PART II

ANALYSIS OF PROPOSED RAILROAD CONSTRUCTION

CHAPTER I

DESCRIPTION OF PROPOSED ACTION

Background and History

Burlington Northern Inc. and Chicago and North Western Transportation Company have filed a joint application pursuant to Section I(18) of the Interstate Commerce Act for authorization to construct and operate a new railroad route located between Gillette and Douglas, Wyoming. The joint application was filed on February 2, 1974, as finance docket No. 27579 before the Interstate Commerce Commission.

The impact statement will consider two phases of activity, construction and on-line operations.

The construction stage will consist of an intensive program associated with new development of the railroad line and pertinent facilities. This will include design, engineering, staking, obtaining rights-of-way, construction of railroad bed, bridges, drainage structures, fences, maintaining facilities, etc. Extensive earthmoving will be required for construction.

The operation stage will involve those activities required for the heavy transportation schedule of coal by unit train. Operations will include long-term maintenance, and additional construction necessary for expanding functions of the railroad.

Purpose of proposed project

The purpose of the proposed railroad is to transport low sulfur subbituminous coal from mines located in the Eastern Powder River Basin to existing main lines at Gillette and Douglas, Wyoming, of both the Burlington

Northern and Chicago and North Western Railroads. The proposed line will also carry connecting traffic from BN/CNW main lines through Gillette and Douglas.

Low sulfur coal is already being transported to electric power plants located in the east, midwest, and southwest on existing railroads. Exportations of coal from Wyoming can be expected to increase significantly if the proposed line is completed.

Location

The route proposed by the companies and major alternative routes are shown on Map No. 12, Appendix A. Refer also to Part I, Chapters II and III.

Specific description

Right-of-way widths are based on the area necessary for cut and fill sections. Right-of-way width will vary from 150 to 600 feet. Total amount of land required for the right-of-way is approximately 2,400 acres. The line will be located on federal, state and private land ownerships. Approximately 80.2 miles of the proposed route will be located on private lands, 9.25 miles on state, and 22.7 miles on federal lands and .6 mile of Converse County lands. Total length of the proposed rail line is approximately 113 miles and together with sidings and mine spur lines, a total of 150 miles of railroad lines would eventually be constructed. Alternative routes of various lengths are being considered that will have differential effects on surface and subsurface resources.

Construction schedules indicate completion of the rail line in a little over two years, with major construction to occur the first two

construction seasons (April through November). An average of 300 temporary construction workers are anticipated to be required to complete the railroad.

The proposed railroad will be a single tract structure with nine major sidings built parallel to the proposed line. Eight sidings are to be located adjacent to the new line and one will be constructed adjacent to the existing Amax Belle Ayr spur line. Sidings are to be spaced at 10- to 12-mile intervals along the route. Minor sidings would be added to the major sidings to handle disabled railcars.

It may be necessary owing to projected frequency of use to construct a second parallel track to carry the expected number of unit trains sometime in the future.

Railroad Construction

Initial preparation

Upon securing the necessary right-of-way, the initial activity will be construction of a right-of-way fence. (See section on right-of-way fence construction for details.) Initial right-of-way preparation will then commence for the construction "reaches." Each construction reach will be composed of a segment of right-of-way approximately five miles in length. The initial effort will consist of access and work road construction, installation of work roads to the top of the cut areas, clearing structures, disposal of debris, mulching sagebrush, and stripping and stockpiling topsoil from the road prism. During this interval, the contractor will also assemble equipment, order materials, and locate borrow pits, construct storage and marshalling yards, and arrange for water supplies along the construction corridor. Water wells are anticipated to be drilled and water tanks installed in those areas where existing wells are unavailable for construction use. Some use of impounded surface water may also supplement water well supplies, all in accordance with State of Wyoming rules and regulations.

Vegetation and structures cleared from the right-of-way will be burned on the right-of-way if permits can be secured from appropriate authorities. If air quality measures prohibit burning, the debris is to be hauled to suitable waste areas within the railroad corridor. Clearing is generally scheduled at least one mile ahead of the next stage of construction.

During the initial construction preparation, the contractor may open exploratory cuts within the right-of-way or leased borrow pits to inventory available materials for road building, culvert bedding and riprap.

Each construction "reach" will contain a "work group" unit which will be composed of earth-moving equipment and support personnel required to conduct the clearing and grading operations. Anticipated equipment will be one or two dozers for clearing and the possible use of scrapers or trucks to transport cleared debris to waste disposal sites. Several reaches and work groups will be active simultaneously along the railroad route. The number of reaches undergoing work will depend on that necessary to meet contract time schedules.

Drainage structures

Upon completion of the initial clearing, work will commence on the placement of drainage culverts and construction of bridges.

Site preparation and installation of culverts will require the following equipment: boom trucks or crane, vibratory rollers, hand tampers, dozers, front-end loader, dump trucks, and transport trucks.

Culverts will generally be asbestos-bonded, asphalt-coated corrugated metal pipe ranging from 24 to 48 inches in diameter. Forty-eight inch to 108-inch multiplate pipe will be used and above 108-inch diameter bridging will be used. Reinforced concrete pipe may be used where soil conditions govern final design. Three areas along the right-of-way will require extensive use of culverts and bridges. These are the (1) Caballo Creek-Belle Fourche River. (2) Antelope Creek and (3) Shawnee Creek areas. (See topographic description.) Approximately 220 culvert sites have been identified along the proposed route (Figure 1). Several "livestock passes" are also anticipated to serve as drainage ways.

Construction of bridge abutments and piers will commence at the same time as culvert installation. Bridges will consist of ballast decks placed on

Figure 1
Drainage Culvert Located on the Amax-Belle Ayr Spur Line; Campbell County.

Note rip-rap placed at the outlet.

steel girder spans supported by steel or concrete piers. Supporting piles will be driven by pile driving equipment. Pile drivers will be supported by crawler tractor or truck mounted cranes. This equipment will also be used to hoist and place bridge spans. Bridge piers are to be located outside of the principal stream channels to minimize obstruction of flood flows. Bridge openings between embankments are designed large enough to allow flood water to pass without excessive flow restriction.

Bridge materials will be hauled by truck from the nearest railroads or loading areas to each bridge location. Equipment requirements for bridge construction would consist of the following: cranes, truck or tractor mounted; pile drivers; dozers; graders; tampers; dump trucks; and transport trucks.

Preliminary railroad designs indicate that bridges will be constructed over Caballo Creek, Belle Fourche River, Coal Creek, Little Thunder Creek, Porcupine Creek, Antelope Creek, Dry Fork of the Cheyenne River, Mike's Draw, Box Creek, Lightning Creek, Shawnee Creek and possibly Walker Creek and several other drainages that may have calculated flood flows greater than culvert capacity.

Alteration of existing drainage ways may be necessary at stream crossings with broad flood plains where construction of the railway embankments necessitates that runoff be consolidated and concentrated at the bridge and culvert openings. Some changes in location of natural drainage channels to accommodate grade and curvature of the rail line will also be necessary. Suitable ditching will also be incorporated at each culvert site to route water flow away from the roadbed and into natural drainage channels. Riprap material will be placed at culvert inlets and outlets to serve as cutoff walls and aprons to control erosion around the pipe. Riprap will also be used to

protect side slopes of altered drainage channels. Wherever possible local materials will be used for riprap. Some heavy riprap will be available from sandstone ledges and harder materials in the "scoria" areas. The smaller riprap materials will be utilized with wire mesh. It is anticipated that most heavy riprap materials may have to hauled in by rail from outside the study area.

Pipelines carrying flammable oil and gas will be crossed by the railroad route mainly in the Hilight oil field area. The standard procedure to protect against breakage is to encase all pipelines (encased in a double pipe).

Grading

Excavation and embankment construction will follow right-of-way clearing and installation of drainage structures. Excavation and embankment construction will involve movement of earth materials from excavation to embankment areas to the extent necessary to shape the railroad bed and obtain final grade elevation. This will be the major work item involved in construction of the rail line. Existing topography will be altered by railroad construction in order to meet alignment and proposed railroad company design criteria of 1 percent maximum grades and 3° maximum curves.

The final railroad bed, including spur lines to mines, will conform to Burlington Northern's "main line standards," which provides for a 28-foot subgrade width at the top of the embankments and a 44-foot subgrade width within excavation areas for single track construction. Double track standards would require an additional 14 feet of subgrade width. Maximum depth of cut on the proposed line will be 102 feet and maximum height of embankments will be 85 feet. Additional proposed construction line characteristics are contained

in Table 1. See Figure 2 for main line road bed characteristics. A total of 15 million cubic yards of excavation (grading) will be required to complete the railroad bed for the proposed route and sidings.

Excavation side slopes will be constructed to a maximum grade of 1.5 feet horizontal to 1.0 feet vertical rise which is approximately a 34° angle from horizontal. Embankment side slopes will be constructed at a maximum steepness of no greater than 1.75 horizontal to 1.0 vertical or approximately 30° from horizontal. Soils or other conditions may dictate that a more gentle slope be left. Burlington Northern's standard plan for main line roadbed sections is contained in Figure 2. Each construction segment will contain a typical work unit consisting of the following equipment: crawler tractor with ripper, crawler tractor with blade, 2 motor-patrols, 5 or 6 self-powered scrapers, push-cat, air compressor, powder magazine, wagon drill or crawler mounted drill, jackhammers, water truck, and rollers.

Several construction segments will be in operation simultaneously. The number of segments in operation at one time will depend on the construction pace necessary to keep contract time schedules.

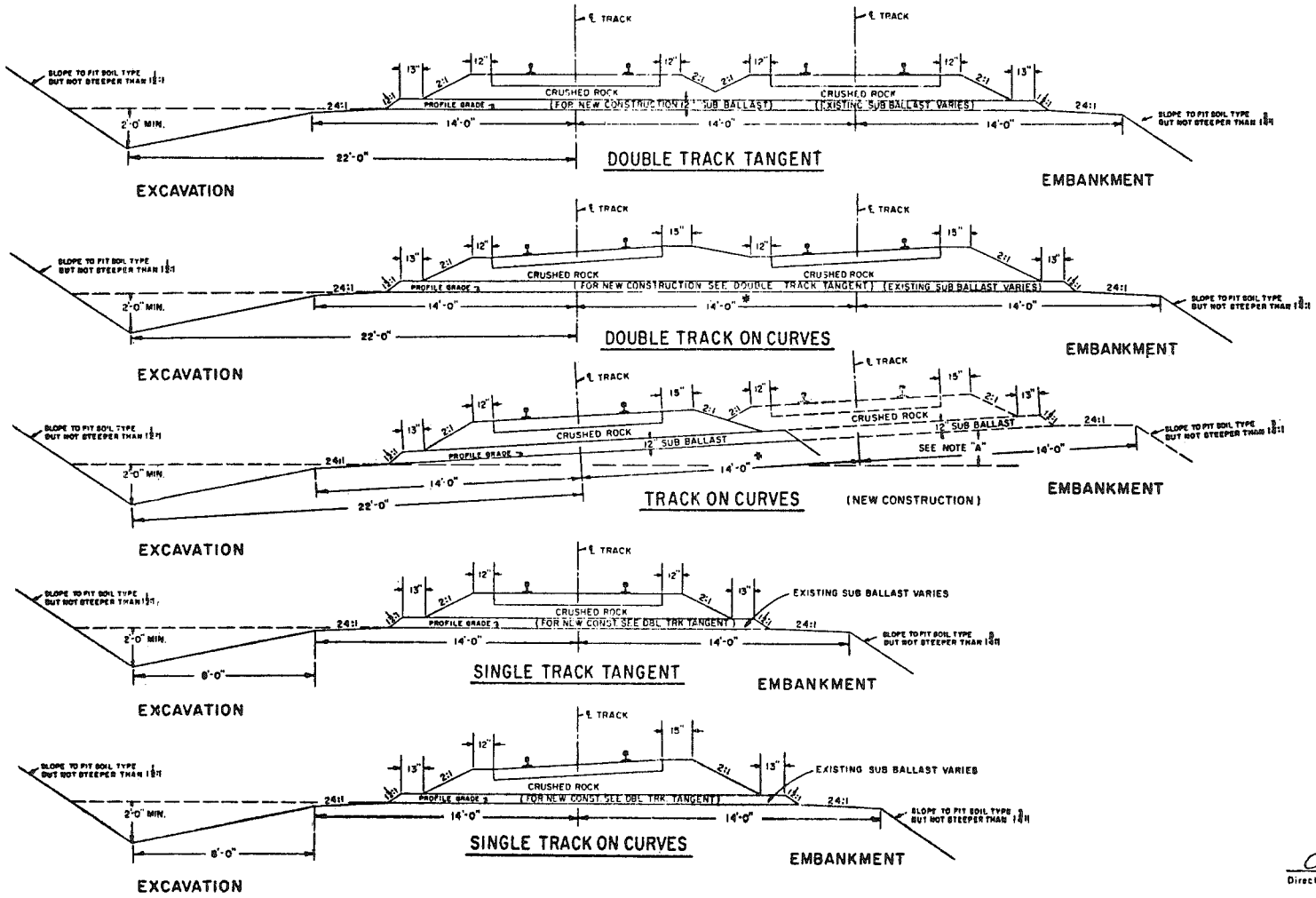
The total cuts and fills are contained in Table 1, under grading. Excavation will commence with construction of access roads to the top of cuts. The initial cuts will be made with scraper and dozers. After initial grading and cutting with dozers, it may be necessary to use rippers to break up the more resistant materials. Scrapers used to excavate cut material are often assisted by a "push-cat" (crawler tractor unit). The scrapers will transport excavated material to a nearby fill area for placement. The contractor may, at his option, pre-irrigate cut material prior to excavation to assist in excavation and to obtain optimum soil moisture content for compaction of fills. This also assists in dust control.

Table 1

Major Characteristics of the Proposed
Gillette to Douglas Railroad Route

LINE CHARACTERISTICS		
Length of Line	Miles	112.77
Grading	Cu. Yds.	15,000,000
Maximum Grade (Compensated)		1%
Total Dist. on Max. Grade, N'Bound	Miles	17.04
Total Dist. on Max. Grade, S'Bound	Miles	25.90
Rise	Feet	+196.4
Rise and Fall	Feet	1,759
Highest Subgrade Elevation		5,268
Lowest Subgrade Elevation		4,456
Maximum Height of Fill	Feet	85
Total Dist. on Fills Greater than 40'	Feet	9,400
Total Dist. on Fills Greater than 60'	Feet	1,850
Maximum Depth of Cut	Feet	102
Total Dist. in Cuts Greater than 40'	Feet	9,050
Total Dist. in Cuts Greater than 60'	Feet	1,800
Number of Curves		66
Maximum Degree of Curvature		3°
Total Angle of Curves		$1,951^{o}$ - 31'
Number of Bridges (Anticipated)		17
Total Length of Bridges	Feet	4,670

Source: Burlington Northern Inc.



NOTE:

M/L TRACK CENTERS IN STATE OF OREGON SHALL BE 15'-0"

CTC AND COAL TRAIN SIDINGS SHALL BE CONSTRUCTED TO MAINLINE ROADBED SECTION STANDARDS.

FOR NEW CONSTRUCTION PROVIDE 12" SUB BALLAST.

FOR MAINTENANCE PROVIDE NEW BALLAST LIFT AS DIRECTED.

* INCREASE TO 15'-0" ON CURVES OVER 6 DEGREES.

NOTE "A": GRADING TO CONFORM TO SUPER ELEVATION OF CURVE.

CONSTRUCT PASSING TRACKS TO SAME SECTION AS DOUBLE TRACK EXCEPT TOP OF RAIL TO BE 6" LOWER AND BALLAST MATERIAL TO BE OF LESSER QUALITY.

CUBIC YARDS PER MILE OF TRACK		
LIFT	SINGLE TRACK	DOUBLE TRACK 14' CENTERS
4"	1800	3550
6"	2250	4500
8"	2750	5450
10"	3250	6400
12"	3800	7400

BURLINGTON NORTHERN INC
STANDARD PLAN

MAINLINE
ROADBED SECTIONS

ENGINEERING DIVISION, ST. PAUL, MINN. NOV. 1973

Recommended
Director Track Engineering

Approved
Vice President, Operations

Asst. Vice President Engineering

Dwg. Nº C-1000.2

Figure 2

In excavation where rock or shale (scoria) is encountered, it may be necessary to use a ripper drawn by a crawler tractor to loosen the materials. Occasionally, it may be necessary to drill and blast layers of sandstone or shale. Jackhammers can often be used to break up resistant rock layers to minimize the use of explosives.

All suitable excavated materials will be used as fill to form the embankments for the roadbed. Fill operations are accomplished by placing excavated materials from cuts or nearby borrow pits in thin layers or lifts of approximately 8 inches to 10 inches thick. A dozer or motor patrol will be used to distribute the fill material dumped by the scrapers. The fill material will be compacted as it is placed. Prior to compaction a water truck will wet the fill materials to facilitate maximum compaction. Sheeps-foot rollers, vibrator rollers or rubber tired rollers will be used as compactors. A 90-percent to 95-percent compaction density is desired on the roadbed fill. Quality control of the compaction will be monitored by collecting fill samples and performing standard compaction tests. Surveyors or "stake jumpers" set slope stakes for filling operation to control the grade line. During the operation proper side slopes can be obtained by controlling fill placements and slopes. Slopes are later finished with draglines or "Gradall" units. See Figures 3 and 4 for typical cut and fills used on rail line construction.

It is anticipated that water for fill compaction and dust control will be obtained from either existing wells or new wells to be drilled. Some use of stored reservoir water is also anticipated.

During construction it may be found that insufficient material is available from excavation areas or that long haul distances from excavations to fill areas may not be economical. In such cases, fill materials may be

Figure 3

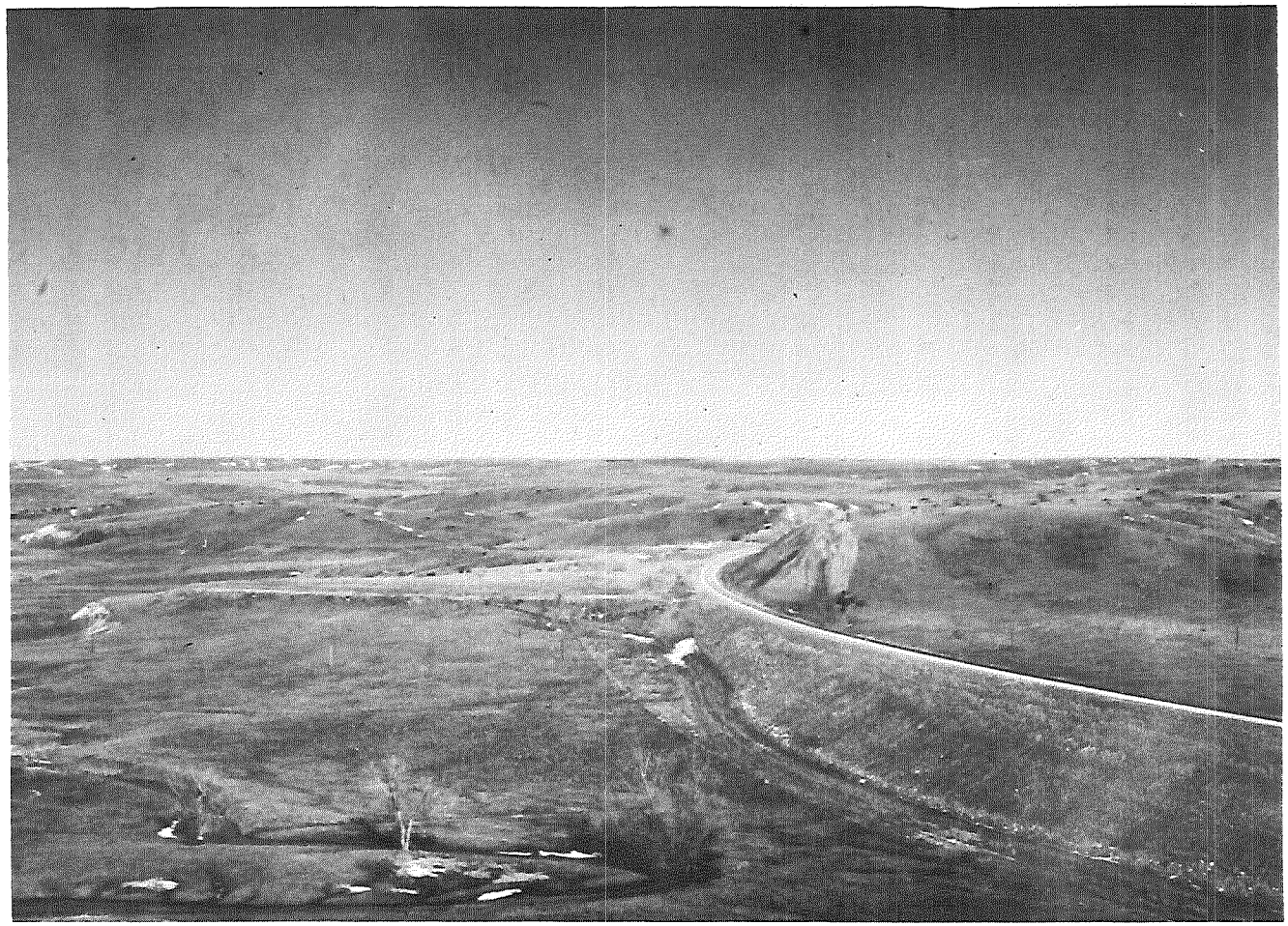
Example of Excavation Cuts Located on Amax-Belle Ayr

Spur Line, Campbell County

Figure 4

Example of Railroad Embankment with Cut and Borrow Areas to the Center and Left of Photograph

Rail line is Amax Belle Ayr spur line, Campbell County.



obtained from borrow areas adjacent to the rail line. Operations in borrow pit areas must comply with regulations of the Wyoming Mined Land Act and federal regulations as well as contract requirements. Standard railroad contract specifications require that borrow pits must be left in a neat condition, shaped to conform to the natural surroundings and provided with drainage facilities.

Motor graders or dozers will be used to shape and smooth side slopes of excavation areas and to finish roadbed surface when the designed profile grade has been attained.

Depending upon location of existing drainages, interceptor ditches may be constructed at the top of cut slopes to reduce erosion of these slopes. The runoff flow is diverted away from the roadbed and to natural drainage channels.

Both grade crossings and larger livestock underpasses are available to permit access to either side of the track by landowners. In areas where land severance results in a hindrance to livestock grazing operation, suitable passes are planned to permit livestock to move from one side of the track to the other (Figures 5 and 6). The underpasses are designed to be of sufficient height for cattle and horses.

Sub-ballast

Upon completion of grading and shaping of the railroad bed, final preparations for laying the track are performed by surfacing of the roadway with sub-ballast material. The sub-ballast will consist of either pit-run gravel or "scoria."

Since suitable gravel is virtually non-existent along most of the proposed route, scoria will be used along the northern 75 miles of the route,

Figure 5

5' X 7' Concrete Livestock Underpass Structure, Amax Belle Ayr Spur Line, Campbell County

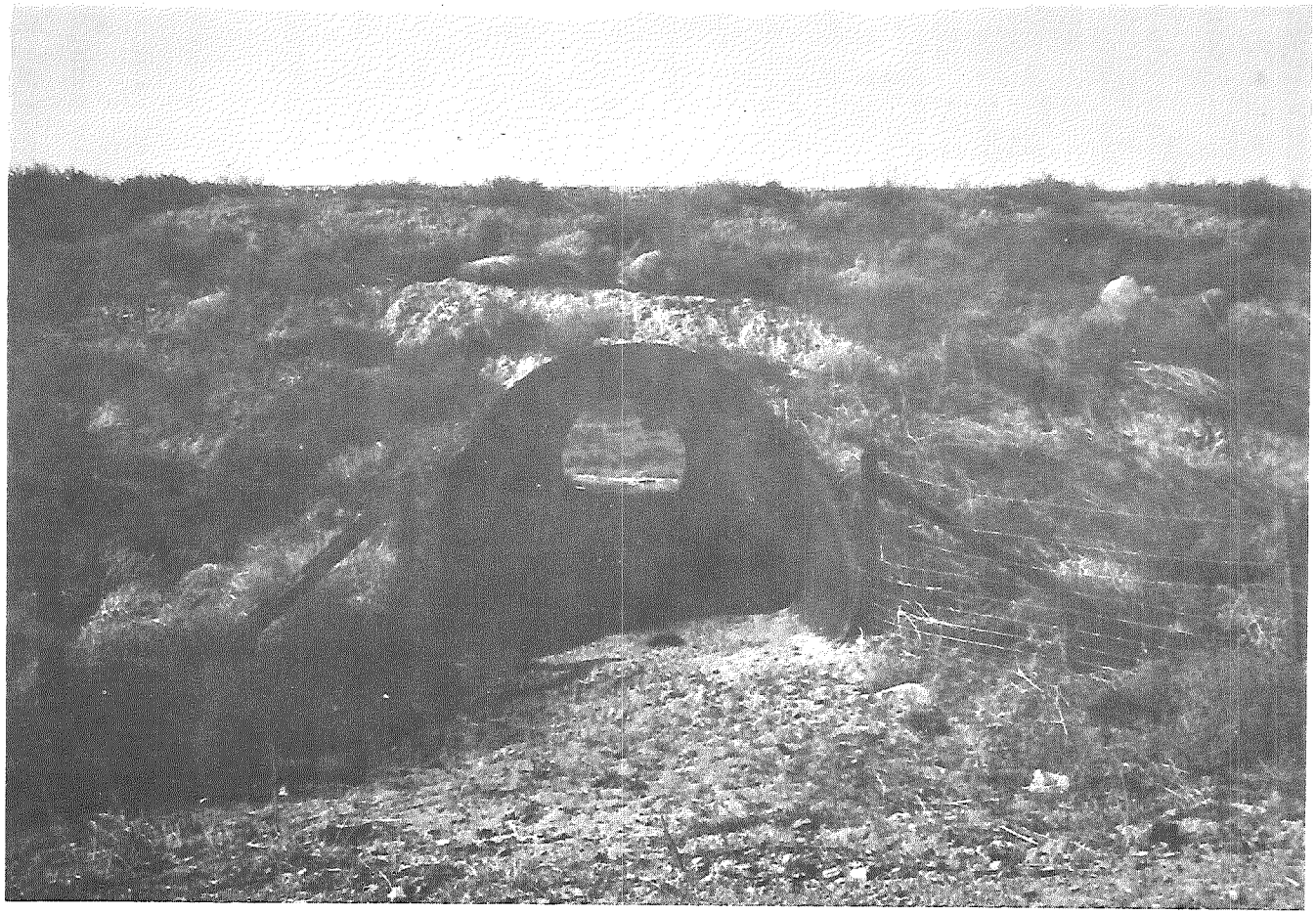


Figure 6

Culvert Type Livestock Underpass Structure 6'10" Span 9'11" Rise Located on Amax Belle Ayr Spur Line, Campbell County

the remaining sub-ballast will be obtained from the Chicago and North Western Transportation Company's gravel pit at Irvine siding located east of Douglas. The sub-ballast material will be excavated from scoria located along the route by front-end loaders and placed in dump trucks for transportation to a rock crusher or screening plant. Burlington Northern and Chicago and North Western standards for sub-ballast allow for a maxiumum size of three-inch diameter rock. Therefore, crushing or screening of the ballast material may be required. The graded ballast is then loaded into 20- to 30-yard center dump trucks for hauling to the completed railroad bed. The dumped ballast is bladed into six-inch lifts and compacted by suitable compacting equipment. Two lifts will be necessary to obtain a sub-ballast base of 12 inches in depth. (Figure 2.)

Although the primary use of scoria for railroad construction will be as sub-ballast, other ancillary railroad facilities will require gravel for surfacing materials on access roads, grade crossings, underpasses, camp-sites and staging areas, etc. The total projected demand for scoria and gravel for all uses associated with railroad construction is 740,000 cubic yards.

The equipment requirements for sub-ballast operation will consist of the following: front-end loaders, crawler tractor, 20-30 cubic yard belly dump trucks, gravel crusher and sorter, motor graders, and rubber tired compactors.

Track laying

The Burlington Northern track will consist of 132 pounds per yard continuous rail which has been welded into lengths of one-quarter mile each. Treated wood ties will be used throughout the new line. At marshalling yards located near or on the proposed line, two tie plates will be fastened

to each treated tie with holddown spikes at exact gauge of four feet, eight and one-half inches. The ties are distributed on the roadbed by hand or loaded into a tie distribution machine which is the preferred method. As the machine moves along the roadbed individual ties are deposited at correct spacing and proper alignment on the roadbed. The distribution machine is capable of laying approximately three miles of ties per day. (See Figure 7.)

After the ties have been positioned and aligned, the line is ready for the rails (Figure 8). The rails are furnished in one-quarter mile continuous welded lengths and transported to the site on a rail train of 26 flat cars. The rails are removed directly from the train to the ties, by means of a "straddle buggy" which pulls two rails simultaneously from the rail train (Figure 9). As rails are unloaded from the train, they come to rest on lightweight rollers and are pulled from the train to their full length. Two more quarter-mile rails are welded to the previous length so that four strings or one-half mile of rail are pulled onto the ties at the same time.

After the rail has come to rest on the tie plates following removal of the rollers, it is spiked at every fifth tie with rail spikes. This supports the rail so that the rail train can move ahead to distribute another half-mile of continuous welded rails.

In adverse weather, the contractor may use a tank-car equipped with a propane-type rail heater. The tank can either heat or cool the rail to comply with stringent temperature requirements ($55^{o}F$ to $75^{o}F$). Immediately following the tank car will be a tie-spacing car which will be used for the final positioning of ties and to correct for movement caused during the rail laying operations.

Figure 7

Tie Distribution Machine Placing Railroad Ties on Roadbed

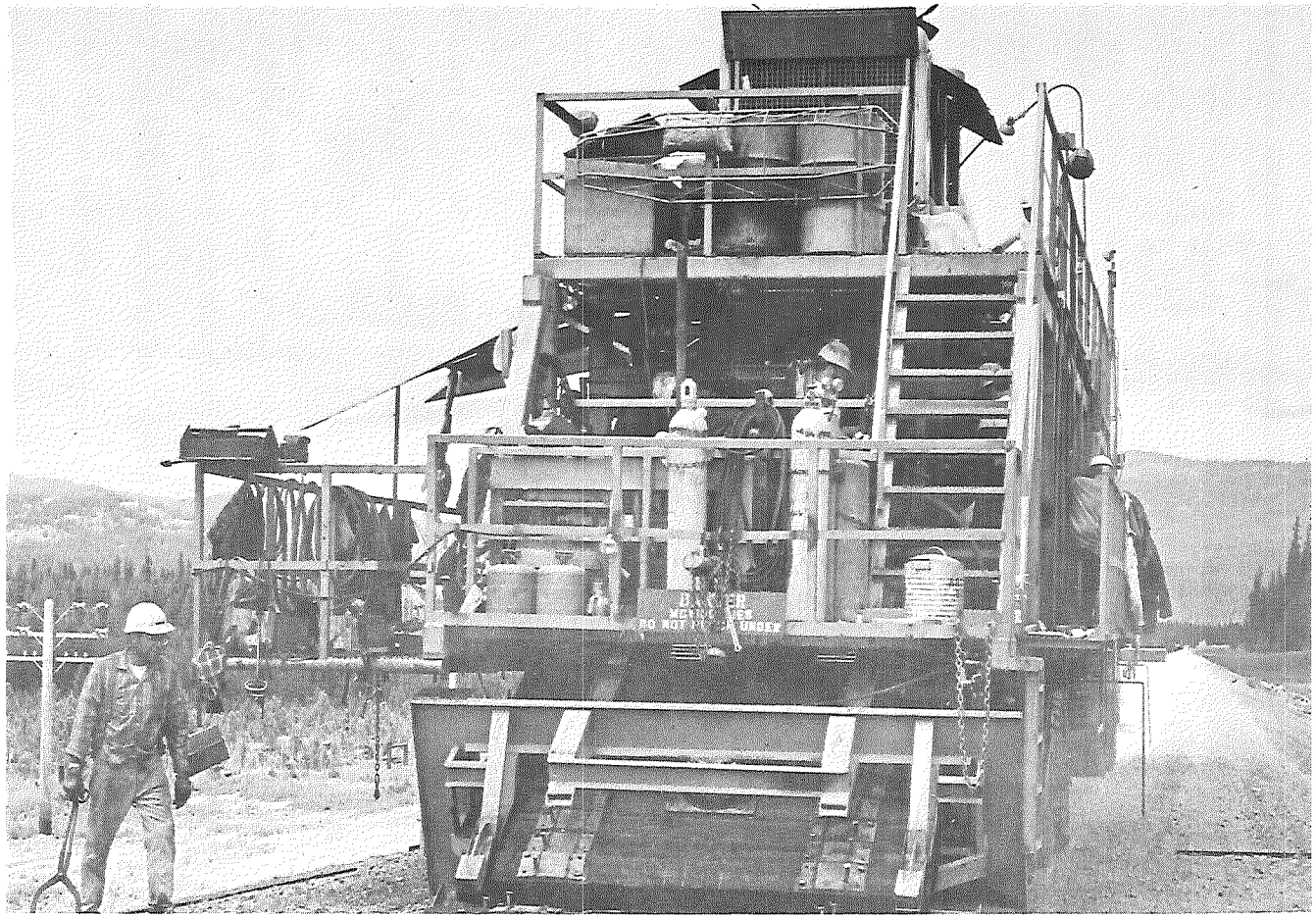


Figure 8

Work Crew Aligning Ties Prior to Placement of Rails

Figure 9

Rails Being Pulled From Rail Train by "Straddle Buggy"

Equipment requirements for track laying would include: Tie hauling trucks, tie distribution machine, 26-car rail train and locomotive, automatic rail spikers, straddle buggies, miscellaneous work crews, mechanic trucks, fuel trucks, light plants, welding equipment, pickup trucks, and transportation busses.

Primary ballast

The next major operation in railroad construction is the installation of the final or primary ballast. The primary ballast is composed of crushed rock which will be obtained from the Burlington Northern limestone quarry near Guernsey. The limestone will require crushing and screening.

The last major operation in the railroad construction is placing and tamping the primary ballast. A ballast train containing from 15 to 25 ballast cars will be pulled to the construction area. For the BN/CNW line, ballast will be obtained from the BN/Guernsey quarry located 40 miles southeast of Douglas and carried in ballast cars to the project site. Ballast is dumped from these cars in four- to six-inch lifts. A ballast sled will raise the ties and rails approximately 12 inches off the sub-ballast, while simultaneously smoothing and tamping the initial primary ballast lift. Sufficient ballast, to give the track a final lift of two inches, will be applied by a second pass of the ballast train. An automatic tamping and lining machine will then be used to reraise the track, tamp the ballast, set it down and align the track (Figure 10). This lift of ballast will fill the cribs between the ties and will give enough excess ballast to cover the shoulders of the roadbed. The total depth of sub-ballast will be approximately 12 inches and will require an estimated total of 570,000 cubic yards for the mainline, sidings and spurs.

Figure 10

Automatic Tamping and Track Lining Machine Lifting Track and Tamping Ballast

In addition to the train crew, the primary ballast operation requires six to eight men to operate the sleds, tampers and alignment equipment. Crews of approximately ten men are responsible for bolting the half-mile sections of track together and for placing rail spikes into final position.

Facilities

Access crossings

Railroad crossings of state and federal highways will be by grade separation structures (overpasses). Currently five grade separations are planned, with three separations being railroad overcrossings and two automobile overcrossings. Most of the private and county road crossings will be Burlington Northern standard grade crossings, designed to comply with the State and United States Class I railroad safety standards. The type of crossing depends upon topography, density of railroad and highway traffic, operating speeds of both railroad and highway. Grade crossings with standard warning signs, flashing lights, gates or grade separations may be necessary.

Railroad overpasses will be constructed simultaneously with bridges, prior to roadbed construction and track laying. Highway overpasses are normally treated timber trestle structures and railroad overpasses will be steel girder supported by steel piles on concrete piers. Timber trestle structures will be constructed after the roadbed has been built.

Approximately 19 grade crossings are presently identified for existing state highway and county maintained roads. These road crossings are listed in Table 2. Simple grade crossings will be constructed by excavation and backfilling necessary to install crossing approaches. Generally, crossing approaches are limited to four percent grade or less. The crossings are constructed of treated timber planks or prefabricated timber sections (Figure 11).

Table 2

County and State Highway Crossings Along the BN and C&NW Route

Road Description	Type of Crossing	Comments
Bishop Road	Grade crossing	
T-7 Road	Possible grade separation	
Hoadley Road	Railroad undercrossing or	3 mile road relocation
Lawver Road	Railroad undercrossing	1 mile road relocation
Hilight Road	Grade crossing	
Mills Road	Grade crossing	
Keeline Road	Grade crossing	
Sec. 14-23, T44N, R72W	Grade crossing	
Small road @ Station 2213+00	Grade crossing	
Gopher Booster Road	Grade crossing	
Antelope Road (Tekla)	Grade crossing	May require signals and road relocation
Edwards Road	Grade crossing	
Matheson Road	Grade crossing	Minor road relocation
Antelope Road	Grade crossing	
Forest Service Road (N. of Antelope Creek)	Grade crossing	
County Road 3-38, Sec. 35, T40N, R71W	railroad undercrossing	Possible road relocation to south
Highway 59 (4 miles N. of Bill)	Railroad undercrossing	
Tillard Road	Grade crossing	
Highway 59 (17 miles So. of Bill)	Railroad undercrossing	
Walker Creek Road	Grade crossing	
County Road, Sec. 2, T33N, R70W	Grade crossing	
County Road, Sec. 17-20, T33N, R69W	Grade crossing	
County road, Sec. 15, T32N, R69W	Grade crossing	
Highway 20	Railroad overcrossing	

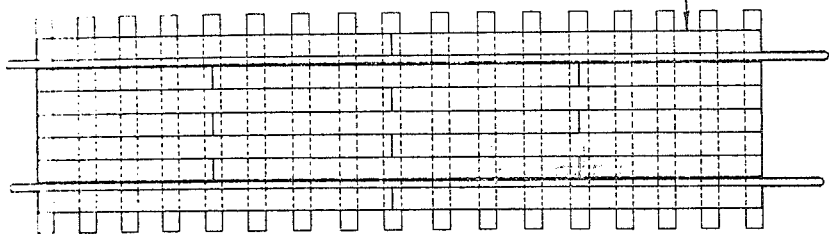
Source: Adapted from Burlington Northern and Chicago and North Western Environmental Impact Analysis, 1974.

Figure 11

NOTE:
PLANKS TO BE NOMINAL 4"x10"x16'-0" Nº1 STRUCTURAL FIR, GUMWOOD RED OAK OR WHITE OAK PER W.C.L.A. RULE 16 PARA. 123 B OR N.H.L. RULE 1963 PAGE 82 AND SHALL BE TREATED 50/50 CREOSOTE OIL TO 8 LB. RETENTION. B.N. INC. CODE Nº 04-240-55508.

32' LAYOUT

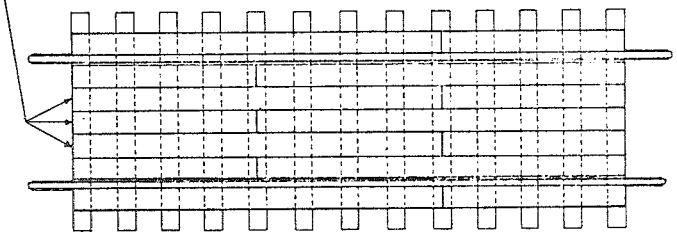
STAGGER PLANKS AS SHOWN



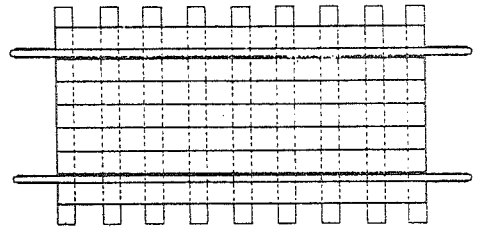
NOTE:
AT UNIMPORTANT PRIVATE CROSSING WHERE CONDITIONS WARRANT, THE 3 CENTER PLANKS MAY BE OMITTED, AND THE SPACE FILLED TO TRACK LEVEL WITH BALLAST MATERIAL.

24' LAYOUT

STAGGER PLANKS AS SHOWN

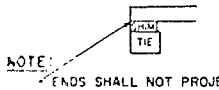


16' LAYOUT



NOTE:
ALL FIELD CUTS IN TIMBER SHALL BE TREATED WITH CREOSOTE

SPIKE PLANKS ON EVERY OTHER TIE USING ONE OF THE FOLLOWING LEWIS SEALTITE DOMEHEAD DRIVE SPIKES OR EQUAL.
10" x 3/4" DRIVE SPIKE TO BE USED WITH 85 LB. RAIL AND LIGHTER.
12" x 3/4" DRIVE SPIKE TO BE USED WITH 90 LB. THRU 119 LB. & 130 LB. Penn. Section.
13" x 3/4" DRIVE SPIKE TO BE USED WITH 129 LB. AND HEAVIER.



NOTE:
ENDS SHALL NOT PROJECT BEYOND SHIMS OR EDGE OF TIE.

SECTION

NOTE:
SHIMS TO BE FIR, PINE OR HEMLOCK WCLB RULE 16 PARAGRAPH 118B, OR EQUAL GRADE, TREATED 50-50 CREOSOTE 8 LB. RETENTION.

1"x8"x7'-0" B.N. INC. CODE Nº 04-226-06002
2"x8"x7'-0" B.N. INC. CODE Nº 04-240-39902

WIDTH OF PUBLIC CROSSINGS

PUBLIC CROSSING SHALL BE OF SUCH WIDTH AS PRESCRIBED BY LAW. BUT IN NO CASE SHALL THE WIDTH BE LESS THAN THAT OF THE GRADED ROADWAY APPROACH.

BURLINGTON NORTHERN INC.
STANDARD PLAN

PLANK CROSSING FOR PRIVATE ROADS AND UNIMPORTANT PUBLIC ROADS

ENGINEERING DIVISION, ST. PAUL, MINN APR. 1972

Recommended
Asst. Vice President Engineering

Approved
Vice President, Operations

Occasionally, road relocation may be advantageous to avoid unnecessary crossings or to satisfy visibility standards for vehicles starting across a crossing from dead stops and for vehicles approaching at maximum speed limits. Figure 12 shows a typical grade crossing located on the Amax Belle Ayr Mine spur line in Campbell County. Figure 11 shows details of typical plank grade crossing.

Right-of-way fences

Fences will be constructed along most of the railroad right-of-way to prevent livestock and big game animals from straying onto the railroad. Burlington Northern's standard plan for right-of-way fences and gates is shown in Figure 13. Generally, sheeptight fence specifications will be similar to hogtight fences with suitable woven wire substitution for hogtight wire fence. Fence construction will commence prior to other construction activities.

Miscellaneous work and facilities

Final work will consist of a ballast-shaper and cleanup crews which follow the primary ballast work units. The functions of these crews are to broom the ballast from the ties and operate the shapers to contour the shoulders and dress up the ballast section.

Track insulator crews will eventually cut the rails at all switches and rail crossovers in order to prepare the track network for the Centralized Traffic Control System which operates in part from signals being transmitted via the rails.

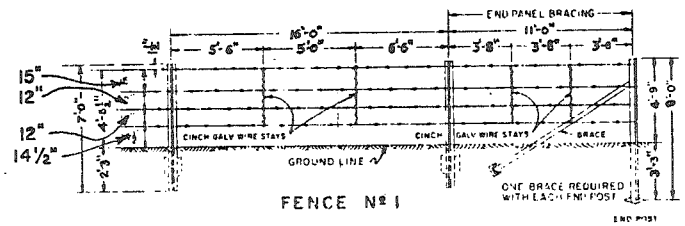
Some of the following appurtenances will be added to the BN/CNW line. These include:

Cattle guards at some grade crossings;

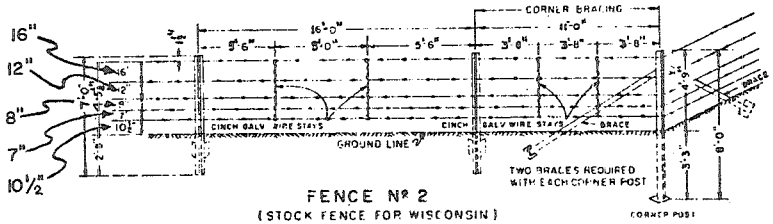
Installation of signs, mileposts, and markers;

Figure 12

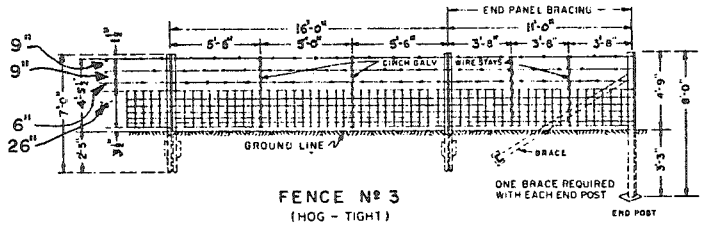
County Road Grade Crossing Located on Amax Belle Ayr Spur Line
Campbell County, Wyoming



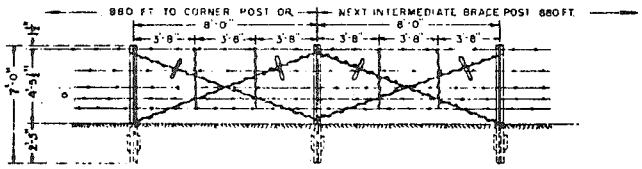
FENCE Nº 1



FENCE Nº 2
(STOCK FENCE FOR WISCONSIN)



FENCE Nº 3
(HOG - TIGHT)



BRACING EVERY 880 FEET

BILL OF MATERIAL FOR ONE MILE OF FENCE

(FENCE Nº 1)

336 T-TYPE STUDDED LINE POSTS WITH ANCHORS FURNISH 4 WIRE CLAMPS PER POST.
21,120 - FEET Nº 12½ GAGE GALVANIZED BARBED WIRE.
672 - CINCH GALVANIZED WIRE STAYS 3'-6" LONG.

(FENCE Nº 2)

336 - T-TYPE STUDDED LINE POSTS WITH ANCHORS FURNISH 5 WIRE CLAMPS PER POST.
26,400 - FEET Nº 12½ GAGE GALVANIZED BARBED WIRE.
672 - CINCH GALVANIZED WIRE STAYS 4'-0" LONG

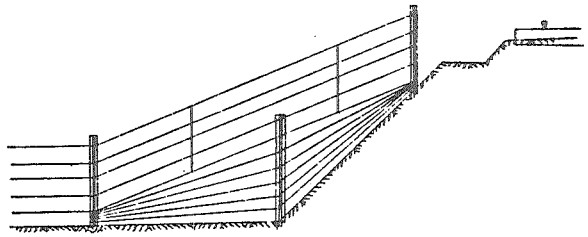
(FENCE Nº 3)

336 - T-TYPE STUDDED LINE POSTS WITH ANCHORS FURNISH 6 WIRE CLAMPS PER POST.
15,840 FEET Nº 12½ GAGE GALVANIZED BARBED WIRE.
5,280 FEET GALV STEEL 7-LINE HOG TIGHT WIRE FENCE 26" HIGH. 6" SPACING BETWEEN STAY WIRES. Nº 9 GAGE GALV STEEL STAY AND LINE WIRES.

NOTE:
DEDUCT ONE LINE POST FOR EACH CORNER POST USED.

(BRACING)

APPROXIMATELY 450 FT. Nº 9 GAGE GALV. STEEL WIRE.



WING FENCE ON EMBANKMENT

NOTE:
LINE POSTS SHALL BE MADE TO A.R.E.A. SPECIFICATIONS AND SHALL HAVE A NOMINAL WEIGHT OF 1.33 LBS PER FOOT.

BURLINGTON NORTHERN INC.
STANDARD PLAN

RIGHT OF WAY FENCES

ENGINEERING DIVISION, ST. PAUL, MINN DEC 1973

Recommended: Asst Vice President Engineering

Approved: Vice President, Operations

Figure 13

Installation of hot-box detectors and dragging equipment detectors;

Switches which can be cut into the main line to provide access to new spur lines or sidings;

Crossing gates and other automatic signaling devices which can be installed in heavy traffic areas;

Installation of Centralized Traffic Control Systems to operate and control major switches and signals.

Campsites and equipment and material storage sites will be necessary during construction. Construction storage is generally the contractor's responsibility. Burlington Northern's contract specifications will require the contractor maintain any campsites or similar areas in a satisfactory condition as to sanitation, oil spills, quality of ground and surface water and other environmental concerns, and conform to local, State and Federal Government regulations.

Access roads, haul roads and construction roads to the work area will be necessary to transport men, equipment and materials to the construction site. These will be the contractor's responsibilities. No information or planning is available as to these facilities. Some of these will probably remain after construction to facilitate operation and maintenance of the railroad.

Other miscellaneous facilities that are anticipated include temporary highway detours, temporary fences, equipment unloading facilities, temporary and permanent cattleguards, gates and standard signs.

Displaced facilities

It appears that no building or occupied houses will be displaced, however, several abandoned homesteads and attached facilities are within

the right-of-way and may be displaced by the railroad. Utilities, similar facilities, county roads and private roads may have to be removed or relocated during construction and operation of the railroad. Livestock fences, reservoir dikes, irrigation ditches and wells are noted as being within the railroad right-of-way. These will possibly have to be either removed, relocated or modified.

Hazard reduction and protection

Dust and fire control problems are contemplated during construction. Temporary construction roads, haul roads, and work areas are to be maintained dust free by sprinkling, graveling, chemical treatment or temporary pavement.

The contractor is required to comply with all state and local laws pertaining to the prevention, control and fighting of fire and is to furnish firefighting equipment, supplies, and personnel required for fire suppression.

The construction contractor is also required to maintain construction and storage area free from waste material and rubbish.

Revegetation and erosion control

The following revegetation plan is contemplated for the railroad right-of-way and other disturbed areas.

Revegetation of those portions of the rail line right-of-way not used for the actual track structure will be completed following construction.

Where it is practical, topsoil to be removed will be saved in such a manner that will allow it to be replaced following construction. This will provide for higher fertility levels and a better seedbed for germination.

Recommendations made by soil testing laboratories are to be used to determine the analysis and quantity of fertilizer needed to obtain desired

soil fertility to insure a good stand of grass in the area to be seeded. Fertilizer application will be made by spreader or aerial application. The type of equipment used will depend on the topography of the area to be seeded.

For reseeding the right-of-way, a mixture of grass species is contemplated. Further consultation with the Agronomy Department of the University of Wyoming, Soil Conservation Service & U.S. Forest Service will determine the mixture which will produce the optimum benefits.

The selection of grass species for the area to be seeded will be made with the objective of obtaining maximum benefit from the limited rainfall available in the region.

Seeding will be done in late fall to make best use of the limited moisture. Snow which accumulates during the winter will provide early spring moisture for seeding establishment. The annual spring precipitation is then relied on for sufficient moisture to provide the vegetation growth necessary to produce an acceptable stand of grass which will not be adversely affected by the windy or dry period of the year.

Seeding is planned to be with drill type equipment (such as a brillion seeder) to insure the seed is placed in the soil sufficiently deep to utilize available moisture for germination. On cuts and fills too steep for ground application, the seed will be broadcast and covered with a mulch. The mulch is applied to hold moisture and reduce erosion by either wind or rain.

Railroad Operations

Unit trains

The principal railroad use will be by unit coal trains. Unit trains will generally be made of 110 cars, however, as few as 40 cars and upwards to 300 car trains are possible. The number of diesel units will vary from four to seven with two or three slave units (locomotives positioned in center of train). Each railcar or "gondola" has the carrying capacity of 100 tons of coal. The average unit train of 110 cars would, therefore, carry 11,000 tons of coal. Most trains are kept together as a unit and operated solely for the purpose of transporting coal from a particular mine to a specific point of destination. Coal cars may be owned by the mining company, the utility company or, in some cases, by the railroad company. The coal becomes the property of the purchaser upon loading in the train.

A train of 110 cars and 5 diesel units would be 6,165 feet or roughly 1.2 miles in length. The average speed of the unit trains is anticipated to be 25 miles per hour. Operating at this speed an average unit train would pass a given point in approximately three minutes.

Coal shipments

The coal to be hauled from the Eastern Powder River Coal Basin over the proposed railroad is presented in Tables 3 and 4. These are presented by destination and receiver, mine origin, and including approximate tonnage to be shipped.

Table 3

Receiver Destination

Area 1 Receivers:	1.	Interstate Power Co., Lansing, Ia.
Iowa	2.	Iowa Power & Light, Council Bluffs, Ia.
Illinois	3.	American Electric Power, Metropolis, Ill.
Indiana	4.	American Electric Power, Sullivan, Ind.
Area 2 Receivers:	1.	Public Service of Colorado, Pueblo, Colo.
Nebraska	2.	Nebraska Public Power, Sutherland, Neb.
Colorado	3.	Kansas Power & Light, Delia, Kans.
Kansas	4.	Kansas City Power & Light, LaCygne, Kans.
Area 3 Receivers:	1.	Southwestern Public Service, Amarillo, Tex.
Texas	2.	Southwestern Electric Power, Carson, Tex.
Oklahoma	3.	Southwestern Electric Power, Siloam Springs, Ark.
Arkansas	4.	Oklahoma Gas & Electric, Muskogee, Okla.
Louisiana	5.	Gulf States Utilities, La.
	6.	Middle South Utilities, Redfield, Ark.

Table 4

Tons in Thousands

Mine Origin		1974	1975	1976	1977	1978	1979	1980
Amax	Area 1	-	2500	5200	7800	11600	12200	12200
	Area 2	2000	2400	3900	4400	6400	6400	8900
	Area 3	-	-	1750	1750	3500	3500	3500
ARCO	Area 1	None						
	Area 2	-	-	-	1800	1800	1800	1800
	Area 3	-	250	1000	2500	4250	5000	5000
Kerr-McGee	Area 1	None						
	Area 2	None						
	Area 3	-	-	-	1200	6500	9000	9000
Peabody	Area 1	None						
	Area 2	None						
	Area 3	-	-	-	-	-	-	2500
Carter	Area 1	-	-	750	4000	5000	5000	5000
	Area 2	None						
	Area 3	None						

Rail line capacities

The proposed rail line will consist of 113 miles of single track with 9 sidings located at ten to twelve mile intervals along the route. Assuming equal spacing of 12.5 mile intervals and average train speeds of 25 mph, trains could be dispatched hourly from each end. The theoretical capacity of the proposed line would be 24 loaded and 24 empty trains per day. Assuming a 365 operating day year, the yearly transportation capacity of the rail line would be 96 million tons a year. However, uneven cycling of trains to and from different destinations, smaller and larger capacity trains with varying speeds, transportation failures, load and unloading delays, and railroad maintenance would reduce rail line capacities significantly. The rail line saturation point could be obtained on any given day long before the theoretical daily capacities are reached.

Work force

The increase of unit train shipment of coal from Wyoming will require an additional railroad work force as new trains are added. The nature of railroad employment dictates that only a few individuals would be working exclusively with coal trains, the levels of employment in most crafts will be directly related to the number of coal trains that were in operation.

Table 5 estimates approximate number of Wyoming jobs presently created by unit coal train operations and those additional jobs that will be created by 1980. The 1980 projections are based partially on announced contracts between coal companies and utilities and partially on estimates of available markets for Wyoming coal, assuming that its development is allowed to continue on an economic basis and that facilities will be located as now planned.

Table 5

Employment Related to Unit Coal Train Operations

Wyoming Residents

Craft	Present Force	Additional Force by 1980	Total 1980 Projection
Engine Men	5	30	35
Conductors & Trainmen	10	75	85
Agents-Operators	--	10	16
Clerks	--	5	5
Carmen and Other Mechanical	--	5	5
Maintenance of Way	5	67	72
Signalmen	--	10	10
Supervisory	--	10	10
Total	20	212	232

Source: Burlington Northern Inc./Chicago and North Western Transportation Company

Accidents

Major and minor derailments involving unit coal trains will occur. Derailments are caused by human error, equipment, and road failure, track flaws, obstacles on the track, dragging equipment, and erosion of roadbeds. During derailment the cars will either remain upright or dump coal along the right-of-way. Dumped coal would be salvaged. Equipment loss would be by the railroad companies should the cars be lost or damaged. The railroads would also be responsible for damage to private or public property due to derailment.

Some vehicular collisions will inevitably occur due to the length of track, number of railroad crossings and the anticipated heavy unit train

traffic. Some livestock and wildlife collisions with trains would also be expected to occur.

Unit train emissions

Exhaust emissions from diesel locomotives may be extensive in the vicinity of the railroad. Information as to exhaust stack emissions from an assumed typical unit train containing 5 locomotives of 3,000 horsepower (HP) and 110 cars is contained in Table 6. The fuel consumption for a 3,000 HP diesel locomotive is 5.0 gal/hr at idle and 152 gal/hr at full load.

More detailed information is available for various and different types of locomotives; however, EPA average locomotive emission factors based on nationwide statistics were used to calculate emissions per unit train. Diesel engine manufacturers are engaged in research and development programs to reduce both visible emissions and exhaust gas contaminants on current and future production engines and developing retrofit components for existing engines.

Table 6

Average Locomotive
Emissions Per Unit Train

	Average Locomotive * Emission Factors	Average Locomotive Emissions ** Per Unit Train/Per Round Trip
	$Lb/10^3$ gal.	Lb/Per Trip
Particulates	25	121
Sulfur Oxides (SO_x as SO_2)	57	277
Carbon Monoxide	130	633
Hydrocarbons	94	457
Nitrogen Oxides (NO_x as NO_2)	370	1801
Aldehydes (as HC HO)	5.5	27
Organic Acid	7	34

* Assumes train of 110 cars and 5 locomotives at 3,000 HP

** Assumes round trip of 4.3 hours with one-half the distance empty and one-half loaded.

Source: U. S. Environmental Protection Agency, Office of Air and Water Programs, Office of Air Quality Planning and Standards Research; Compilation of Air Pollutant Emission Factors, EPA Bulletin No. 42

Noise

Unit train noise level which is heard at a specific location is a function of distance between the railroad, location of and number of cars and locomotives, and the noise levels from each source. In most cases trains have higher noise levels than do trucks (Table 7).

Table 7

Vehicle	Noise Level (Decibels--50 ft. from Vehicle)
Railroads	
a. Diesel, Electric, Locomotives	88 - 98
b. Freight Cars	80 - 94
c. Passenger Cars	80 - 90
Trucks	
a. Light	70 - 85
b. Medium	80 - 89
c. Heavy Duty	85 - 95

Source: Kerber, Matthew J. 1973/74. Your Government and the Environment--A Supplemental Environmental Reference, Vol. 2-S. Output Systems Corporation.

Unit train frequencies will have a direct bearing on the constancy and amount of noise nuisance as well as the ambient noise level of the area involved.

Fire occurrence

Fires along railroad rights-of-way originate from both operation and maintenance of the rail line. These fires can be caused by sparks from locomotive emissions, hot-boxes, brake-shoes, and maintenance crew operations. Accumulations of combustible spilled coal along the right-of-way make wayside fires more of a concern along the proposed rail line. The Wyoming Public Service Commission has issued general order No. 41, imposing fireguard roles on railroad operations. Railroads and lightning have been identified as the two main causes of fire within Campbell and Converse Counties. The following table (Table 8) represents recorded fire occurrence in Converse and Campbell Counties as reported by Clarke-McNary (CM2) cooperating counties.

Table 8

Fire Occurrence

Campbell and Converse Counties*

1971 through 1973

Campbell County

Identified Cause	No. of Fires 1971	1972	1973	Acres Burned 1971	1972	1973
Railroad	21	17	26	664	961	238
Lightning	17	32	23	21,960	8,030	3,013
Other	11	30	20	2,066	1,015	184
Total	49	79	69	24,690	10,006	3,435

Converse County

Identified Cause	No. of Fires 1971	1972	1973	Acres Burned 1971	1972	1973
Railroad	22	11	6	499	1,801	4
Lightning	4	8	7	1	140	12
Other	2	4	1	-	5	-
Total	28	23	14	500	1,946	16

* Wyoming State Forestry Division

Note: These statistics are considered inconclusive by the State Forestry Division. It is estimated that another 20 percent to 30 percent of all fires are unreported.

Total railroad trackage within Campbell County is 56 miles and Converse 120 miles. Average fire frequency per mile of track for the recorded three-year period would be 0.38 fires/mile for Campbell County and 0.11 fires/mile for Converse County.

Where conditions necessitate, fireguards are installed on both sides of track. Current methods used for fireguard construction involve use of either a disc plow or dozer or aerial application of herbicides. Retention type spark arrestors are being installed on all diesel locomotive units. A spark arrestor installation program is to be completed in 1974. During the fire season, a fuel oil additive is added at all diesel fueling stations. This additive is specific in preventing carbon buildup and elimination of exhaust sparking. The use of this chemical additive was initiated three years ago. Turbo-chargers also act as spark arrestors. It is anticipated that most unit train locomotives will be turbo-charged in the future.

Weed control

Noxious weed control along railroad rights-of-way by chemical means is a general practice to comply with legal and safety regulations.

All chemical compounds presently used are rated at least a No. 4 rating on the USDA's Toxicity Rating Chart. Burlington Northern uses the Amine form of the chemical, 2,4-Dichlorophenoxyacetic Acid for the control of broadleaf weeds and is used at the rate of 2 to 4 pounds acid per acre dependent upon weed species. A combination of 2,4-D, and 2,4,5-T (Tri-chlorophenoxy-acetic acid) is used for the control of woody plants or brush species, and is used at the rate of 6 to 9 pounds acid per acre. Both formulations are diluted with water and applied at the rate of 50 to 300 gallons per acre of right-of-way infestations. Equipment used varies from 5-gallon back-pack sprayers, to 200-500 gallon capacity portable sprayers complete with 50 foot hose--reels and sprayguns. Application takes place in June and July.

Two procedures are employed for the treatment of roadbed ballast. On primary main tracks, siding, house and industry tracks, company-owned railbound spraycars equipped with either gasoline or diesel powered engines, pumps and spray booms use the above-described diluted chemical spray solutions under pressures varying from 8 to 30 pounds p.s.i., depending upon spray patterns employed. Chemical compounds are pre-diluted or tank mixed as required to conform to the chemical compound employed. These chemical combinations are employed after actual testing within the area where similar soil and climatic conditions are known to exist. All chemical compounds and formulations are furnished by railroad contractor which furnished the pre-diluted formulation in tankcar lots to correspond to useage. The contractor

provides a licensed and experienced supervisor to accompany each spray unit employed in these programs.

Off-track truck spraying units equipped with a 1,500 gallon tank, mechanical agitation, engine, pump and spray booms apply from 30 to 50 gallons of spray solution per acre under prescribed spray patterns. Chemical combinations employed are pretested. All chemical compounds are furnished by the contractor who employs properly licensed and experienced operator/supervisor on each truck unit. This type of equipment is normally confined to branch lines, sidings, house, industry, yard tracks, and all major yards and/or terminals.

In 1973 Burlington Northern chemical formulation for primary main tracks consisted of the following:

5.00 lbs. Dupont's Krovar 1 (80% material)

2.00 lbs. Amchem's Amizol (90% material)

0.50 gal. Velsicol's Banvel 720 chemical

0.25% by volume - Triton X-114 surfactant

0.50 pint - Nalco's E-102 Drift Inhibitor

Water sufficient to produce fifty (50) gallons of diluted spray solution applied at the rate of fifty (50) gallons per acre.

It is tentatively planned to follow the same formulation in 1974 with the following two exceptions: (a) One (1) gallon of Amchem's Amdon 101 will replace the Banvel 720 and (b) six (6) pounds of Dupont's Karmex 80 percent material will replace the Krovar 1.

The 1973 Wyoming Legislature passed Enrolled Act 34 wherein all railroad rights-of-way would be inspected annually by a team comprised of

Wyoming State District Forester Representative, County Warden or County Commissioner Representative and Railroad Representative, which team will prescribe plowed or sterilized fire guards (1 side), plowed or sterilized fire guards (both sides), burn right-of-way (1 side), burn right-of-way (both sides), sterilize right-of-way (1 or both sides) herbicide treatment of right-of-way for fuel reduction (1 or both sides).

In the State of Wyoming primary weeds listed as noxious are: Field Bindweed, Leafy Spurge, Canada Thistle, Perennial Sow Thistle, Hoary Cress, Russian Knapweed, Horse Nettle, Quackgrass and Wild Mustard (3 species).

The right-of-way crossings are mowed in accordance with normal maintenance procedures to maintain proper sight distance of all public road crossings and other locations. Weed and brush growths are harmful to safe operation of trains, maintenance of right-of-way equipment and personnel whose duties compel them to travel or work on railroad rights-of-way.

Railroad Abandonment

Abandonment of the proposed railroad line is remote and not within the foreseeable future because of the extensive coal deposits that exist and the potential use of this line by Burlington Northern, Inc. as an interconnecting route between existing rail lines. Eventual relocation of the rail lines and spurs may be necessary where they overlie coal deposits at depths subject to surface mining.

There are several factors which are contemplated by the railroad prior to abandonment. In the case of the Douglas-Gillette line, profitability and use of the trackage by the railroad in furtherance of their common carrier obligations are considered. Use of this line for other than unit coal train traffic such as other rail oriented industry may be of significance and abandonment would not be considered.

Under existing law, it would be necessary for the railroad company to make application to the Interstate Commerce Commission to initiate abandonment proceedings. Section 1(18) of the Interstate Commerce Act, 49 USC 1(18), 49 Stat. 543 governs rail line abandonments. The legal standard applied by the Interstate Commerce Commission in determining whether the abandonment will be approved or denied is one of the present or future public convenience and necessity.

If abandonment is approved by the Interstate Commerce Commission, the track and structures are removed and salvaged. Bridges and culverts may be left in place at the request of adjacent landowners who assume responsibility for the maintenance of these structures. Railroad right-of-way may be offered to adjacent landowners for purchase.

Removal of track and structures is either accomplished by railroad company forces or a contract is awarded to private contractors. Contractors who perform this type work have the necessary equipment and qualified personnel

to adequately assure the job is completed without damage to adjacent landowners. The primary consideration between company forces and a private contractor utilization for removal of trackage is that if the track and structures can be utilized by the railroad at another location, the rail line is salvaged.