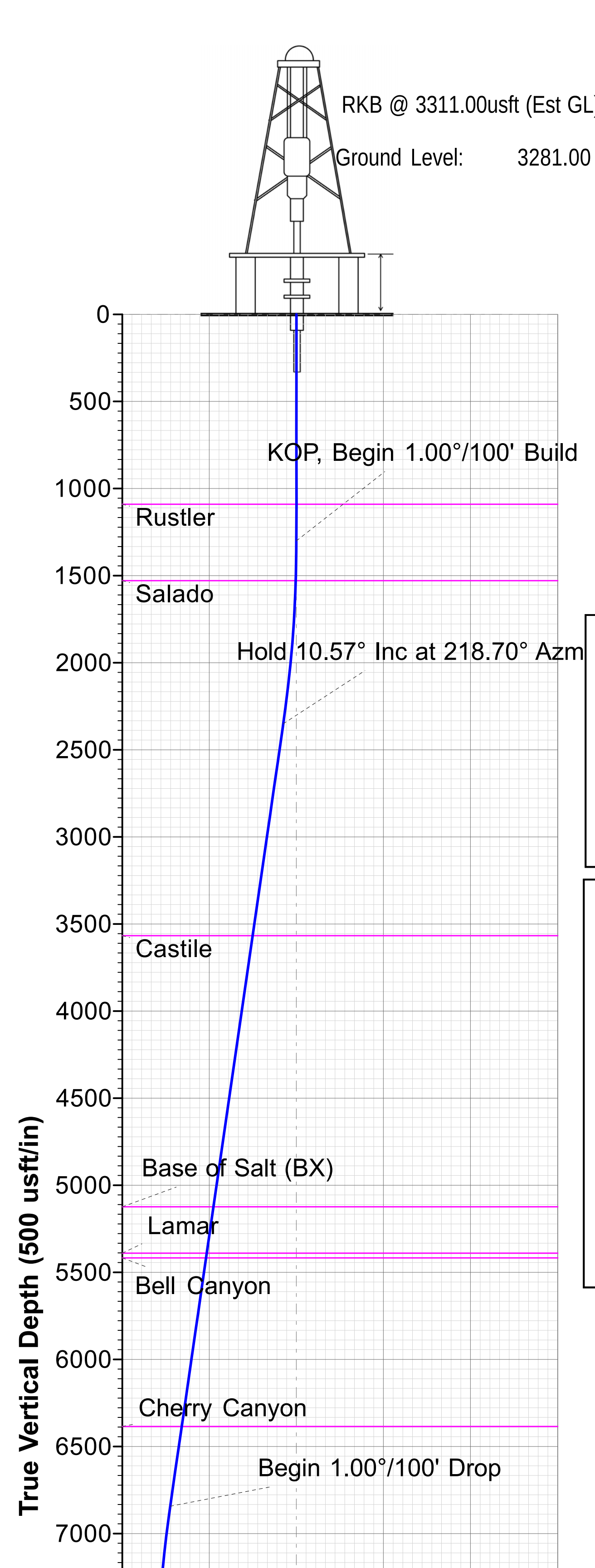
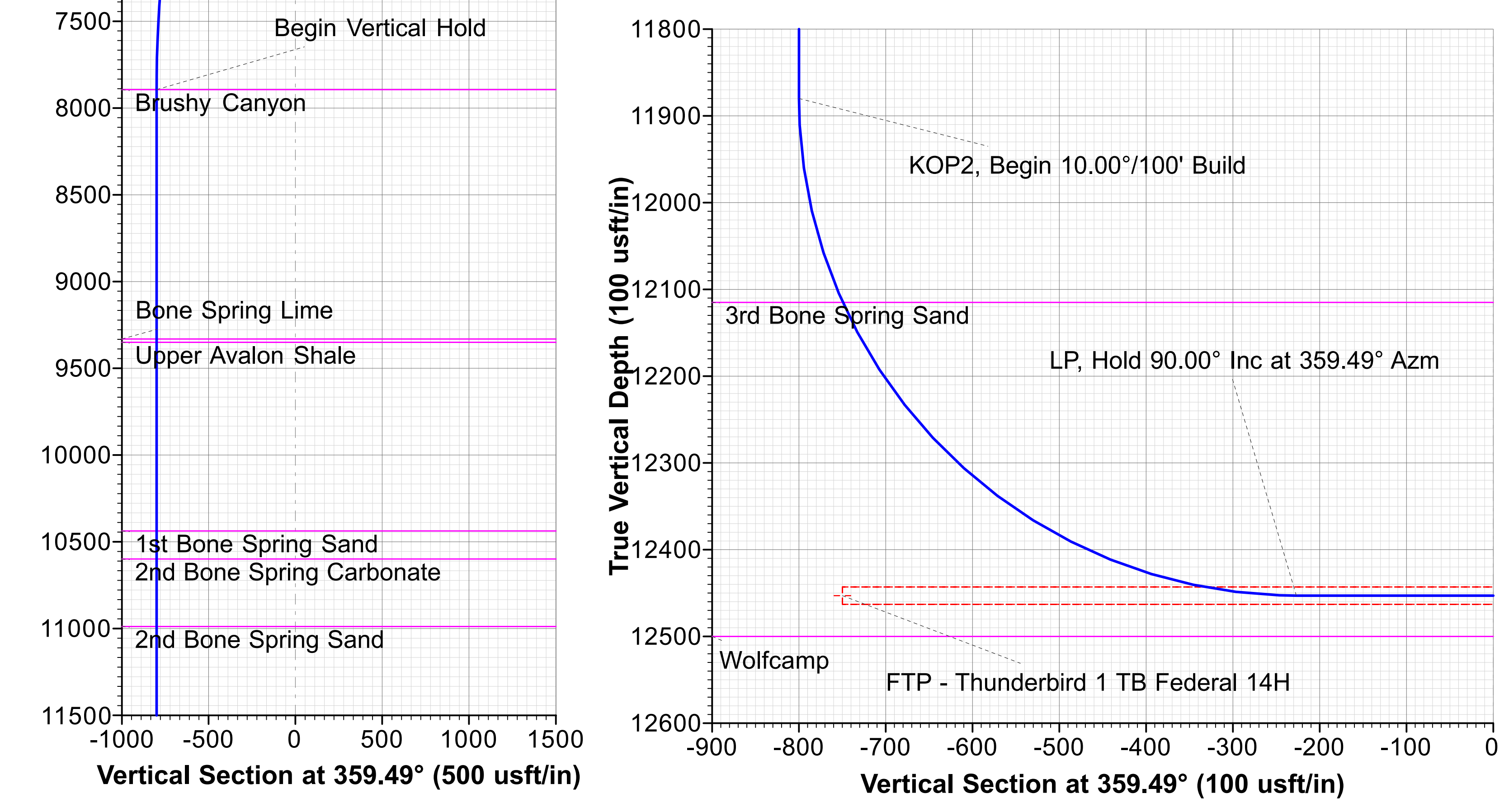
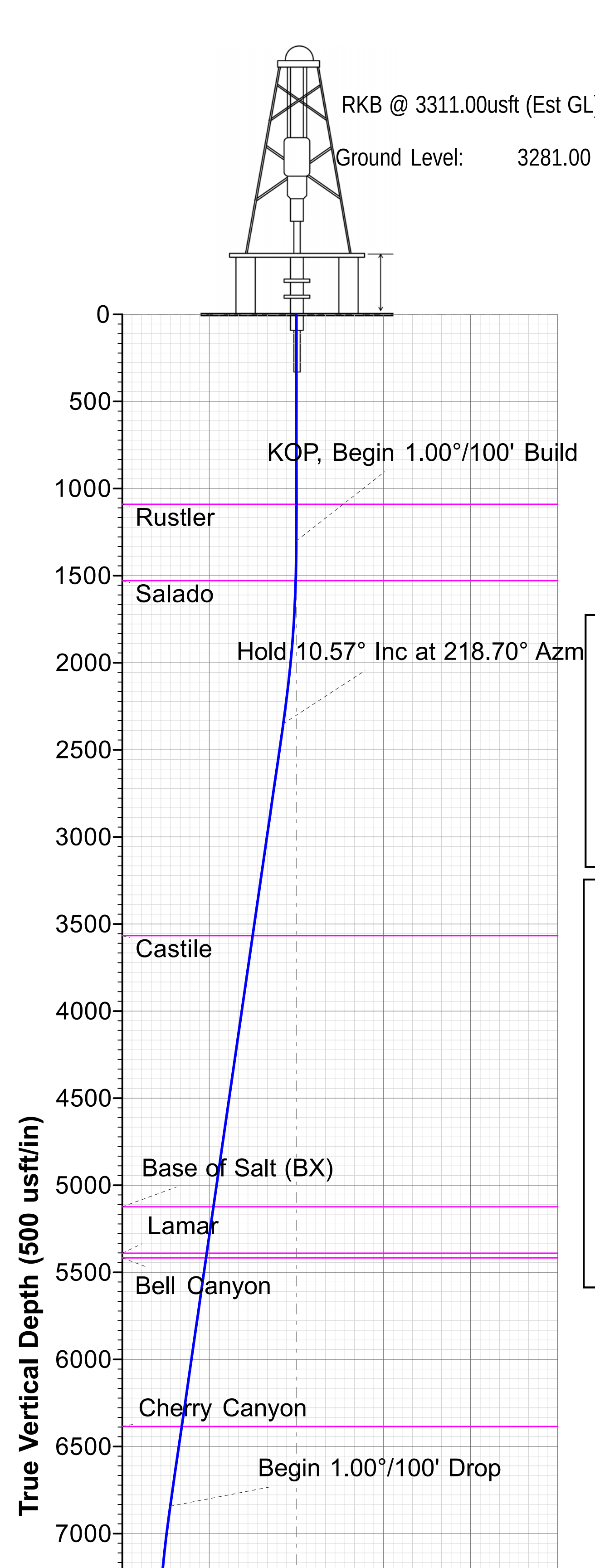
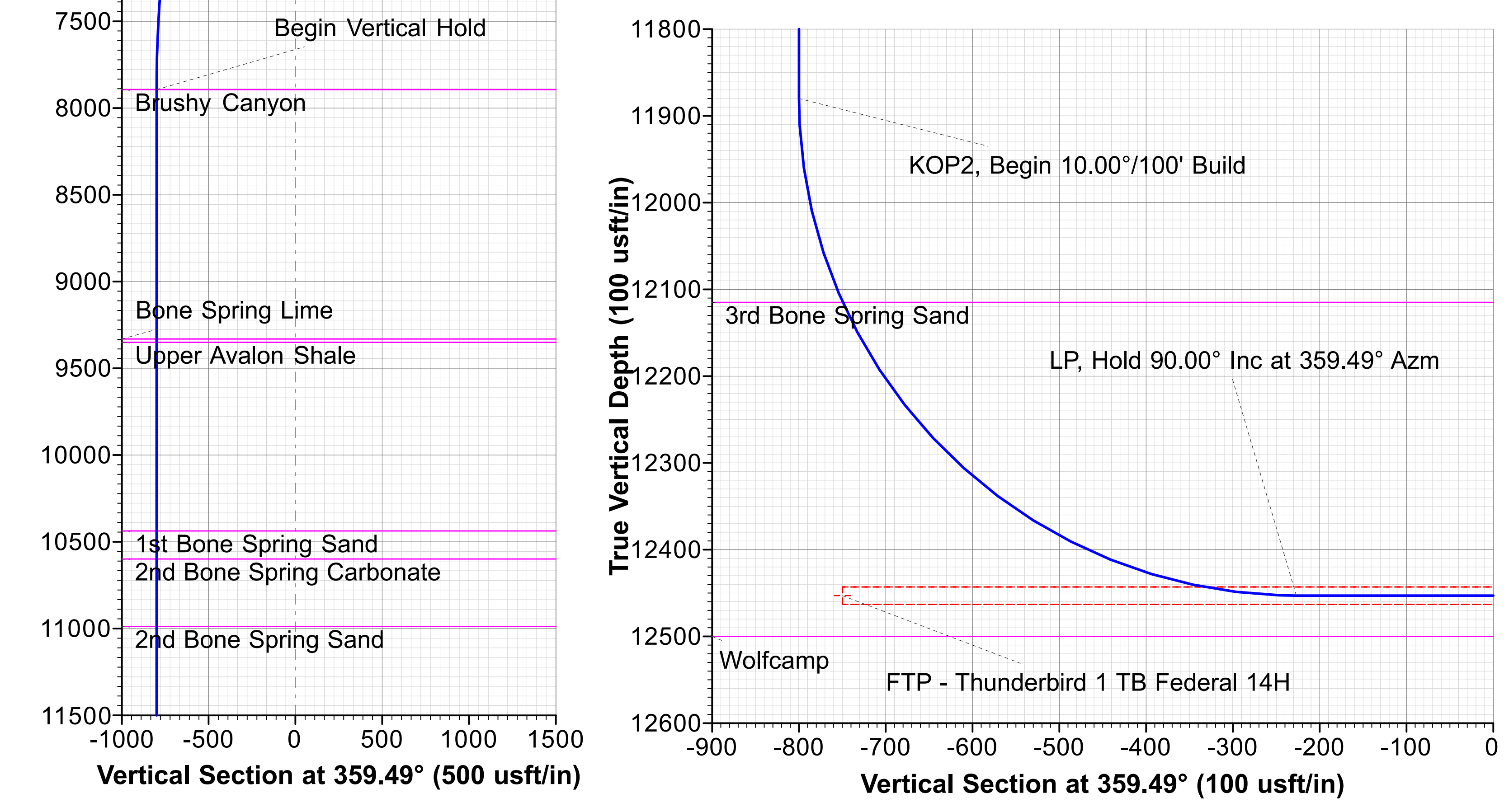
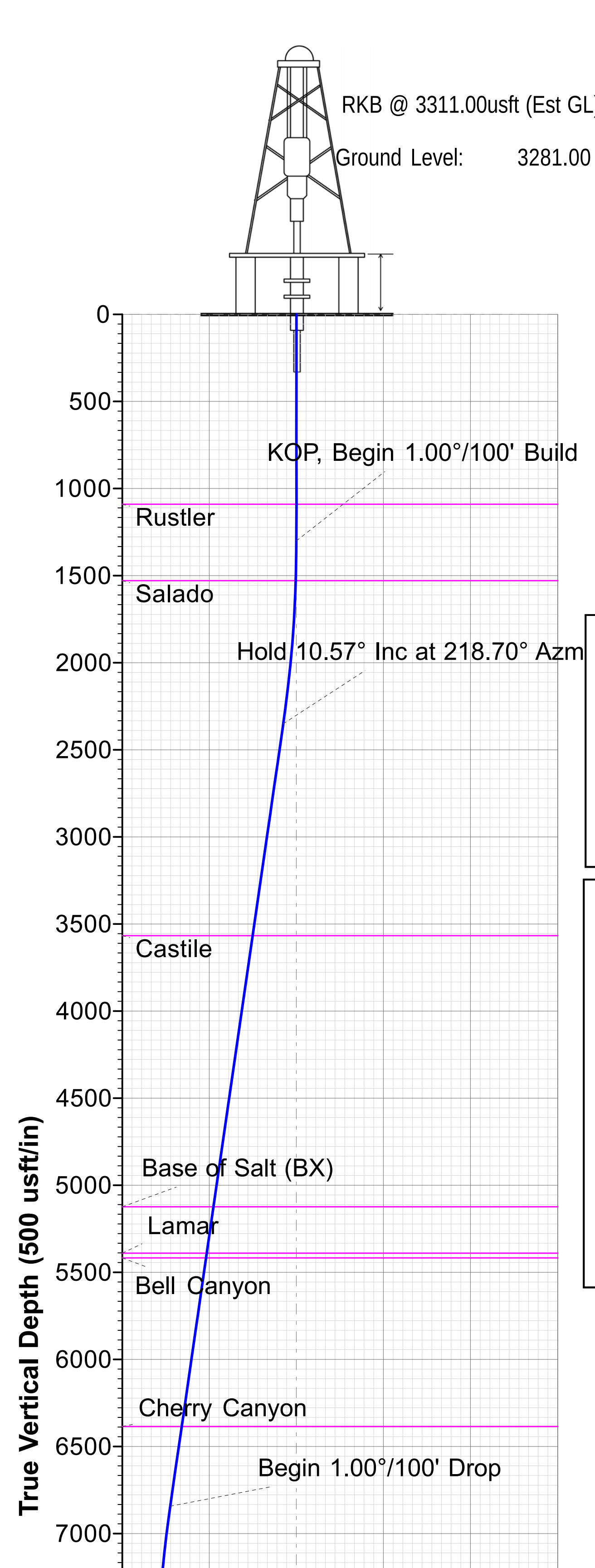
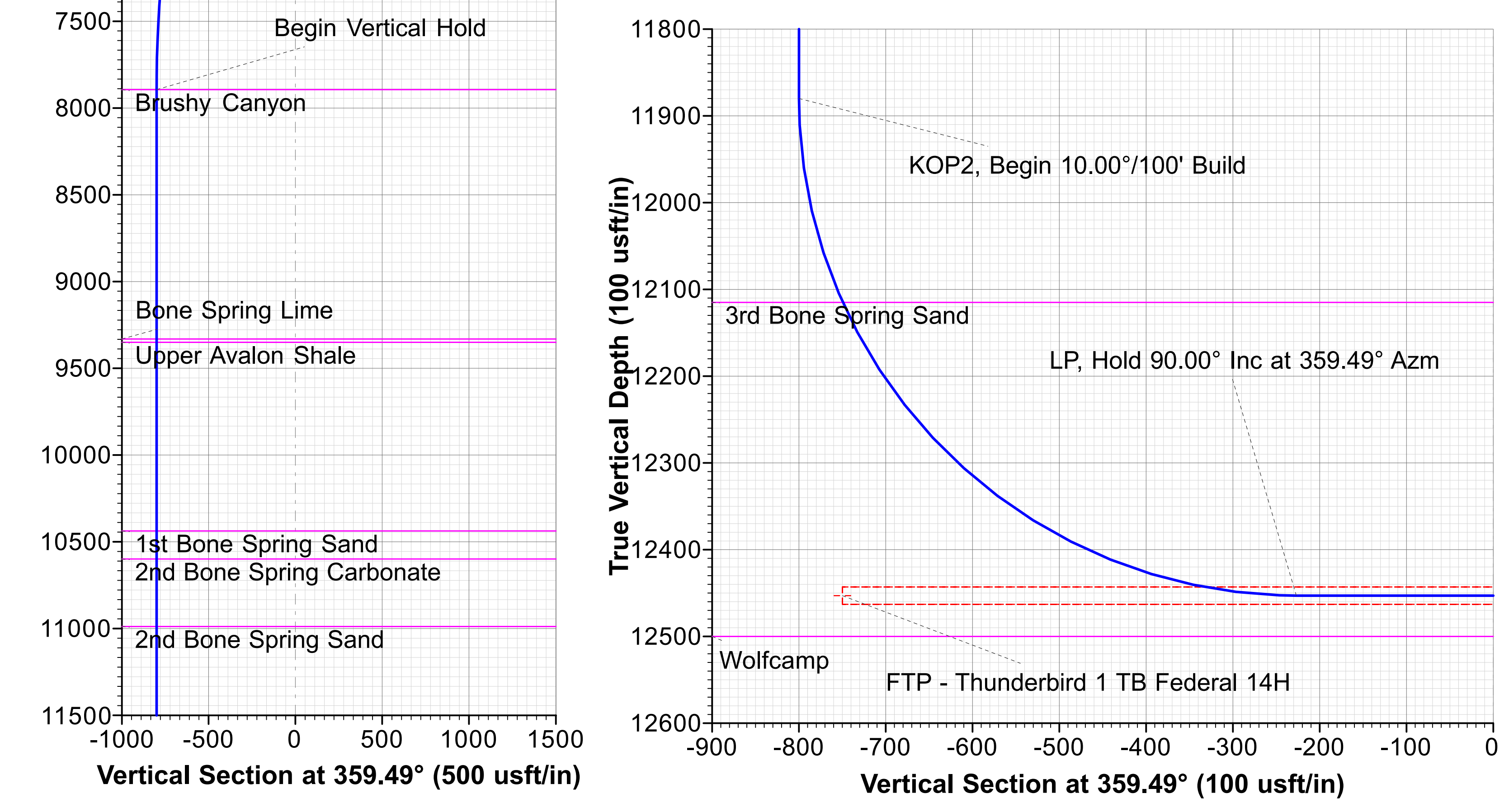
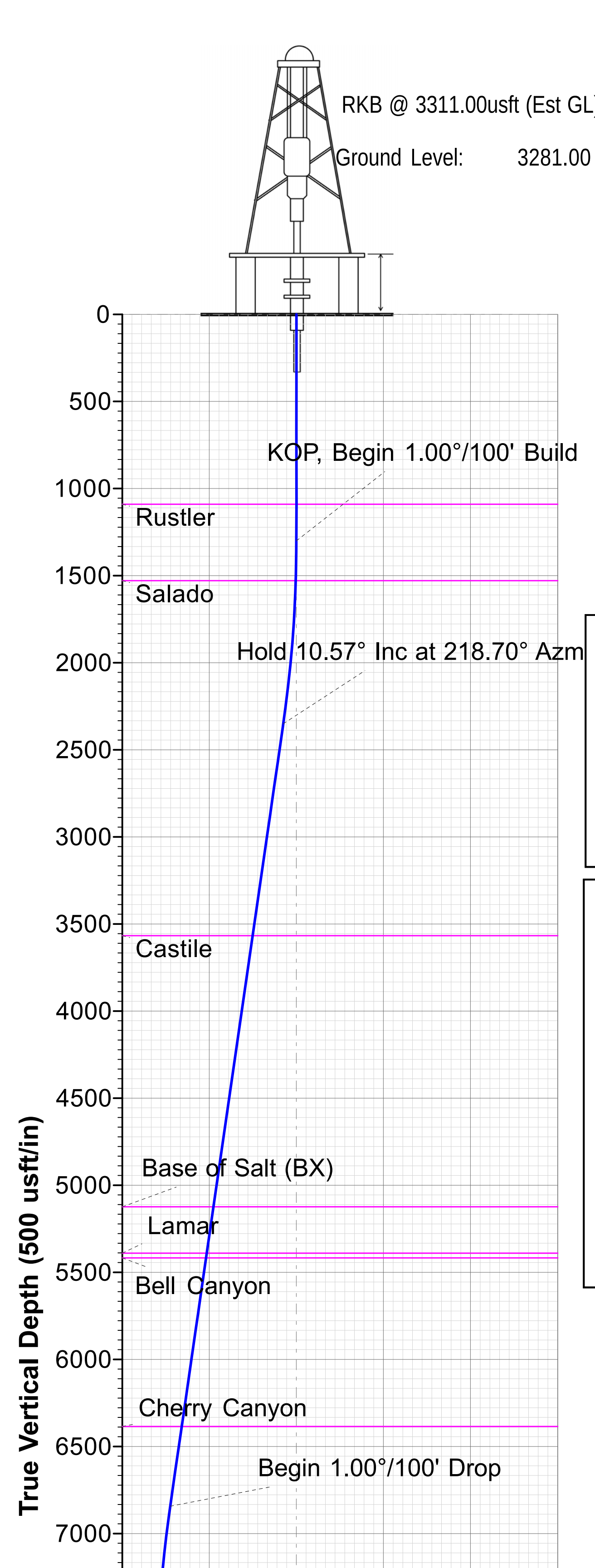
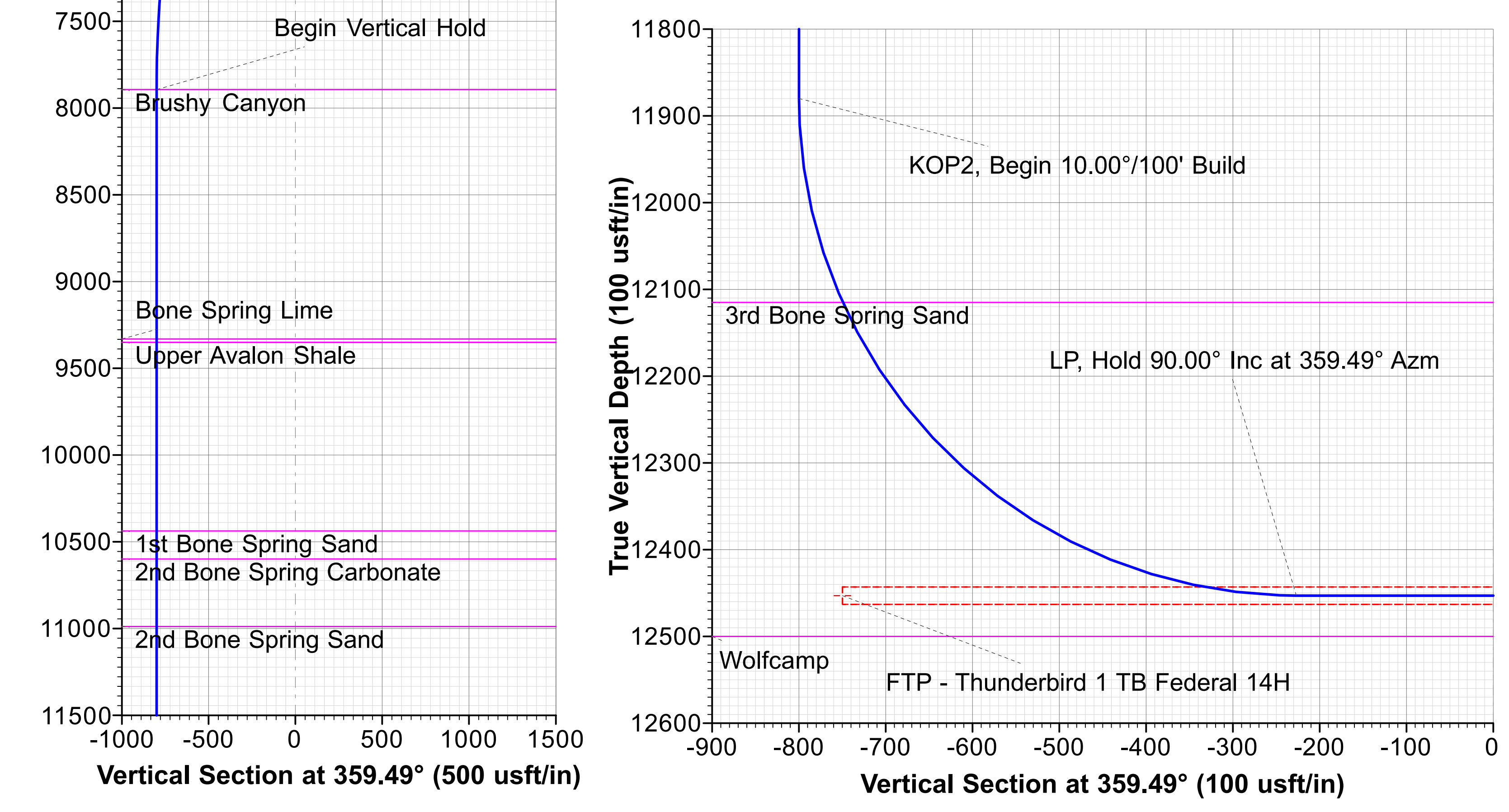
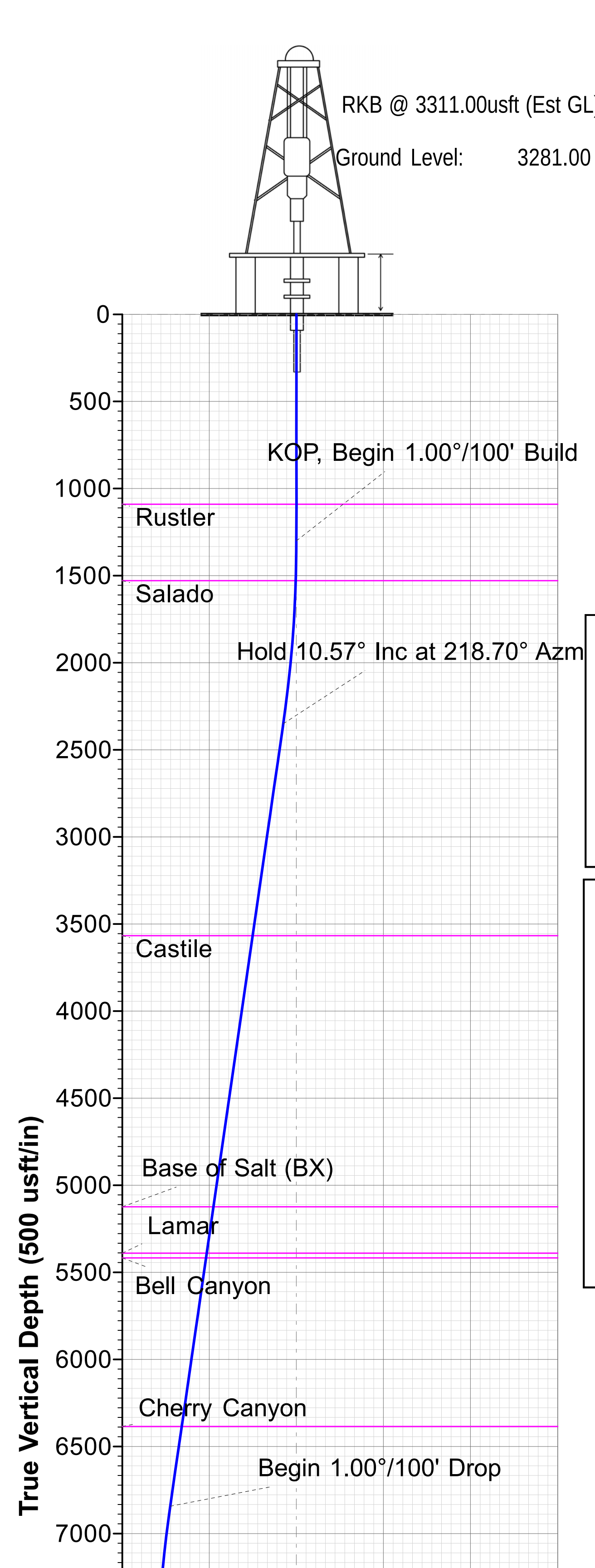
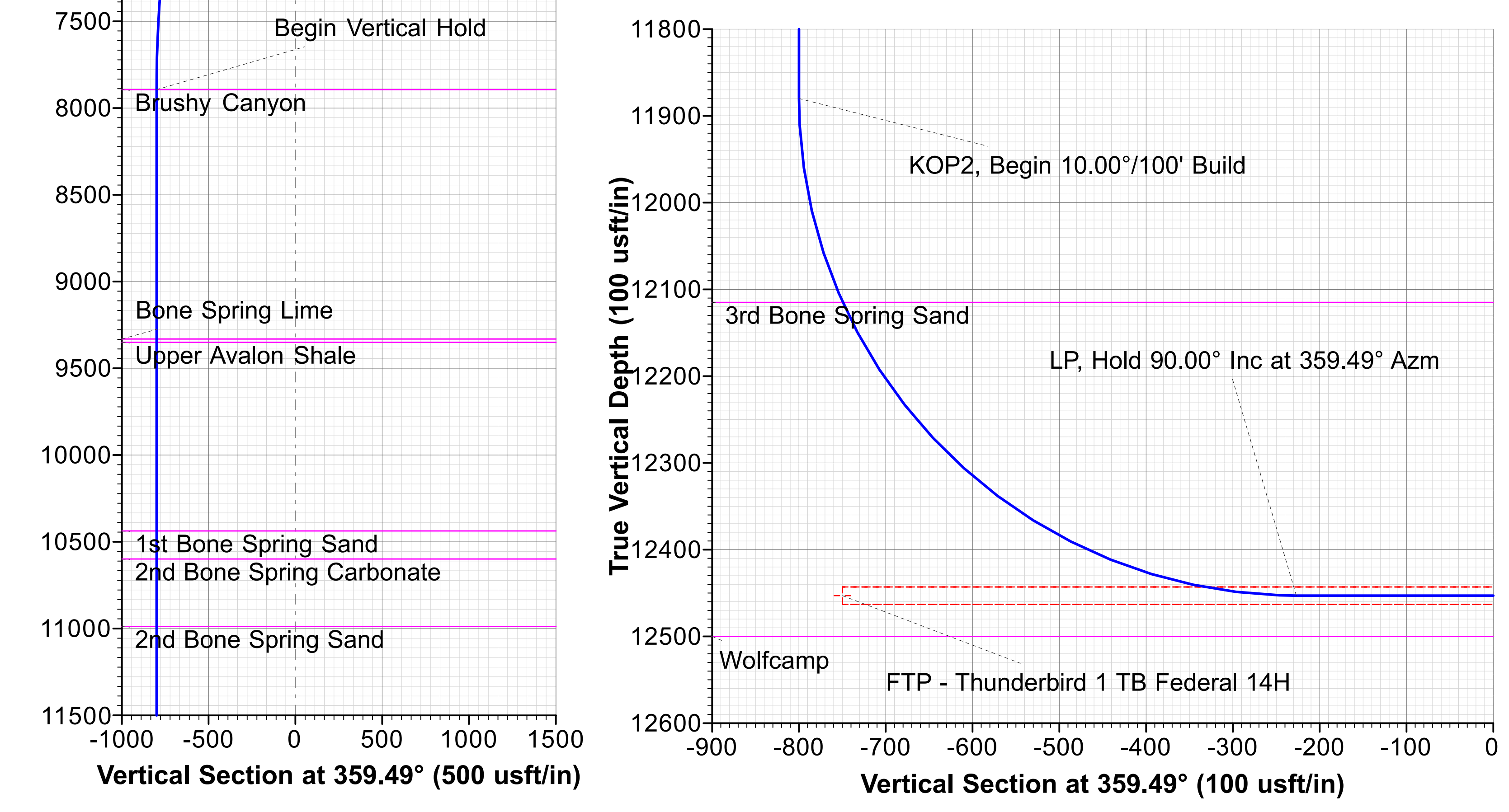
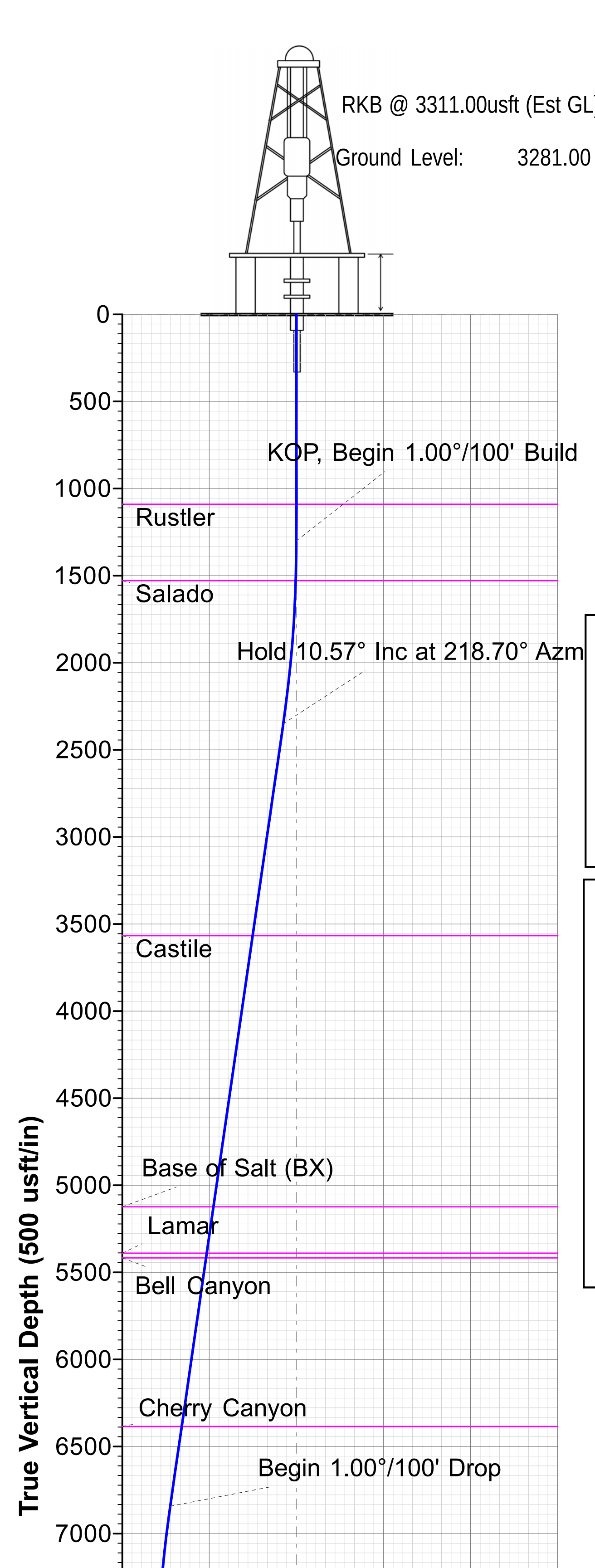
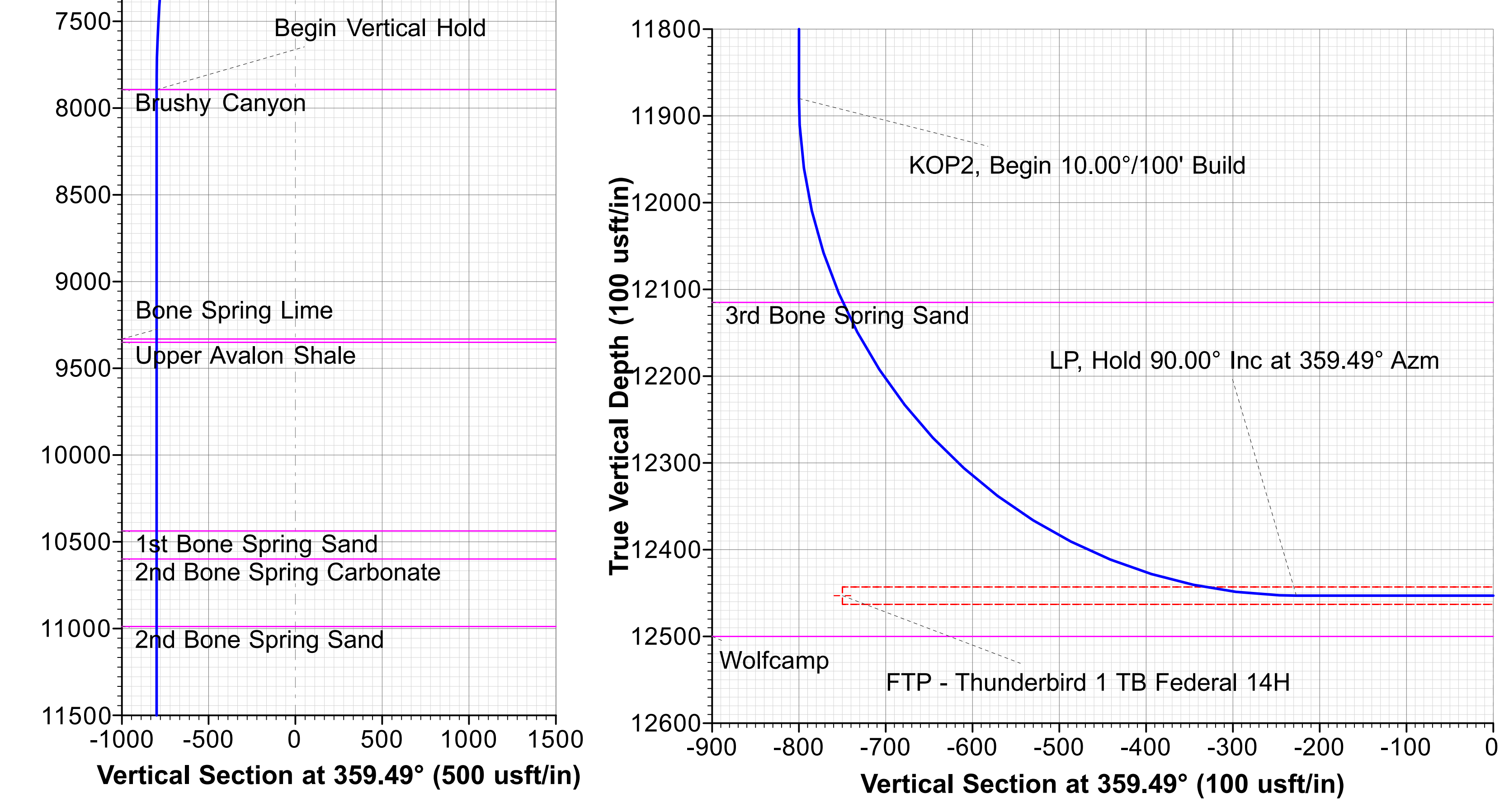
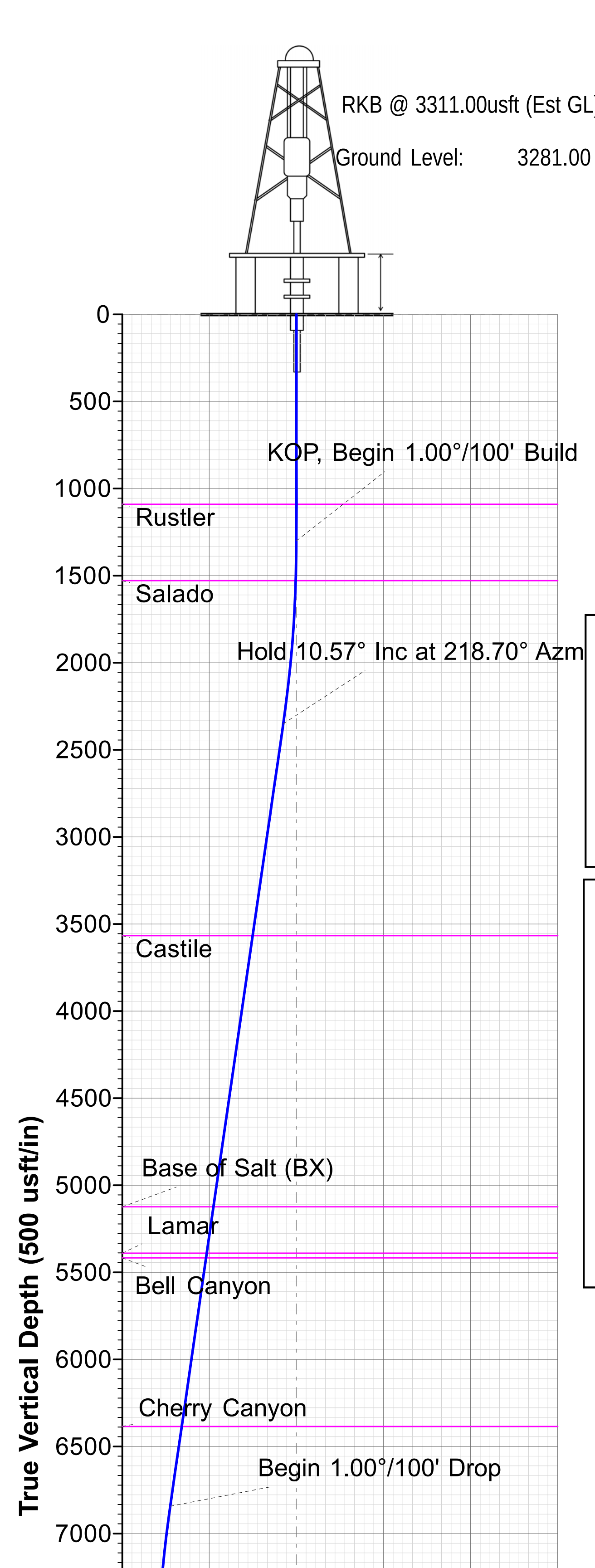
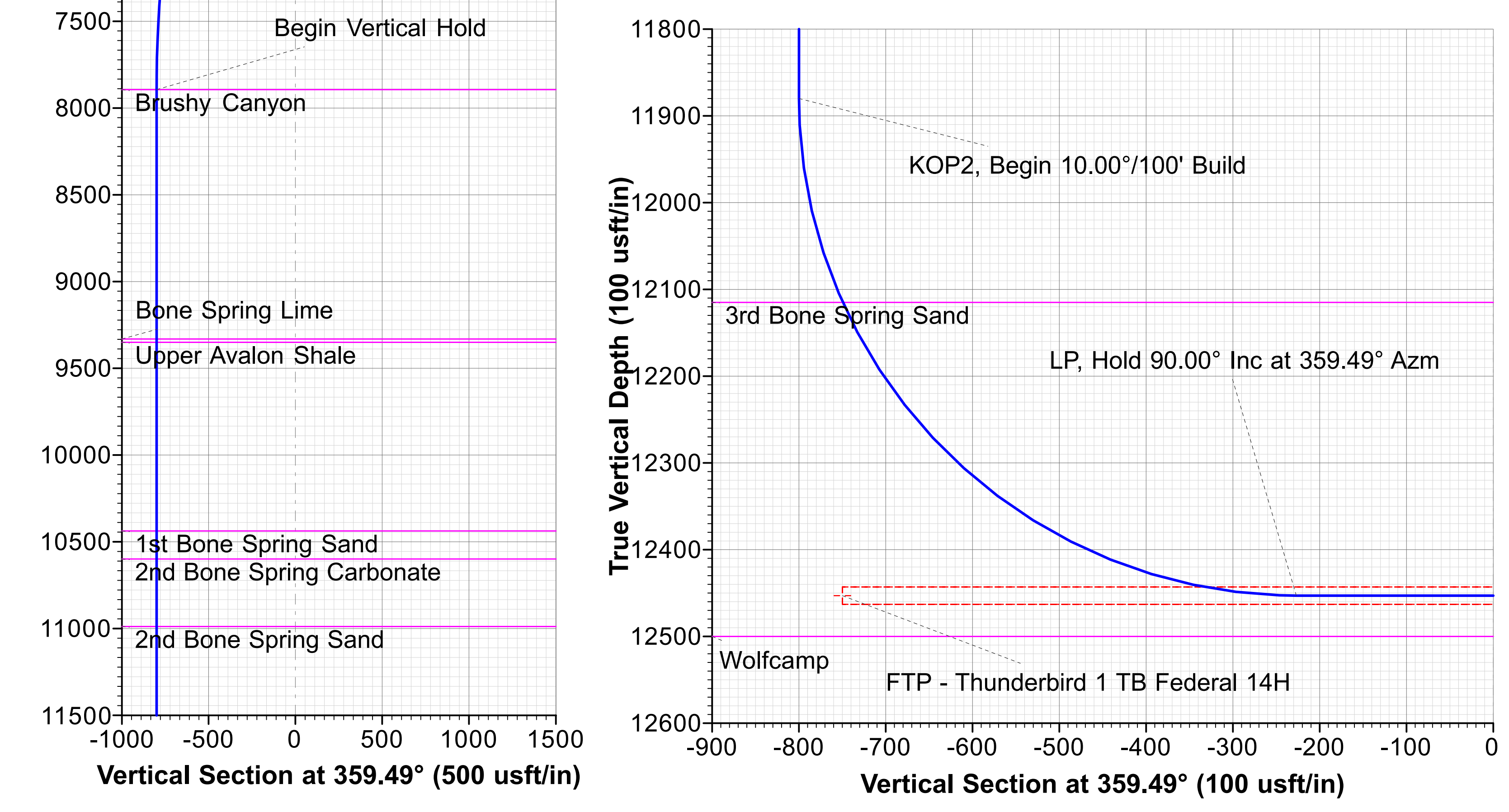
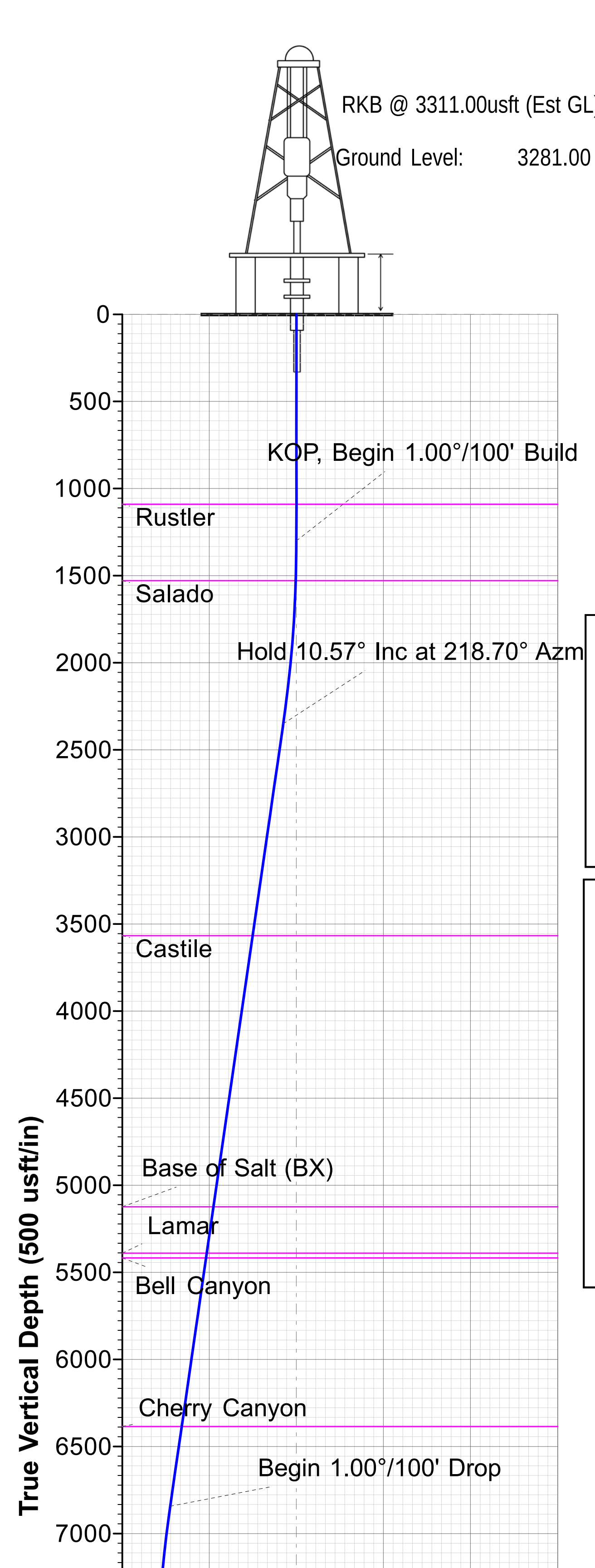
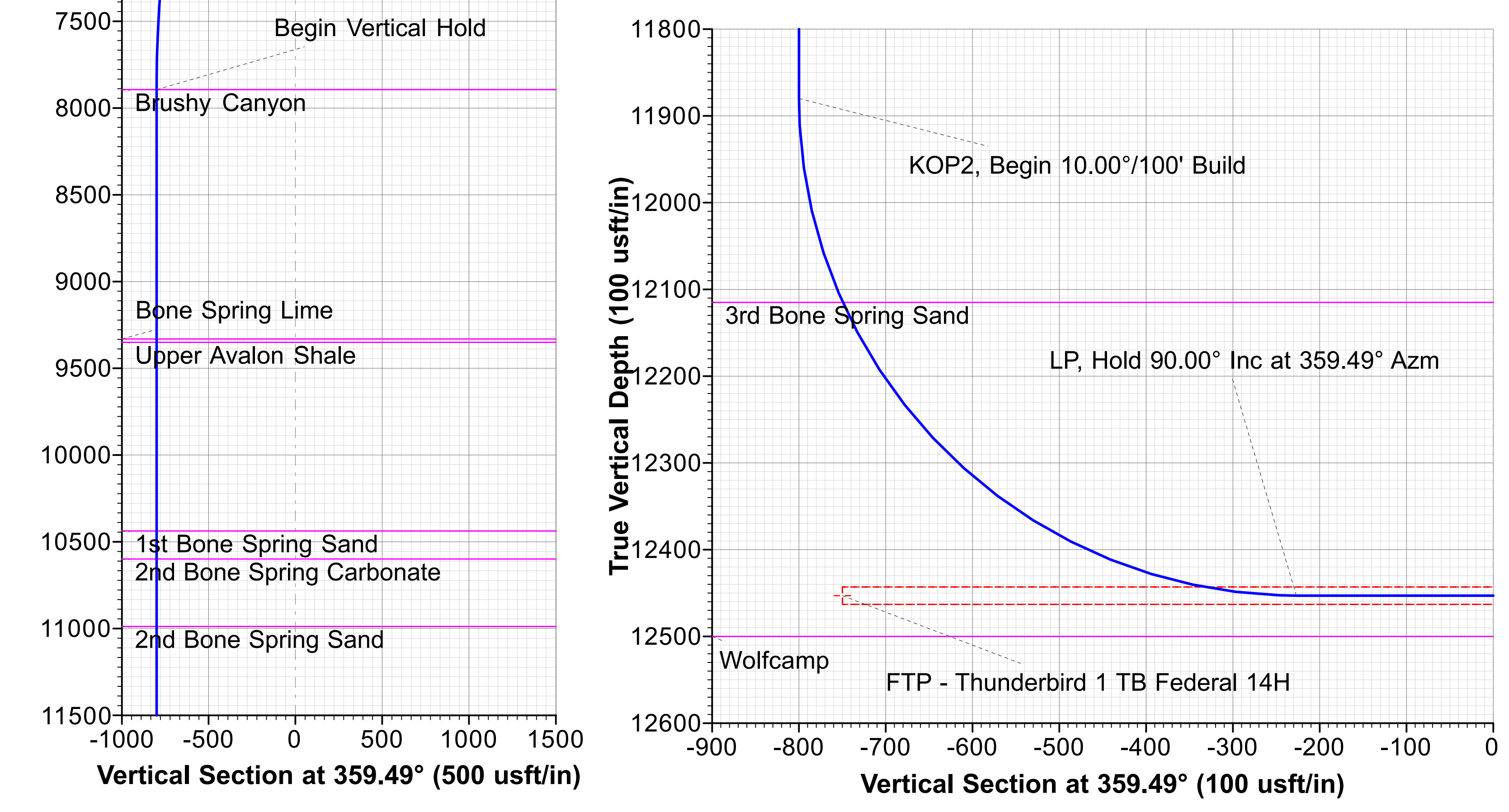
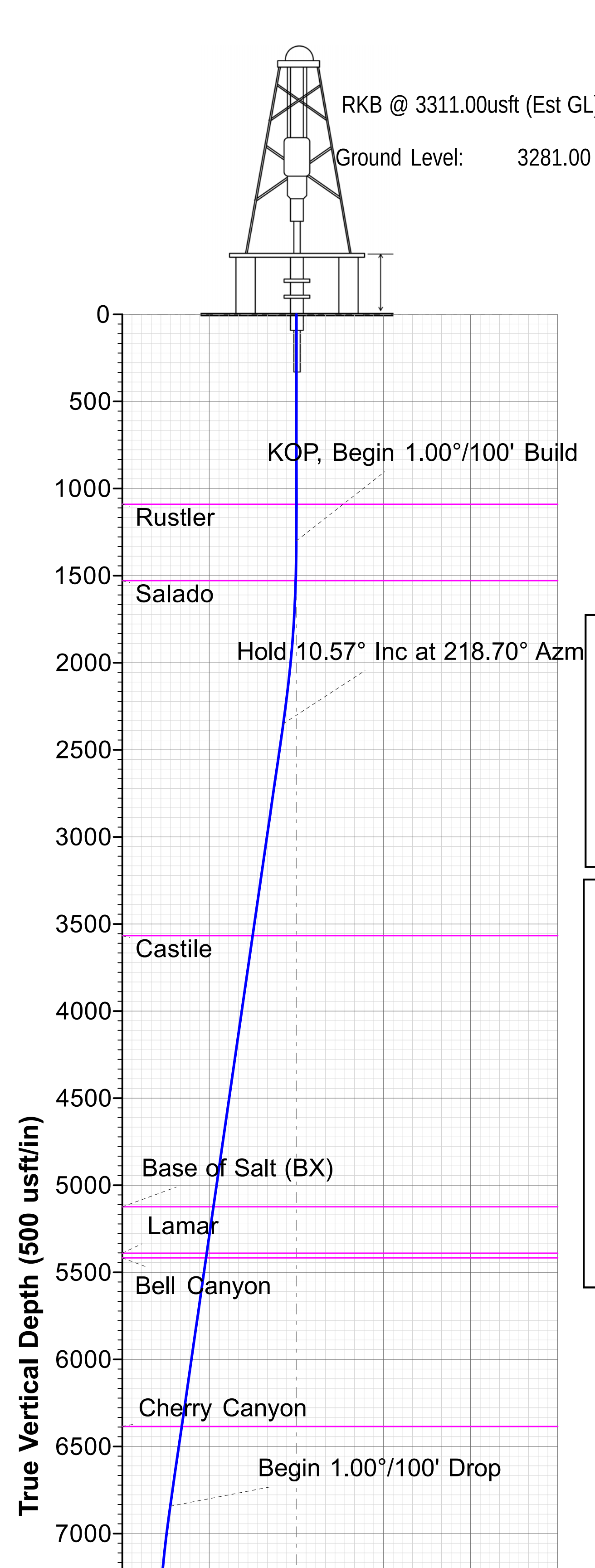
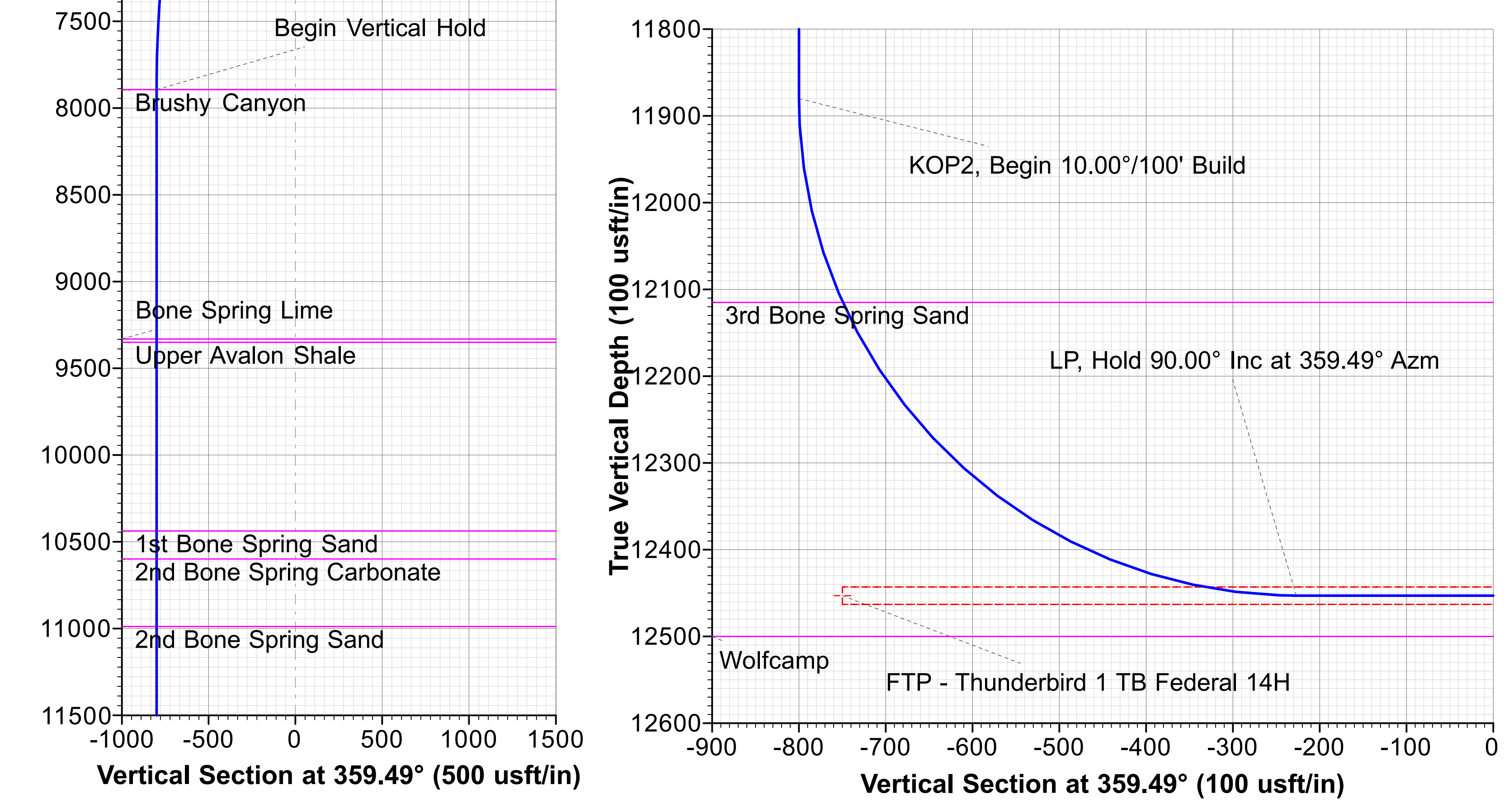
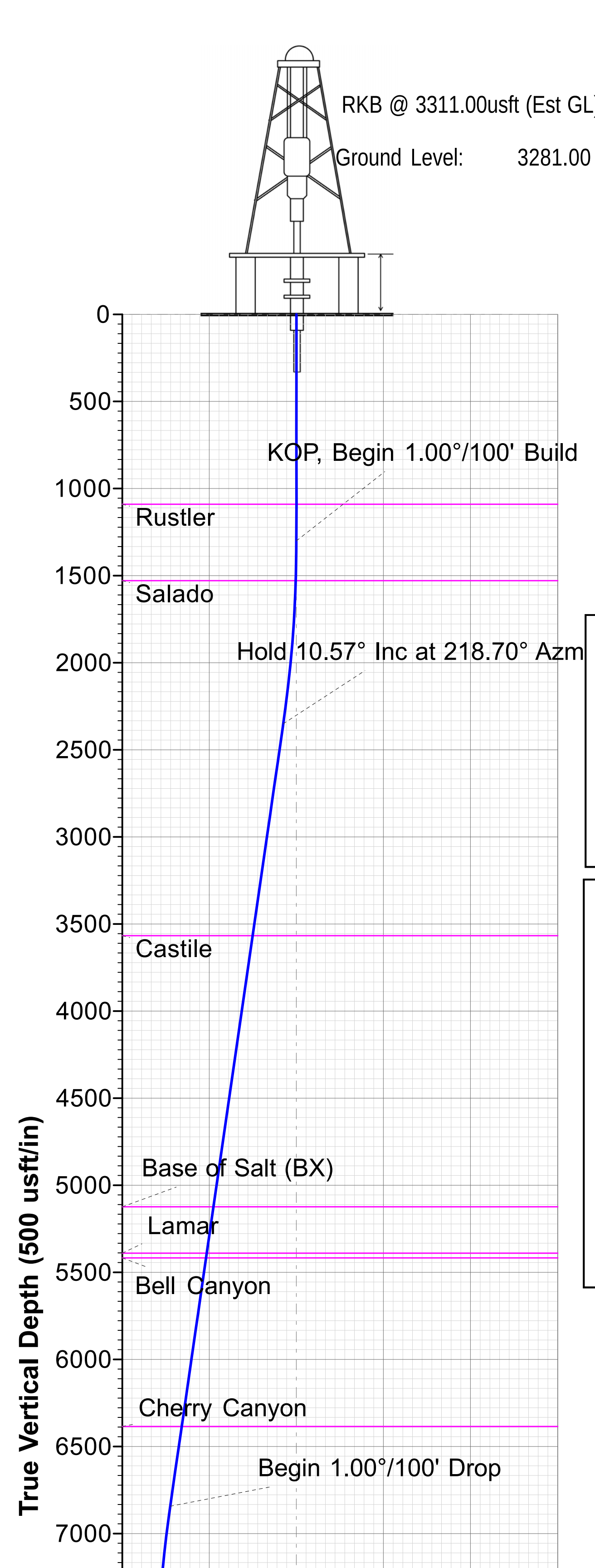
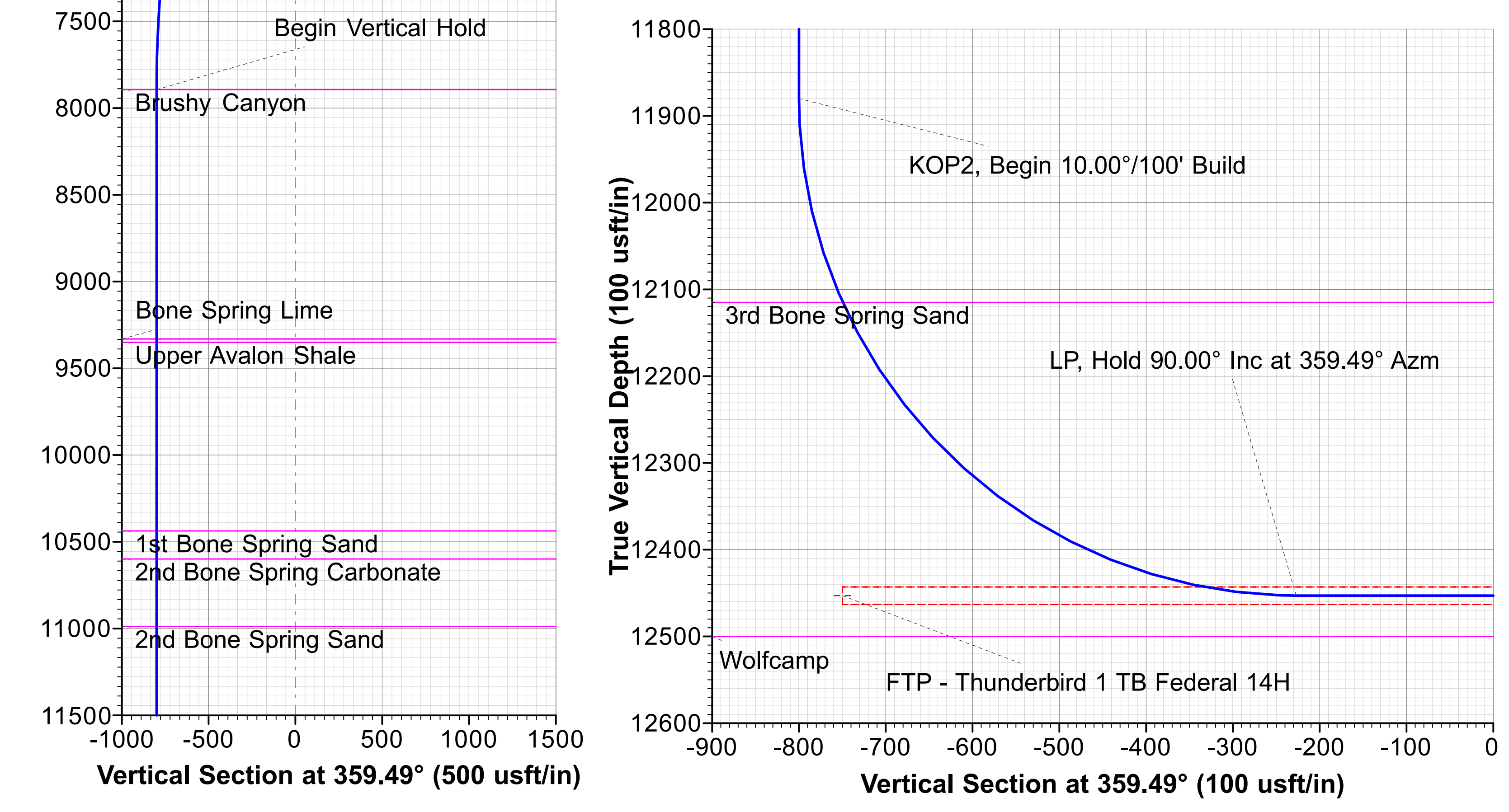
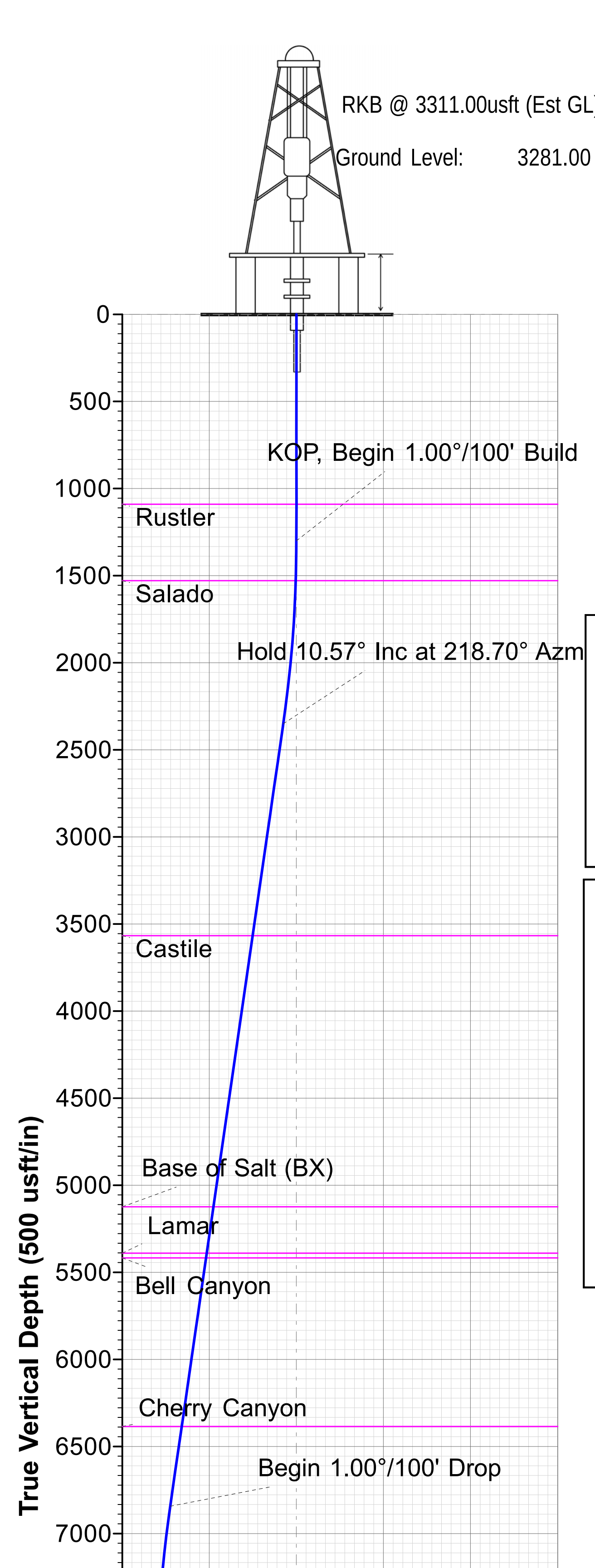
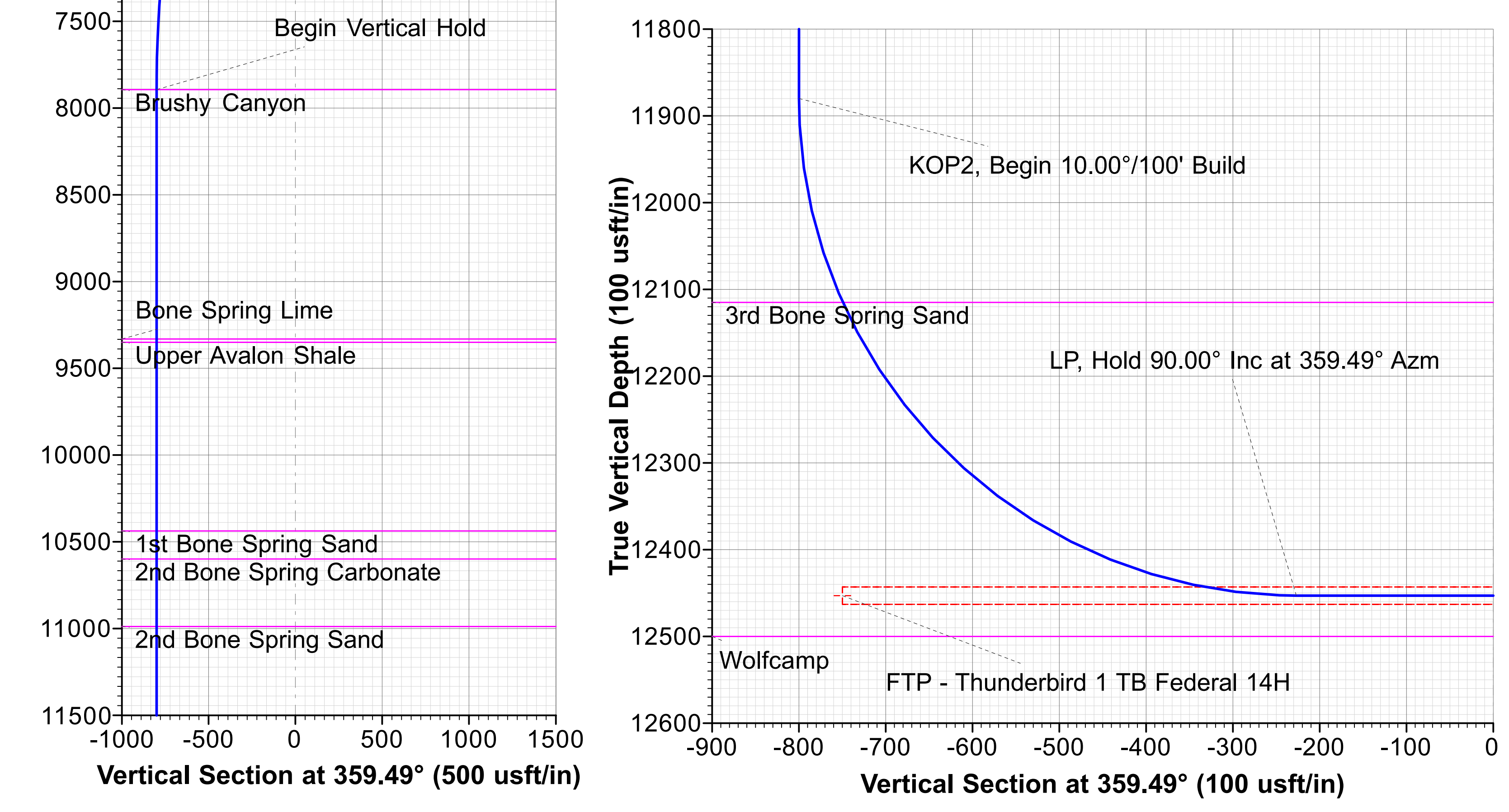
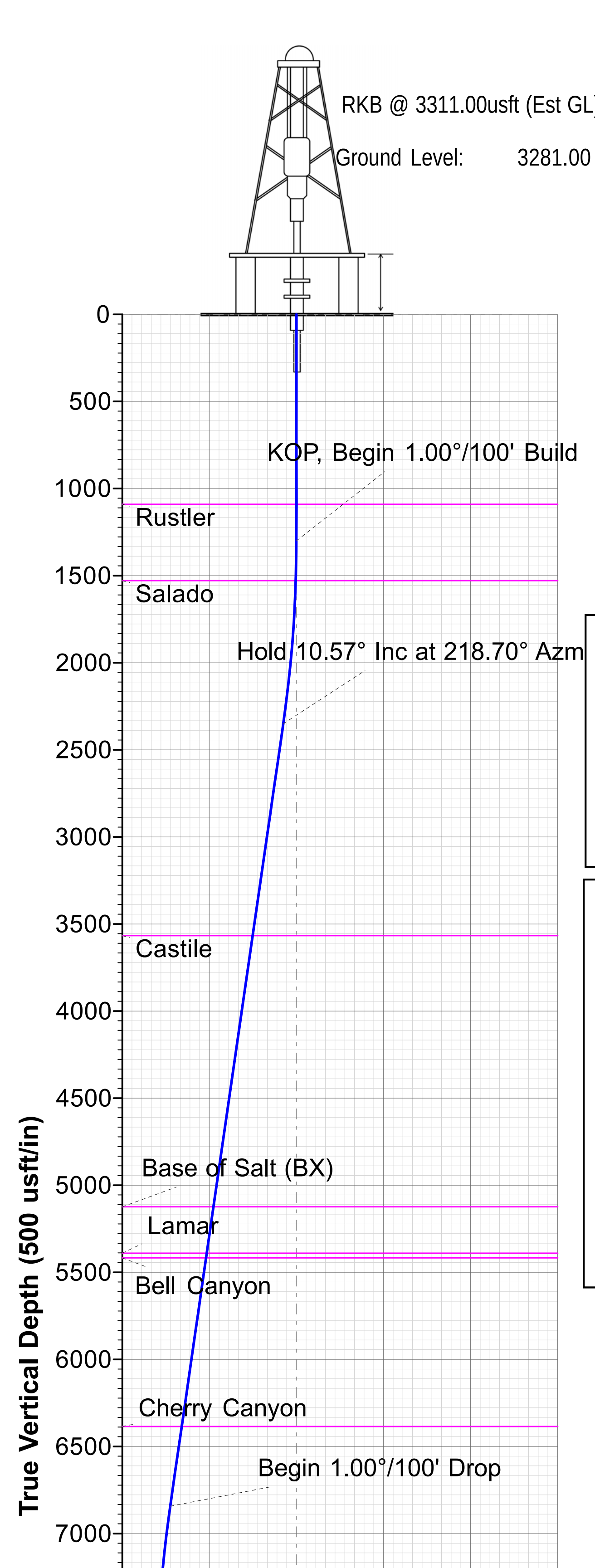
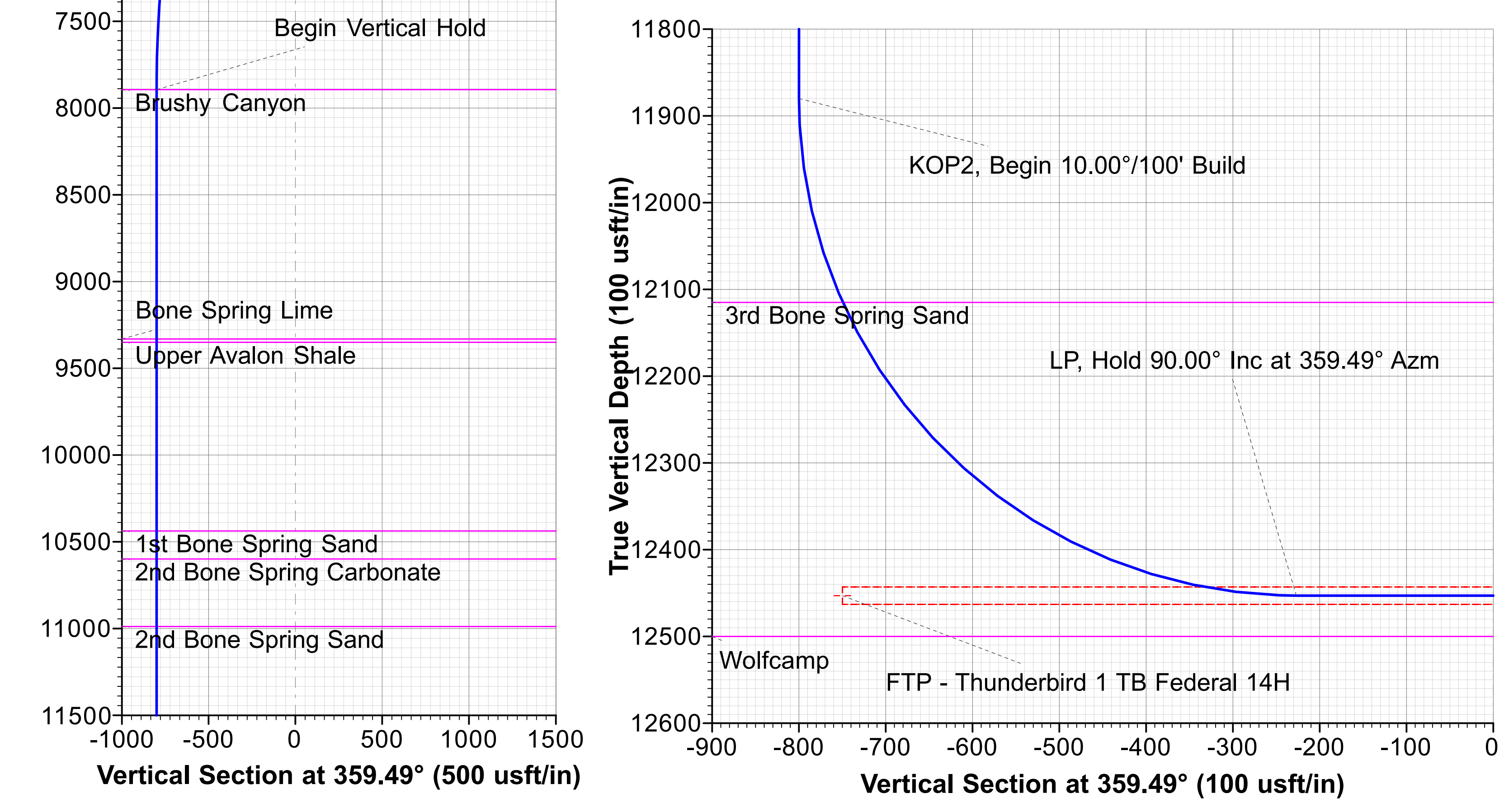
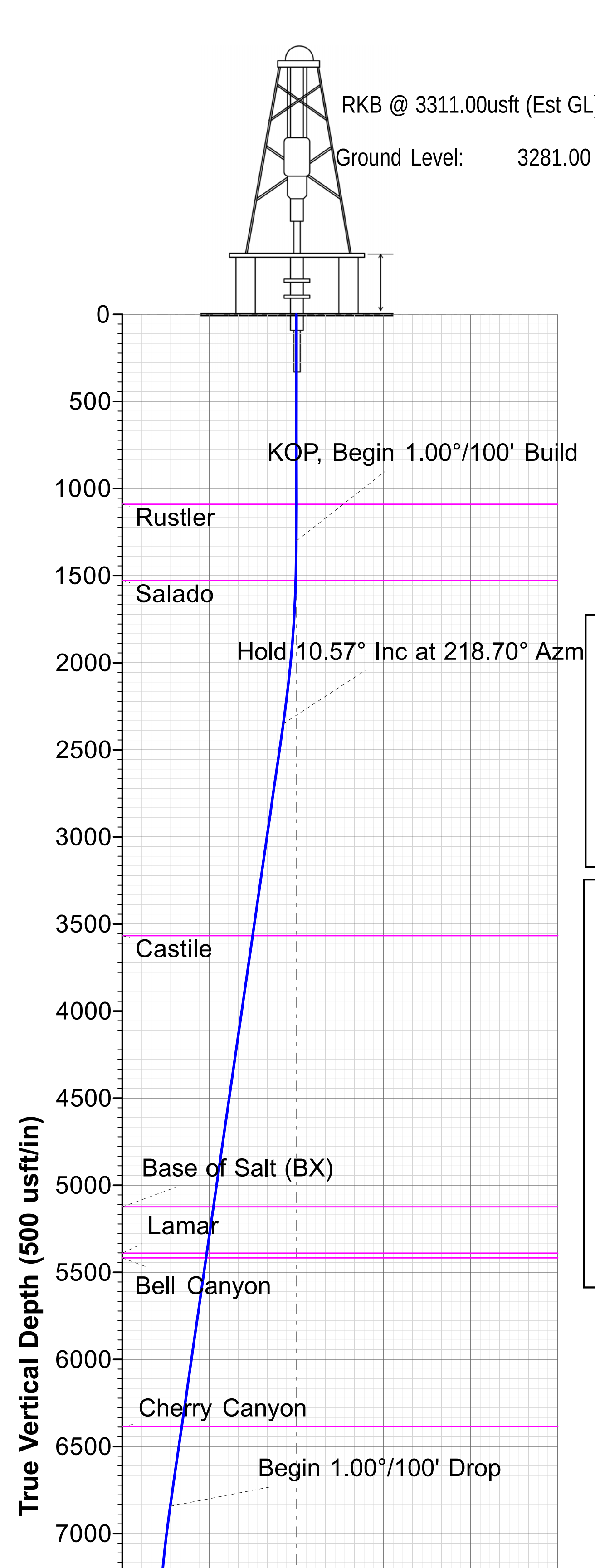
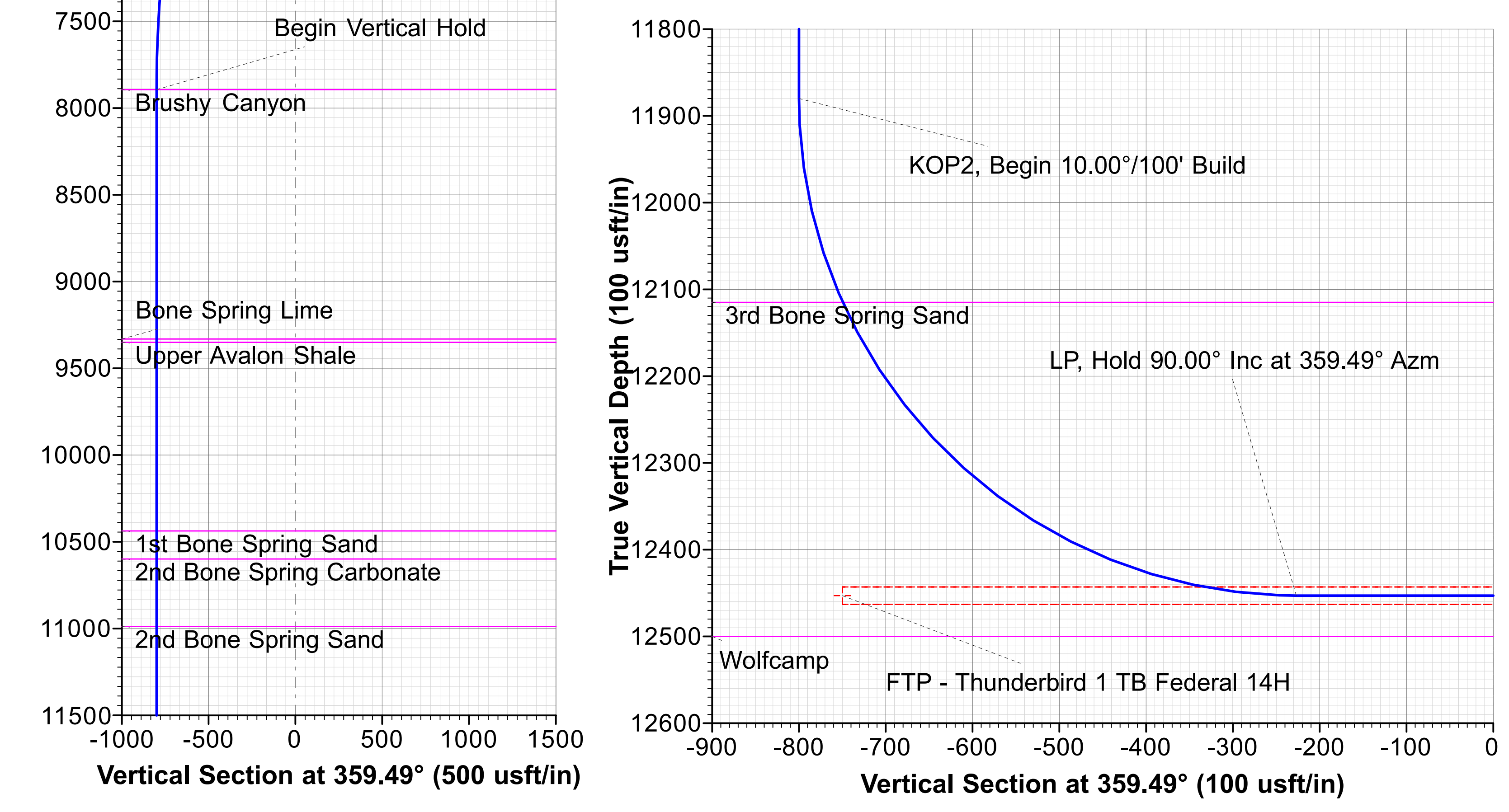
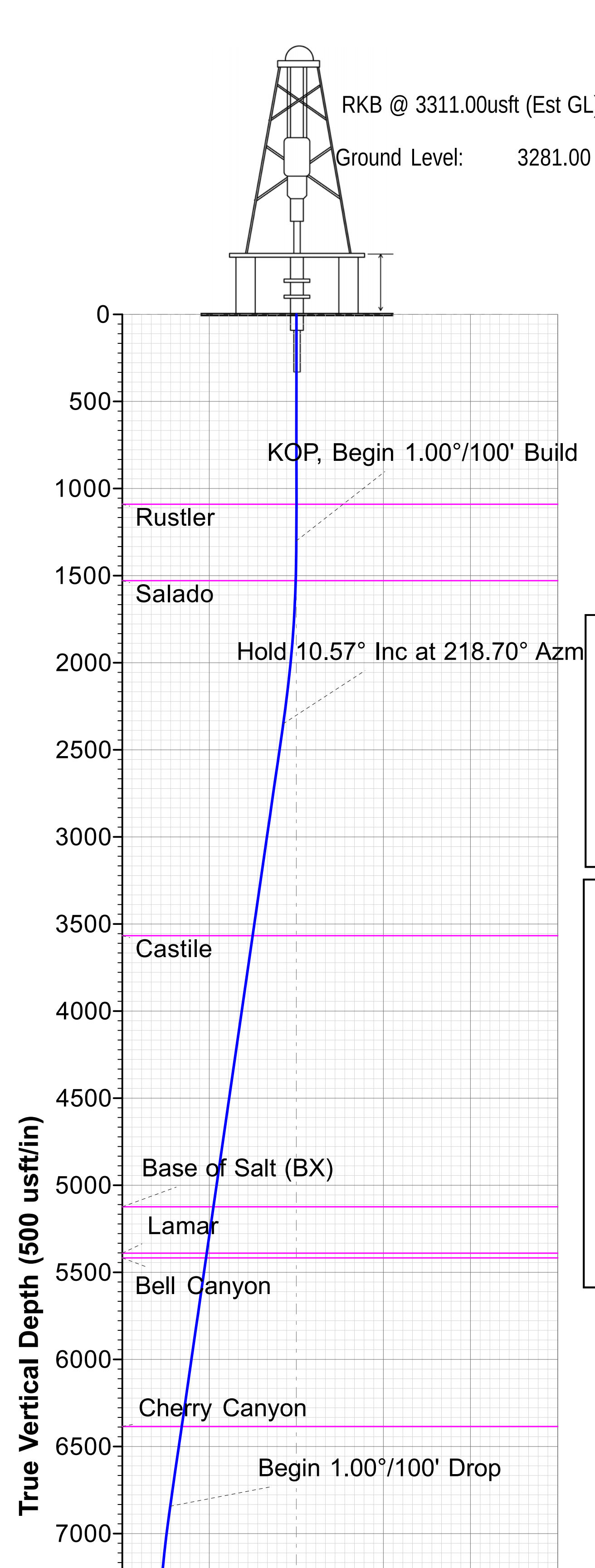
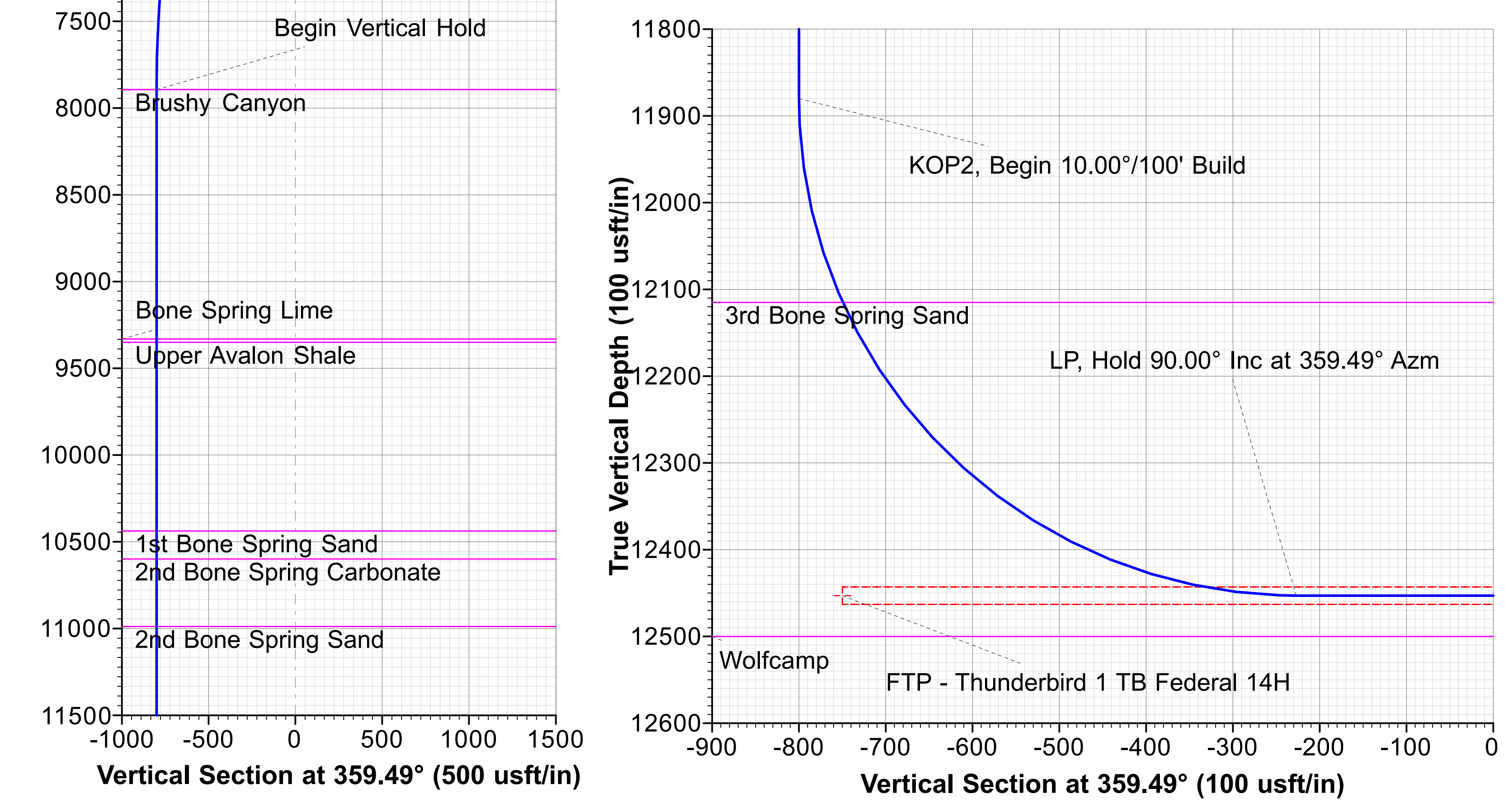
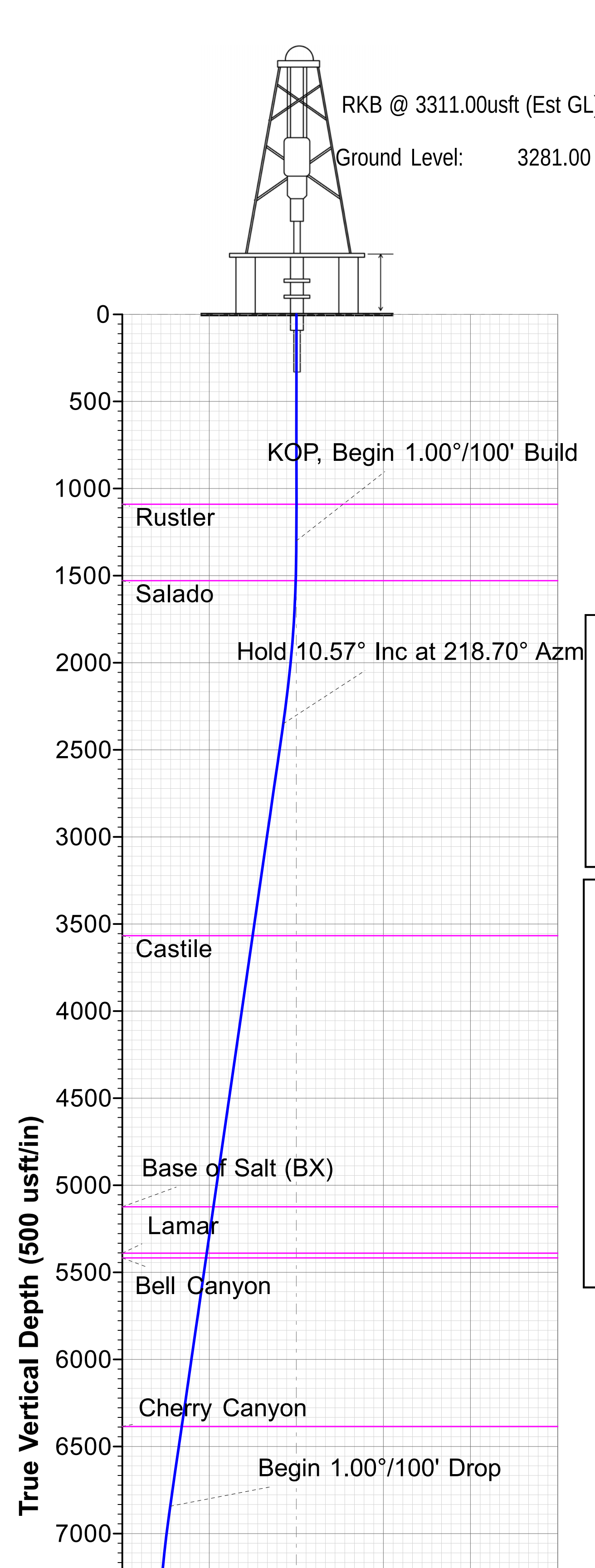
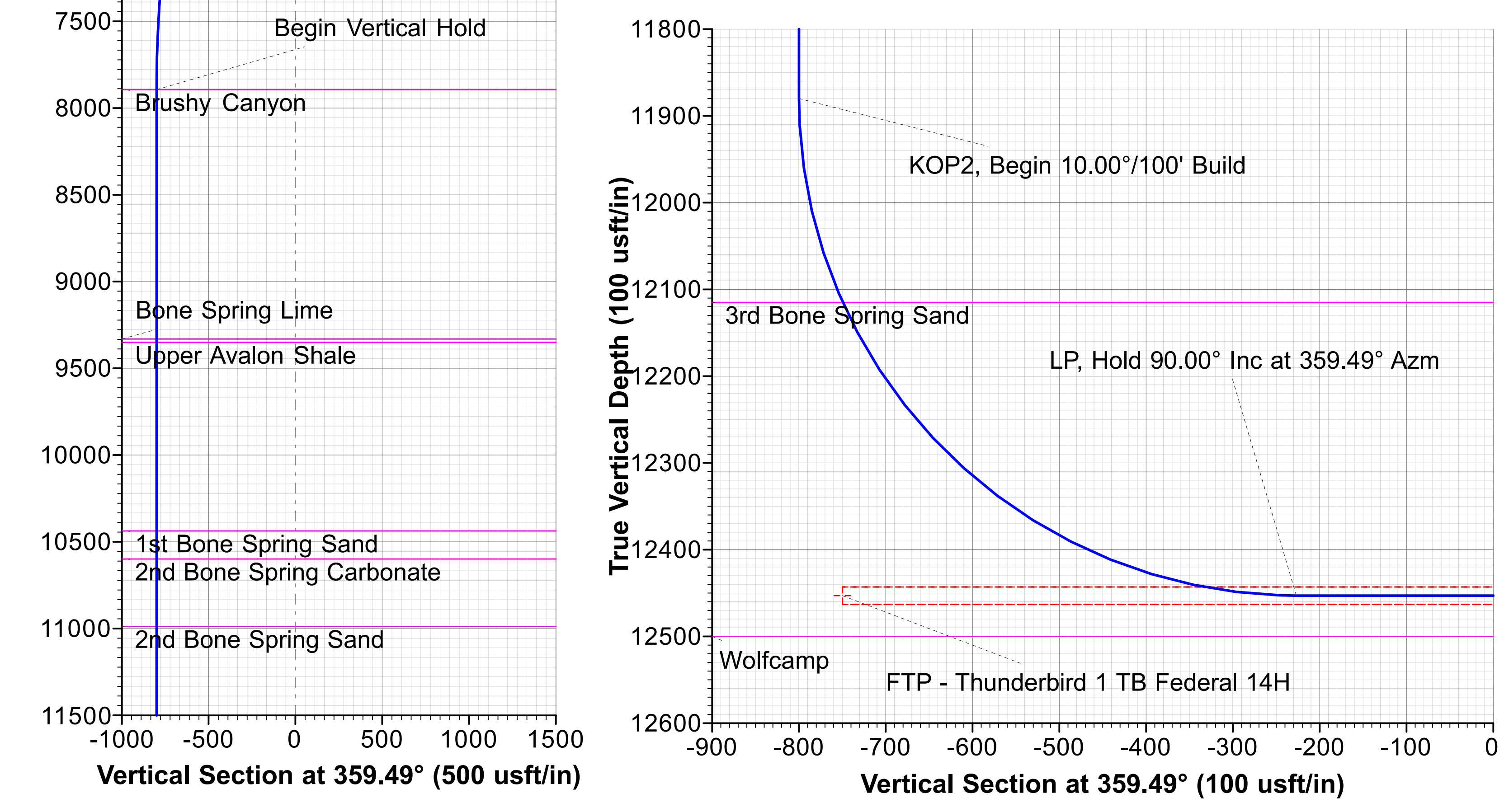
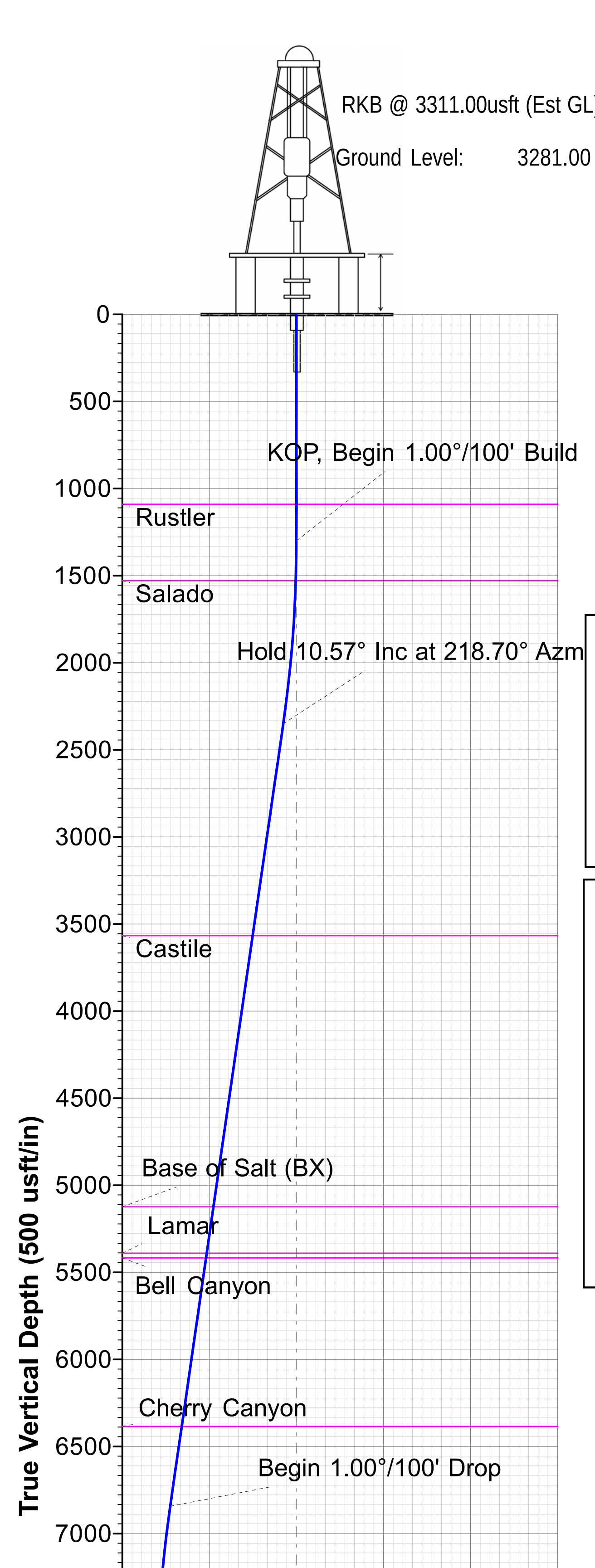
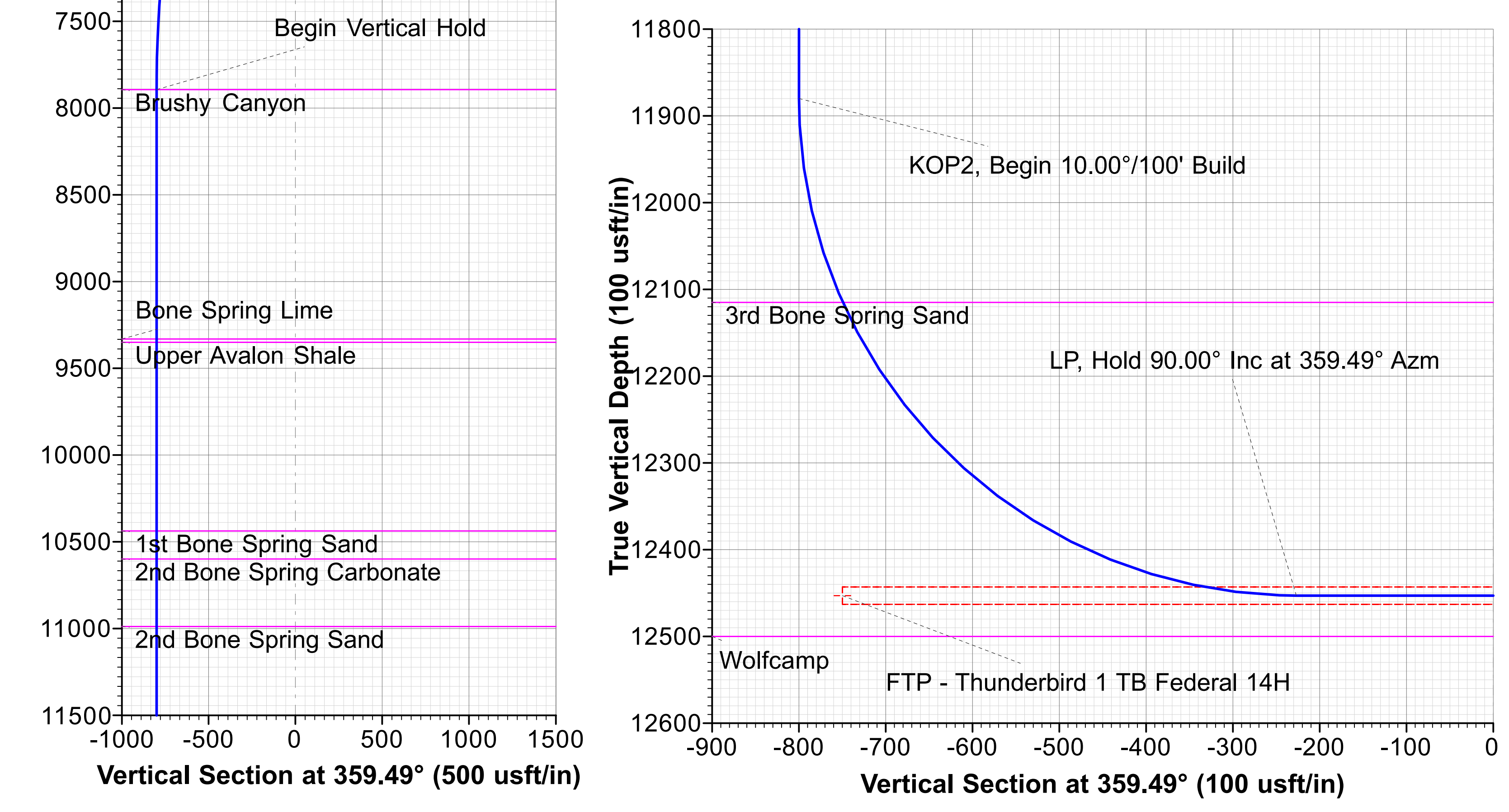
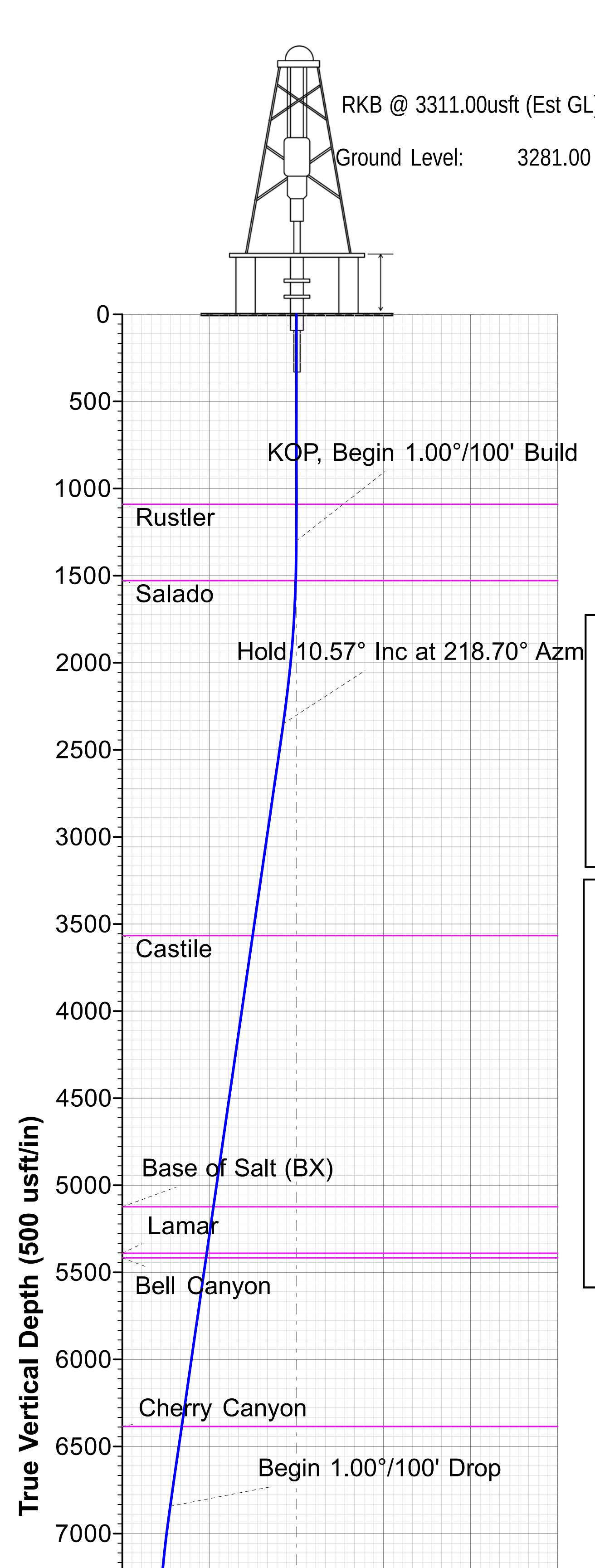
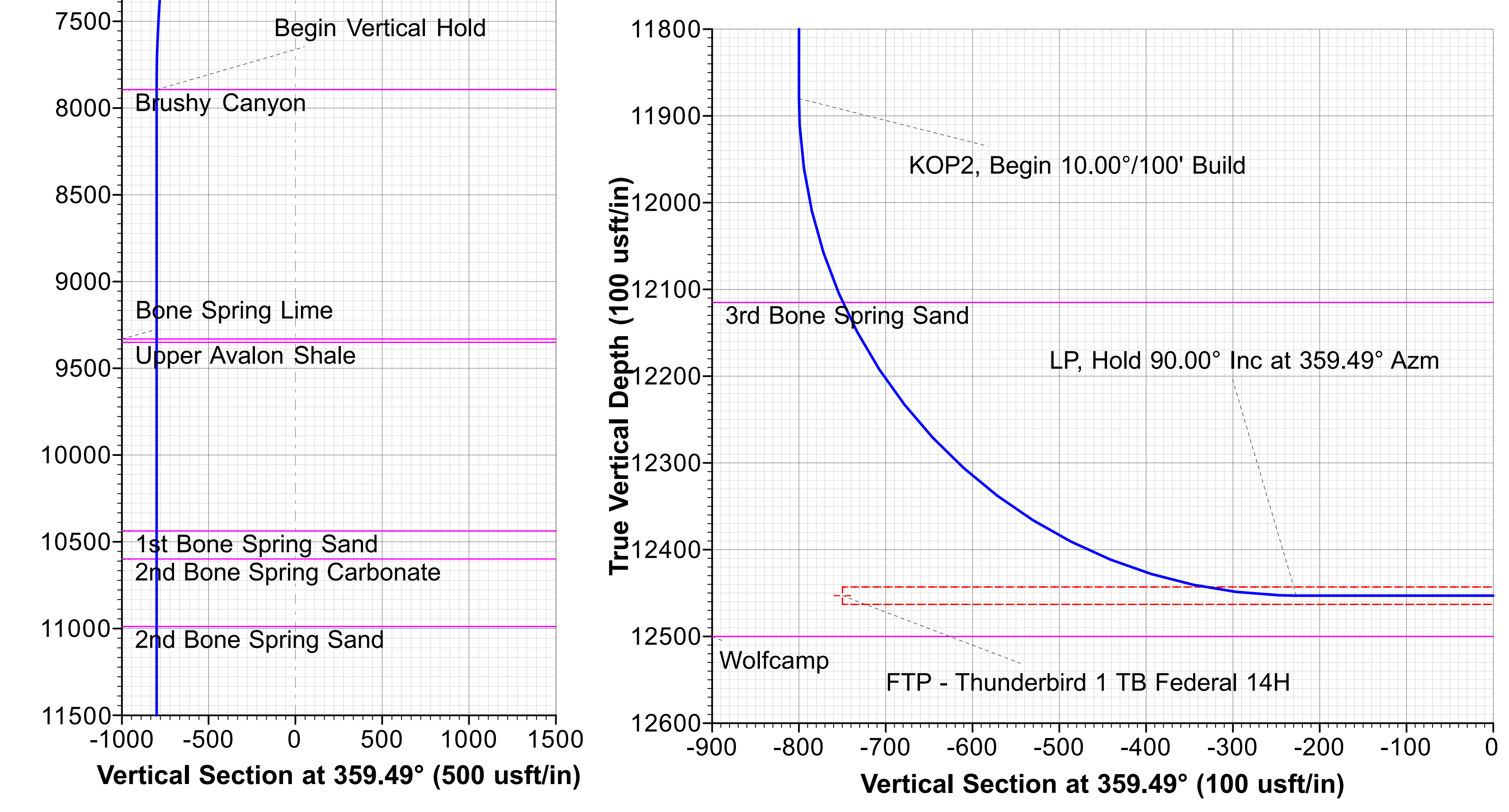
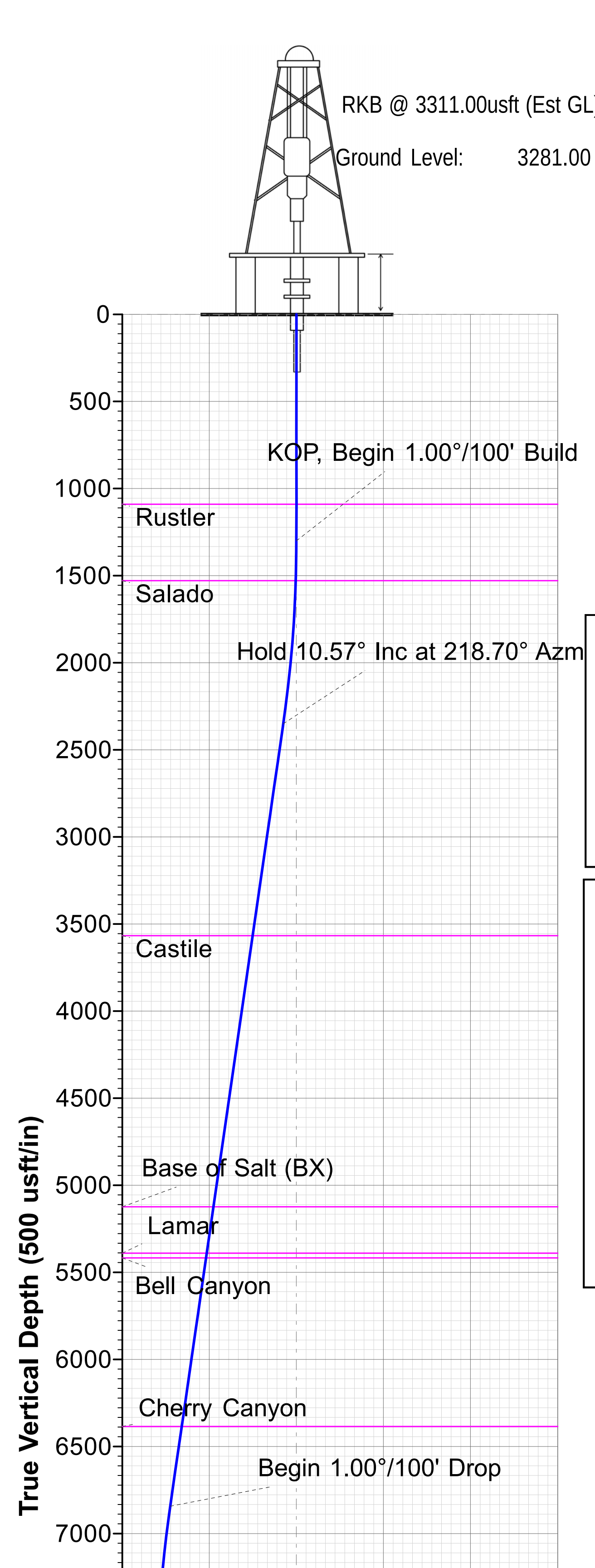
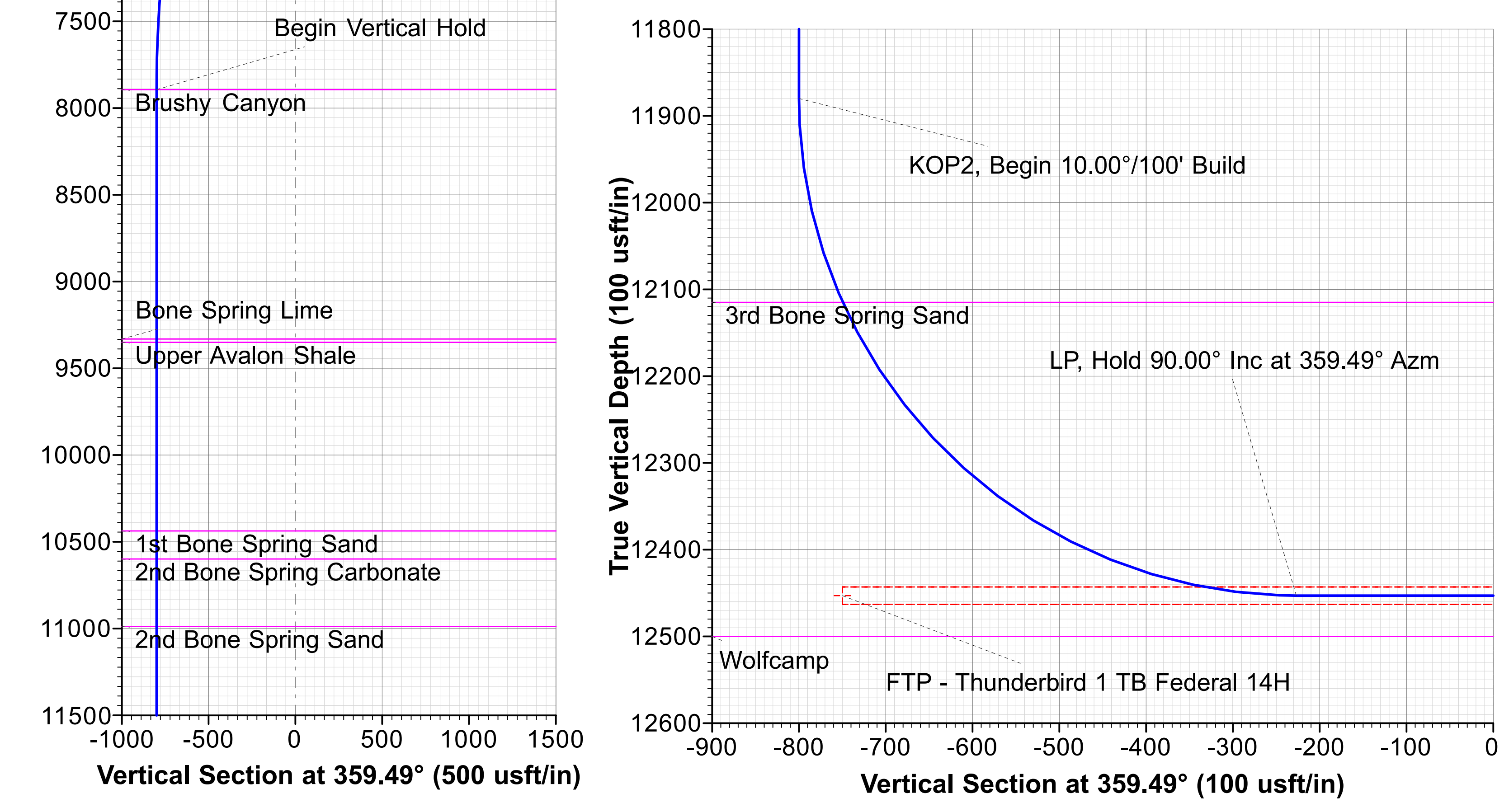
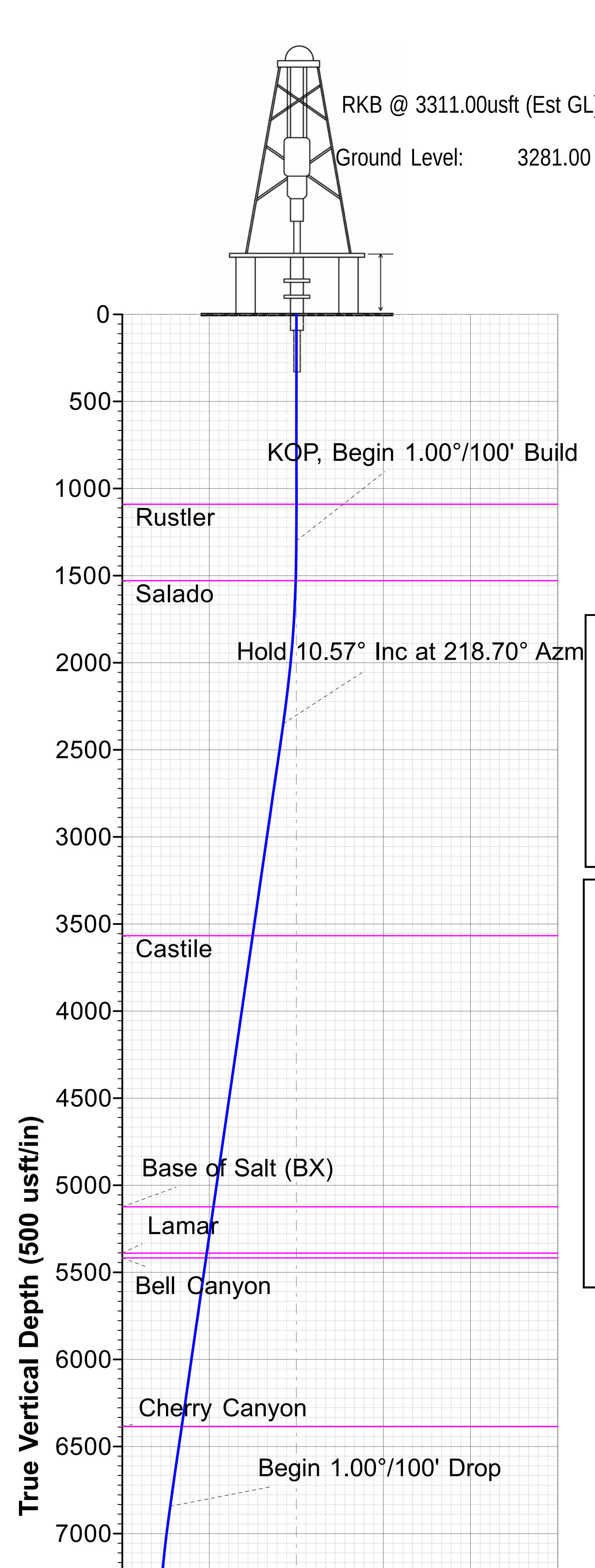
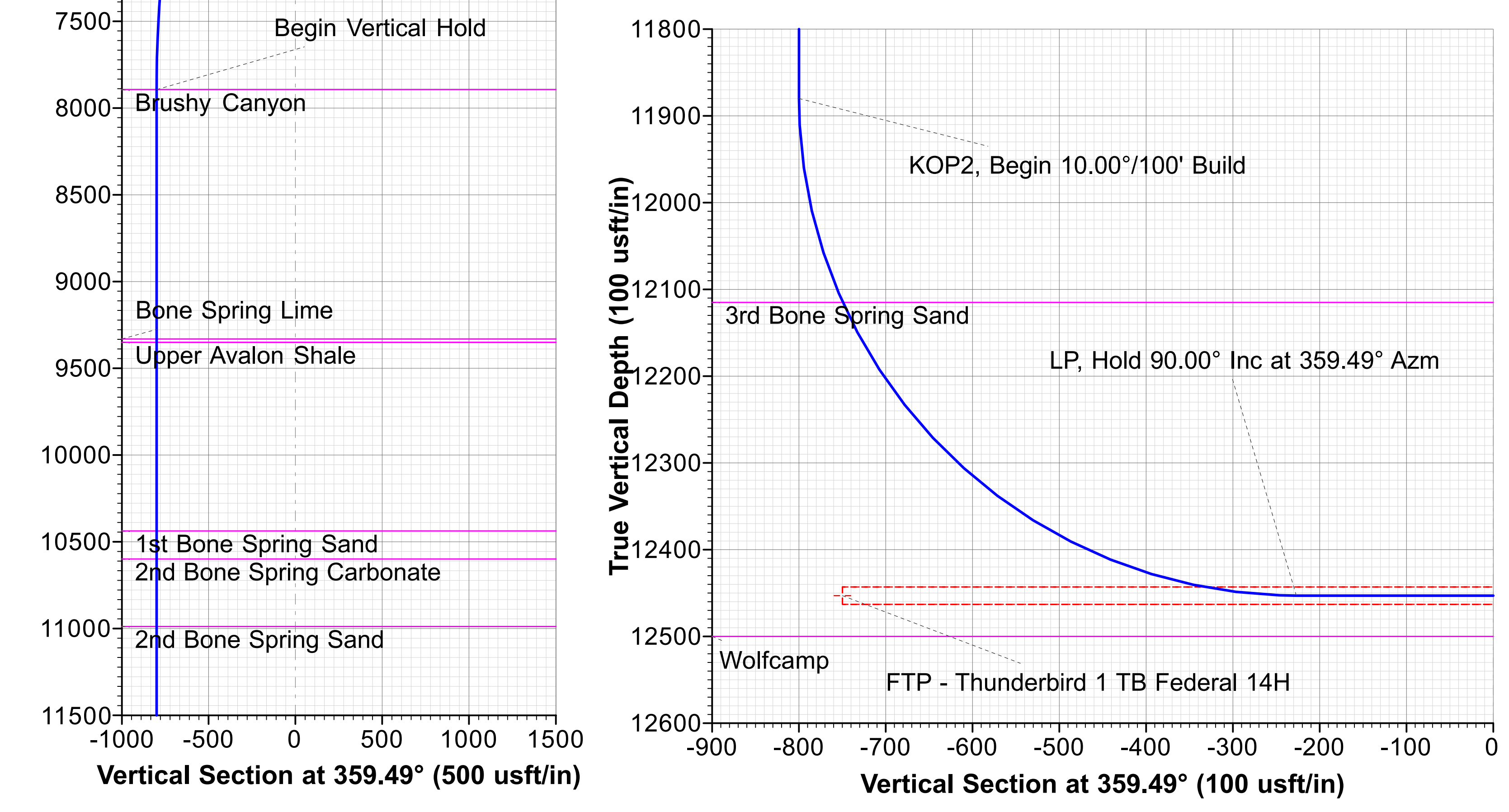
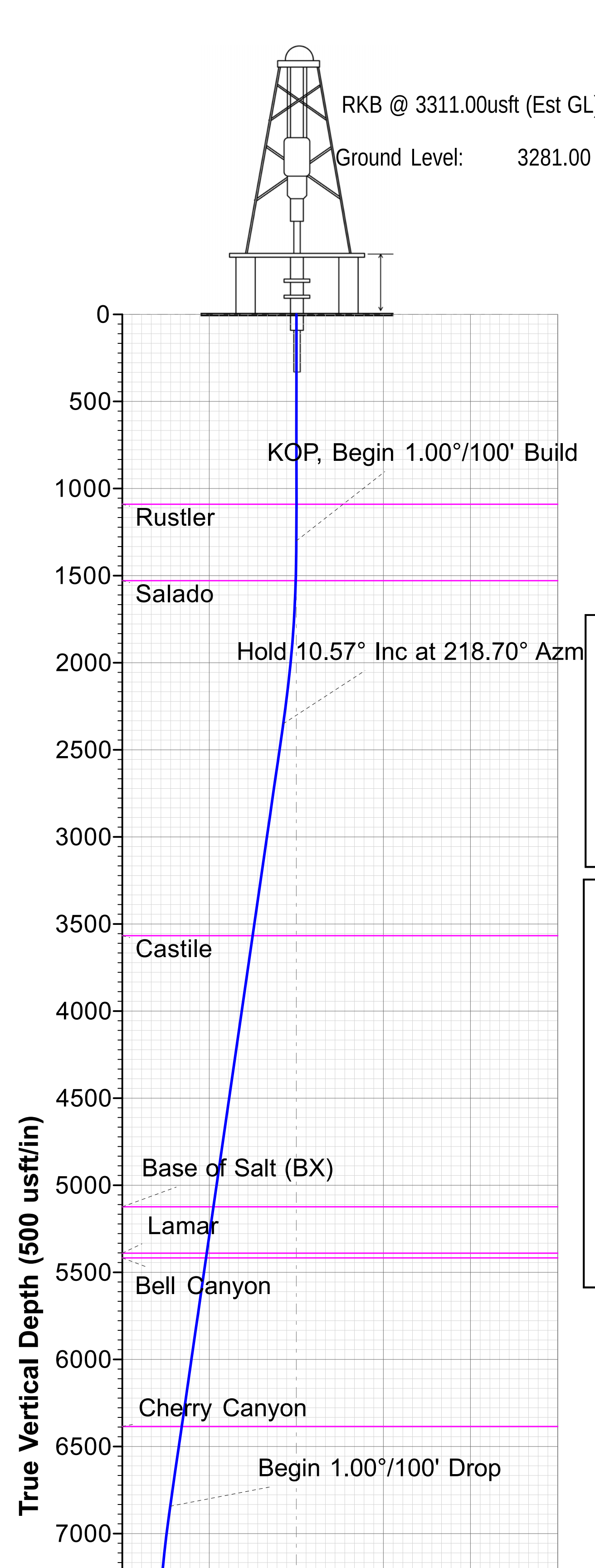
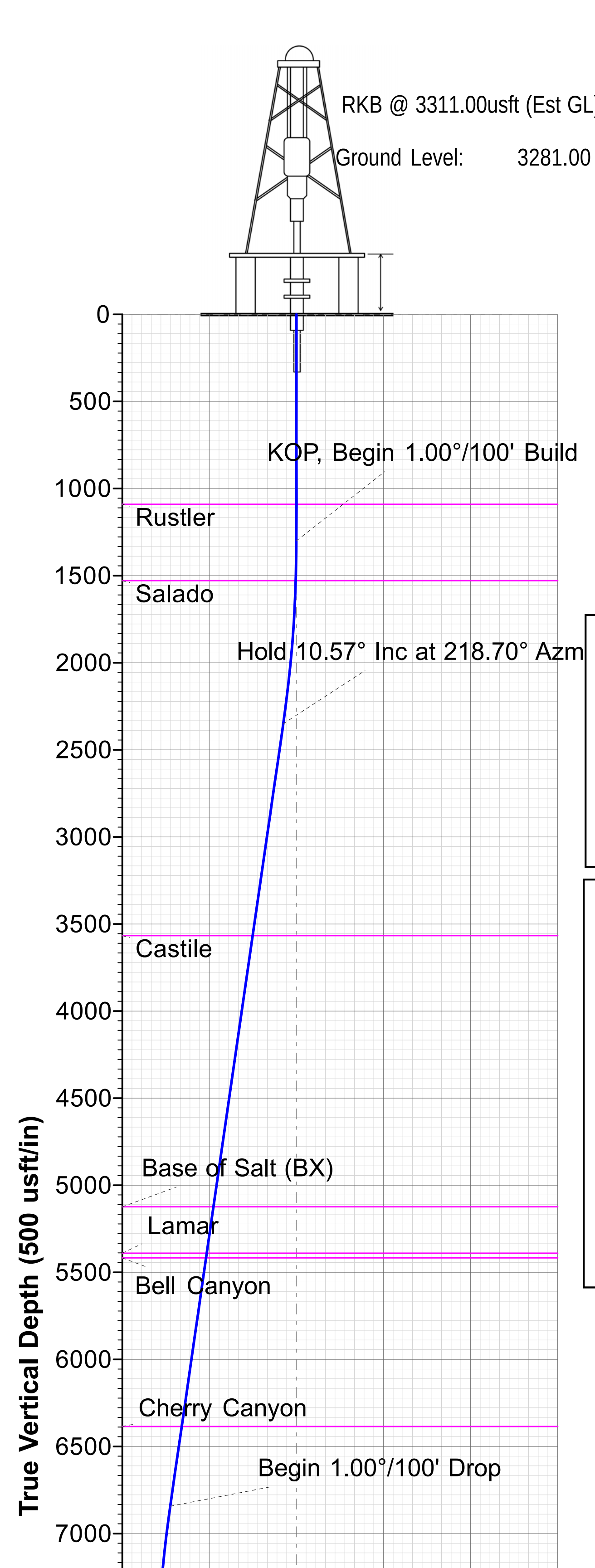
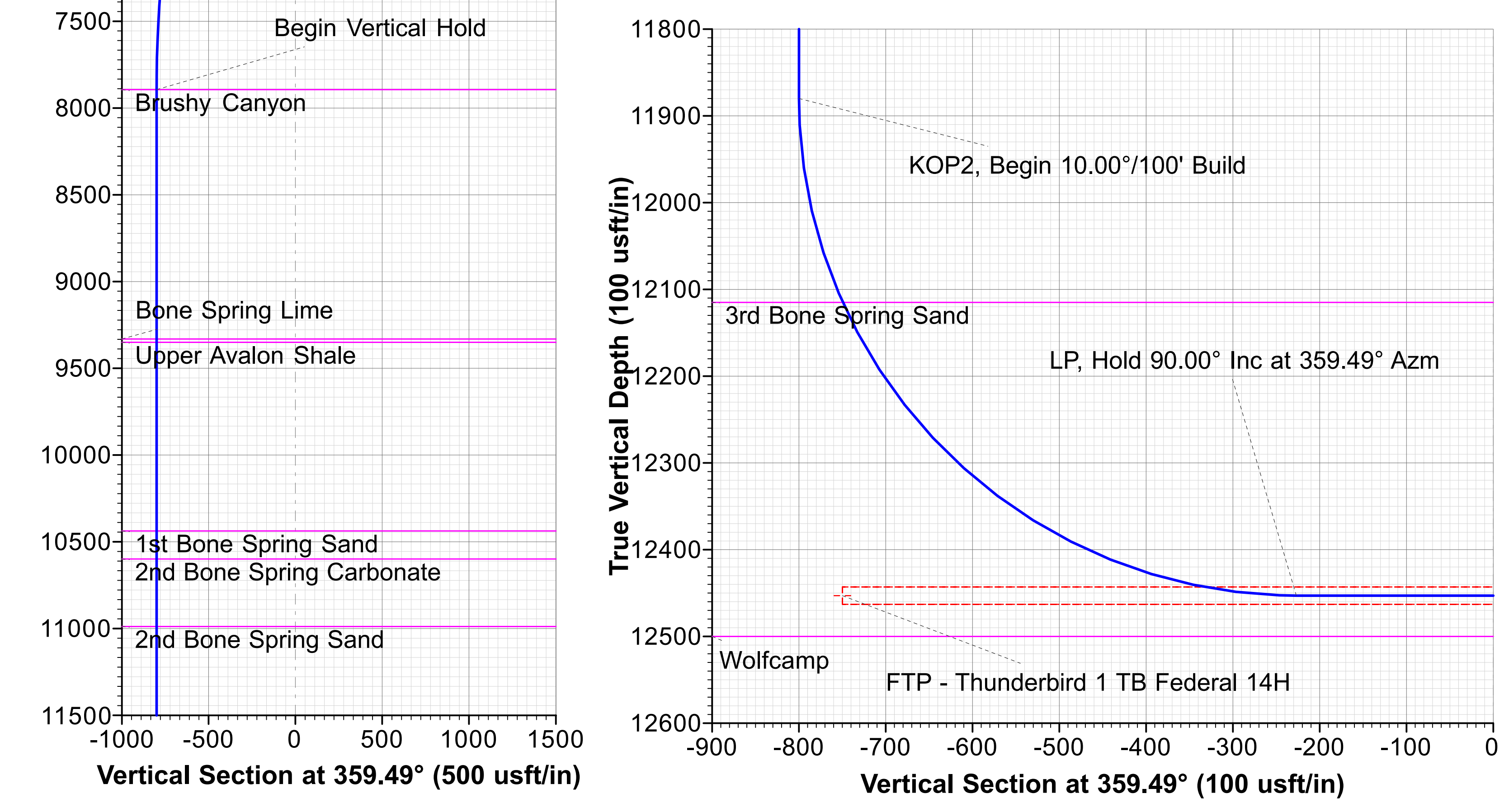
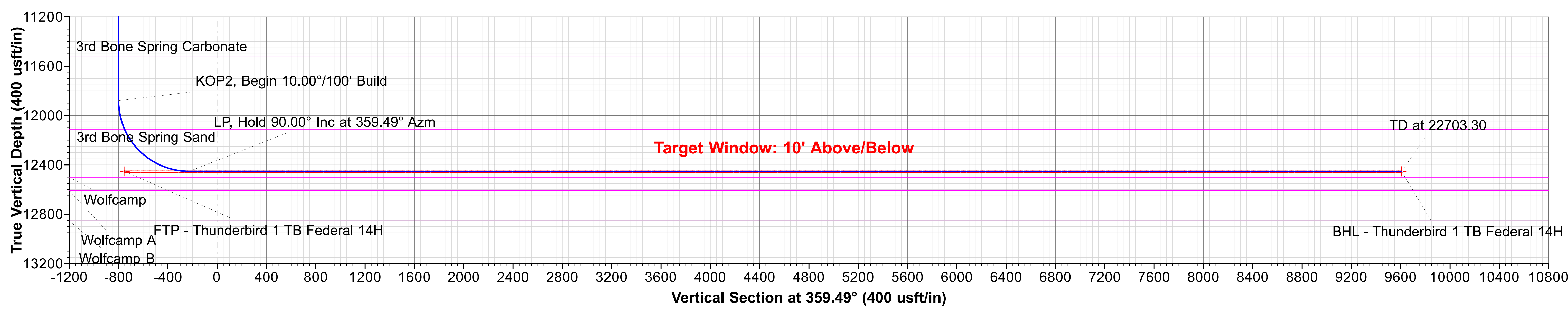
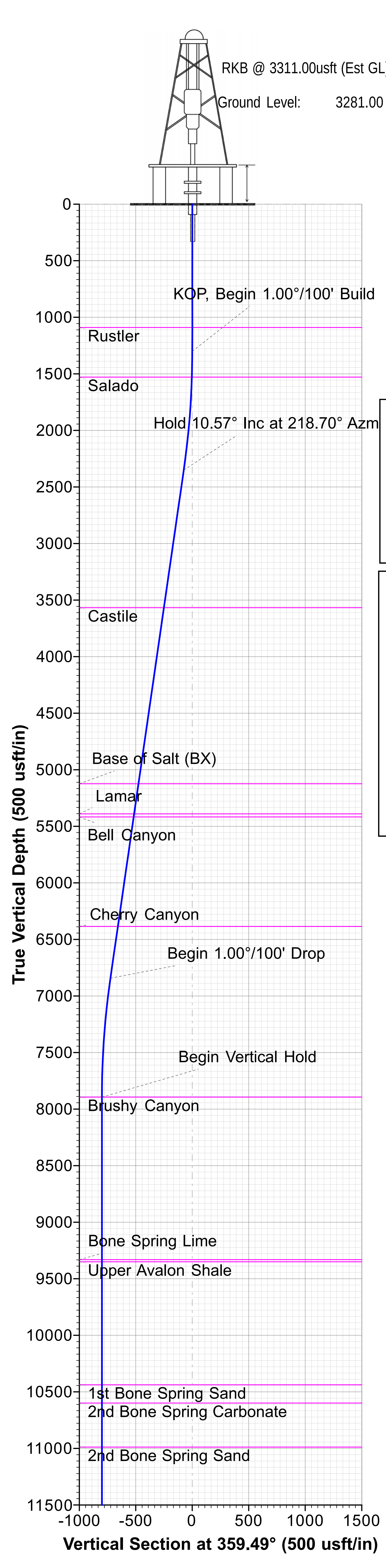


RED HILLS 3 CSG + LINER

StressCheck 5000.16.1.02 Build 14

Marathon Oil Permian, LLC.

Casing Attachment | Page 5 of 5





Marathon Oil Permian LLC

Lea County, NM (NAD27 NME)

Thunderbird 1

Thunderbird 1 TB Federal 14H

OH

Plan: Plan 1 01-25-22

Standard Planning Report

25 January, 2022





Planning Report



Database:	USA Compass	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	TVD Reference:	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	North Reference:	Grid
Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Project	Lea County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site		Thunderbird 1			
Site Position:		Northing:	389,429.57 usft	Latitude:	32° 4' 2.481899 N
From:	Map	Easting:	783,349.48 usft	Longitude:	103° 25' 7.085457 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.49

Well	Thunderbird 1 TB Federal 14H					
Well Position	+N/-S	0.00 usft	Northing:	389,429.57 usft	Latitude:	32° 4' 2.481899 N
	+E/-W	0.00 usft	Easting:	783,349.48 usft	Longitude:	103° 25' 7.085457 W
Position Uncertainty		1.00 usft	Wellhead Elevation:		Ground Level:	3,281.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	2/28/2022	6.29	59.63	47,412.94260204

Design	Plan 1 01-25-22			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	359.49

Plan Survey Tool Program	Date	1/25/2022		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	22,703.30	Plan 1 01-25-22 (OH)	MWD+HRGM
				OWSG MWD + HRGM

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,356.58	10.57	218.70	2,350.60	-75.81	-60.75	1.00	1.00	0.00	218.70	
6,926.86	10.57	218.70	6,843.40	-729.79	-584.77	0.00	0.00	0.00	0.00	
7,983.45	0.00	0.01	7,894.00	-805.60	-645.52	1.00	-1.00	0.00	180.00	
11,969.49	0.00	0.00	11,880.04	-805.60	-645.52	0.00	0.00	0.00	0.00	
12,869.49	90.00	359.49	12,453.00	-232.66	-650.61	10.00	10.00	0.00	359.49	
22,703.30	90.00	359.49	12,453.00	9,600.76	-737.91	0.00	0.00	0.00	0.00	BHL - Thunderbird



Planning Report



Database:	USA Compass	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	TVD Reference:	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	North Reference:	Grid
Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 1.00°/100' Build									
1,400.00	1.00	218.70	1,399.99	-0.68	-0.55	-0.68	1.00	1.00	0.00
1,500.00	2.00	218.70	1,499.96	-2.72	-2.18	-2.70	1.00	1.00	0.00
1,600.00	3.00	218.70	1,599.86	-6.13	-4.91	-6.08	1.00	1.00	0.00
1,700.00	4.00	218.70	1,699.68	-10.89	-8.73	-10.81	1.00	1.00	0.00
1,800.00	5.00	218.70	1,799.37	-17.01	-13.63	-16.89	1.00	1.00	0.00
1,900.00	6.00	218.70	1,898.90	-24.49	-19.63	-24.32	1.00	1.00	0.00
2,000.00	7.00	218.70	1,998.26	-33.33	-26.71	-33.09	1.00	1.00	0.00
2,100.00	8.00	218.70	2,097.40	-43.51	-34.87	-43.20	1.00	1.00	0.00
2,200.00	9.00	218.70	2,196.30	-55.05	-44.11	-54.65	1.00	1.00	0.00
2,300.00	10.00	218.70	2,294.93	-67.93	-54.43	-67.44	1.00	1.00	0.00
2,356.58	10.57	218.70	2,350.60	-75.81	-60.75	-75.27	1.00	1.00	0.00
Hold 10.57° Inc at 218.70° Azm									
2,400.00	10.57	218.70	2,393.29	-82.02	-65.72	-81.43	0.00	0.00	0.00
2,500.00	10.57	218.70	2,491.59	-96.33	-77.19	-95.64	0.00	0.00	0.00
2,600.00	10.57	218.70	2,589.89	-110.64	-88.66	-109.85	0.00	0.00	0.00
2,700.00	10.57	218.70	2,688.20	-124.95	-100.12	-124.06	0.00	0.00	0.00
2,800.00	10.57	218.70	2,786.50	-139.26	-111.59	-138.26	0.00	0.00	0.00
2,900.00	10.57	218.70	2,884.81	-153.57	-123.05	-152.47	0.00	0.00	0.00
3,000.00	10.57	218.70	2,983.11	-167.88	-134.52	-166.68	0.00	0.00	0.00
3,100.00	10.57	218.70	3,081.42	-182.19	-145.99	-180.88	0.00	0.00	0.00
3,200.00	10.57	218.70	3,179.72	-196.50	-157.45	-195.09	0.00	0.00	0.00
3,300.00	10.57	218.70	3,278.03	-210.81	-168.92	-209.30	0.00	0.00	0.00
3,400.00	10.57	218.70	3,376.33	-225.12	-180.38	-223.50	0.00	0.00	0.00
3,500.00	10.57	218.70	3,474.64	-239.43	-191.85	-237.71	0.00	0.00	0.00
3,600.00	10.57	218.70	3,572.94	-253.74	-203.32	-251.92	0.00	0.00	0.00
3,700.00	10.57	218.70	3,671.24	-268.05	-214.78	-266.12	0.00	0.00	0.00
3,800.00	10.57	218.70	3,769.55	-282.35	-226.25	-280.33	0.00	0.00	0.00
3,900.00	10.57	218.70	3,867.85	-296.66	-237.71	-294.54	0.00	0.00	0.00
4,000.00	10.57	218.70	3,966.16	-310.97	-249.18	-308.74	0.00	0.00	0.00
4,100.00	10.57	218.70	4,064.46	-325.28	-260.65	-322.95	0.00	0.00	0.00
4,200.00	10.57	218.70	4,162.77	-339.59	-272.11	-337.16	0.00	0.00	0.00
4,300.00	10.57	218.70	4,261.07	-353.90	-283.58	-351.36	0.00	0.00	0.00
4,400.00	10.57	218.70	4,359.38	-368.21	-295.04	-365.57	0.00	0.00	0.00
4,500.00	10.57	218.70	4,457.68	-382.52	-306.51	-379.78	0.00	0.00	0.00
4,600.00	10.57	218.70	4,555.98	-396.83	-317.98	-393.98	0.00	0.00	0.00
4,700.00	10.57	218.70	4,654.29	-411.14	-329.44	-408.19	0.00	0.00	0.00
4,800.00	10.57	218.70	4,752.59	-425.45	-340.91	-422.40	0.00	0.00	0.00
4,900.00	10.57	218.70	4,850.90	-439.76	-352.37	-436.60	0.00	0.00	0.00
5,000.00	10.57	218.70	4,949.20	-454.07	-363.84	-450.81	0.00	0.00	0.00
5,100.00	10.57	218.70	5,047.51	-468.38	-375.31	-465.02	0.00	0.00	0.00
5,200.00	10.57	218.70	5,145.81	-482.69	-386.77	-479.22	0.00	0.00	0.00
5,300.00	10.57	218.70	5,244.12	-497.00	-398.24	-493.43	0.00	0.00	0.00
5,400.00	10.57	218.70	5,342.42	-511.30	-409.70	-507.64	0.00	0.00	0.00
5,500.00	10.57	218.70	5,440.72	-525.61	-421.17	-521.84	0.00	0.00	0.00
5,600.00	10.57	218.70	5,539.03	-539.92	-432.64	-536.05	0.00	0.00	0.00
5,700.00	10.57	218.70	5,637.33	-554.23	-444.10	-550.26	0.00	0.00	0.00
5,800.00	10.57	218.70	5,735.64	-568.54	-455.57	-564.46	0.00	0.00	0.00
5,900.00	10.57	218.70	5,833.94	-582.85	-467.03	-578.67	0.00	0.00	0.00
6,000.00	10.57	218.70	5,932.25	-597.16	-478.50	-592.88	0.00	0.00	0.00
6,100.00	10.57	218.70	6,030.55	-611.47	-489.97	-607.09	0.00	0.00	0.00



Planning Report



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Site:	Thunderbird 1	North Reference:	Grid
Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,200.00	10.57	218.70	6,128.86	-625.78	-501.43	-621.29	0.00	0.00	0.00
6,300.00	10.57	218.70	6,227.16	-640.09	-512.90	-635.50	0.00	0.00	0.00
6,400.00	10.57	218.70	6,325.47	-654.40	-524.36	-649.71	0.00	0.00	0.00
6,500.00	10.57	218.70	6,423.77	-668.71	-535.83	-663.91	0.00	0.00	0.00
6,600.00	10.57	218.70	6,522.07	-683.02	-547.30	-678.12	0.00	0.00	0.00
6,700.00	10.57	218.70	6,620.38	-697.33	-558.76	-692.33	0.00	0.00	0.00
6,800.00	10.57	218.70	6,718.68	-711.64	-570.23	-706.53	0.00	0.00	0.00
6,900.00	10.57	218.70	6,816.99	-725.95	-581.69	-720.74	0.00	0.00	0.00
6,926.86	10.57	218.70	6,843.39	-729.79	-584.77	-724.56	0.00	0.00	0.00
Begin 1.00°/100' Drop									
7,000.00	9.83	218.70	6,915.38	-739.90	-592.87	-734.59	1.00	-1.00	0.00
7,100.00	8.83	218.70	7,014.05	-752.55	-603.01	-747.16	1.00	-1.00	0.00
7,200.00	7.83	218.70	7,112.99	-763.87	-612.08	-758.39	1.00	-1.00	0.00
7,300.00	6.83	218.70	7,212.17	-773.83	-620.06	-768.28	1.00	-1.00	0.00
7,400.00	5.83	218.70	7,311.56	-782.44	-626.96	-776.83	1.00	-1.00	0.00
7,500.00	4.83	218.70	7,411.13	-789.69	-632.77	-784.03	1.00	-1.00	0.00
7,600.00	3.83	218.70	7,510.84	-795.59	-637.50	-789.88	1.00	-1.00	0.00
7,700.00	2.83	218.70	7,610.67	-800.13	-641.14	-794.39	1.00	-1.00	0.00
7,800.00	1.83	218.70	7,710.59	-803.31	-643.68	-797.55	1.00	-1.00	0.00
7,900.00	0.83	218.70	7,810.56	-805.13	-645.14	-799.35	1.00	-1.00	0.00
7,983.45	0.00	0.01	7,894.00	-805.60	-645.52	-799.82	1.00	-1.00	0.00
Begin Vertical Hold									
11,969.49	0.00	0.00	11,880.04	-805.60	-645.52	-799.82	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build									
12,000.00	3.05	359.49	11,910.54	-804.79	-645.53	-799.01	10.00	10.00	0.00
12,100.00	13.05	359.49	12,009.43	-790.80	-645.65	-785.02	10.00	10.00	0.00
12,200.00	23.05	359.49	12,104.39	-759.85	-645.93	-754.07	10.00	10.00	0.00
12,300.00	33.05	359.49	12,192.53	-712.89	-646.34	-707.11	10.00	10.00	0.00
12,400.00	43.05	359.49	12,271.17	-651.33	-646.89	-645.55	10.00	10.00	0.00
12,500.00	53.05	359.49	12,337.93	-577.06	-647.55	-571.27	10.00	10.00	0.00
12,600.00	63.05	359.49	12,390.78	-492.32	-648.30	-486.53	10.00	10.00	0.00
12,700.00	73.05	359.49	12,428.11	-399.69	-649.12	-393.89	10.00	10.00	0.00
12,800.00	83.05	359.49	12,448.79	-301.98	-649.99	-296.18	10.00	10.00	0.00
12,869.49	90.00	359.49	12,453.00	-232.66	-650.61	-226.86	10.00	10.00	0.00
LP, Hold 90.00° Inc at 359.49° Azm									
12,900.00	90.00	359.49	12,453.00	-202.15	-650.88	-196.35	0.00	0.00	0.00
13,000.00	90.00	359.49	12,453.00	-102.16	-651.77	-96.35	0.00	0.00	0.00
13,100.00	90.00	359.49	12,453.00	-2.16	-652.65	3.65	0.00	0.00	0.00
13,200.00	90.00	359.49	12,453.00	97.83	-653.54	103.65	0.00	0.00	0.00
13,300.00	90.00	359.49	12,453.00	197.83	-654.43	203.65	0.00	0.00	0.00
13,400.00	90.00	359.49	12,453.00	297.83	-655.32	303.65	0.00	0.00	0.00
13,500.00	90.00	359.49	12,453.00	397.82	-656.20	403.65	0.00	0.00	0.00
13,600.00	90.00	359.49	12,453.00	497.82	-657.09	503.65	0.00	0.00	0.00
13,700.00	90.00	359.49	12,453.00	597.81	-657.98	603.65	0.00	0.00	0.00
13,800.00	90.00	359.49	12,453.00	697.81	-658.87	703.65	0.00	0.00	0.00
13,900.00	90.00	359.49	12,453.00	797.81	-659.76	803.65	0.00	0.00	0.00
14,000.00	90.00	359.49	12,453.00	897.80	-660.64	903.65	0.00	0.00	0.00
14,100.00	90.00	359.49	12,453.00	997.80	-661.53	1,003.65	0.00	0.00	0.00
14,200.00	90.00	359.49	12,453.00	1,097.79	-662.42	1,103.65	0.00	0.00	0.00
14,300.00	90.00	359.49	12,453.00	1,197.79	-663.31	1,203.65	0.00	0.00	0.00
14,400.00	90.00	359.49	12,453.00	1,297.79	-664.19	1,303.65	0.00	0.00	0.00
14,500.00	90.00	359.49	12,453.00	1,397.78	-665.08	1,403.65	0.00	0.00	0.00
14,600.00	90.00	359.49	12,453.00	1,497.78	-665.97	1,503.65	0.00	0.00	0.00



Planning Report



Database:	USA Compass	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	TVD Reference:	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	North Reference:	Grid
Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
14,700.00	90.00	359.49	12,453.00	1,597.77	-666.86	1,603.65	0.00	0.00	0.00
14,800.00	90.00	359.49	12,453.00	1,697.77	-667.75	1,703.65	0.00	0.00	0.00
14,900.00	90.00	359.49	12,453.00	1,797.77	-668.63	1,803.65	0.00	0.00	0.00
15,000.00	90.00	359.49	12,453.00	1,897.76	-669.52	1,903.65	0.00	0.00	0.00
15,100.00	90.00	359.49	12,453.00	1,997.76	-670.41	2,003.65	0.00	0.00	0.00
15,200.00	90.00	359.49	12,453.00	2,097.75	-671.30	2,103.65	0.00	0.00	0.00
15,300.00	90.00	359.49	12,453.00	2,197.75	-672.19	2,203.65	0.00	0.00	0.00
15,400.00	90.00	359.49	12,453.00	2,297.75	-673.07	2,303.65	0.00	0.00	0.00
15,500.00	90.00	359.49	12,453.00	2,397.74	-673.96	2,403.65	0.00	0.00	0.00
15,600.00	90.00	359.49	12,453.00	2,497.74	-674.85	2,503.65	0.00	0.00	0.00
15,700.00	90.00	359.49	12,453.00	2,597.74	-675.74	2,603.65	0.00	0.00	0.00
15,800.00	90.00	359.49	12,453.00	2,697.73	-676.62	2,703.65	0.00	0.00	0.00
15,900.00	90.00	359.49	12,453.00	2,797.73	-677.51	2,803.65	0.00	0.00	0.00
16,000.00	90.00	359.49	12,453.00	2,897.72	-678.40	2,903.65	0.00	0.00	0.00
16,100.00	90.00	359.49	12,453.00	2,997.72	-679.29	3,003.65	0.00	0.00	0.00
16,200.00	90.00	359.49	12,453.00	3,097.72	-680.18	3,103.65	0.00	0.00	0.00
16,300.00	90.00	359.49	12,453.00	3,197.71	-681.06	3,203.65	0.00	0.00	0.00
16,400.00	90.00	359.49	12,453.00	3,297.71	-681.95	3,303.65	0.00	0.00	0.00
16,500.00	90.00	359.49	12,453.00	3,397.70	-682.84	3,403.65	0.00	0.00	0.00
16,600.00	90.00	359.49	12,453.00	3,497.70	-683.73	3,503.65	0.00	0.00	0.00
16,700.00	90.00	359.49	12,453.00	3,597.70	-684.61	3,603.65	0.00	0.00	0.00
16,800.00	90.00	359.49	12,453.00	3,697.69	-685.50	3,703.65	0.00	0.00	0.00
16,900.00	90.00	359.49	12,453.00	3,797.69	-686.39	3,803.65	0.00	0.00	0.00
17,000.00	90.00	359.49	12,453.00	3,897.68	-687.28	3,903.65	0.00	0.00	0.00
17,100.00	90.00	359.49	12,453.00	3,997.68	-688.17	4,003.65	0.00	0.00	0.00
17,200.00	90.00	359.49	12,453.00	4,097.68	-689.05	4,103.65	0.00	0.00	0.00
17,300.00	90.00	359.49	12,453.00	4,197.67	-689.94	4,203.65	0.00	0.00	0.00
17,400.00	90.00	359.49	12,453.00	4,297.67	-690.83	4,303.65	0.00	0.00	0.00
17,500.00	90.00	359.49	12,453.00	4,397.66	-691.72	4,403.65	0.00	0.00	0.00
17,600.00	90.00	359.49	12,453.00	4,497.66	-692.60	4,503.65	0.00	0.00	0.00
17,700.00	90.00	359.49	12,453.00	4,597.66	-693.49	4,603.65	0.00	0.00	0.00
17,800.00	90.00	359.49	12,453.00	4,697.65	-694.38	4,703.65	0.00	0.00	0.00
17,900.00	90.00	359.49	12,453.00	4,797.65	-695.27	4,803.65	0.00	0.00	0.00
18,000.00	90.00	359.49	12,453.00	4,897.64	-696.16	4,903.65	0.00	0.00	0.00
18,100.00	90.00	359.49	12,453.00	4,997.64	-697.04	5,003.65	0.00	0.00	0.00
18,200.00	90.00	359.49	12,453.00	5,097.64	-697.93	5,103.65	0.00	0.00	0.00
18,300.00	90.00	359.49	12,453.00	5,197.63	-698.82	5,203.65	0.00	0.00	0.00
18,400.00	90.00	359.49	12,453.00	5,297.63	-699.71	5,303.65	0.00	0.00	0.00
18,500.00	90.00	359.49	12,453.00	5,397.62	-700.59	5,403.65	0.00	0.00	0.00
18,600.00	90.00	359.49	12,453.00	5,497.62	-701.48	5,503.65	0.00	0.00	0.00
18,700.00	90.00	359.49	12,453.00	5,597.62	-702.37	5,603.65	0.00	0.00	0.00
18,800.00	90.00	359.49	12,453.00	5,697.61	-703.26	5,703.65	0.00	0.00	0.00
18,900.00	90.00	359.49	12,453.00	5,797.61	-704.15	5,803.65	0.00	0.00	0.00
19,000.00	90.00	359.49	12,453.00	5,897.61	-705.03	5,903.65	0.00	0.00	0.00
19,100.00	90.00	359.49	12,453.00	5,997.60	-705.92	6,003.65	0.00	0.00	0.00
19,200.00	90.00	359.49	12,453.00	6,097.60	-706.81	6,103.65	0.00	0.00	0.00
19,300.00	90.00	359.49	12,453.00	6,197.59	-707.70	6,203.65	0.00	0.00	0.00
19,400.00	90.00	359.49	12,453.00	6,297.59	-708.59	6,303.65	0.00	0.00	0.00
19,500.00	90.00	359.49	12,453.00	6,397.59	-709.47	6,403.65	0.00	0.00	0.00
19,600.00	90.00	359.49	12,453.00	6,497.58	-710.36	6,503.65	0.00	0.00	0.00
19,700.00	90.00	359.49	12,453.00	6,597.58	-711.25	6,603.65	0.00	0.00	0.00
19,800.00	90.00	359.49	12,453.00	6,697.57	-712.14	6,703.65	0.00	0.00	0.00
19,900.00	90.00	359.49	12,453.00	6,797.57	-713.02	6,803.65	0.00	0.00	0.00
20,000.00	90.00	359.49	12,453.00	6,897.57	-713.91	6,903.65	0.00	0.00	0.00



Planning Report



Database:	USA Compass	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	TVD Reference:	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	North Reference:	Grid
Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
20,100.00	90.00	359.49	12,453.00	6,997.56	-714.80	7,003.65	0.00	0.00	0.00
20,200.00	90.00	359.49	12,453.00	7,097.56	-715.69	7,103.65	0.00	0.00	0.00
20,300.00	90.00	359.49	12,453.00	7,197.55	-716.58	7,203.65	0.00	0.00	0.00
20,400.00	90.00	359.49	12,453.00	7,297.55	-717.46	7,303.65	0.00	0.00	0.00
20,500.00	90.00	359.49	12,453.00	7,397.55	-718.35	7,403.65	0.00	0.00	0.00
20,600.00	90.00	359.49	12,453.00	7,497.54	-719.24	7,503.65	0.00	0.00	0.00
20,700.00	90.00	359.49	12,453.00	7,597.54	-720.13	7,603.65	0.00	0.00	0.00
20,800.00	90.00	359.49	12,453.00	7,697.53	-721.01	7,703.65	0.00	0.00	0.00
20,900.00	90.00	359.49	12,453.00	7,797.53	-721.90	7,803.65	0.00	0.00	0.00
21,000.00	90.00	359.49	12,453.00	7,897.53	-722.79	7,903.65	0.00	0.00	0.00
21,100.00	90.00	359.49	12,453.00	7,997.52	-723.68	8,003.65	0.00	0.00	0.00
21,200.00	90.00	359.49	12,453.00	8,097.52	-724.57	8,103.65	0.00	0.00	0.00
21,300.00	90.00	359.49	12,453.00	8,197.51	-725.45	8,203.65	0.00	0.00	0.00
21,400.00	90.00	359.49	12,453.00	8,297.51	-726.34	8,303.65	0.00	0.00	0.00
21,500.00	90.00	359.49	12,453.00	8,397.51	-727.23	8,403.65	0.00	0.00	0.00
21,600.00	90.00	359.49	12,453.00	8,497.50	-728.12	8,503.65	0.00	0.00	0.00
21,700.00	90.00	359.49	12,453.00	8,597.50	-729.00	8,603.65	0.00	0.00	0.00
21,800.00	90.00	359.49	12,453.00	8,697.49	-729.89	8,703.65	0.00	0.00	0.00
21,900.00	90.00	359.49	12,453.00	8,797.49	-730.78	8,803.65	0.00	0.00	0.00
22,000.00	90.00	359.49	12,453.00	8,897.49	-731.67	8,903.65	0.00	0.00	0.00
22,100.00	90.00	359.49	12,453.00	8,997.48	-732.56	9,003.65	0.00	0.00	0.00
22,200.00	90.00	359.49	12,453.00	9,097.48	-733.44	9,103.65	0.00	0.00	0.00
22,300.00	90.00	359.49	12,453.00	9,197.48	-734.33	9,203.65	0.00	0.00	0.00
22,400.00	90.00	359.49	12,453.00	9,297.47	-735.22	9,303.65	0.00	0.00	0.00
22,500.00	90.00	359.49	12,453.00	9,397.47	-736.11	9,403.65	0.00	0.00	0.00
22,600.00	90.00	359.49	12,453.00	9,497.46	-736.99	9,503.65	0.00	0.00	0.00
22,700.00	90.00	359.49	12,453.00	9,597.46	-737.88	9,603.65	0.00	0.00	0.00
22,703.30	90.00	359.49	12,453.00	9,600.76	-737.91	9,606.95	0.00	0.00	0.00
TD at 22703.30									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
FTP - Thunderbird 1 T	0.00	0.00	12,453.00	-755.60	-645.97	388,673.97	782,703.51	32° 3' 55.059084 N	3° 25' 14.665908 W
- plan misses target center by 202.78usft at 12444.05usft MD (12302.18 TVD, -620.06 N, -647.17 E)									
- Point									
BHL - Thunderbird 1 T	0.00	359.49	12,453.00	9,600.76	-737.91	399,030.33	782,611.57	32° 5' 37.546605 N	3° 25' 14.716271 W
- plan hits target center									
- Rectangle (sides W60.00 H10,356.71 D20.00)									



Planning Report



Database:	USA Compass	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Company:	Marathon Oil Permian LLC	TVD Reference:	RKB @ 3311.00usft (Est GL)
Project:	Lea County, NM (NAD27 NME)	MD Reference:	RKB @ 3311.00usft (Est GL)
Site:	Thunderbird 1	North Reference:	Grid
Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 01-25-22		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
1,090.00	1,090.00	Rustler		0.00	
1,529.06	1,529.00	Salado		0.00	
3,593.96	3,567.00	Castile		0.00	
5,177.81	5,124.00	Base of Salt (BX)		0.00	
5,448.40	5,390.00	Lamar		0.00	
5,475.87	5,417.00	Bell Canyon		0.00	
6,460.56	6,385.00	Cherry Canyon		0.00	
7,983.45	7,894.00	Brushy Canyon		0.00	
9,420.45	9,331.00	Bone Spring Lime		0.00	
9,439.45	9,350.00	Upper Avalon Shale		0.00	
10,526.45	10,437.00	1st Bone Spring Sand		0.00	
10,688.45	10,599.00	2nd Bone Spring Carbonate		0.00	
11,077.45	10,988.00	2nd Bone Spring Sand		0.00	
11,614.45	11,525.00	3rd Bone Spring Carbonate		0.00	
12,211.59	12,115.00	3rd Bone Spring Sand		0.00	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,300.00	1,300.00	0.00	0.00	KOP, Begin 1.00°/100' Build
2,356.58	2,350.60	-75.81	-60.75	Hold 10.57° Inc at 218.70° Azm
6,926.86	6,843.39	-729.79	-584.77	Begin 1.00°/100' Drop
7,983.45	7,894.00	-805.60	-645.52	Begin Vertical Hold
11,969.49	11,880.04	-805.60	-645.52	KOP2, Begin 10.00°/100' Build
12,869.49	12,453.00	-232.66	-650.61	LP, Hold 90.00° Inc at 359.49° Azm
22,703.30	12,453.00	9,600.76	-737.91	TD at 22703.30



Marathon Oil Permian LLC

Lea County, NM (NAD27 NME)

Thunderbird 1

Thunderbird 1 TB Federal 14H

OH

Plan 1 01-25-22

Anticollision Report

25 January, 2022





Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Reference	Plan 1 01-25-22		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum centre distance of 50,000.00usft	Error Surface:	Pedal Curve
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 1/25/2022			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	22,703.30	Plan 1 01-25-22 (OH)	MWD+HRGM	OWSG MWD + HRGM

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Mammoth 1 Federal BC						
2H - OH - Plan 1 01-26-17	9,131.89	9,142.84	173.39	118.03	3.132	CC, ES, SF
Thunderbird 1						
Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22	1,300.00	1,300.00	30.04	21.16	3.382	CC, ES
Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22	1,400.00	1,400.03	30.82	21.61	3.346	SF

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17													Offset Site Error:	0.00 usft
Survey Program: 0-		Offset		Semi Major Axis		Offset Wellbore Centre			Rule Assigned:		Offset Well Error:		0.00 usft	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
0.00	0.00	0.00	11.50	1.00	0.00	-155.60	-1,124.88	-510.29	1,235.27					
100.00	100.00	88.50	100.00	1.11	0.11	-155.60	-1,124.88	-510.29	1,235.21	1,233.99	1.22	1,013.444		
200.00	200.00	188.50	200.00	1.64	0.45	-155.60	-1,124.88	-510.29	1,235.21	1,233.13	2.09	592.166		
300.00	300.00	288.50	300.00	2.04	0.80	-155.60	-1,124.88	-510.29	1,235.21	1,232.37	2.85	433.879		
400.00	400.00	388.50	400.00	2.38	1.16	-155.60	-1,124.88	-510.29	1,235.21	1,231.67	3.54	348.584		
500.00	500.00	488.50	500.00	2.68	1.52	-155.60	-1,124.88	-510.29	1,235.21	1,231.01	4.20	294.082		
600.00	600.00	588.50	600.00	2.95	1.88	-155.60	-1,124.88	-510.29	1,235.21	1,230.38	4.83	255.781		
700.00	700.00	688.50	700.00	3.20	2.24	-155.60	-1,124.88	-510.29	1,235.21	1,229.78	5.44	227.169		
800.00	800.00	788.50	800.00	3.43	2.60	-155.60	-1,124.88	-510.29	1,235.21	1,229.18	6.03	204.863		
900.00	900.00	888.50	900.00	3.65	2.95	-155.60	-1,124.88	-510.29	1,235.21	1,228.61	6.61	186.915		
1,000.00	1,000.00	988.50	1,000.00	3.86	3.31	-155.60	-1,124.88	-510.29	1,235.21	1,228.04	7.18	172.119		
1,100.00	1,100.00	1,088.50	1,100.00	4.06	3.67	-155.60	-1,124.88	-510.29	1,235.21	1,227.48	7.74	159.682		
1,200.00	1,200.00	1,188.50	1,200.00	4.26	4.03	-155.60	-1,124.88	-510.29	1,235.21	1,226.93	8.29	149.063		
1,300.00	1,300.00	1,288.50	1,300.00	4.44	4.39	-155.60	-1,124.88	-510.29	1,235.21	1,226.38	8.83	139.876		
1,400.00	1,399.99	1,388.49	1,399.99	4.61	4.75	-14.32	-1,124.88	-510.29	1,234.37	1,225.01	9.35	131.959		
1,500.00	1,499.96	1,488.46	1,499.96	4.77	5.11	-14.35	-1,124.88	-510.29	1,231.83	1,221.96	9.87	124.799		
1,600.00	1,599.86	1,588.36	1,599.86	4.94	5.46	-14.41	-1,124.88	-510.29	1,227.61	1,217.20	10.40	118.004		
1,700.00	1,699.68	1,688.18	1,699.68	5.14	5.82	-14.50	-1,124.88	-510.29	1,221.69	1,210.74	10.95	111.522		
1,800.00	1,799.37	1,787.87	1,799.37	5.36	6.18	-14.61	-1,124.88	-510.29	1,214.10	1,202.57	11.53	105.329		
1,900.00	1,898.90	1,887.40	1,898.90	5.60	6.54	-14.75	-1,124.88	-510.29	1,204.82	1,192.70	12.12	99.412		
2,000.00	1,998.26	1,986.76	1,998.26	5.87	6.89	-14.92	-1,124.88	-510.29	1,193.88	1,181.14	12.73	93.764		
2,100.00	2,097.40	2,085.90	2,097.40	6.15	7.25	-15.11	-1,124.88	-510.29	1,181.26	1,167.90	13.37	88.379		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17													Offset Site Error:
Survey Program: 0-													Offset Well Error:
Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,200.00	2,196.30	2,184.80	2,196.30	6.46	7.60	-15.34	-1,124.88	-510.29	1,166.99	1,152.97	14.02	83.251	
2,300.00	2,294.93	2,283.43	2,294.93	6.79	7.96	-15.60	-1,124.88	-510.29	1,151.07	1,136.38	14.69	78.372	
2,400.00	2,393.29	2,381.79	2,393.29	7.07	8.31	-15.87	-1,124.88	-510.29	1,133.66	1,118.35	15.32	74.022	
2,500.00	2,491.59	2,480.09	2,491.59	7.43	8.66	-16.13	-1,124.88	-510.29	1,116.01	1,100.00	16.01	69.694	
2,600.00	2,589.89	2,578.39	2,589.89	7.80	9.01	-16.39	-1,124.88	-510.29	1,098.39	1,081.67	16.72	65.690	
2,700.00	2,688.20	2,676.70	2,688.20	8.18	9.36	-16.67	-1,124.88	-510.29	1,080.79	1,063.35	17.44	61.984	
2,800.00	2,786.50	2,775.00	2,786.50	8.57	9.72	-16.95	-1,124.88	-510.29	1,063.21	1,045.05	18.16	58.548	
2,900.00	2,884.81	2,873.31	2,884.81	8.96	10.07	-17.24	-1,124.88	-510.29	1,045.66	1,026.77	18.89	55.360	
3,000.00	2,983.11	2,971.61	2,983.11	9.36	10.42	-17.55	-1,124.88	-510.29	1,028.13	1,008.51	19.62	52.397	
3,100.00	3,081.42	3,069.92	3,081.42	9.77	10.77	-17.86	-1,124.88	-510.29	1,010.64	990.28	20.36	49.638	
3,200.00	3,179.72	3,168.22	3,179.72	10.18	11.13	-18.18	-1,124.88	-510.29	993.17	972.07	21.10	47.067	
3,300.00	3,278.03	3,266.53	3,278.03	10.59	11.48	-18.52	-1,124.88	-510.29	975.74	953.89	21.85	44.666	
3,400.00	3,376.33	3,364.83	3,376.33	11.01	11.83	-18.87	-1,124.88	-510.29	958.34	935.75	22.59	42.420	
3,500.00	3,474.64	3,463.14	3,474.64	11.43	12.18	-19.23	-1,124.88	-510.29	940.97	917.64	23.34	40.317	
3,600.00	3,572.94	3,561.44	3,572.94	11.86	12.54	-19.60	-1,124.88	-510.29	923.65	899.56	24.09	38.344	
3,700.00	3,671.24	3,659.74	3,671.24	12.29	12.89	-19.99	-1,124.88	-510.29	906.36	881.52	24.84	36.490	
3,800.00	3,769.55	3,758.05	3,769.55	12.72	13.24	-20.39	-1,124.88	-510.29	889.12	863.53	25.59	34.747	
3,900.00	3,867.85	3,856.35	3,867.85	13.15	13.59	-20.81	-1,124.88	-510.29	871.92	845.58	26.34	33.104	
4,000.00	3,966.16	3,954.66	3,966.16	13.58	13.95	-21.25	-1,124.88	-510.29	854.77	827.68	27.09	31.555	
4,100.00	4,064.46	4,052.96	4,064.46	14.02	14.30	-21.70	-1,124.88	-510.29	837.66	809.83	27.84	30.092	
4,200.00	4,162.77	4,151.27	4,162.77	14.46	14.65	-22.17	-1,124.88	-510.29	820.61	792.03	28.58	28.709	
4,300.00	4,261.07	4,249.57	4,261.07	14.90	15.00	-22.66	-1,124.88	-510.29	803.62	774.29	29.33	27.400	
4,400.00	4,359.38	4,347.88	4,359.38	15.34	15.36	-23.18	-1,124.88	-510.29	786.69	756.62	30.07	26.160	
4,500.00	4,457.68	4,446.18	4,457.68	15.78	15.71	-23.71	-1,124.88	-510.29	769.82	739.01	30.81	24.983	
4,600.00	4,555.98	4,544.48	4,555.98	16.22	16.06	-24.27	-1,124.88	-510.29	753.02	721.47	31.55	23.866	
4,700.00	4,654.29	4,642.79	4,654.29	16.67	16.41	-24.86	-1,124.88	-510.29	736.30	704.01	32.29	22.805	
4,800.00	4,752.59	4,741.09	4,752.59	17.11	16.77	-25.47	-1,124.88	-510.29	719.65	686.63	33.02	21.796	
4,900.00	4,850.90	4,839.40	4,850.90	17.56	17.12	-26.11	-1,124.88	-510.29	703.09	669.34	33.74	20.836	
5,000.00	4,949.20	4,937.70	4,949.20	18.00	17.47	-26.78	-1,124.88	-510.29	686.61	652.15	34.46	19.922	
5,100.00	5,047.51	5,036.01	5,047.51	18.45	17.82	-27.49	-1,124.88	-510.29	670.24	635.06	35.18	19.052	
5,200.00	5,145.81	5,134.31	5,145.81	18.90	18.17	-28.22	-1,124.88	-510.29	653.96	618.08	35.89	18.222	
5,300.00	5,244.12	5,232.62	5,244.12	19.35	18.53	-29.00	-1,124.88	-510.29	637.80	601.21	36.59	17.431	
5,400.00	5,342.42	5,330.92	5,342.42	19.80	18.88	-29.82	-1,124.88	-510.29	621.77	584.48	37.29	16.676	
5,500.00	5,440.72	5,429.22	5,440.72	20.25	19.23	-30.67	-1,124.88	-510.29	605.86	567.89	37.97	15.956	
5,600.00	5,539.03	5,527.53	5,539.03	20.70	19.58	-31.58	-1,124.88	-510.29	590.09	551.44	38.65	15.269	
5,700.00	5,637.33	5,625.83	5,637.33	21.15	19.94	-32.53	-1,124.88	-510.29	574.47	535.16	39.31	14.614	
5,800.00	5,735.64	5,724.14	5,735.64	21.60	20.29	-33.54	-1,124.88	-510.29	559.02	519.06	39.96	13.988	
5,900.00	5,833.94	5,822.44	5,833.94	22.05	20.64	-34.60	-1,124.88	-510.29	543.75	503.15	40.60	13.392	
6,000.00	5,932.25	5,920.75	5,932.25	22.51	20.99	-35.72	-1,124.88	-510.29	528.68	487.45	41.23	12.824	
6,100.00	6,030.55	6,019.05	6,030.55	22.96	21.35	-36.91	-1,124.88	-510.29	513.81	471.98	41.83	12.282	
6,200.00	6,128.86	6,117.36	6,128.86	23.41	21.70	-38.16	-1,124.88	-510.29	499.18	456.75	42.42	11.766	
6,300.00	6,227.16	6,215.66	6,227.16	23.87	22.05	-39.49	-1,124.88	-510.29	484.80	441.80	42.99	11.276	
6,400.00	6,325.47	6,313.97	6,325.47	24.32	22.40	-40.90	-1,124.88	-510.29	470.69	427.15	43.54	10.810	
6,500.00	6,423.77	6,412.27	6,423.77	24.78	22.76	-42.40	-1,124.88	-510.29	456.89	412.82	44.07	10.368	
6,600.00	6,522.07	6,510.57	6,522.07	25.23	23.11	-43.98	-1,124.88	-510.29	443.41	398.84	44.56	9.950	
6,700.00	6,620.38	6,608.88	6,620.38	25.69	23.46	-45.66	-1,124.88	-510.29	430.29	385.26	45.03	9.555	
6,800.00	6,718.68	6,707.18	6,718.68	26.14	23.81	-47.45	-1,124.88	-510.29	417.57	372.09	45.48	9.182	
6,900.00	6,816.99	6,805.49	6,816.99	26.60	24.17	-49.34	-1,124.88	-510.29	405.27	359.39	45.88	8.832	
7,000.00	6,915.38	6,903.88	6,915.38	27.04	24.52	-51.23	-1,124.88	-510.29	393.74	347.49	46.25	8.513	
7,100.00	7,014.05	7,002.55	7,014.05	27.48	24.87	-53.02	-1,124.88	-510.29	383.70	337.08	46.62	8.230	
7,200.00	7,112.99	7,101.49	7,112.99	27.92	25.23	-54.70	-1,124.88	-510.29	375.09	328.11	46.98	7.983	
7,300.00	7,212.17	7,200.67	7,212.17	28.34	25.58	-56.26	-1,124.88	-510.29	367.81	320.47	47.35	7.769	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17													Offset Site Error:
Survey Program: 0-													Offset Well Error:
Reference	Offset	Semi Major Axis	Highside	Offset Wellbore Centre		Rule Assigned:		Distance	Minimum	Separation	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor	
7,400.00	7,311.56	7,300.06	7,311.56	28.75	25.94	-57.65	-1,124.88	-510.29	361.77	314.06	47.71	7.582	
7,500.00	7,411.13	7,399.63	7,411.13	29.14	26.30	-58.87	-1,124.88	-510.29	356.86	308.77	48.09	7.420	
7,600.00	7,510.84	7,499.34	7,510.84	29.51	26.65	-59.88	-1,124.88	-510.29	353.01	304.52	48.48	7.281	
7,700.00	7,610.67	7,599.17	7,610.67	29.87	27.01	-60.68	-1,124.88	-510.29	350.12	301.23	48.89	7.162	
7,800.00	7,710.59	7,699.09	7,710.59	30.19	27.37	-61.25	-1,124.88	-510.29	348.14	298.83	49.31	7.060	
7,900.00	7,810.56	7,799.06	7,810.56	30.47	27.73	-61.57	-1,124.88	-510.29	347.03	297.27	49.76	6.975	
8,000.00	7,910.55	7,899.05	7,910.55	30.58	28.09	157.05	-1,124.88	-510.29	346.74	296.58	50.15	6.913	
8,100.00	8,010.55	7,999.05	8,010.55	30.60	28.44	157.05	-1,124.88	-510.29	346.74	296.20	50.54	6.861	
8,200.00	8,110.55	8,099.05	8,110.55	30.62	28.80	157.05	-1,124.88	-510.29	346.74	295.82	50.92	6.810	
8,300.00	8,210.55	8,199.05	8,210.55	30.63	29.16	157.05	-1,124.88	-510.29	346.74	295.44	51.30	6.759	
8,400.00	8,310.55	8,299.05	8,310.55	30.65	29.52	157.05	-1,124.88	-510.29	346.74	295.06	51.68	6.709	
8,500.00	8,410.55	8,399.05	8,410.55	30.67	29.88	157.05	-1,124.88	-510.29	346.74	294.67	52.06	6.660	
8,600.00	8,510.55	8,499.05	8,510.55	30.68	30.24	157.05	-1,124.88	-510.29	346.74	294.29	52.45	6.611	
8,700.00	8,610.55	8,674.97	8,684.84	30.70	30.86	155.40	-1,106.03	-507.96	338.67	287.35	51.32	6.599	
8,800.00	8,710.55	8,849.48	8,844.23	30.72	31.43	147.76	-1,037.19	-499.45	304.70	256.97	47.72	6.385	
8,900.00	8,810.55	8,976.33	8,943.18	30.73	31.82	134.53	-958.83	-489.76	255.60	209.51	46.10	5.545	
9,000.00	8,910.55	9,064.62	9,000.65	30.75	32.09	117.90	-892.42	-481.54	206.26	157.32	48.94	4.214	
9,100.00	9,010.55	9,126.88	9,034.66	30.77	32.27	101.64	-840.70	-475.15	175.61	121.20	54.42	3.227	
9,131.89	9,042.45	9,142.84	9,042.45	30.78	32.32	97.05	-826.88	-473.44	173.39	118.03	55.36	3.132 CC, ES, SF	
9,200.00	9,110.55	9,172.16	9,055.74	30.79	32.41	88.48	-800.95	-470.23	183.72	129.37	54.35	3.381	
9,300.00	9,210.55	9,206.18	9,069.45	30.81	32.51	78.78	-770.06	-466.41	230.77	182.50	48.27	4.781	
9,400.00	9,310.55	9,232.50	9,078.79	30.83	32.59	71.78	-745.64	-463.39	300.80	258.25	42.56	7.068	
9,500.00	9,410.55	9,250.00	9,084.36	30.84	32.65	67.46	-729.17	-461.35	382.31	343.74	38.57	9.913	
9,600.00	9,510.55	9,270.33	9,090.20	30.86	32.71	62.83	-709.85	-458.96	469.75	433.37	36.39	12.910	
9,700.00	9,610.55	9,284.32	9,093.82	30.88	32.75	59.89	-696.43	-457.31	560.68	525.79	34.89	16.068	
9,800.00	9,710.55	9,300.00	9,097.47	30.90	32.80	56.82	-681.30	-455.43	653.80	619.73	34.07	19.188	
9,900.00	9,810.55	9,300.00	9,097.47	30.92	32.80	56.82	-681.30	-455.43	748.38	715.17	33.21	22.534	
10,000.00	9,910.55	9,300.00	9,097.47	30.94	32.80	56.82	-681.30	-455.43	844.21	811.50	32.70	25.814	
10,100.00	10,010.55	9,322.09	9,101.91	30.96	32.87	52.90	-659.83	-452.78	940.23	907.41	32.82	28.649	
10,200.00	10,110.55	9,328.63	9,103.07	30.98	32.89	51.82	-653.44	-451.99	1,037.13	1,004.38	32.74	31.674	
10,300.00	10,210.55	9,350.00	9,106.33	31.00	32.96	48.57	-632.48	-449.40	1,134.79	1,101.81	32.98	34.405	
10,400.00	10,310.55	9,350.00	9,106.33	31.02	32.96	48.57	-632.48	-449.40	1,232.31	1,199.35	32.96	37.384	
10,500.00	10,410.55	9,350.00	9,106.33	31.04	32.96	48.57	-632.48	-449.40	1,330.20	1,297.19	33.02	40.287	
10,600.00	10,510.55	9,350.00	9,106.33	31.07	32.96	48.57	-632.48	-449.40	1,428.39	1,395.26	33.13	43.117	
10,700.00	10,610.55	9,350.00	9,106.33	31.09	32.96	48.57	-632.48	-449.40	1,526.81	1,493.52	33.28	45.874	
10,800.00	10,710.55	9,350.00	9,106.33	31.11	32.96	48.57	-632.48	-449.40	1,625.42	1,591.95	33.47	48.563	
10,900.00	10,810.55	9,350.00	9,106.33	31.13	32.96	48.57	-632.48	-449.40	1,724.19	1,690.50	33.69	51.185	
11,000.00	10,910.55	9,350.00	9,106.33	31.15	32.96	48.57	-632.48	-449.40	1,823.09	1,789.17	33.92	53.743	
11,100.00	11,010.55	9,350.00	9,106.33	31.17	32.96	48.57	-632.48	-449.40	1,922.11	1,887.94	34.18	56.239	
11,200.00	11,110.55	9,350.00	9,106.33	31.20	32.96	48.57	-632.48	-449.40	2,021.23	1,986.78	34.45	58.675	
11,300.00	11,210.55	9,350.00	9,106.33	31.22	32.96	48.57	-632.48	-449.40	2,120.43	2,085.70	34.73	61.053	
11,400.00	11,310.55	9,370.86	9,108.75	31.24	33.02	45.73	-611.92	-446.85	2,219.22	2,184.07	35.15	63.139	
11,500.00	11,410.55	9,372.80	9,108.93	31.26	33.03	45.48	-610.00	-446.62	2,318.47	2,283.01	35.46	65.387	
11,600.00	11,510.55	9,374.62	9,109.10	31.29	33.03	45.25	-608.21	-446.39	2,417.77	2,381.99	35.77	67.584	
11,700.00	11,610.55	9,376.31	9,109.25	31.31	33.04	45.04	-606.53	-446.19	2,517.11	2,481.02	36.10	69.730	
11,800.00	11,710.55	9,377.91	9,109.39	31.33	33.04	44.84	-604.96	-445.99	2,616.51	2,580.08	36.43	71.826	
11,900.00	11,810.55	9,400.00	9,110.86	31.36	33.11	42.27	-583.08	-443.29	2,716.39	2,679.52	36.87	73.679	
12,000.00	11,910.54	9,400.00	9,110.86	31.34	33.11	28.99	-583.08	-443.29	2,815.72	2,778.52	37.20	75.698	
12,100.00	12,009.43	9,400.00	9,110.86	31.10	33.11	13.43	-583.08	-443.29	2,913.04	2,875.54	37.50	77.677	
12,200.00	12,104.39	9,400.00	9,110.86	30.79	33.11	8.71	-583.08	-443.29	3,005.58	2,967.80	37.78	79.550	
12,300.00	12,192.53	9,400.00	9,110.86	30.48	33.11	6.52	-583.08	-443.29	3,091.08	3,053.02	38.05	81.227	
12,400.00	12,271.17	9,400.00	9,110.86	30.18	33.11	5.29	-583.08	-443.29	3,167.60	3,129.26	38.34	82.618	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17												Offset Site Error:	0.00 usft
Survey Program: 0-												Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre		Distance Between Centres (usft)		Minimum Separation (usft)	Separation Factor	Warning
							+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
12,500.00	12,337.93	9,427.04	9,111.50	29.92	33.20	4.59	-556.25	-439.97	3,233.17	3,194.45	38.73	83.487	
12,600.00	12,390.78	9,467.99	9,111.50	29.74	33.33	4.18	-515.58	-435.23	3,286.28	3,247.11	39.17	83.898	
12,700.00	12,428.11	9,567.79	9,111.50	29.65	33.70	4.02	-416.20	-426.13	3,324.15	3,284.37	39.77	83.576	
12,800.00	12,448.79	9,673.69	9,111.50	29.66	34.14	3.97	-310.47	-420.27	3,345.20	3,304.78	40.42	82.754	
12,900.00	12,453.00	9,782.25	9,111.50	29.79	34.66	3.98	-201.93	-418.31	3,349.59	3,308.51	41.08	81.541	
13,000.00	12,453.00	9,884.05	9,111.50	29.96	35.20	3.98	-100.14	-419.11	3,349.59	3,307.86	41.73	80.267	
13,100.00	12,453.00	9,984.05	9,111.50	30.17	35.78	3.98	-0.14	-419.98	3,349.59	3,307.16	42.43	78.941	
13,200.00	12,453.00	10,084.05	9,111.50	30.41	36.41	3.98	99.86	-420.85	3,349.60	3,306.41	43.18	77.570	
13,300.00	12,453.00	10,184.05	9,111.50	30.69	37.08	3.98	199.85	-421.71	3,349.60	3,305.62	43.98	76.166	
13,400.00	12,453.00	10,284.05	9,111.50	31.00	37.79	3.98	299.85	-422.58	3,349.60	3,304.78	44.82	74.742	
13,500.00	12,453.00	10,384.05	9,111.50	31.36	38.55	3.98	399.84	-423.45	3,349.60	3,303.91	45.69	73.308	
13,600.00	12,453.00	10,484.05	9,111.50	31.75	39.34	3.99	499.84	-424.32	3,349.60	3,302.99	46.61	71.871	
13,700.00	12,453.00	10,584.05	9,111.50	32.18	40.17	3.99	599.84	-425.19	3,349.60	3,302.05	47.55	70.440	
13,800.00	12,453.00	10,684.05	9,111.50	32.66	41.03	3.99	699.83	-426.05	3,349.60	3,301.07	48.53	69.019	
13,900.00	12,453.00	10,784.05	9,111.50	33.18	41.93	3.99	799.83	-426.92	3,349.60	3,300.07	49.54	67.615	
14,000.00	12,453.00	10,884.05	9,111.50	33.75	42.85	3.99	899.83	-427.79	3,349.61	3,299.03	50.57	66.231	
14,100.00	12,453.00	10,984.05	9,111.50	34.37	43.80	3.99	999.82	-428.66	3,349.61	3,297.97	51.63	64.871	
14,200.00	12,453.00	11,084.05	9,111.50	35.04	44.78	3.99	1,099.82	-429.53	3,349.61	3,296.89	52.72	63.537	
14,300.00	12,453.00	11,184.05	9,111.50	35.75	45.78	3.99	1,199.81	-430.39	3,349.61	3,295.78	53.83	62.230	
14,400.00	12,453.00	11,284.05	9,111.50	36.50	46.80	3.99	1,299.81	-431.26	3,349.61	3,294.66	54.95	60.953	
14,500.00	12,453.00	11,384.05	9,111.50	37.30	47.85	3.99	1,399.81	-432.13	3,349.61	3,293.51	56.10	59.706	
14,600.00	12,453.00	11,484.05	9,111.50	38.14	48.91	3.99	1,499.80	-433.00	3,349.61	3,292.35	57.27	58.491	
14,700.00	12,453.00	11,584.05	9,111.50	39.02	49.99	3.99	1,599.80	-433.87	3,349.61	3,291.16	58.45	57.306	
14,800.00	12,453.00	11,684.05	9,111.50	39.94	51.09	3.99	1,699.80	-434.74	3,349.62	3,289.97	59.65	56.154	
14,900.00	12,453.00	11,784.05	9,111.50	40.90	52.21	3.99	1,799.79	-435.60	3,349.62	3,288.75	60.87	55.032	
15,000.00	12,453.00	11,884.05	9,111.50	41.88	53.34	3.99	1,899.79	-436.47	3,349.62	3,287.52	62.10	53.942	
15,100.00	12,453.00	11,984.05	9,111.50	42.90	54.49	3.99	1,999.78	-437.34	3,349.62	3,286.28	63.34	52.883	
15,200.00	12,453.00	12,084.05	9,111.50	43.95	55.65	3.99	2,099.78	-438.21	3,349.62	3,285.02	64.60	51.853	
15,300.00	12,453.00	12,184.05	9,111.50	45.02	56.82	3.99	2,199.78	-439.08	3,349.62	3,283.76	65.87	50.854	
15,400.00	12,453.00	12,284.05	9,111.50	46.12	58.01	3.99	2,299.77	-439.94	3,349.62	3,282.48	67.15	49.884	
15,500.00	12,453.00	12,384.05	9,111.50	47.23	59.20	3.99	2,399.77	-440.81	3,349.63	3,281.18	68.44	48.941	
15,600.00	12,453.00	12,484.05	9,111.50	48.37	60.41	3.99	2,499.77	-441.68	3,349.63	3,279.88	69.74	48.027	
15,700.00	12,453.00	12,584.05	9,111.50	49.53	61.62	3.99	2,599.76	-442.55	3,349.63	3,278.57	71.06	47.139	
15,800.00	12,453.00	12,684.05	9,111.50	50.70	62.85	3.99	2,699.76	-443.42	3,349.63	3,277.25	72.38	46.278	
15,900.00	12,453.00	12,784.05	9,111.50	51.89	64.08	3.99	2,799.75	-444.28	3,349.63	3,275.92	73.71	45.442	
16,000.00	12,453.00	12,884.05	9,111.50	53.10	65.32	3.99	2,899.75	-445.15	3,349.63	3,274.58	75.05	44.630	
16,100.00	12,453.00	12,984.05	9,111.50	54.31	66.57	3.99	2,999.75	-446.02	3,349.63	3,273.23	76.40	43.842	
16,200.00	12,453.00	13,084.05	9,111.50	55.54	67.83	3.99	3,099.74	-446.89	3,349.63	3,271.88	77.76	43.077	
16,300.00	12,453.00	13,184.05	9,111.50	56.78	69.09	3.99	3,199.74	-447.76	3,349.64	3,270.51	79.12	42.334	
16,400.00	12,453.00	13,284.05	9,111.50	58.04	70.37	3.99	3,299.73	-448.62	3,349.64	3,269.14	80.49	41.613	
16,500.00	12,453.00	13,384.05	9,111.50	59.30	71.64	3.99	3,399.73	-449.49	3,349.64	3,267.77	81.87	40.913	
16,600.00	12,453.00	13,484.05	9,111.50	60.57	72.92	4.00	3,499.73	-450.36	3,349.64	3,266.38	83.26	40.232	
16,700.00	12,453.00	13,584.05	9,111.50	61.85	74.21	4.00	3,599.72	-451.23	3,349.64	3,264.99	84.65	39.571	
16,800.00	12,453.00	13,684.05	9,111.50	63.13	75.51	4.00	3,699.72	-452.10	3,349.64	3,263.60	86.05	38.929	
16,900.00	12,453.00	13,784.05	9,111.50	64.43	76.81	4.00	3,799.72	-452.97	3,349.64	3,262.20	87.45	38.304	
17,000.00	12,453.00	13,884.05	9,111.50	65.73	78.11	4.00	3,899.71	-453.83	3,349.65	3,260.79	88.86	37.697	
17,100.00	12,453.00	13,984.05	9,111.50	67.04	79.42	4.00	3,999.71	-454.70	3,349.65	3,259.38	90.27	37.107	
17,108.71	12,453.00	13,992.76	9,111.50	67.15	79.53	4.00	4,008.42	-454.78	3,349.65	3,259.25	90.39	37.056	
17,200.00	12,453.00	14,078.47	9,111.50	68.35	80.66	4.00	4,094.13	-455.52	3,349.65	3,257.98	91.68	36.537	
17,300.00	12,453.00	14,078.47	9,111.50	69.67	80.66	4.00	4,094.13	-455.52	3,351.31	3,258.44	92.88	36.083	
17,400.00	12,453.00	14,078.47	9,111.50	70.99	80.66	4.00	4,094.13	-455.52	3,355.95	3,261.92	94.03	35.689	
17,500.00	12,453.00	14,078.47	9,111.50	72.32	80.66	4.00	4,094.13	-455.52	3,363.56	3,268.42	95.14	35.353	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17

Survey Program: 0-													Offset Site Error: 0.00 usft		
Reference				Offset		Semi Major Axis		Offset Wellbore Centre		Rule Assigned: Distance				Offset Well Error: 0.00 usft	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
17,600.00	12,453.00	14,078.47	9,111.50	73.65	80.66	4.00	4,094.13	-455.52	3,374.12	3,277.92	96.20	35.074			
17,700.00	12,453.00	14,078.47	9,111.50	74.99	80.66	4.00	4,094.13	-455.52	3,387.59	3,290.39	97.21	34.850			
17,800.00	12,453.00	14,078.47	9,111.50	76.33	80.66	4.00	4,094.13	-455.52	3,403.96	3,305.80	98.16	34.679			
17,900.00	12,453.00	14,078.47	9,111.50	77.68	80.66	4.00	4,094.13	-455.52	3,423.16	3,324.11	99.05	34.560			
18,000.00	12,453.00	14,078.47	9,111.50	79.03	80.66	4.00	4,094.13	-455.52	3,445.17	3,345.28	99.89	34.490			
18,100.00	12,453.00	14,078.47	9,111.50	80.38	80.66	4.00	4,094.13	-455.52	3,469.91	3,369.24	100.67	34.469			
18,200.00	12,453.00	14,078.47	9,111.50	81.73	80.66	4.00	4,094.13	-455.52	3,497.34	3,395.95	101.39	34.493			
18,300.00	12,453.00	14,078.47	9,111.50	83.09	80.66	4.00	4,094.13	-455.52	3,527.40	3,425.34	102.06	34.561			
18,400.00	12,453.00	14,078.47	9,111.50	84.45	80.66	4.00	4,094.13	-455.52	3,560.01	3,457.33	102.68	34.673			
18,500.00	12,453.00	14,078.47	9,111.50	85.82	80.66	4.00	4,094.13	-455.52	3,595.11	3,491.87	103.24	34.824			
18,600.00	12,453.00	14,078.47	9,111.50	87.18	80.66	4.00	4,094.13	-455.52	3,632.62	3,528.87	103.74	35.015			
18,700.00	12,453.00	14,078.47	9,111.50	88.55	80.66	4.00	4,094.13	-455.52	3,672.47	3,568.27	104.20	35.243			
18,800.00	12,453.00	14,078.47	9,111.50	89.92	80.66	4.00	4,094.13	-455.52	3,714.59	3,609.97	104.62	35.507			
18,900.00	12,453.00	14,078.47	9,111.50	91.29	80.66	4.00	4,094.13	-455.52	3,758.89	3,653.91	104.98	35.805			
19,000.00	12,453.00	14,078.47	9,111.50	92.67	80.66	4.00	4,094.13	-455.52	3,805.31	3,700.01	105.31	36.135			
19,100.00	12,453.00	14,078.47	9,111.50	94.05	80.66	4.00	4,094.13	-455.52	3,853.77	3,748.18	105.59	36.497			
19,200.00	12,453.00	14,078.47	9,111.50	95.43	80.66	4.00	4,094.13	-455.52	3,904.18	3,798.35	105.84	36.888			
19,300.00	12,453.00	14,078.47	9,111.50	96.81	80.66	4.00	4,094.13	-455.52	3,956.48	3,850.43	106.05	37.308			
19,400.00	12,453.00	14,078.47	9,111.50	98.19	80.66	4.00	4,094.13	-455.52	4,010.60	3,904.37	106.23	37.754			
19,500.00	12,453.00	14,078.47	9,111.50	99.57	80.66	4.00	4,094.13	-455.52	4,066.45	3,960.07	106.38	38.226			
19,600.00	12,453.00	14,078.47	9,111.50	100.96	80.66	4.00	4,094.13	-455.52	4,123.97	4,017.47	106.50	38.723			
19,700.00	12,453.00	14,078.47	9,111.50	102.35	80.66	4.00	4,094.13	-455.52	4,183.09	4,076.50	106.60	39.243			
19,800.00	12,453.00	14,078.47	9,111.50	103.74	80.66	4.00	4,094.13	-455.52	4,243.75	4,137.08	106.67	39.785			
19,900.00	12,453.00	14,078.47	9,111.50	105.13	80.66	4.00	4,094.13	-455.52	4,305.87	4,199.15	106.72	40.348			
20,000.00	12,453.00	14,078.47	9,111.50	106.52	80.66	4.00	4,094.13	-455.52	4,369.40	4,262.65	106.75	40.931			
20,100.00	12,453.00	14,078.47	9,111.50	107.91	80.66	4.00	4,094.13	-455.52	4,434.27	4,327.51	106.77	41.533			
20,200.00	12,453.00	14,078.47	9,111.50	109.30	80.66	4.00	4,094.13	-455.52	4,500.43	4,393.67	106.76	42.153			
20,300.00	12,453.00	14,078.47	9,111.50	110.70	80.66	4.00	4,094.13	-455.52	4,567.82	4,461.08	106.75	42.791			
20,400.00	12,453.00	14,078.47	9,111.50	112.10	80.66	4.00	4,094.13	-455.52	4,636.39	4,529.67	106.72	43.444			
20,500.00	12,453.00	14,078.47	9,111.50	113.49	80.66	4.00	4,094.13	-455.52	4,706.09	4,599.41	106.68	44.114			
20,600.00	12,453.00	14,078.47	9,111.50	114.89	80.66	4.00	4,094.13	-455.52	4,776.86	4,670.23	106.63	44.798			
20,700.00	12,453.00	14,078.47	9,111.50	116.29	80.66	4.00	4,094.13	-455.52	4,848.66	4,742.09	106.57	45.496			
20,800.00	12,453.00	14,078.47	9,111.50	117.69	80.66	4.00	4,094.13	-455.52	4,921.45	4,814.94	106.51	46.207			
20,900.00	12,453.00	14,078.47	9,111.50	119.09	80.66	4.00	4,094.13	-455.52	4,995.17	4,888.74	106.44	46.931			
21,000.00	12,453.00	14,078.47	9,111.50	120.49	80.66	4.00	4,094.13	-455.52	5,069.80	4,963.44	106.36	47.667			
21,100.00	12,453.00	14,078.47	9,111.50	121.90	80.66	4.00	4,094.13	-455.52	5,145.29	5,039.01	106.28	48.414			
21,200.00	12,453.00	14,078.47	9,111.50	123.30	80.66	4.00	4,094.13	-455.52	5,221.60	5,115.41	106.19	49.172			
21,300.00	12,453.00	14,078.47	9,111.50	124.70	80.66	4.00	4,094.13	-455.52	5,298.70	5,192.60	106.10	49.940			
21,400.00	12,453.00	14,078.47	9,111.50	126.11	80.66	4.00	4,094.13	-455.52	5,376.56	5,270.55	106.01	50.718			
21,500.00	12,453.00	14,078.47	9,111.50	127.51	80.66	4.00	4,094.13	-455.52	5,455.14	5,349.22	105.91	51.505			
21,600.00	12,453.00	14,078.47	9,111.50	128.92	80.66	4.00	4,094.13	-455.52	5,534.40	5,428.58	105.82	52.301			
21,700.00	12,453.00	14,078.47	9,111.50	130.33	80.66	4.00	4,094.13	-455.52	5,614.33	5,508.61	105.72	53.105			
21,800.00	12,453.00	14,078.47	9,111.50	131.74	80.66	4.00	4,094.13	-455.52	5,694.90	5,589.27	105.63	53.916			
21,900.00	12,453.00	14,078.47	9,111.50	133.14	80.66	4.00	4,094.13	-455.52	5,776.07	5,670.54	105.53	54.735			
22,000.00	12,453.00	14,078.47	9,111.50	134.55	80.66	4.00	4,094.13	-455.52	5,857.83	5,752.40	105.43	55.561			
22,100.00	12,453.00	14,078.47	9,111.50	135.96	80.66	4.00	4,094.13	-455.52	5,940.14	5,834.80	105.33	56.394			
22,200.00	12,453.00	14,078.47	9,111.50	137.37	80.66	4.00	4,094.13	-455.52	6,022.99	5,917.75	105.24	57.232			
22,300.00	12,453.00	14,078.47	9,111.50	138.78	80.66	4.00	4,094.13	-455.52	6,106.35	6,001.21	105.14	58.077			
22,400.00	12,453.00	14,078.47	9,111.50	140.20	80.66	4.00	4,094.13	-455.52	6,190.20	6,085.15	105.05	58.927			
22,500.00	12,453.00	14,078.47	9,111.50	141.61	80.66	4.00	4,094.13	-455.52	6,274.53	6,169.57	104.96	59.782			
22,600.00	12,453.00	14,078.47	9,111.50	143.02	80.66	4.00	4,094.13	-455.52	6,359.31	6,254.45	104.87	60.643			
22,700.00	12,453.00	14,078.47	9,111.50	144.43	80.66	4.00	4,094.13	-455.52	6,444.53	6,339.75	104.78	61.507			

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Mammoth 1 Federal BC - 2H - OH - Plan 1 01-26-17													Offset Site Error: 0.00 usft
Survey Program: 0-													Offset Well Error: 0.00 usft
Reference	Offset	Semi Major Axis	Highside	Offset Wellbore Centre	Distance	Rule Assigned:							
Measured	Vertical	Measured	Vertical	Reference	Offset	Toolface	+N/-S	+E/-W	Between	Between	Minimum	Separation	Warning
Depth	Depth	Depth	Depth	Reference	Offset	Toolface	+N/-S	+E/-W	Centres	Centres	Separation	Factor	
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
22,703.30	12,453.00	14,078.47	9,111.50	144.48	80.66	4.00	4,094.13	-455.52	6,447.35	6,342.58	104.77	61.536	



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 1.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre		Distance Between Centres (usft)		Minimum Separation (usft)	Separation Factor	Warning
							+N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	1.00	1.00	54.92	17.27	24.59	30.04				
100.00	100.00	100.00	100.00	1.11	1.11	54.92	17.27	24.59	30.04	27.83	2.21	13.589	
200.00	200.00	200.00	200.00	1.64	1.64	54.92	17.27	24.59	30.04	26.76	3.28	9.156	
300.00	300.00	300.00	300.00	2.04	2.04	54.92	17.27	24.59	30.04	25.96	4.09	7.352	
400.00	400.00	400.00	400.00	2.38	2.38	54.92	17.27	24.59	30.04	25.28	4.76	6.308	
500.00	500.00	500.00	500.00	2.68	2.68	54.92	17.27	24.59	30.04	24.68	5.36	5.606	
600.00	600.00	600.00	600.00	2.95	2.95	54.92	17.27	24.59	30.04	24.14	5.90	5.092	
700.00	700.00	700.00	700.00	3.20	3.20	54.92	17.27	24.59	30.04	23.64	6.40	4.695	
800.00	800.00	800.00	800.00	3.43	3.43	54.92	17.27	24.59	30.04	23.18	6.87	4.375	
900.00	900.00	900.00	900.00	3.65	3.65	54.92	17.27	24.59	30.04	22.74	7.31	4.111	
1,000.00	1,000.00	1,000.00	1,000.00	3.86	3.86	54.92	17.27	24.59	30.04	22.32	7.73	3.888	
1,100.00	1,100.00	1,100.00	1,100.00	4.06	4.06	54.92	17.27	24.59	30.04	21.91	8.13	3.696	
1,200.00	1,200.00	1,200.00	1,200.00	4.26	4.26	54.92	17.27	24.59	30.04	21.53	8.51	3.529	
1,300.00	1,300.00	1,300.00	1,300.00	4.44	4.44	54.92	17.27	24.59	30.04	21.16	8.88	3.382 CC, ES	
1,400.00	1,399.99	1,400.03	1,400.03	4.61	4.61	-162.62	16.52	25.03	30.82	21.61	9.21	3.346 SF	
1,500.00	1,499.96	1,500.00	1,499.96	4.77	4.76	-159.45	14.26	26.37	33.22	23.71	9.51	3.493	
1,600.00	1,599.86	1,599.85	1,599.72	4.94	4.94	-155.10	10.52	28.59	37.41	27.59	9.82	3.810	
1,700.00	1,699.68	1,699.53	1,699.21	5.14	5.13	-150.45	5.29	31.69	43.54	33.41	10.14	4.295	
1,800.00	1,799.37	1,798.97	1,798.34	5.36	5.35	-146.12	-1.40	35.67	51.73	41.26	10.47	4.941	
1,900.00	1,898.90	1,898.12	1,897.03	5.60	5.59	-142.39	-9.55	40.51	61.99	51.18	10.81	5.733	
2,000.00	1,998.26	1,996.92	1,995.20	5.87	5.85	-139.32	-19.13	46.20	74.33	63.16	11.18	6.651	
2,100.00	2,097.40	2,095.32	2,092.77	6.15	6.13	-136.83	-30.12	52.72	88.73	77.17	11.56	7.675	
2,200.00	2,196.30	2,193.26	2,189.64	6.46	6.43	-134.82	-42.49	60.06	105.14	93.17	11.96	8.787	
2,300.00	2,294.93	2,291.00	2,286.09	6.79	6.69	-133.23	-56.16	68.18	123.49	111.15	12.33	10.012	
2,400.00	2,393.29	2,389.05	2,382.77	7.07	7.02	-132.40	-70.17	76.50	143.10	130.37	12.73	11.242	
2,500.00	2,491.59	2,487.06	2,479.41	7.43	7.36	-131.92	-84.18	84.81	162.91	149.70	13.21	12.331	
2,600.00	2,589.89	2,585.07	2,576.06	7.80	7.72	-131.54	-98.18	93.13	182.73	169.02	13.71	13.328	
2,700.00	2,688.20	2,683.07	2,672.71	8.18	8.08	-131.23	-112.19	101.44	202.56	188.34	14.22	14.240	
2,800.00	2,786.50	2,781.08	2,769.35	8.57	8.45	-130.98	-126.19	109.76	222.39	207.64	14.75	15.076	
2,900.00	2,884.81	2,879.09	2,866.00	8.96	8.83	-130.77	-140.20	118.07	242.23	226.94	15.29	15.843	
3,000.00	2,983.11	2,977.10	2,962.64	9.36	9.21	-130.59	-154.21	126.39	262.07	246.23	15.84	16.547	
3,100.00	3,081.42	3,075.11	3,059.29	9.77	9.60	-130.43	-168.21	134.71	281.91	265.51	16.40	17.193	
3,200.00	3,179.72	3,173.12	3,155.94	10.18	10.00	-130.30	-182.22	143.02	301.75	284.79	16.96	17.789	
3,300.00	3,278.03	3,271.13	3,252.58	10.59	10.39	-130.18	-196.23	151.34	321.60	304.06	17.54	18.338	
3,400.00	3,376.33	3,369.14	3,349.23	11.01	10.79	-130.08	-210.23	159.65	341.44	323.32	18.12	18.845	
3,500.00	3,474.64	3,467.15	3,445.88	11.43	11.20	-129.99	-224.24	167.97	361.29	342.58	18.71	19.315	
3,600.00	3,572.94	3,565.16	3,542.52	11.86	11.60	-129.91	-238.25	176.28	381.13	361.83	19.30	19.750	
3,700.00	3,671.24	3,663.17	3,639.17	12.29	12.01	-129.83	-252.25	184.60	400.98	381.08	19.90	20.153	
3,800.00	3,769.55	3,761.18	3,735.81	12.72	12.42	-129.77	-266.26	192.92	420.83	400.33	20.50	20.529	
3,900.00	3,867.85	3,859.19	3,832.46	13.15	12.84	-129.70	-280.27	201.23	440.68	419.57	21.11	20.879	
4,000.00	3,966.16	3,957.20	3,929.11	13.58	13.25	-129.65	-294.27	209.55	460.52	438.81	21.72	21.205	
4,100.00	4,064.46	4,055.21	4,025.75	14.02	13.67	-129.60	-308.28	217.86	480.37	458.04	22.33	21.510	
4,200.00	4,162.77	4,153.22	4,122.40	14.46	14.09	-129.55	-322.29	226.18	500.22	477.27	22.95	21.796	
4,300.00	4,261.07	4,251.23	4,219.05	14.90	14.51	-129.51	-336.29	234.49	520.07	496.50	23.57	22.064	
4,400.00	4,359.38	4,349.23	4,315.69	15.34	14.93	-129.47	-350.30	242.81	539.92	515.73	24.20	22.315	
4,500.00	4,457.68	4,447.24	4,412.34	15.78	15.35	-129.43	-364.31	251.13	559.77	534.95	24.82	22.551	
4,600.00	4,555.98	4,545.25	4,508.99	16.22	15.78	-129.39	-378.31	259.44	579.62	554.17	25.45	22.774	
4,700.00	4,654.29	4,643.26	4,605.63	16.67	16.20	-129.36	-392.32	267.76	599.47	573.39	26.08	22.983	
4,800.00	4,752.59	4,741.27	4,702.28	17.11	16.63	-129.33	-406.33	276.07	619.33	592.61	26.72	23.181	
4,900.00	4,850.90	4,839.28	4,798.92	17.56	17.05	-129.30	-420.33	284.39	639.18	611.82	27.35	23.368	
5,000.00	4,949.20	4,937.29	4,895.57	18.00	17.48	-129.27	-434.34	292.71	659.03	631.04	27.99	23.545	
5,100.00	5,047.51	5,035.30	4,992.22	18.45	17.91	-129.25	-448.35	301.02	678.88	650.25	28.63	23.713	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22													Offset Site Error:
Survey Program: 0-MWD+HRGM													Offset Well Error:
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre		Distance Between Centres (usft)		Minimum Separation (usft)	Separation Factor	Warning
							+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
5,200.00	5,145.81	5,133.31	5,088.86	18.90	18.34	-129.22	-462.35	309.34	698.73	669.46	29.27	23.872	
5,300.00	5,244.12	5,231.32	5,185.51	19.35	18.77	-129.20	-476.36	317.65	718.58	688.67	29.91	24.023	
5,400.00	5,342.42	5,329.33	5,282.16	19.80	19.20	-129.18	-490.37	325.97	738.43	707.88	30.56	24.167	
5,500.00	5,440.72	5,427.34	5,378.80	20.25	19.63	-129.16	-504.37	334.28	758.29	727.08	31.20	24.304	
5,600.00	5,539.03	5,525.35	5,475.45	20.70	20.06	-129.14	-518.38	342.60	778.14	746.29	31.85	24.434	
5,700.00	5,637.33	5,623.36	5,572.09	21.15	20.49	-129.12	-532.39	350.92	797.99	765.49	32.49	24.558	
5,800.00	5,735.64	5,721.37	5,668.74	21.60	20.93	-129.11	-546.39	359.23	817.84	784.70	33.14	24.676	
5,900.00	5,833.94	5,819.38	5,765.39	22.05	21.36	-129.09	-560.40	367.55	837.69	803.90	33.79	24.789	
6,000.00	5,932.25	5,917.38	5,862.03	22.51	21.79	-129.07	-574.41	375.86	857.55	823.10	34.44	24.897	
6,100.00	6,030.55	6,015.39	5,958.68	22.96	22.23	-129.06	-588.41	384.18	877.40	842.30	35.09	25.001	
6,200.00	6,128.86	6,113.40	6,055.33	23.41	22.66	-129.04	-602.42	392.49	897.25	861.50	35.75	25.100	
6,300.00	6,227.16	6,211.41	6,151.97	23.87	23.10	-129.03	-616.42	400.81	917.10	880.70	36.40	25.195	
6,400.00	6,325.47	6,309.42	6,248.62	24.32	23.53	-129.02	-630.43	409.13	936.95	899.90	37.06	25.285	
6,500.00	6,423.77	6,407.43	6,345.26	24.78	23.97	-129.00	-644.44	417.44	956.81	919.10	37.71	25.373	
6,600.00	6,522.07	6,505.44	6,441.91	25.23	24.40	-128.99	-658.44	425.76	976.66	938.29	38.37	25.457	
6,700.00	6,620.38	6,603.45	6,538.56	25.69	24.84	-128.98	-672.45	434.07	996.51	957.49	39.02	25.537	
6,800.00	6,718.68	6,701.46	6,635.20	26.14	25.27	-128.97	-686.46	442.39	1,016.36	976.68	39.68	25.614	
6,900.00	6,816.99	6,799.47	6,731.85	26.60	25.71	-128.96	-700.46	450.70	1,036.22	995.88	40.34	25.689	
7,000.00	6,915.38	6,897.53	6,828.55	27.04	26.15	-129.04	-714.48	459.03	1,055.78	1,014.80	40.98	25.765	
7,100.00	7,014.05	6,995.79	6,925.43	27.48	26.58	-129.09	-728.52	467.36	1,074.31	1,032.69	41.62	25.813	
7,200.00	7,112.99	7,102.79	7,031.07	27.92	27.05	-129.07	-743.21	476.08	1,091.43	1,049.15	42.28	25.812	
7,300.00	7,212.17	7,212.08	7,139.26	28.34	27.52	-129.05	-756.47	483.96	1,106.56	1,063.63	42.93	25.774	
7,400.00	7,311.56	7,321.89	7,248.24	28.75	27.98	-129.04	-768.01	490.81	1,119.65	1,076.11	43.55	25.711	
7,500.00	7,411.13	7,432.14	7,357.90	29.14	28.42	-129.03	-777.79	496.61	1,130.70	1,086.58	44.12	25.626	
7,600.00	7,510.84	7,542.76	7,468.14	29.51	28.84	-129.02	-785.78	501.35	1,139.70	1,095.04	44.66	25.521	
7,700.00	7,610.67	7,653.68	7,578.82	29.87	29.24	-129.02	-791.94	505.02	1,146.62	1,101.48	45.15	25.399	
7,800.00	7,710.59	7,764.82	7,689.85	30.19	29.61	-129.01	-796.28	507.59	1,151.48	1,105.90	45.58	25.261	
7,900.00	7,810.56	7,876.10	7,801.09	30.47	29.93	-129.01	-798.76	509.06	1,154.26	1,108.30	45.96	25.116	
8,000.00	7,910.55	7,985.57	7,910.55	30.58	30.08	89.69	-799.40	509.45	1,154.98	1,108.87	46.11	25.047	
8,100.00	8,010.55	8,085.57	8,010.55	30.60	30.09	89.69	-799.40	509.45	1,154.98	1,108.84	46.14	25.031	
8,200.00	8,110.55	8,185.57	8,110.55	30.62	30.11	89.69	-799.40	509.45	1,154.98	1,108.81	46.18	25.012	
8,300.00	8,210.55	8,285.57	8,210.55	30.63	30.12	89.69	-799.40	509.45	1,154.98	1,108.77	46.21	24.993	
8,400.00	8,310.55	8,385.57	8,310.55	30.65	30.14	89.69	-799.40	509.45	1,154.98	1,108.73	46.25	24.974	
8,500.00	8,410.55	8,485.57	8,410.55	30.67	30.16	89.69	-799.40	509.45	1,154.98	1,108.70	46.28	24.955	
8,600.00	8,510.55	8,585.57	8,510.55	30.68	30.17	89.69	-799.40	509.45	1,154.98	1,108.66	46.32	24.935	
8,700.00	8,610.55	8,685.57	8,610.55	30.70	30.19	89.69	-799.40	509.45	1,154.98	1,108.62	46.36	24.915	
8,800.00	8,710.55	8,785.57	8,710.55	30.72	30.21	89.69	-799.40	509.45	1,154.98	1,108.59	46.40	24.894	
8,900.00	8,810.55	8,885.57	8,810.55	30.73	30.22	89.69	-799.40	509.45	1,154.98	1,108.55	46.43	24.874	
9,000.00	8,910.55	8,985.57	8,910.55	30.75	30.24	89.69	-799.40	509.45	1,154.98	1,108.51	46.47	24.853	
9,100.00	9,010.55	9,085.57	9,010.55	30.77	30.26	89.69	-799.40	509.45	1,154.98	1,108.47	46.51	24.832	
9,200.00	9,110.55	9,185.57	9,110.55	30.79	30.27	89.69	-799.40	509.45	1,154.98	1,108.43	46.55	24.811	
9,300.00	9,210.55	9,285.57	9,210.55	30.81	30.29	89.69	-799.40	509.45	1,154.98	1,108.39	46.59	24.789	
9,400.00	9,310.55	9,385.57	9,310.55	30.83	30.31	89.69	-799.40	509.45	1,154.98	1,108.35	46.63	24.767	
9,500.00	9,410.55	9,485.57	9,410.55	30.84	30.33	89.69	-799.40	509.45	1,154.98	1,108.31	46.67	24.745	
9,600.00	9,510.55	9,585.57	9,510.55	30.86	30.35	89.69	-799.40	509.45	1,154.98	1,108.27	46.72	24.723	
9,700.00	9,610.55	9,685.57	9,610.55	30.88	30.36	89.69	-799.40	509.45	1,154.98	1,108.22	46.76	24.701	
9,800.00	9,710.55	9,785.57	9,710.55	30.90	30.38	89.69	-799.40	509.45	1,154.98	1,108.18	46.80	24.678	
9,900.00	9,810.55	9,885.57	9,810.55	30.92	30.40	89.69	-799.40	509.45	1,154.98	1,108.14	46.85	24.655	
10,000.00	9,910.55	9,985.57	9,910.55	30.94	30.42	89.69	-799.40	509.45	1,154.98	1,108.09	46.89	24.632	
10,100.00	10,010.55	10,085.57	10,010.55	30.96	30.44	89.69	-799.40	509.45	1,154.98	1,108.05	46.93	24.608	
10,200.00	10,110.55	10,185.57	10,110.55	30.98	30.46	89.69	-799.40	509.45	1,154.98	1,108.00	46.98	24.584	
10,300.00	10,210.55	10,285.57	10,210.55	31.00	30.48	89.69	-799.40	509.45	1,154.98	1,107.96	47.03	24.560	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22													Offset Site Error:
Survey Program: 0-MWD+HRGM													0.00 usft
Rule Assigned:													Offset Well Error:
Warning													1.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,400.00	10,310.55	10,385.57	10,310.55	31.02	30.50	89.69	-799.40	509.45	1,154.98	1,107.91	47.07	24.536	
10,500.00	10,410.55	10,485.57	10,410.55	31.04	30.52	89.69	-799.40	509.45	1,154.98	1,107.86	47.12	24.512	
10,600.00	10,510.55	10,585.57	10,510.55	31.07	30.54	89.69	-799.40	509.45	1,154.98	1,107.82	47.17	24.487	
10,700.00	10,610.55	10,685.57	10,610.55	31.09	30.56	89.69	-799.40	509.45	1,154.98	1,107.77	47.21	24.463	
10,800.00	10,710.55	10,785.57	10,710.55	31.11	30.58	89.69	-799.40	509.45	1,154.98	1,107.72	47.26	24.438	
10,900.00	10,810.55	10,885.57	10,810.55	31.13	30.60	89.69	-799.40	509.45	1,154.98	1,107.67	47.31	24.412	
11,000.00	10,910.55	10,985.57	10,910.55	31.15	30.62	89.69	-799.40	509.45	1,154.98	1,107.62	47.36	24.387	
11,100.00	11,010.55	11,085.57	11,010.55	31.17	30.64	89.69	-799.40	509.45	1,154.98	1,107.57	47.41	24.361	
11,200.00	11,110.55	11,185.57	11,110.55	31.20	30.66	89.69	-799.40	509.45	1,154.98	1,107.52	47.46	24.335	
11,300.00	11,210.55	11,285.57	11,210.55	31.22	30.69	89.69	-799.40	509.45	1,154.98	1,107.47	47.51	24.309	
11,400.00	11,310.55	11,385.57	11,310.55	31.24	30.71	89.69	-799.40	509.45	1,154.98	1,107.42	47.56	24.283	
11,500.00	11,410.55	11,485.57	11,410.55	31.26	30.73	89.69	-799.40	509.45	1,154.98	1,107.37	47.62	24.256	
11,600.00	11,510.55	11,585.57	11,510.55	31.29	30.75	89.69	-799.40	509.45	1,154.98	1,107.31	47.67	24.230	
11,700.00	11,610.55	11,685.57	11,610.55	31.31	30.78	89.69	-799.40	509.45	1,154.98	1,107.26	47.72	24.203	
11,800.00	11,710.55	11,785.57	11,710.55	31.33	30.80	89.69	-799.40	509.45	1,154.98	1,107.21	47.77	24.176	
11,900.00	11,810.55	11,885.57	11,810.55	31.36	30.82	89.69	-799.40	509.45	1,154.98	1,107.15	47.83	24.149	
11,900.17	11,810.72	11,885.74	11,810.72	31.36	30.82	89.69	-799.40	509.45	1,154.98	1,107.15	47.83	24.148	
12,000.00	11,910.54	11,985.56	11,910.54	31.34	30.84	90.24	-799.40	509.45	1,154.99	1,107.12	47.86	24.130	
12,100.00	12,009.43	12,084.45	12,009.43	31.10	30.87	90.91	-799.40	509.45	1,155.13	1,107.28	47.85	24.142	
12,200.00	12,104.39	12,179.41	12,104.39	30.79	30.89	92.27	-799.40	509.45	1,156.05	1,108.27	47.78	24.197	
12,300.00	12,192.53	12,261.94	12,206.57	30.48	30.71	94.11	-792.52	509.38	1,158.55	1,110.93	47.62	24.328	
12,400.00	12,271.17	12,395.71	12,316.49	30.18	30.35	95.97	-763.94	509.13	1,162.38	1,115.03	47.35	24.548	
12,500.00	12,337.93	12,521.63	12,428.90	29.92	29.92	97.76	-707.75	508.64	1,167.10	1,120.11	47.00	24.834	
12,600.00	12,390.78	12,661.51	12,536.02	29.74	29.46	99.40	-618.34	507.86	1,172.04	1,125.39	46.64	25.128	
12,700.00	12,428.11	12,815.64	12,625.14	29.65	29.08	100.72	-493.17	506.76	1,176.27	1,129.86	46.41	25.345	
12,800.00	12,448.79	12,981.26	12,680.13	29.66	28.90	101.51	-337.56	505.39	1,178.85	1,132.45	46.40	25.405	
12,900.00	12,453.00	13,127.52	12,691.00	29.79	28.98	101.64	-192.01	504.11	1,179.30	1,132.70	46.60	25.307	
13,000.00	12,453.00	13,227.52	12,691.00	29.96	29.10	101.64	-92.02	503.23	1,179.31	1,132.40	46.91	25.141	
13,100.00	12,453.00	13,327.52	12,691.00	30.17	29.25	101.64	7.98	502.36	1,179.32	1,131.93	47.38	24.889	
13,200.00	12,453.00	13,427.52	12,691.00	30.41	29.43	101.64	107.98	501.48	1,179.33	1,131.30	48.02	24.557	
13,300.00	12,453.00	13,527.52	12,691.00	30.69	29.63	101.64	207.97	500.60	1,179.34	1,130.52	48.82	24.156	
13,400.00	12,453.00	13,627.52	12,691.00	31.00	29.86	101.64	307.97	499.72	1,179.35	1,129.58	49.77	23.696	
13,500.00	12,453.00	13,727.52	12,691.00	31.36	30.13	101.64	407.96	498.84	1,179.36	1,128.50	50.86	23.189	
13,600.00	12,453.00	13,827.52	12,691.00	31.75	30.44	101.64	507.96	497.97	1,179.37	1,127.29	52.08	22.645	
13,700.00	12,453.00	13,927.52	12,691.00	32.18	30.80	101.64	607.96	497.09	1,179.38	1,125.95	53.42	22.075	
13,800.00	12,453.00	14,027.52	12,691.00	32.66	31.20	101.64	707.95	496.21	1,179.39	1,124.50	54.88	21.489	
13,900.00	12,453.00	14,127.52	12,691.00	33.18	31.65	101.64	807.95	495.33	1,179.39	1,122.95	56.45	20.893	
14,000.00	12,453.00	14,227.52	12,691.00	33.75	32.15	101.64	907.95	494.45	1,179.40	1,121.29	58.11	20.296	
14,100.00	12,453.00	14,327.52	12,691.00	34.37	32.71	101.64	1,007.94	493.57	1,179.41	1,119.55	59.86	19.703	
14,200.00	12,453.00	14,427.52	12,691.00	35.04	33.34	101.64	1,107.94	492.70	1,179.42	1,117.73	61.69	19.118	
14,300.00	12,453.00	14,527.52	12,691.00	35.75	34.01	101.64	1,207.93	491.82	1,179.43	1,115.84	63.60	18.546	
14,400.00	12,453.00	14,627.52	12,691.00	36.50	34.75	101.64	1,307.93	490.94	1,179.44	1,113.88	65.57	17.988	
14,500.00	12,453.00	14,727.52	12,691.00	37.30	35.54	101.64	1,407.93	490.06	1,179.45	1,111.85	67.60	17.447	
14,600.00	12,453.00	14,827.52	12,691.00	38.14	36.39	101.64	1,507.92	489.18	1,179.46	1,109.77	69.69	16.925	
14,700.00	12,453.00	14,927.52	12,691.00	39.02	37.28	101.64	1,607.92	488.31	1,179.47	1,107.64	71.83	16.421	
14,800.00	12,453.00	15,027.52	12,691.00	39.94	38.23	101.64	1,707.91	487.43	1,179.48	1,105.47	74.02	15.936	
14,900.00	12,453.00	15,127.52	12,691.00	40.90	39.21	101.64	1,807.91	486.55	1,179.49	1,103.25	76.24	15.470	
15,000.00	12,453.00	15,227.52	12,691.00	41.88	40.23	101.64	1,907.91	485.67	1,179.50	1,100.99	78.51	15.023	
15,100.00	12,453.00	15,327.52	12,691.00	42.90	41.28	101.64	2,007.90	484.79	1,179.51	1,098.69	80.81	14.595	
15,200.00	12,453.00	15,427.52	12,691.00	43.95	42.37	101.64	2,107.90	483.92	1,179.52	1,096.37	83.15	14.185	
15,300.00	12,453.00	15,527.52	12,691.00	45.02	43.48	101.64	2,207.90	483.04	1,179.53	1,094.01	85.52	13.793	
15,400.00	12,453.00	15,627.52	12,691.00	46.12	44.62	101.64	2,307.89	482.16	1,179.54	1,091.63	87.91	13.418	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design: Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error: 1.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre		Rule Assigned: Distance Between Centres (usft)		Minimum Separation (usft)	Separation Factor	Warning
							+N/-S (usft)	+E/-W (usft)					
15,500.00	12,453.00	15,727.52	12,691.00	47.23	45.78	101.64	2,407.89	481.28	1,179.55	1,089.22	90.33	13.059	
15,600.00	12,453.00	15,827.52	12,691.00	48.37	46.96	101.64	2,507.88	480.40	1,179.56	1,086.79	92.77	12.715	
15,700.00	12,453.00	15,927.52	12,691.00	49.53	48.16	101.64	2,607.88	479.53	1,179.57	1,084.33	95.23	12.386	
15,800.00	12,453.00	16,027.52	12,691.00	50.70	49.37	101.64	2,707.88	478.65	1,179.58	1,081.86	97.72	12.072	
15,900.00	12,453.00	16,127.52	12,691.00	51.89	50.60	101.64	2,807.87	477.77	1,179.59	1,079.37	100.22	11.770	
16,000.00	12,453.00	16,227.52	12,691.00	53.10	51.84	101.64	2,907.87	476.89	1,179.59	1,076.86	102.74	11.482	
16,100.00	12,453.00	16,327.52	12,691.00	54.31	53.10	101.64	3,007.86	476.01	1,179.60	1,074.33	105.27	11.206	
16,200.00	12,453.00	16,427.52	12,691.00	55.54	54.37	101.64	3,107.86	475.14	1,179.61	1,071.80	107.82	10.941	
16,300.00	12,453.00	16,527.52	12,691.00	56.78	55.64	101.64	3,207.86	474.26	1,179.62	1,069.24	110.38	10.687	
16,400.00	12,453.00	16,627.52	12,691.00	58.04	56.93	101.64	3,307.85	473.38	1,179.63	1,066.68	112.96	10.443	
16,500.00	12,453.00	16,727.52	12,691.00	59.30	58.22	101.64	3,407.85	472.50	1,179.64	1,064.10	115.54	10.209	
16,600.00	12,453.00	16,827.52	12,691.00	60.57	59.53	101.64	3,507.85	471.62	1,179.65	1,061.51	118.14	9.985	
16,700.00	12,453.00	16,927.52	12,691.00	61.85	60.83	101.64	3,607.84	470.74	1,179.66	1,058.91	120.75	9.769	
16,800.00	12,453.00	17,027.52	12,691.00	63.13	62.15	101.64	3,707.84	469.87	1,179.67	1,056.30	123.37	9.562	
16,900.00	12,453.00	17,127.52	12,691.00	64.43	63.47	101.64	3,807.83	468.99	1,179.68	1,053.68	126.00	9.363	
17,000.00	12,453.00	17,227.52	12,691.00	65.73	64.80	101.64	3,907.83	468.11	1,179.69	1,051.06	128.63	9.171	
17,100.00	12,453.00	17,327.52	12,691.00	67.04	66.13	101.64	4,007.83	467.23	1,179.70	1,048.42	131.28	8.986	
17,200.00	12,453.00	17,427.52	12,691.00	68.35	67.47	101.64	4,107.82	466.35	1,179.71	1,045.78	133.93	8.808	
17,300.00	12,453.00	17,527.52	12,691.00	69.67	68.81	101.64	4,207.82	465.48	1,179.72	1,043.13	136.59	8.637	
17,400.00	12,453.00	17,627.52	12,691.00	70.99	70.16	101.64	4,307.81	464.60	1,179.73	1,040.47	139.26	8.472	
17,500.00	12,453.00	17,727.52	12,691.00	72.32	71.51	101.64	4,407.81	463.72	1,179.74	1,037.81	141.93	8.312	
17,600.00	12,453.00	17,827.52	12,691.00	73.65	72.87	101.64	4,507.81	462.84	1,179.75	1,035.14	144.61	8.158	
17,700.00	12,453.00	17,927.52	12,691.00	74.99	74.22	101.64	4,607.80	461.96	1,179.76	1,032.47	147.29	8.010	
17,800.00	12,453.00	18,027.52	12,691.00	76.33	75.59	101.64	4,707.80	461.09	1,179.77	1,029.79	149.98	7.866	
17,900.00	12,453.00	18,127.52	12,691.00	77.68	76.95	101.64	4,807.79	460.21	1,179.78	1,027.10	152.67	7.727	
18,000.00	12,453.00	18,227.52	12,691.00	79.03	78.32	101.64	4,907.79	459.33	1,179.79	1,024.41	155.37	7.593	
18,100.00	12,453.00	18,327.52	12,691.00	80.38	79.69	101.64	5,007.79	458.45	1,179.79	1,021.72	158.08	7.463	
18,200.00	12,453.00	18,427.52	12,691.00	81.73	81.06	101.64	5,107.78	457.57	1,179.80	1,019.02	160.78	7.338	
18,300.00	12,453.00	18,527.52	12,691.00	83.09	82.43	101.64	5,207.78	456.70	1,179.81	1,016.32	163.50	7.216	
18,400.00	12,453.00	18,627.52	12,691.00	84.45	83.81	101.64	5,307.78	455.82	1,179.82	1,013.61	166.21	7.098	
18,500.00	12,453.00	18,727.52	12,691.00	85.82	85.19	101.64	5,407.77	454.94	1,179.83	1,010.90	168.93	6.984	
18,600.00	12,453.00	18,827.52	12,691.00	87.18	86.57	101.64	5,507.77	454.06	1,179.84	1,008.19	171.66	6.873	
18,700.00	12,453.00	18,927.52	12,691.00	88.55	87.96	101.64	5,607.76	453.18	1,179.85	1,005.47	174.38	6.766	
18,800.00	12,453.00	19,027.52	12,691.00	89.92	89.34	101.64	5,707.76	452.31	1,179.86	1,002.75	177.11	6.662	
18,900.00	12,453.00	19,127.52	12,691.00	91.29	90.73	101.64	5,807.76	451.43	1,179.87	1,000.02	179.85	6.560	
19,000.00	12,453.00	19,227.52	12,691.00	92.67	92.12	101.64	5,907.75	450.55	1,179.88	997.30	182.58	6.462	
19,100.00	12,453.00	19,327.52	12,691.00	94.05	93.51	101.64	6,007.75	449.67	1,179.89	994.57	185.32	6.367	
19,200.00	12,453.00	19,427.52	12,691.00	95.43	94.90	101.64	6,107.74	448.79	1,179.90	991.84	188.06	6.274	
19,300.00	12,453.00	19,527.52	12,691.00	96.81	96.29	101.64	6,207.74	447.91	1,179.91	989.10	190.81	6.184	
19,400.00	12,453.00	19,627.52	12,691.00	98.19	97.68	101.64	6,307.74	447.04	1,179.92	986.36	193.55	6.096	
19,500.00	12,453.00	19,727.52	12,691.00	99.57	99.08	101.64	6,407.73	446.16	1,179.93	983.62	196.30	6.011	
19,600.00	12,453.00	19,827.52	12,691.00	100.96	100.48	101.64	6,507.73	445.28	1,179.94	980.88	199.06	5.928	
19,700.00	12,453.00	19,927.52	12,691.00	102.35	101.87	101.64	6,607.73	444.40	1,179.95	978.14	201.81	5.847	
19,800.00	12,453.00	20,027.52	12,691.00	103.74	103.27	101.64	6,707.72	443.52	1,179.96	975.39	204.56	5.768	
19,900.00	12,453.00	20,127.52	12,691.00	105.13	104.67	101.64	6,807.72	442.65	1,179.97	972.64	207.32	5.691	
20,000.00	12,453.00	20,227.52	12,691.00	106.52	106.07	101.64	6,907.71	441.77	1,179.98	969.89	210.08	5.617	
20,100.00	12,453.00	20,327.52	12,691.00	107.91	107.48	101.64	7,007.71	440.89	1,179.99	967.14	212.84	5.544	
20,200.00	12,453.00	20,427.52	12,691.00	109.30	108.88	101.64	7,107.71	440.01	1,180.00	964.39	215.61	5.473	
20,300.00	12,453.00	20,527.52	12,691.00	110.70	110.28	101.64	7,207.70	439.13	1,180.00	961.63	218.37	5.404	
20,400.00	12,453.00	20,627.52	12,691.00	112.10	111.69	101.64	7,307.70	438.26	1,180.01	958.88	221.14	5.336	
20,500.00	12,453.00	20,727.52	12,691.00	113.49	113.09	101.64	7,407.69	437.38	1,180.02	956.12	223.91	5.270	
20,600.00	12,453.00	20,827.52	12,691.00	114.89	114.50	101.64	7,507.69	436.50	1,180.03	953.36	226.68	5.206	

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Offset Design:Thunderbird 1 - Thunderbird 1 WA Federal 18H - OH - Plan 1 01-25-22													Offset Site Error:	0.00 usft	
Survey Program:		0-MWD+HRGM		Offset		Semi Major Axis		Offset Wellbore Centre		Rule Assigned:				Offset Well Error:	1.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
20,700.00	12,453.00	20,927.52	12,691.00	116.29	115.91	101.64	7,607.69	435.62	1,180.04	950.59	229.45	5.143			
20,800.00	12,453.00	21,027.52	12,691.00	117.69	117.32	101.64	7,707.68	434.74	1,180.05	947.83	232.22	5.082			
20,900.00	12,453.00	21,127.52	12,691.00	119.09	118.72	101.64	7,807.68	433.87	1,180.06	945.07	235.00	5.022			
21,000.00	12,453.00	21,227.52	12,691.00	120.49	120.13	101.64	7,907.68	432.99	1,180.07	942.30	237.77	4.963			
21,100.00	12,453.00	21,327.52	12,691.00	121.90	121.54	101.64	8,007.67	432.11	1,180.08	939.53	240.55	4.906			
21,200.00	12,453.00	21,427.52	12,691.00	123.30	122.95	101.64	8,107.67	431.23	1,180.09	936.76	243.33	4.850			
21,300.00	12,453.00	21,527.52	12,691.00	124.70	124.37	101.64	8,207.66	430.35	1,180.10	934.00	246.10	4.795			
21,400.00	12,453.00	21,627.52	12,691.00	126.11	125.78	101.63	8,307.66	429.47	1,180.11	931.22	248.88	4.742			
21,500.00	12,453.00	21,727.52	12,691.00	127.51	127.19	101.63	8,407.66	428.60	1,180.12	928.45	251.67	4.689			
21,600.00	12,453.00	21,827.52	12,691.00	128.92	128.60	101.63	8,507.65	427.72	1,180.13	925.68	254.45	4.638			
21,700.00	12,453.00	21,927.52	12,691.00	130.33	130.02	101.63	8,607.65	426.84	1,180.14	922.91	257.23	4.588			
21,800.00	12,453.00	22,027.52	12,691.00	131.74	131.43	101.63	8,707.64	425.96	1,180.15	920.13	260.02	4.539			
21,900.00	12,453.00	22,127.52	12,691.00	133.14	132.85	101.63	8,807.64	425.08	1,180.16	917.35	262.80	4.491			
22,000.00	12,453.00	22,227.52	12,691.00	134.55	134.26	101.63	8,907.64	424.21	1,180.17	914.58	265.59	4.444			
22,100.00	12,453.00	22,327.52	12,691.00	135.96	135.68	101.63	9,007.63	423.33	1,180.18	911.80	268.38	4.397			
22,200.00	12,453.00	22,427.52	12,691.00	137.37	137.09	101.63	9,107.63	422.45	1,180.19	909.02	271.16	4.352			
22,300.00	12,453.00	22,527.52	12,691.00	138.78	138.51	101.63	9,207.63	421.57	1,180.20	906.24	273.95	4.308			
22,400.00	12,453.00	22,627.52	12,691.00	140.20	139.93	101.63	9,307.62	420.69	1,180.20	903.46	276.74	4.265			
22,500.00	12,453.00	22,727.52	12,691.00	141.61	141.34	101.63	9,407.62	419.82	1,180.21	900.68	279.53	4.222			
22,600.00	12,453.00	22,827.52	12,691.00	143.02	142.76	101.63	9,507.61	418.94	1,180.22	897.90	282.33	4.180			
22,700.00	12,453.00	22,927.24	12,691.00	144.43	144.17	101.63	9,607.33	418.06	1,180.23	895.12	285.11	4.140			
22,703.30	12,453.00	22,927.24	12,691.00	144.48	144.17	101.63	9,607.33	418.06	1,180.24	895.10	285.14	4.139			

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Reference Depths are relative to RKB @ 3311.00usft (Est GL)

Offset Depths are relative to Offset Datum

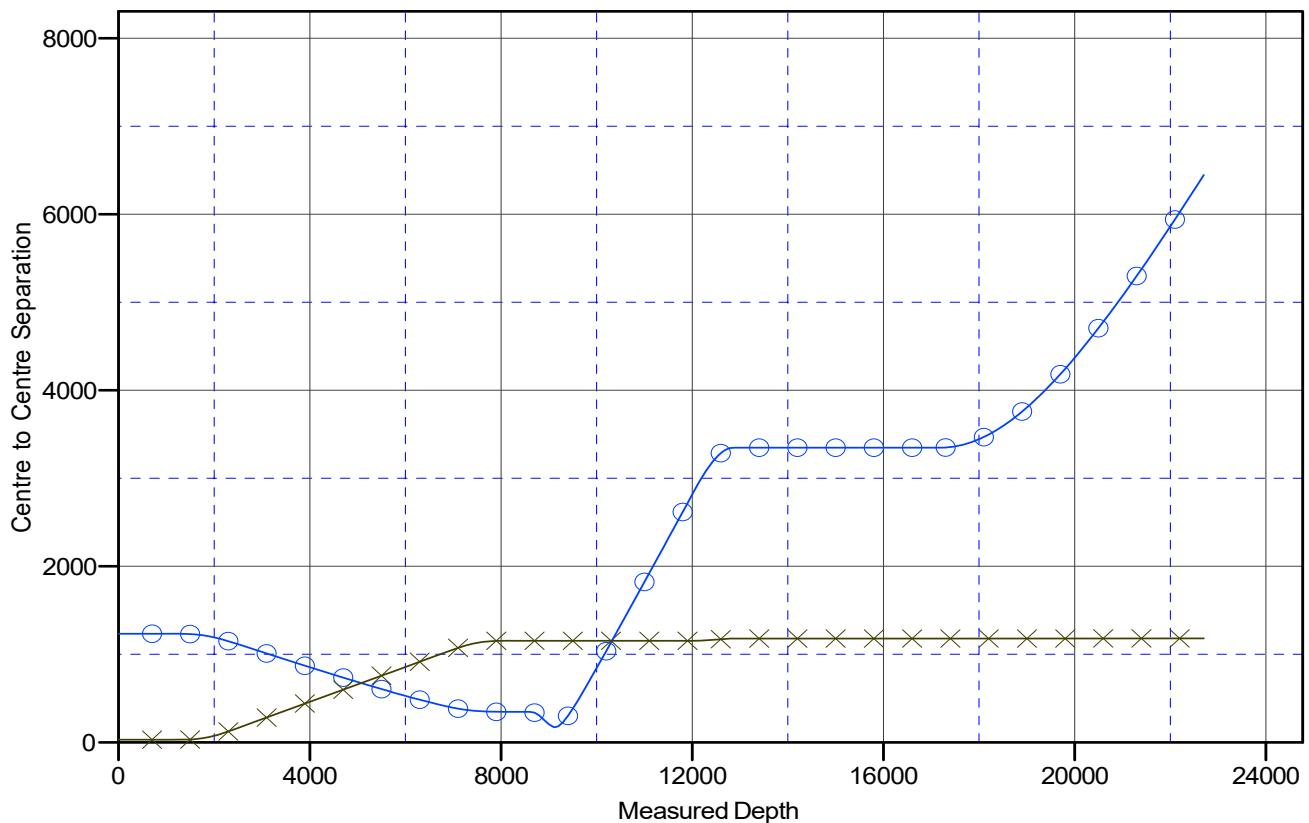
Central Meridian is 104° 19' 60.000000 W

Coordinates are relative to: Thunderbird 1 TB Federal 14H

Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 301

Grid Convergence at Surface is: 0.49°

Ladder Plot



LEGEND

● 2H, OH, Plan 1 01-26-17 V0

✕ Thunderbird 1 WA Federal 18H, OH, Plan 1 01-25-22 V0

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Anticollision Report



Company:	Marathon Oil Permian LLC	Local Co-ordinate Reference:	Well Thunderbird 1 TB Federal 14H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB @ 3311.00usft (Est GL)
Reference Site:	Thunderbird 1	MD Reference:	RKB @ 3311.00usft (Est GL)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	Thunderbird 1 TB Federal 14H	Survey Calculation Method:	Minimum Curvature
Well Error:	1.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	USA Compass
Reference Design:	Plan 1 01-25-22	Offset TVD Reference:	Reference Datum

Reference Depths are relative to RKB @ 3311.00usft (Est GL)

Offset Depths are relative to Offset Datum

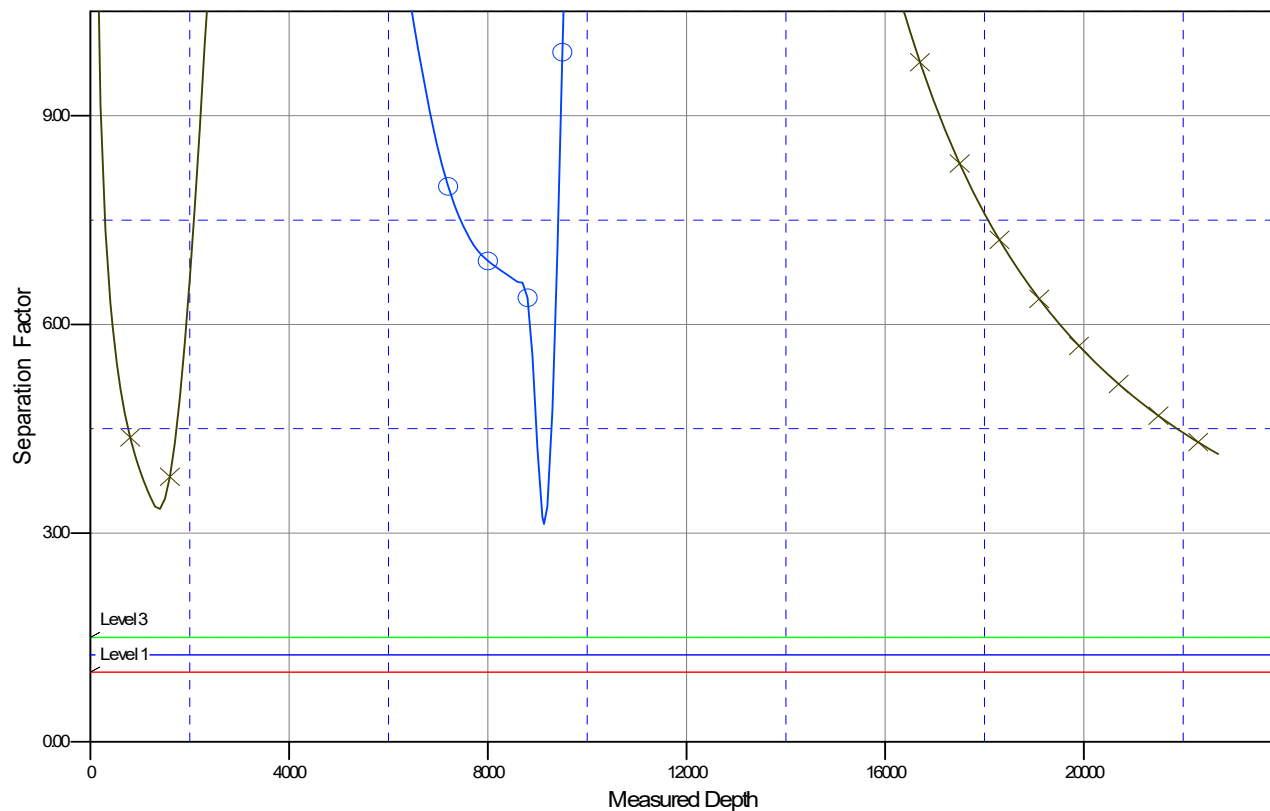
Central Meridian is 104° 19' 60.000000 W

Coordinates are relative to: Thunderbird 1 TB Federal 14H

Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30

Grid Convergence at Surface is: 0.49°

Separation Factor Plot



LEGEND

2H, OH, Plan 1 01-26-17 V0

Thunderbird 1 WA Federal 18H, OH, Plan 1 01-25-22 V0

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
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District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 118785

CONDITIONS

Operator: MARATHON OIL PERMIAN LLC 990 Town & Country Blvd. Houston, TX 77024	OGRID: 372098
	Action Number: 118785
	Action Type: [C-103] NOI Change of Plans (C-103A)

CONDITIONS

Created By	Condition	Condition Date
pkautz	previous COA's apply	6/29/2022