



00046955

MASTER 10 POINT DRILLING PROGRAM
CHANDLER & ASSOCIATES, INC.
SW RANGELY FEDERAL PROJECT
RIO BLANCO COUNTY, COLORADO

1. Surface Formation: Green River
- 2-3. Estimated Tops See individual well APD.

4. Casing Program:

Hole Size	Casing Size	WT	Grade	Joint	Cond	From/To
12-1/4"	8-5/8"	24#	K-55	LT&C	New	0'-300'
7-7/8"	5-1/2"	15.5#	K-55	LT&C	New	0'-TD

Casing strings will be tested to 1500 psi or to 0.22 psi/ft equivalent, whichever is greater.

Cementing Program: See individual well APD.

5. Pressure Control Equipment (See attached DOP and manifold schematic):
- a) Shaffer 8" double hydraulic with Payne closing unit. One set rams blind and one set for 4" drill pipe: tested upon installation to 2000# and daily. b) Rotary head for use while air or mist drilling.

6. Auxiliary Equipment:

1. Kelly cock
2. Drill pipe float
3. No monitoring on mud system as air will be used for drilling.
4. Stabbing valve will be used for drill pipe.

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7. Proposed Circulating Medium:

Depth	Type & Additives	MW	Vis	WL
0'-300'	Air or water	--	--	--
300'-TD	Air or Air Mist w/2% KCl or 2% KCl	8.4-9.0#	28-40	10-15 cc

A sufficient quantity of mud reserve material (equal to the active mud system capacity) will be kept on hand to meet any lost circulation or well control problems.

8. Testing, Logging, and Coring Program:

Logging:

IES & GR Density will be run. Cement Bond Log will be run 200' either side of Castlegate Fm to insure protection or isolation of the Mesaverde Fm.

Coring:

No cores are planned.

DST:

No Drill Stem Tests will be run due to air drilling.

Stimulation:

Stimulation will be designed for the particular formation of interest as encountered. Frac gradient - approx. .79 psi/ft

9. **Abnormal Pressures or Temperatures:**

No abnormal high pressure, temperature or H₂S gas should be encountered. Productive zone is sub-normal in pressure, and gas analysis indicate no H₂S hazard. Bottom Hole Pressure expected - less than 600#, based on offsetting production data.

10. **Anticipated Starting Date:**

Anticipated starting date for this well is set for as soon as possible after State and Federal approvals have been received.

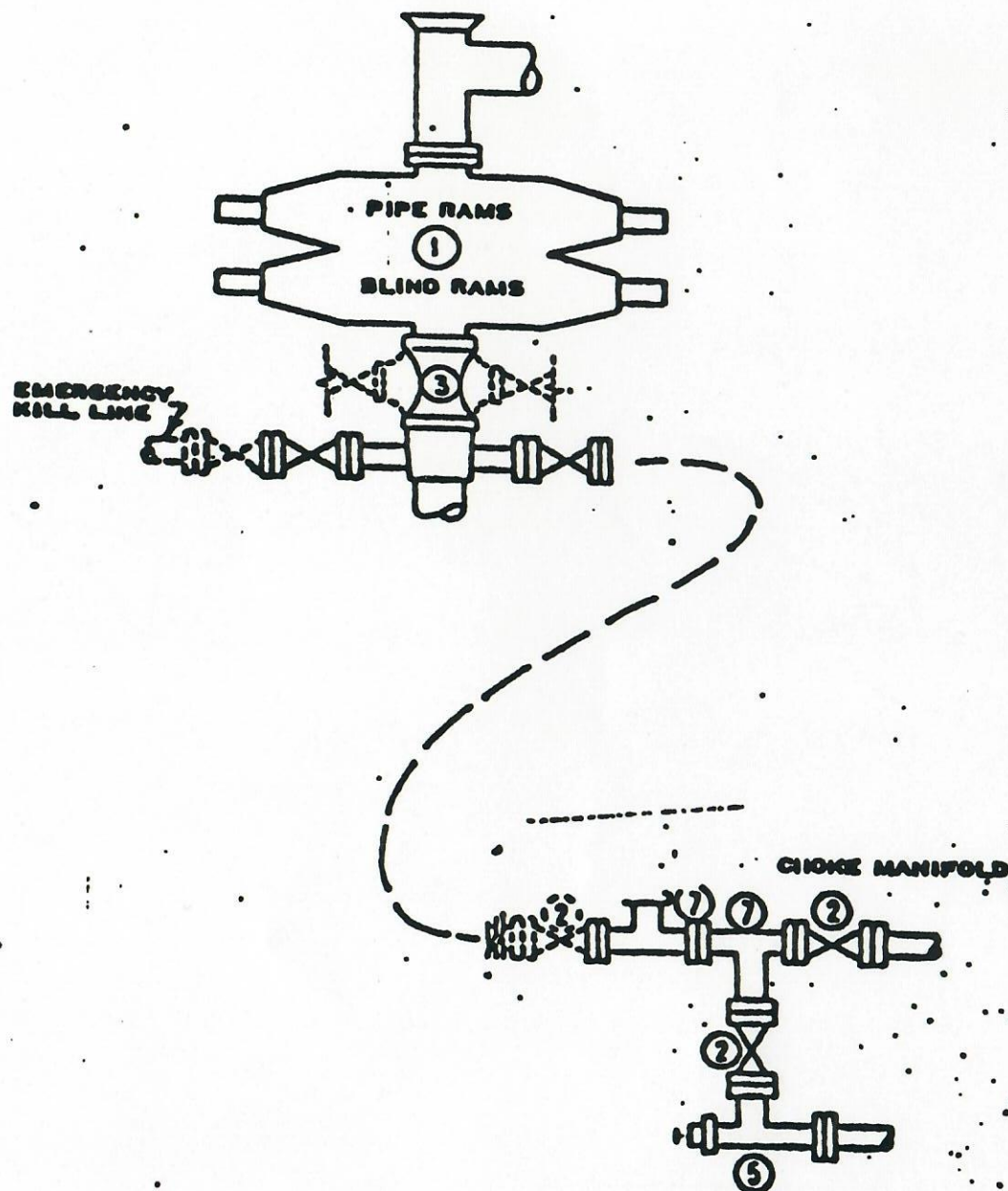
Duration of Operations: Estimated drilling time is 6 days. An additional 7 days would be required for completion purposes.

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DOUBLE PREVENTER



- ① SERIES 900 RAM-TYPE BOP
- ② 2" SERIES 900 VALVE
- ③ SERIES 900 DRILLING SPOOL
- ④ 2" MUD PRESSURE GAUGE
- ⑤ 2" SERIES 900 CHOKE
- ⑥ 2" SERIES 900 CHECK VALVE
- ⑦ 2" SERIES 900 STEEL TEE

NOTES:

1. 2000 PSI WP CLAMP THIS MAY BE SUBSTITUTED FOR FLANGES
2. VALVES MAY BE EITHER HAND OR POWER OPERATED BUT, IF POWER OPERATED, THE VALVES FLANGED TO THE BOP RUN MUST BE CAPABLE OF BEING OPENED AND CLOSED MANUALLY OR CLOSE ON POWER FAILURE AND BE CAPABLE OF BEING OPENED MANUALLY

..... OPTIONAL EQUIPMENT

CHANDLER DRILLING CORP
RIG #7
2000 PSI WORKING PRESSURE
BLOWOUT PREVENTER HOOK-UP
(SERIES 900 FLANGES OR BETTER)

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FIGURE NO. 4

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Master Surface Use Plan

SW Rangely Federal Project

Rio Blanco County, Colorado

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Chandler & Associates, Inc.
Master Surface Use Plan
SW Rangely Federal Project

1. Existing Roads: Referenced Maps and Plats pertain to those in individual well APD's.
 - A. Topo Map "A" is the vicinity map, showing the access routes from Rangely, Colorado.
 - B. Topo Map "B" shows the proposed access road to each individual well. It also shows existing roads in the immediate area.
 - C. The existing and proposed access roads, unless otherwise stated, shall be crowned, ditched and dipped from Rio Blanco County Road #2 or #23 to each location, prior to use for moving the drill rig onto site.
 - D. On the Shavetail Park access road, there are two existing 24 inch culverts located in the SE1/4 SE1/4, Sec. 33, T1N, R103W, 6th P.M. These culverts shall be lengthened and any existing erosion at the culverts shall be repaired.
 - E. Occasional maintenance blading and storm repairs will keep roads in good condition.
 - F. There shall be no mud blading on the access road. Vehicles may be towed through the mud provided they stay on the roadway.

2. Planned Access Roads:

All proposed and planned access roads - finished surface will be approximately 15' wide with a total right-of-way width of 25' as stipulated by Alan Schroeder, Meeker - B.L.M.

The proposed access roads, unless otherwise stated, will be crowned, ditched and dipped.

- A. Maximum grade will be 8% or less, unless otherwise stated.
- B. If Turnouts are required they will be shown on Topo Map "B".
- C. Any culverts required will be shown on Topo Map "B".
- D. Road Surface Material will be that native to the area.
- E. No gates will be required

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- F. The proposed access roads were flagged at the time the locations were staked.
- G. The White River Resource Area Manager will be contacted at least 24 hours prior to commencing construction of the access road and well pad.
- H. The backslopes of the proposed access roads will be no steeper than vertical or 1/4:1 in rock; and 2:1, elsewhere.

3. Location of Existing Wells:

For a one mile radius of Development Wells, Topographic Map "C" shows and identifies existing:

- A. Water Wells
- B. Abandoned Wells
- C. Temporarily Abandoned Wells
- D. Disposal Wells
- E. Drilling Wells
- F. Producing Wells
- G. Shut-In Wells
- H. Injection Wells

4. Location of Existing and/or Proposed Facilities:

- A. All Petroleum Production Facilities are to be contained within the proposed location sites.
- B. At the present time there are no other Chandler & Associates Gas Gathering Lines, Oil Gathering Lines, Injection Lines or Disposal Lines in the SW Rangely Project.
- C. In the event that production of these wells is established, the following will be shown:
 - 1. Proposed Location and Attendant Lines, by flagging, if off well pad.
 - 2. Dimensions of facilities.
 - 3. Construction methods and materials.
- D. The area used to contain the proposed production facilities will be built using native materials. If these materials are not acceptable, then other arrangements will be made to acquire them from private sources. These facilities will be constructed using bulldozers, graders, and workman crews to construct and

place the proposed facilities.

- E. All permanent facilities placed on the locations shall be painted Carlsbad Canyon Gray (Munsell soil color chart No. 2.5Y 6/2 or equivalent) to blend with the natural environment.
- F. A dike shall be constructed around the Tank Battery, of sufficient capacity to adequately contain at least 110 percent of the storage capacity of the largest tank within the dike.

5. Location and Type of Water Supply:

Water to be used for the drilling of these wells will be hauled by truck over the roads described in Item's #1 and #2 of the individual well APD's, from the Rangely City Water Supply.

There will be no water wells drilled at any of these sites.

6. Source of Construction Materials:

- A. All construction material for these location sites and access roads shall be borrow material accumulated during the construction of the location sites and access roads. No additional construction material from other sources is anticipated at this time, but if it is required the appropriate actions will be taken to acquire it from private sources.
- B. In the event of production, the small amount of gravel needed for facilities will be hauled in by truck from a local gravel pit over existing access roads from the area. No special access other than for drilling operations and pipeline construction is needed.
- C. All surface disturbance area is on BLM Lands.
- D. All trees on the location and proposed access road shall be purchased from the Bureau of Land Management, White River Resource Area. The trees shall be cut with a maximum stump height of six inches and disposed of by one of the following methods:
 - a. Skidded off the location or access road. Trees may not be dozed off the location or access road.
 - b. Removed from Federal Lands for resale or private use. Limbs may be scattered off the location or access road but not dozed off.

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- c. Burned in the reserve pit prior to placement of drilling facilities. If material is burned, the operator must obtain a State burning permit and notify the Rio Blanco County Sheriff's Office one day in advance of burning. BLM has the right to restrict burning during high fire danger.

Stumps shall be burned as in (c) above, buried or placed off the location or access road to be scattered back over the disturbed area as part of final reclamation.

7. Methods of Handling Waste Disposals

See Individual Location Layout Sheet

- A. A reserve pit will be constructed and be approximately 8' deep.
- B. If deemed necessary by the agencies concerned to prevent contamination to surrounding areas, the reserve pits will be lined.
- C. Non-flammable materials such as cuttings, salts and drilling fluids will be contained in the reserve pits.

When the reserve pit dries and reclamation activities commence, the pits will be covered with a minimum of four feet of soil and all requirements in Item #10 will be followed.

- D. All pits shall be fenced with livestock-proof fencing. For the following wells, woven wire fencing 36 to 42 inches high shall be used:
12-34-1N-103, 16-32-1N-102, 4-11-1S-103, and 9-3-1S-103.
For the remaining wells, a 3-strand, braced barbed wire fence 48-inches high will be used.
- E. Portable chemical toilets will be provided and serviced by a local commercial sanitary service.
- F. Garbage and trash will be collected in a trash cage and its contents hauled to a sanitary landfill. All wastes caused by the construction activities shall be promptly removed and disposed of in a sanitary landfill or as directed by the authorized officer.
- G. Prior to commencement of drilling, the reserve pit will be fenced on three sides using three strands of barbed

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wire. When drilling activities are completed it will be fenced on the fourth side and allowed to dry (if liquids are present). After drying, the fences will be removed and the pit shall be buried. Reclamation will be undertaken no later than the fall of the year after all drilling activity has ceased.

- H. A flare pit shall also be constructed and the flare lines shall be angled down into the flare pits.
- I. In the event heavy rock is encountered during location construction, the flare pit may be pulled back toward the reserve pit approximately 25-30 feet, and shortened to 45 feet so that it is flush with the edge of the location. A ditch, approximately 13 feet wide and 2-4 feet deep will be constructed along the base of the cut between the flare pit and reserve pit. (This action may be used on any of the locations but was specifically identified for 9#3-1S-103, 4#11-1S-103, and 3#9-1S-102.

8. Ancillary Facilities:

No air strips, camps or other living facilities will be built off the location. Housing and office trailers will be on the location as seen on Plat #4 of each well.

9. Well Site Layout:

- A. See individual Location Layout Sheets.
- B. The White River Resource Area Manager will be contacted at least 24 hours prior to commencing construction of the access road and well pad.
- C. The authorized officer will determine after each location is constructed whether the pit is to be lined and if so, the type of material to be used.
- D. Topsoil shall be stripped to a depth of 4 to 6 inches and stockpiled as shown on the location layout plat for each location.
- E. The backslopes of the locations will be no steeper than vertical or 1/4:1 in rock; and 2:1 elsewhere.
- F. The upper edges of all cut banks on the the access roads and well pads will be rounded.

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10. Plans for Restoration of Surface:

- A. Immediately upon completion, the location and surrounding area will be cleared of all debris, materials, trash and junk not required for production.
- B. Before any dirt work to restore the location takes place, the reserve pit must be completely dry. The reserve pit will be reclaimed within 90 days from the date of well completion.
- C. The White River Resource Area Manager shall be notified at least 48 hours prior to commencing reclamation work.
- D. All disturbed areas will be seeded with the following mixture:

Seed Mixture #2

<u>Species</u>	<u>Lbs. PLS/Acre</u>
Russian Wildrye (Vinall)	2
Western Wheatgrass (Arriba)	3
Pubescent Wheatgrass (Luna)	2
Crested Wheatgrass (Fairway)	2
Fourwing Saltbrush (Wytana/Rincon)	2

- E. The seed bed will be prepared by disking, following the natural contour. Drill seed on contour at a depth no greater than 1/2 inch. In areas that cannot be drilled, the seed will be broadcast at double the seeding rate and harrowed into soil. Certified seed is recommended.
- F. Fall seeding will be completed after September 1st, and prior to prolonged ground frost.
- G. If the well is a producer, the access roads will be upgraded and maintained as necessary to prevent soil erosion, and accommodate year round traffic. Areas unnecessary to operations will be reshaped, topsoil distributed, and seed distributed according to the above mixtures. Perennial Vegetation must be established. Additional work shall be required in case of seeding failures, etc.
- H. If the well is abandoned or a dry hole the access road and location will be restored to approximately the original contours. During reclamation of the site the fill material will be pushed into cuts and up over the

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backslope. No depressions will be left that would trap water or form ponds. Topsoil will be distributed evenly over the location and seeded according to the above mixture. The access road and the location shall be ripped or disked prior to seeding. Perennial Vegetation must be established. Additional work shall be required in case of seeding failures, etc.

- I. Annual or noxious weeds shall be controlled on all disturbed areas as directed by the White River Resource Area Manager. Method of control shall be by an approved mechanical method or an Environmental Protection Agency (EPA) registered herbicide. All herbicide application proposals must be approved by the BLM. Application of herbicides must be under direct field supervision of an EPA certified pesticide applicator.

11. Surface Ownership:

All land affected by the SW Rangely Federal Project is owned by the Federal Government.

12. Other Information:

The Topography of the General Area - (See Topo Map "A")

- A. The area slopes from the rim of the Book Cliff Mountains to the South to the White River to the North, and is a portion of the Roan Plateau. The area is interlaced with numerous canyons and ridges which are extremely steep with many ledges formed in sandstone, conglomerates and shale deposits.

The soils in this semi-arid area of the Williams Fork Formation (Upper Cretaceous) and Wasatch Formation (Eocene) consist of light brownish-gray clays (OL) to sandy soil (SM-ML) type with poorly graded gravels.

Outcrops of sandstone ledges, conglomerate deposits and shale are common in this area.

The topsoils in the area range from a sandy clay (SM-ML) type soil to a clayey (OL) soil.

The majority of the numerous washes and draws in the area are of non-perennial nature flowing during the early spring run-off and heavy rain storms of long duration which are rare as the normal annual rainfall in the area

is only 8".

Due to the low precipitation average, climatic conditions and the marginal types of soils, the vegetation that is found in the area are common of the semi-arid regions and consists of juniper and pinion forest as the primary flora with areas of sagebrush, rabbitbrush, greasewood, some grasses and cacti.

- B. The fauna of the areas is sparse and consists predominantly of the mule deer, coyotes, rabbits and varieties of small ground squirrels and other types of rodents.

The birds of the area are raptors, finches, ground sparrows, magpies, crows and jays.

The area is used by man for the primary purpose of grazing domestic livestock.

If, in its operations, the holder discovers any cultural remains, monuments or sites, or any project of antiquity subject to the Antiquities Act of June 8, 1906 (34 Stat. 225; 16 U.S.C. Secs. 431-433), the Archaeological Resources Protection Act of 1979 (Public Law 96-95), and 43 CFR, Part 3, the holder shall immediately cease activity and report directly to the Area Manager. The Bureau shall then take such action as required under the acts and regulations thereunder. The holder shall follow the mitigation requirements set forth by the BLM concerning protection, preservation or disposition of any sites or material discovered. In cases where salvage excavation is necessary, the cost of such excavation shall be borne by the holder, unless otherwise stated.

All activity shall cease when soils or road surfaces become saturated to a depth of three inches, unless otherwise approved by the Authorized Officer.

If any fossils are discovered during construction, the operator shall cease construction immediately and notify the Authorized Officer so as to determine the significance of the discovery.

- C. A Class III (100% pedestrian) cultural resource inventory shall be completed prior to disturbance by a qualified professional Archaeologist in the following areas: A report of the inventory will be submitted and approved by

the BLM with stipulations as appropriate in order to comply with EO 11593 and Section 106 of the National Historic Preservation Act of 1966.

- D. The United States of America considers the development of groundwater resources to be necessary and frequently indispensable to effective land management. Therefore, any groundwater intercepted by the party conducting mineral exploration shall be reported to the District Manager immediately including approximate quantities and a sample in a sealed quart container. The United States shall have the first opportunity to file state water rights for the intercepted groundwater. The undersigned may file for water rights only with a written waiver from the District Manager.
- E. The operator is responsible for informing all persons in the area who are associated with this project that they will be subject to prosecution for knowingly disturbing historic or archaeological sites, or for collecting artifacts. If historic or archaeological materials are uncovered during construction, the operator is to immediately stop work that might further disturb such materials and contact the authorized officer (AO). Within five working days the AO will inform the operator as to:

whether the materials appear eligible for the National Register of Historic Places;
the mitigation measures the operator will likely have to undertake before the site can be used (assuming in situ preservation is not necessary); and
a timeframe for the AO to complete an expedited review under 36 CFR 800.411 to confirm, through the State Historic Preservation Officer, that the findings of the AO are correct and that mitigation is appropriate.

If the operator wishes, at any time, to relocate activities to avoid the expense of mitigation and/or delays associated with this process, the AO will assume responsibility for whatever recordation and stabilization of the exposed materials may be required. Otherwise, the operator will be responsible for mitigation costs. The AO will provide technical and procedural guidelines for the conduct of mitigation. Upon verification from the AO that the required mitigation has been completed, an operator will then be allowed to resume construction.

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13. LESEE'S OR OPERATORS REPRESENTATIVE AND CERTIFICATION

Representative * Hugo Cartaya

Address * 1860 Lincoln Street
Suite 770
Denver, Colorado 80203

Phone No. * (303) 863-9100

Certification:

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill sites and access routes; that I am familiar with the condition which currently exist; that the statements made in this plan are true and correct to the best of my knowledge; and, that the work associated with the operations proposed here will be performed by CHANDLER & ASSOCIATES, INC., and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.

6/25/90
Date

Hugo Cartaya
Hugo Cartaya, Petroleum Engineer

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10 POINT PROGRAM
SITE SPECIFIC DATA

SW RANGELY FED 15-25-1N-3
SW SE 25-1N-103W
RIO BLANCO COUNTY, CO

2-3. Estimated Tops

<u>Name</u>	<u>Top</u>	<u>Prod Phase Anticipated</u>
Castlegate Ss.	3292'	
Mancos "B"	4542'	Gas
Base Mancos "B"	4572'	
TD	4672'	

4. Cementing Program:

<u>Casing</u>	<u>Volume</u>	<u>Type & Additives</u>
Surface	215 sx	Class "G", 3% CaCl ₂ , 1/4#/sk cello
Production		
Set DV tool @ 3300'.		
3300' to Surface	225 sx	Class "G", 3% Anhydrous Sodium Metasilicate, 3% KCl, 5#/sk Hi-seal. 13.25#/Gal.
Plus 125 sx		Class "G", 3% KCl, 2#/sx Hi-seal. 15.6#/Gal.
TD Across Mancos	125 sx	Class "G", 3% KCl. 15.6#/Gal.

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Site Specific Data
13 - Point Surface Use Plan

Chandler & Associates, Inc.
SW Rangely Federal # 15-25-1N-3
SW 1/4 SE 1/4, Sec. 25, T1N, R103W
Rio Blanco County, Colorado

1. Existing Roads: See Topo Map "A"

A. To reach the location proceed Westerly from Rangely, Colorado along the White River on County Road #2 for approximately 8.1 miles to a road intersection located in the SE 1/4, Section 10, T1N, R103W; turn left at said road intersection on an improved access road and proceed in a Southerly direction for approximately 4.7 miles to the proposed well location.

B. That portion of the existing road from the above described road intersection in the SE 1/4, Section 10, to the South line of the N 1/2 NW 1/4, Section 14, T1N, R103W is private property. (see Topo Map "B") Negotiations are currently under way for road use with the private surface owner. There is approximately 0.61 miles of road in this section and it is off lease.

C. That portion of the existing road from the South Line of the N 1/2 NW 1/4, Section 14, T1N, R103W, to the South Line of the N 1/2 NE 1/4, Section 26, T1N, R103W is off lease. There is approximately 3.0 miles of road in this section.

D. That portion of the existing road from the South Line of the N 1/2 NE 1/4, Section 26 to location including approximately 250' of new construction is on this lease. There is approximately 1.1 miles of road in this section.

E. This road was previously upgraded for a Coseka Well Location located in the NE 1/4 Section 26, T1N, R103W, that was built but never drilled. It will take only minor upgrading from County Road #2 to this point. The remainder of the road is existing two track that will require upgrading.

F. Both the existing and proposed access road will be treated as stated in item # 2 of the Master Surface Use Plan.

G. A 2-foot diameter corrugated metal pipe (i.e. culvert) with approximately 10 feet of cover shall be installed at the deep drainage crossing in the NE 1/4 SW 1/4, Section 25,

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T1N, R103W. Said culvert shall be approximately 35 feet long and shall be installed in accordance with Exhibit B and good engineering practices.

H. The operator shall construct drainage dips on those portions of the existing and proposed access roads which have long, continuous, non-rolling grades. Said dips shall be constructed in accordance with Exhibit A, and shall have the following maximum spacings:

<u>ROAD GRADE</u>	<u>MAXIMUM SLOPE SPACING</u>
2%	400 feet
4%	300 feet
6%	200 feet
8%	150 feet
greater than 8%	as directed by A0

The starting point for dip spacing considerations shall be the crest of the grade.

I. Dust from roads and the well location during drilling or completion operations shall be controlled by frequent watering of the roads and well location.

J. The existing and proposed access roads shall be crowned, ditched and dipped from Rio Blanco County Road #2 to the location, prior to use for moving the drill rig onto the site.

K. The backslope to the access road will be no steeper than 2:1.

2. Planned Access Roads:

A. Both the existing and planned access road will be treated as stated in the Master Surface Use Plan.

B. There is approximately 250' of new road construction needed. (See Topo Map "B")

3. Existing Well: See Topo Map "C"

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9. Well Site Layout:

- A. Topsoil shall be stripped to a depth of 4 inches and stockpiled at the north end of the location.
- B. Backslopes of the location will be no steeper than 3:1.
- C. In order to allow continued through traffic to the Shavetail Triangulation Point in the NW 1/4, Section 36, T1N, R103W, the operator shall construct an access trail from the proposed road northwest of corner 8 and around the south end of the well location and tie into the existing trail east of corner G.
- D. A diversion ditch shall be constructed around the south end of the well location from the access road northwest of corner 8 to corner B.

12. Other Information:

- A. The operator shall install overhead wire and flagging on the reserve pit to discourage access of pit contents by eagles. Said flagging shall be installed immediately following well completion and shall remain in place and maintained in an effective condition until pit backfilling work commences.
- B. Round the upper edges of all cut banks on the access road and pad.

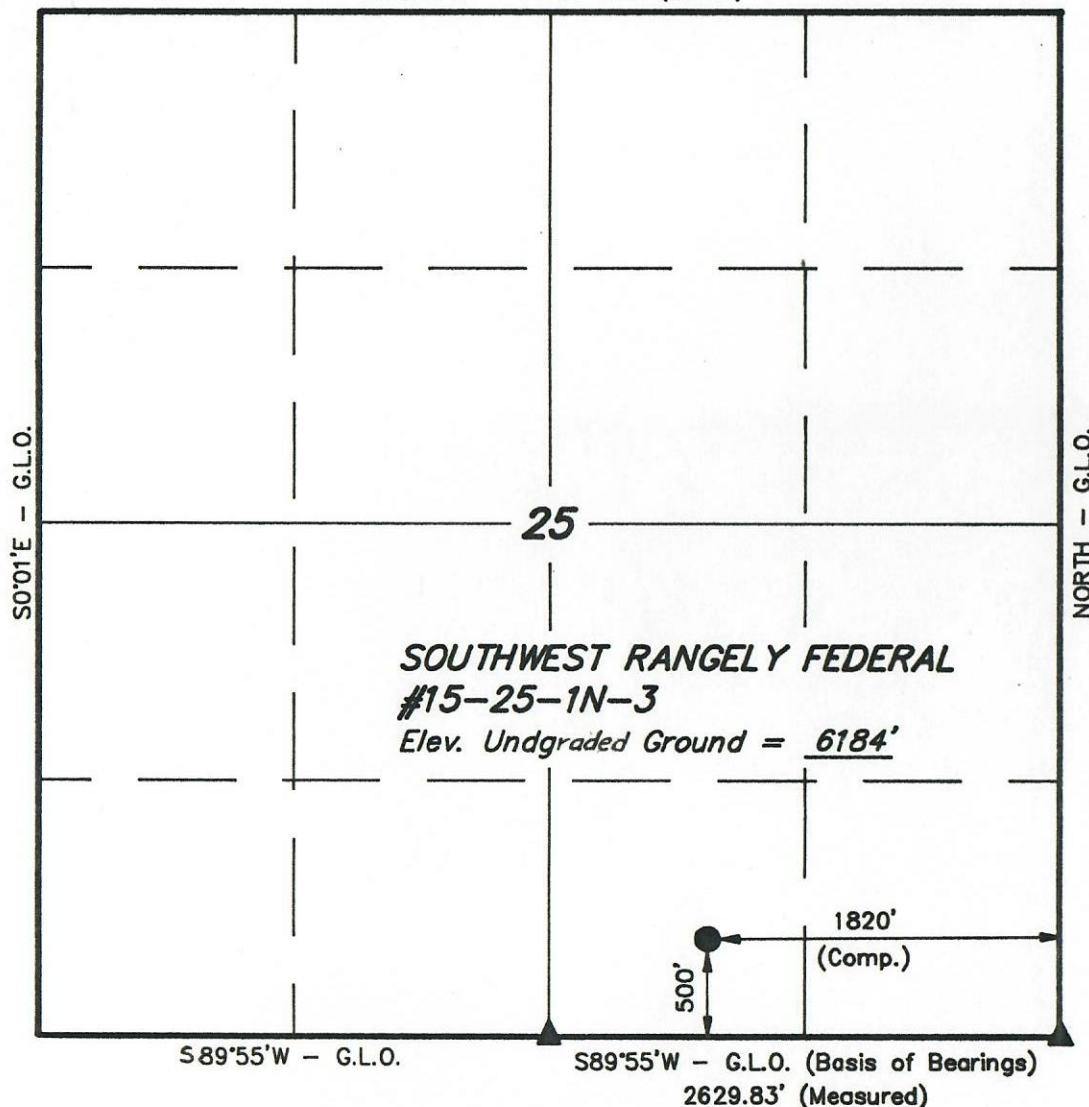
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T1N, R103W, 6th P.M.

S89°59'W - 79.90 chs. (G.L.O.)



▲ = SECTION CORNERS LOCATED. (STONE)

CHANDLER & ASSOCIATES, INC.

Well location, SOUTHWEST RANGELY FEDERAL #15-25-1N-3, located as shown in the SW 1/4 SE 1/4 of Section 25, T1N, R103W, 6th P.M. Rio Blanco County, Colorado.

BASIS OF ELEVATION

ELEVATION AT SHAVETAIL TRIANGULATION STATION LOCATED IN THE SE 1/4 NE 1/4 OF SECTION 36, T1N, R103W, 6th P.M. TAKEN FROM THE BANTY POINT QUADRANGLE, COLORADO, RIO BLANCO COUNTY, 7.5 MINUTE QUAD. (TOPOGRAPHIC MAP) PUBLISHED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY. SAID ELEVATION IS MARKED AS BEING 6285 FEET.



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CERTIFICATE

THIS IS TO CERTIFY THAT THE ABOVE PLAT WAS PREPARED FROM FIELD NOTES OF ACTUAL SURVEYS MADE BY ME OR UNDER MY SUPERVISION AND THAT THE SAME ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

Robert L. Kay
REGISTERED LAND SURVEYOR
REGISTRATION NO. 17492
STATE OF COLORADO

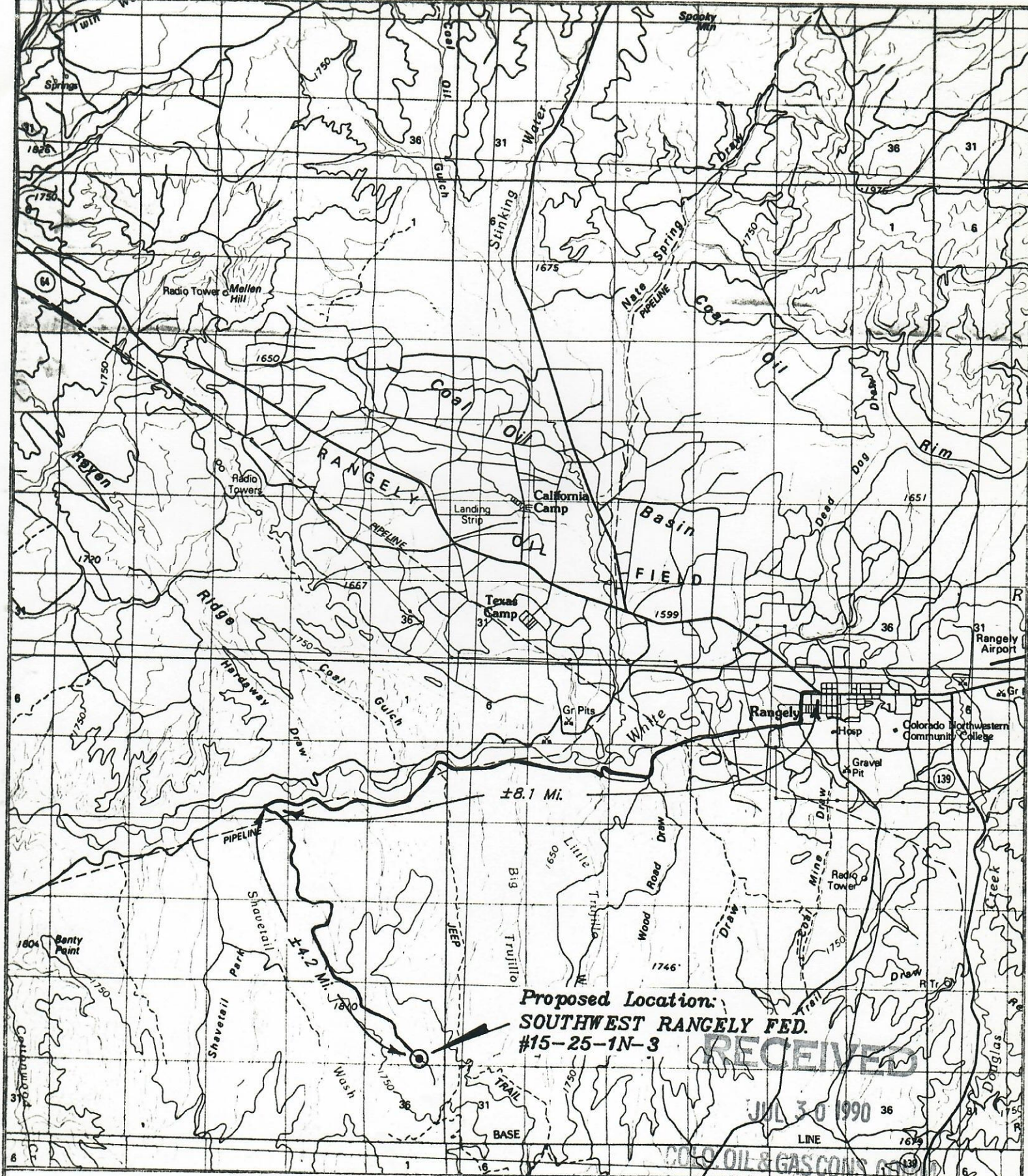
UTAH ENGINEERING & LAND SURVEYING
P. O. BOX 1758 - 85 SOUTH - 200 EAST
VERNAL, UTAH - 84078

SCALE 1" = 1000'	DATE 1-23-90
PARTY R.L.K. L.D.T. J.R.S.	REFERENCES G.L.O. PLAT
WEATHER COLD - STORMY	FILE CHANDLER & ASSOCIATES, INC.

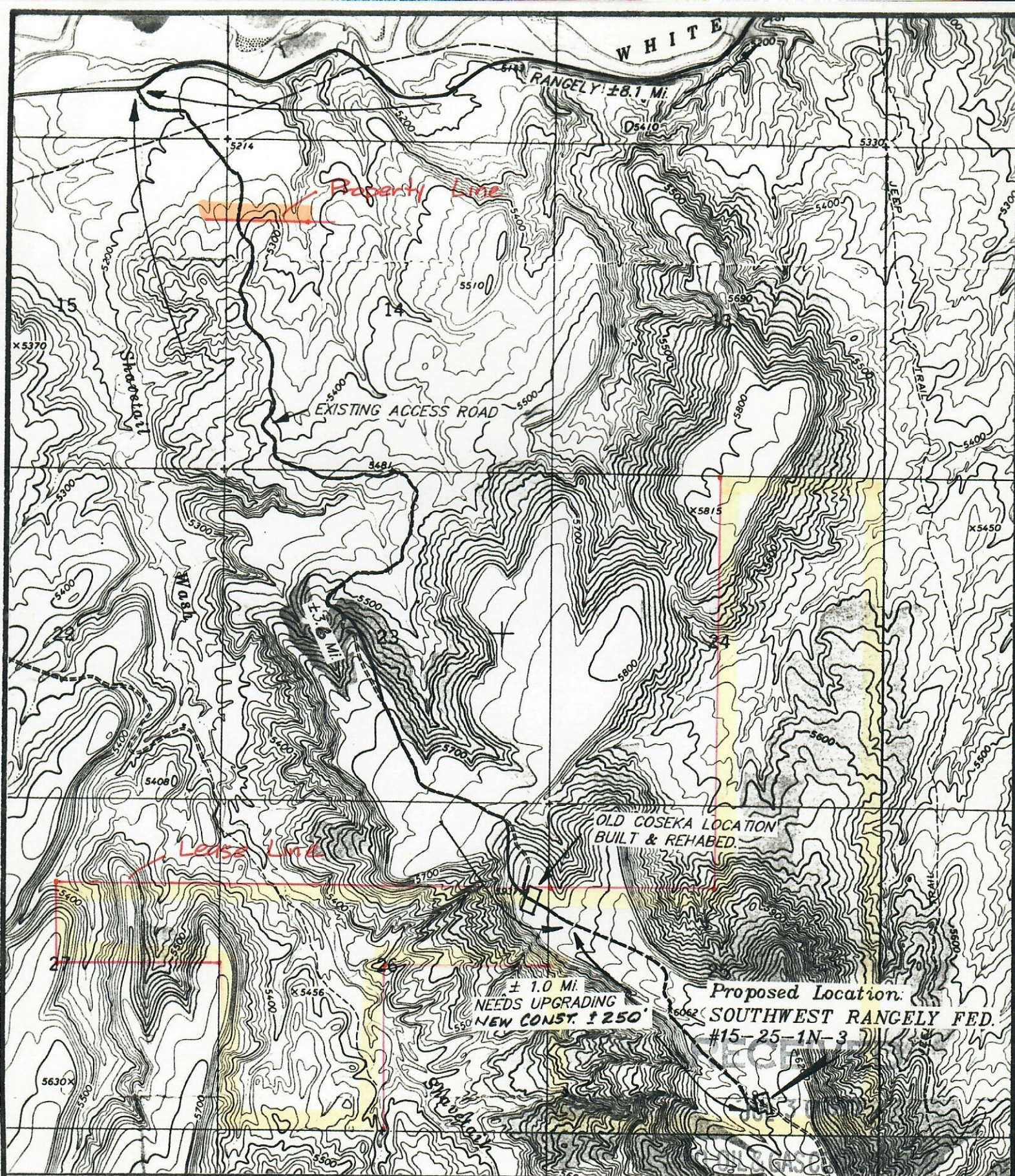
TOPOGRAPHIC
MAP "A"
DATE: 1-23-90



CHANDLER & ASSOCIATES, INC.
SOUTHWEST RANGELY FED. #15-25-1N-3
SECTION 25, T1N, R103W, 6th P.M.



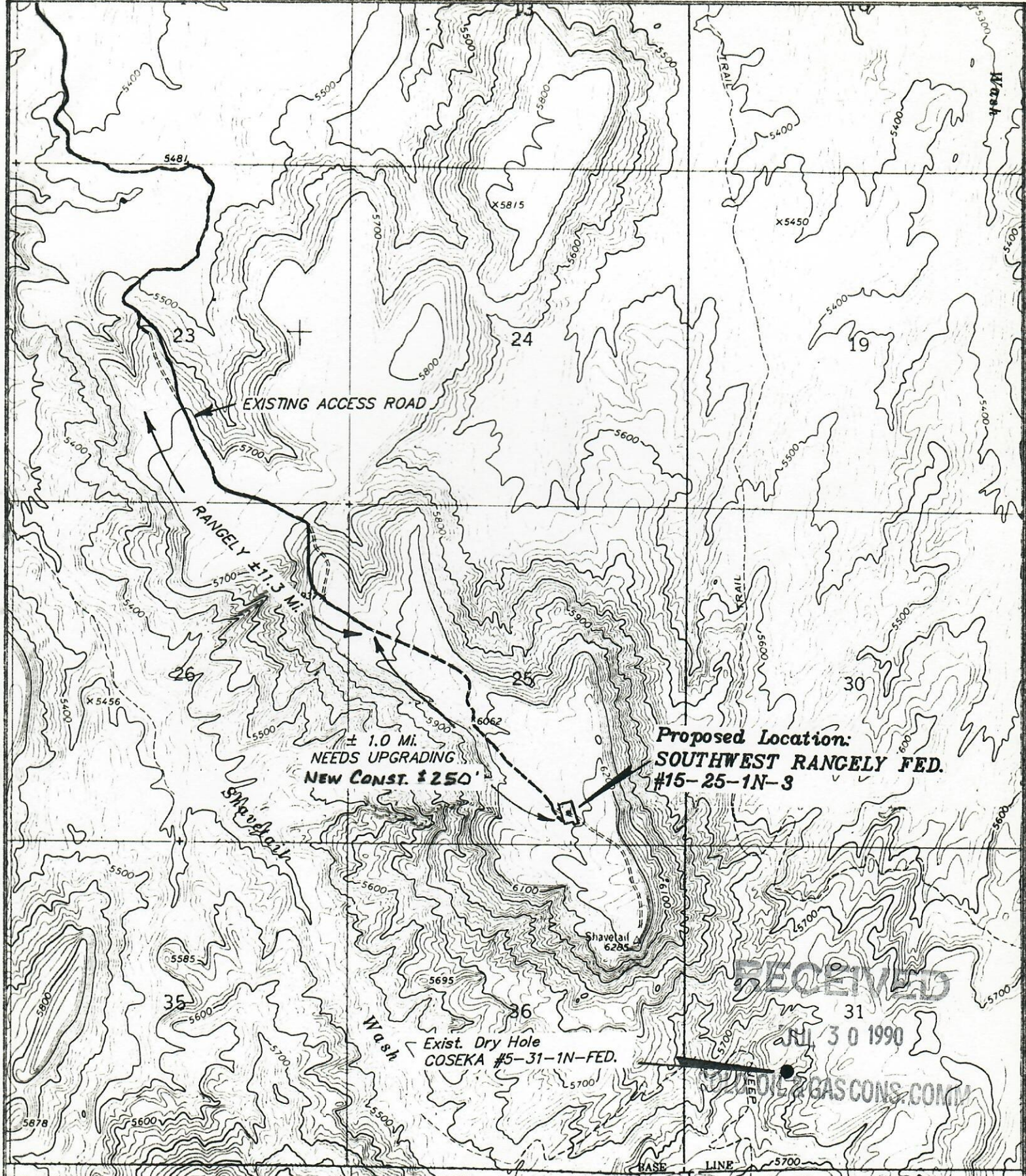
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TOPOGRAPHIC
MAP "B"
SCALE: 1" = 2000'
DATE: 2-9-90



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SOUTHWEST RANGELY FED. #15-25-1N-3
SECTION 25, T1N, R103W, 6th P.M.

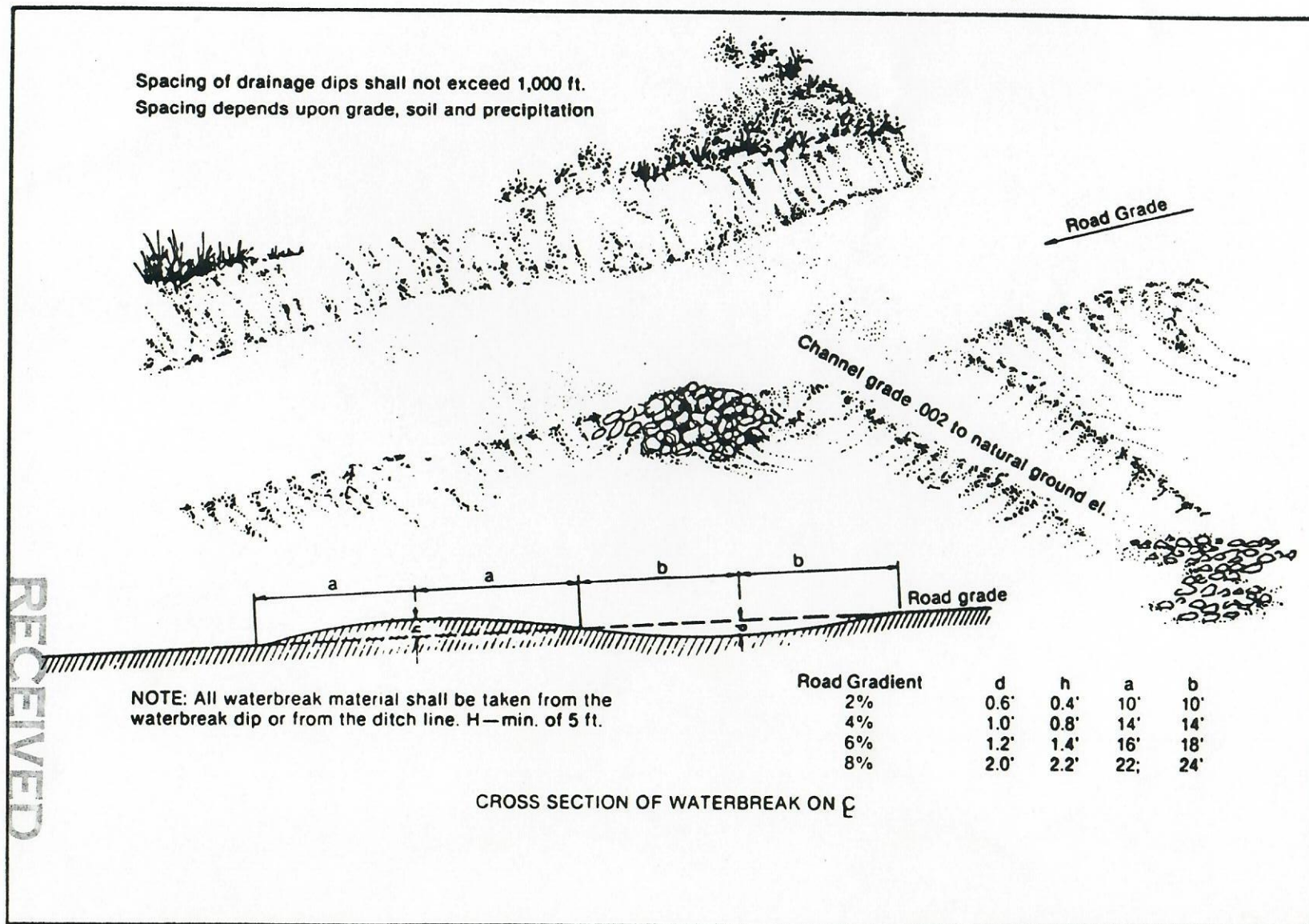


TOPOGRAPHIC
MAP "C"
SCALE: 1" = 2000'
DATE: 1-23-90



CHANDLER & ASSOCIATES, INC.
SOUTHWEST RANGELY FED. #15-25-1N-3
SECTION 25, T1N, R103W, 6th P.M.

FIGURE 5. DRAINAGE DIP ILLUSTRATION FOR SLIGHT TO MODERATE SLOPE
FOR ACCESS ROADS



d. **Culverts.** Culverts are used in two applications on oil and gas access roads; (1) in streams and gullies to allow normal drainage to flow under the traveled way, and (2) to drain inside road ditches. The latter may not be required if drainage dips are used.

The location of each culvert should be shown on the plan and profile or similar drawings submitted with the APD or ROW application. All culverts should be laid on natural ground or at the original elevation of any drainage crossed. Culverts should be placed on a 3 percent minimum grade; reverse camber is not allowed. See Figures 7 and 8 for installation details.

The outlet of all culverts should extend at least one foot beyond the toe of any slope. Culverts should be installed as shown in Photograph 3.

All culverts used in construction of oil and gas access roads should be concrete or corrugated metal pipe (CMP) made of steel or aluminum. Only undamaged culverts are to be used, and any culvert should be inspected for damage prior to installation. All spots on the pipes where the zinc coating has been injured should be painted with two coats of zinc-rich paint or otherwise repaired as approved by the surface managing agency.

Excavation, bedding and backfilling of culverts should be conducted according to requirements of the SMA and good engineering practices.

PHOTOGRAPH 3. ACCEPTABLE CULVERT INSTALLATION



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