Appendix B.3

Construction Details and Workforce Estimates

CONSTRUCTION, OPERATION, MAINTENANCE, AND ABANDONMENT

Preconstruction conferences with each affected agency would be conducted to introduce the contractors and their field representatives, discuss mitigation measures and schedules, and introduce each agency's point of contact prior to commencement of construction. As construction proceeds, the construction engineer or inspector would monitor activities and right-of-way authorizations to ensure compliance or to initiate modifications where necessary. In environmentally sensitive areas, an environmental specialist with appropriate qualifications (e.g. biologist, archaeologist) would inspect construction activities to ensure compliance with specific resource mitigation. Following completion of construction, the line would be mapped as as-built and separate packages would be submitted to each of the various agencies to close the right-of-way acquisition process. Post-construction meetings with agencies may be necessary to review the acquisition process and to determine if modifications are needed.

Transmission Line

Construction

Construction of a transmission line is discussed in the following section according to the sequence of activities listed below.

- Surveying the transmission line centerline
- Access road identification and construction
- Right-of-way and structure sites clearing (including temporary material staging sites, and batch plants)
- Installing foundations
- Assembling and erecting the structures
- Clearing of pulling, tensioning, and splicing sites
- Installing ground wires and conductors
- Installing counterpoise/ground rods
- Cleanup and site reclamation

Various phases of construction would occur at different locations throughout the construction process. This would require several contractors operating at the same time in different locations.

Topographic Surveying Activities

Before construction surveying begins, it would be necessary to obtain either a survey permit on federal and state lands, or rights-of-entry for private lands. Construction survey work would consist of locating the centerline, structure center hubs, right-of-way boundaries; and structure access roads. All of these activities would begin approximately two years prior to the start of construction. Cultural resources and threatened and endangered species intensive surveys can begin once the survey of the centerline and access roads is completed and clearly marked.

Access Road Construction

The construction, operation, and maintenance of the proposed transmission line would require that heavy vehicles access structure sites along the right-of-way. If new access roads are required, they would be constructed to support the weight of these vehicles.

All roads would be upgraded or constructed in accordance with standard construction practices, or according to the land managing agencies' requirements. Road will not be surfaced unless required by permitting agencies or design specifications. However, existing paved and unpaved highways and roads would be used, where possible, for the transportation of materials and equipment from storage yards to the areas where they would be needed along the transmission line right-of-way.

Private landowners or land users would be consulted before road construction begins. Road standards and plans for construction, rehabilitation and/or maintenance of roads would be documented in the POD during the engineering design phase of the project. These plans would incorporate the relevant criteria of the affected agencies and landowners or land users.

Where the proposed transmission line would parallel existing transmission lines or other linear utilities, the access roads along the existing utilities would be used wherever possible to minimize the amount of new road construction. However, these roads may require upgrading before they could be used for construction. All roads existing prior to construction of MSTI would be left in a condition equal to or better than the condition prior to construction. Wherever existing roads could be used, only spur roads to structure sites may be needed.

Permanent access roads would be constructed where needed for construction and long-term maintenance. Permanent roads would be graded to a travel service width of 20 feet (with 2 feet on either side for shoulders, yielding a total of 24 foot wide disturbance), including back slopes and side cast material except where turnouts and curves or specifications of the land managing agency require a wider surface width.

Culverts or other drainage structures would be installed as necessary across drainages, but the roads would usually follow the natural grade. Wherever possible, roads would be built at right angles to streams and washes. In addition, road construction would include dust control and erosion control measures in sensitive areas. All existing roads would be left in a condition equal to or better than their condition prior to the construction of the transmission line.

The approximate area of ground disturbance associated with the typical construction activities was estimated for six types or levels of access. The ground disturbance levels are summarized in Table B.3-1. These access levels describe the assumptions for the degree of disturbance expected to occur with each access level. Further, the access levels consider areas of as much as five acres per mile that may be temporarily disturbed (e.g., grasses crushed) by structure construction sites, pulling, tensioning, and splicing sites, batch plants, and marshalling yards. This information was combined with slope data to provide an estimate of the potential ground disturbance that could result from upgrading existing roads or constructing new roads. These results were used as part of the impact assessment.

Table B.3-1. Access Levels and Ground Disturbance

Level 1	Existing Improved Roads	Previously disturbed. Roads generally are in good condition but may require small improvements at stream crossings, steep slope areas, and other locations. New ground disturbance would be minimal. New spur roads would be required to access each structure site; an average of 300 feet of new spur road for each structure. Spur roads would disturb approximately 0.4 acres per mile of transmission line. Roads will be graveled only if required by permitting agencies or design specifications.
Level 2	Roads that Require Improvement	Previously disturbed. Existing two-track or narrow unimproved roads would require improvement to make roads serviceable (e.g., mowing, grading) for construction. Low ground disturbance; assume approximately 0.5 to 1.0 miles of road improvements for each mile of transmission line. Road improvements would disturb approximately 0.75 to 1.0 acres per mile of transmission line. An average of 300 feet of spur roads would be required to access each structure site. Spur roads would disturb about 0.4 acres per mile of transmission line. Roads will be graveled only if required by permitting agencies or design specifications.
Level 3	Construct Road in Flat Terrain (0 to 8 percent)	Low to Moderate ground disturbance for new access road construction; assume approximately 1.0 to 1.2 miles of new roads would be required for each mile of transmission line. Road construction would disturb approximately 1.7 to 2.0 acres per mile of transmission line.
Level 4	Construct Road in Sloping Terrain (8 to 15 percent)	Moderate ground disturbance for new access road construction; assume 1.2 to 1.5 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 2.0 to 2.5 acres per mile of transmission line.
Level 5	Construct Road in Steep Terrain (15 to 30 percent)	Moderate to high ground disturbance for new access road construction; assume approximately 1.5 to 2.0 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 2.5 to 3.4 acres per mile of transmission line.
Level 6	Construct Road in Very Steep Terrain (over 30 percent)	High to very high ground disturbance for new access road construction; assume approximately 2.0 to 3.0 miles of new road would be required for each mile of transmission line. Road construction would disturb approximately 3.4 to 5.0 acres per mile of transmission line.

All roads would be constructed in accordance with NorthWestern requirements for transmission line access roads (also refer to description above). In the event of a conflict between NorthWestern requirements and the requirements of the BLM and USFS, the states of Montana, Idaho, or other agencies, the governing agency requirements would take precedence. Private landowners along the proposed roads would be consulted before construction begins.

Structure Site Clearing

At each structure site, leveled areas (pads) would be needed to facilitate the safe operation of equipment, such as construction cranes. The leveled area required for the location and safe operation of large cranes would be approximately 30 by 40 feet. At each structure site, a work area of approximately 200 by 200 feet would be required for the location of structure footings, assembly of the structure, and the necessary crane maneuvers. The work area would be cleared of vegetation only to the extent necessary. After line construction, all pads not needed for normal transmission line maintenance would be graded to blend as near as possible with the natural contours, and renegotiated with indigenous plant species where required. Areas would be reseeded prior to the season(s) when precipitation is normally received.

Clearing of Right-of-Way

The clearing of some natural vegetation may be required. However, selective clearing would be performed only when necessary to provide for land surveying activities, electrical safety clearances, long-term maintenance and reliability of the transmission line. Within or adjacent to the right-of-way topping or removal of mature vegetation, under or near the conductors, would be performed to provide adequate electrical clearance as required by NESC standards.

Trees that could fall onto the transmission line, affect the transmission line during wind-induced line swing, or otherwise present an immediate hazard to the transmission line or have the potential to encroach within a safe distance to the conductor as a result of bending, growing, swinging or falling toward the conductor would be removed. Normal clearing procedures are to top or remove large trees and not disturb smaller trees. If a conflict were to arise regarding clearance procedures, the conflict would be jointly reviewed and agreed upon between NorthWestern and the owners or managers of the property.

Construction Yards/Material Staging Sites

Temporary material staging sites would be located near each end of the transmission line and approximately every 40 miles along the route. These would be located in previously disturbed areas or in areas of minimal vegetative cover where possible and would require five acres of land. The location of all sites would be determined through discussions with landowners or the land-managing agency.

Concrete used to construct foundations would be dispensed by a variety of methods as described below under Concrete Sources and Delivery. One method is to use a portable concrete batch plant. Approximately one acre of land is required for each site. A rubber-tired flatbed truck and tractor would be used to relocate each plant along the right-of-way.

The construction yards/temporary material staging areas would serve as field offices, reporting locations for workers, parking spaces for vehicles and equipment, sites for material storage, and stations for equipment maintenance. Facilities may be fenced and their gates locked. Security guards would be assigned where needed.

Diesel fuel, gasoline, oil and other lubricants as well as adhesives and sealants would be utilized during construction of the transmission line and the substations. Bulk quantities would be stored in designated construction yards/materials staging sites. Vehicle fueling and maintenance activities would be restricted to staging areas or approved areas away from drainage channels or sensitive habitats. All construction vehicles would be monitored for leaks and receive regular off-site preventative maintenance to reduce the chance of leakage. A spill plan would be prepared and implemented to minimize potential adverse effects associated with leaks and/or spills during fueling.

Concrete Sources and Delivery

Ready mixed concrete from retail establishments would be used for concrete requirements within a 35-mile haul distance from the existing ready mix batch plant. These existing batch plants are normally located in or near cities and major towns. Ready mix trucks would use access roads established for other construction equipment.

For occasions where a minimal amount of concrete is required in a remote location, concrete would be mixed with volumetric concrete trucks. The volumetric mixer truck with compartments for sand, aggregate, cement and water drives to a foundation site and proportionately combines the ingredients to make concrete.

For sections of tubular pole construction in remote areas, a field concrete batch plant would be established. The foundations for tubular poles require significant amounts of concrete and more automated batching is needed. The concrete would be delivered by ready-mix concrete trucks which would use access roads established for other construction equipment.

Foundation Installation

Excavations for foundations would be made with power drilling equipment. Where the soil permits, a vehicle-mounted power auger or backhoe would be used. In rocky areas, the foundation holes may be excavated by drilling and blasting, or installing special rock anchors. All safeguards associated with using explosives (e.g., blasting mats) would be employed when adjacent areas need to be protected. Blasting activities would be coordinated with the appropriate land-managing agency, particularly for purposes of safety and protection of sensitive areas.

In extremely sandy areas, soil stabilization by water or a gelling agent may be used to stabilize the soil before excavation. After excavations are completed, pre-cast or cast-in-place foundations would be installed. Steel grillage foundations may be specified in mountainous areas.

Pre-cast Footings for Guyed Structures

The pre-cast footing would be lowered into an excavated foundation hole, positioned, backfilled and cast in place. The cast-in-place footing would be installed by placing reinforcing steel and a structure stub into the foundation hole, positioning the stub, and encasing it in concrete. Spoil material would be used for fill where suitable or spread at the construction site. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks.

Structure Assembly and Erection

Bundles of steel members and associated hardware would be shipped to each structure site by truck. Steel members would be assembled into subsections of convenient size and weight. The assembled subsections would be hoisted into place by a large crane and then fastened together to form a complete structure. Figures B.3-1 and B.3-2 illustrate typical construction activities.

Conductor Installation

After the structures are erected, insulators, hardware, and stringing sheaves would be delivered to each structure site. The structures would be rigged with insulator strings and stringing sheaves at each ground wire and conductor position.

For public protection during wire installation, guard structures would be erected over highways, railroads, power-lines, structures, and other obstacles. Guard structures would consist of H-frame poles placed on either side of an obstacle. These structures would prevent ground wire, conductor, or equipment from falling on an obstacle. Equipment for erecting guard structures would include augers, line trucks, pole trailers, and cranes. Guard structures may not be required for small roads. In such cases other safety measures such as barriers, flagmen, or other traffic control would be used.

Following stringing and tensioning of all conductors, the guard structures would be removed.
Pilot lines, would be pulled (strung) from structure to structure by a helicopter and threaded through the stringing sheaves at each structure. Following pilot lines, a larger diameter, stronger line would be attached to conductors to pull them onto structures. This is called the pulling line. This process would be repeated until the ground wire or conductor is pulled through all sheaves.

Ground wire and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment as shown on Figure B.3-1. Sites for tensioning equipment and pulling equipment would be approximately three miles apart. If a fiber optic ground wire is installed rather than conventional ground wire, the construction methods would be the same. The appearance of a fiber optic ground wire is the same as conventional ground wire.

The tensioning site would be an area approximately 200 feet wide by 600 feet long. Tensioners, line trucks, wire trailers, and tractors needed for stringing and anchoring the ground wire or conductor would be located at this site. The tensioner, in concert with the puller, would maintain tension on the ground wire or conductor while they are fastened to the structures.

The pulling site would require approximately half the area of the tension site. A puller, line trucks, and tractors needed for pulling and temporarily anchoring the counterpoise/ground wire and conductors would be located at this site.

Ground Rod Installation

Part of standard construction practices prior to conductor installation would involve measuring the resistance (known as "ohm") of the ground to electrical current near the structure footings. If the resistance to remote earth for each transmission structure is greater than 25 ohms, ground rods 8 to 16 feet in length would be installed in the ground. If ground rods do not provide sufficient grounding, counterpoise (grounds) would be installed to lower the resistance to 10 ohms or less. Counterpoise would consist of a bare copper clad or galvanized steel cable buried a *minimum* of 12 inches deep, extending from one or more structure legs for approximately 200 feet.

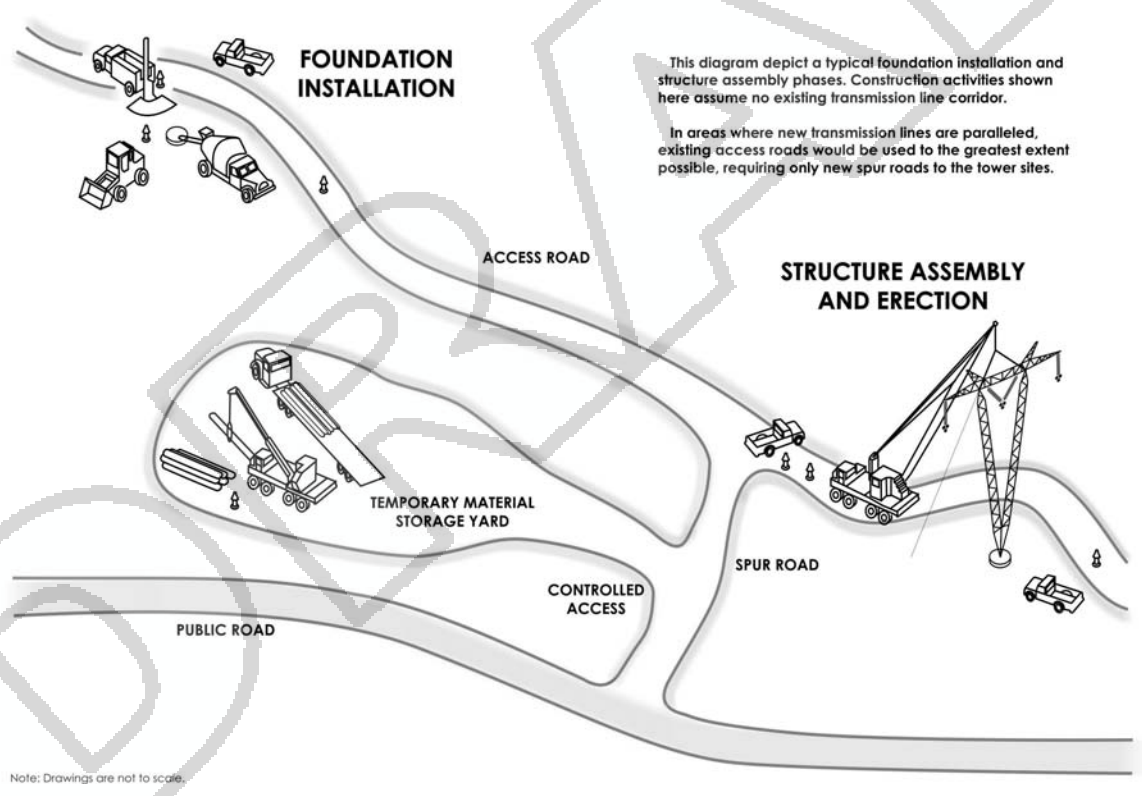

Figure B.3-1. Foundation and Structure Construction Activities

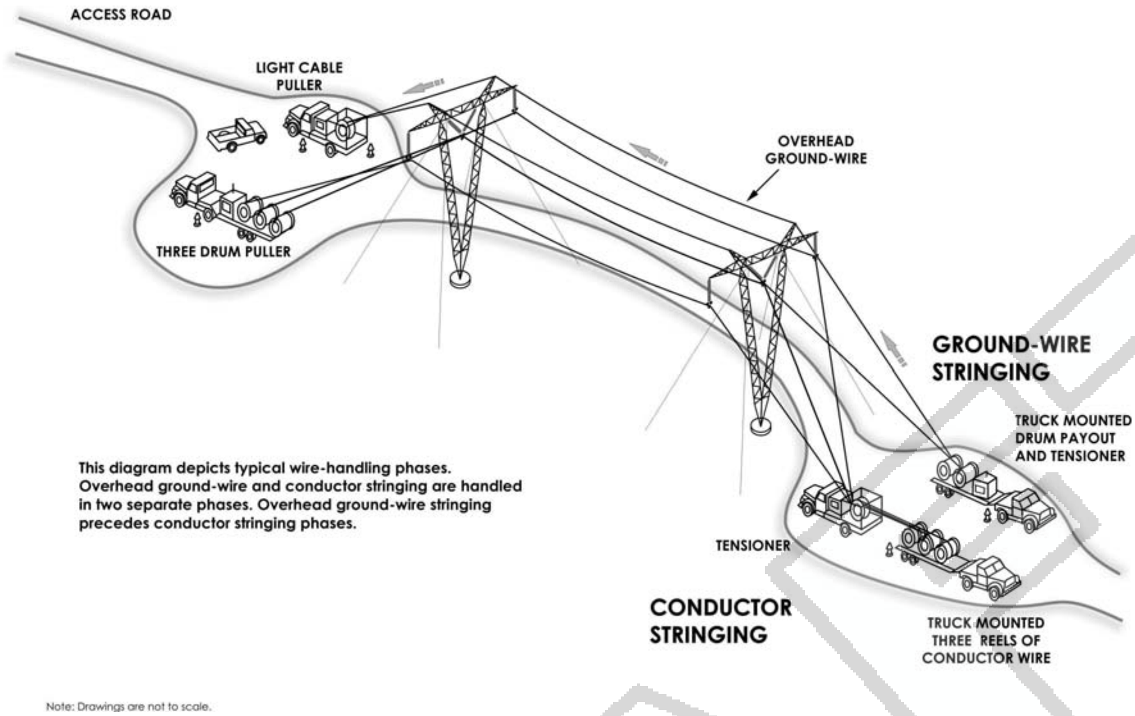

Figure B.3-2. Conductor and Ground Wire Stringing Activities

Erosion and Sediment Control/Pollution Control during Construction

A construction Storm Water Pollution Prevention Plan would be developed for the project for erosion, sediment and pollution control during construction. The Storm Water Pollution Prevention Plan would be prepared to meet the requirements of the MDEQ's General Permit to Discharge Storm Water through its storm water pollution control program (Montana Water Quality Act 75-5-401 et seq., MCA) associated with construction activities. The Storm Water Pollution Prevention Plan would include both structural and non-structural best management practices. Examples of structural best management practices could include installing silt curtains or other physical controls to divert flows from exposed soils, or otherwise limit runoff and pollutants from exposed areas. Examples of non-structural best management practices include management practices such as materials handling and waste disposal requirements and spill prevention methods. NorthWestern would prepare and submit a SWPPP meeting the conditions of the General Permit to Discharge Storm Water to the Storm Water Pollution Prevention Plan along with a Notice of Intent for construction activities prior to the start of projection construction. IDEQ and federal erosion control regulations will also be complied with.

Control of Noxious Weeds and Invasive Plants

Appendix C.10-2 lists noxious weeds in the project area. NorthWestern will develop a Noxious Weed and Invasive Plant Control Plan to minimize the potential for the spread of weeds and invasive plants, and to minimize their spread within the project area. The plan will prescribe measures to prevent and control the spread of noxious weeds and invasive plants during and following construction of the project. The primary objectives of noxious weed and invasive plant control will be:

- To acquire information on the occurrence, distribution and abundance of noxious weeds and invasive plants in the project area prior to construction.
- To reduce/eliminate existing infestation and prevent the spread of new and existing populations of noxious weeds and invasive plants within the project area.

- To ensure any populations of rare plants within the project area are not negatively affected by control activities.
- To coordinate and consult with federal land management agencies (BLM and USFS), MDEQ and Montana county weed control districts regarding noxious weed control activities to be conducted by NorthWestern within the project area to ensure compatibility with existing weed control protocols and requirements. Coordination will also occur with Idaho Department of Agriculture and Idaho county weed districts.

Cleanup and Construction Waste Disposal

Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Refuse and trash would be removed from the sites and disposed of in an approved manner. Oils and fuels would not be dumped along the line. Oils or chemicals would be hauled to a disposal facility authorized to accept such materials. No open burning of construction trash would occur without agency approval.

Petroleum products such as gasoline, diesel fuel, helicopter fuel, crankcase oil, lubricants, and cleaning solvents would be present within the transmission line corridor during construction. These products would be used to fuel, lubricate, and clean vehicles and equipment. These products would be containerized by fuel trucks or by approved containers. When not in use, hazardous materials would be properly stored to prevent drainage or accidents.

Hazardous materials would not be drained onto the ground or into streams or drainage areas. Totally enclosed containment shall be provided for all trash. All construction waste including trash, litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials.

All construction, operation, and maintenance activities would comply with all applicable federal, state, and local laws and regulations regarding the use of hazardous substances. The construction or maintenance crew foreman would insure that all applicable laws are obeyed. In addition, an on-site inspector would be present during construction to make sure that all hazardous materials are used and stored properly. A health and safety plan would be developed as part of the POD preparation during the engineering and preconstruction phase of the project.

Site Reclamation

After construction is completed, the right-of-way would be restored as required by the property owner or land management agency. All practical means would be made to restore the land to its original contour and to restore natural drainage patterns along the right-of-way. Because revegetation would be difficult in many areas of the project where precipitation is minimal, it would be important to minimize disturbance during the construction. All practical means would be made to increase the chances of vegetation reestablishment in disturbed areas.

Restoration activities would consist of restoring temporarily disturbed areas as close as possible to their original condition. This excludes the access roads, which would remain in place for the life of the project. The areas affected by construction would be seeded with an appropriate seed mix where there is adequate soil moisture, as appropriate to the location. Similar restoration activities would be followed at areas temporarily disturbed for construction staging, equipment lay down and temporary construction access. On site construction management would monitor for erosion and implement additional control measures if necessary.

Construction cleanup and permanent erosion-control measures would be carried out in accordance with the project SWPPP.

The total construction period would be approximately three years. The POD that would be prepared during the engineering and preconstruction phase of the project would address site reclamation of disturbed areas.

Fire Protection

All applicable fire laws and regulations would be observed during the construction period. All construction personnel would be advised of their responsibilities under the applicable fire laws and regulations, including taking practical measures to report and suppress fires. A fire protection and suppression plan will be developed as part of the POD preparation during the engineering and preconstruction phase of the project.

Transmission Line Construction Schedule and Work Force

It is estimated that the total construction time for the transmission line would be 32 months. Construction of the Townsend Substation, and substation additions at Mill Creek and Midpoint would occur during the same time frame as transmission line construction.

Construction services will be divided into a number of contractor awards. It is anticipated that two contracts for transmission line construction would be awarded; one each for the Montana and Idaho portions of the line. Likewise, it is anticipated that substation construction and additions would be preformed with two contractors, one for each state. It is anticipated that one or two small specialty subcontractors would be used for the communications facilities for the entire project. Some of the communications work may also be performed by NorthWestern’s workforce.

The mountainous area at the Montana-Idaho state line will necessitate beginning construction in early spring and having each contractor work north and south of the state line respectively until the line terminates at the Townsend Substation in Montana, and the Midpoint Substation in Idaho. The actual starting point is generally decided prior to taking construction bids and depends on the status of right-of-way acquisition, weather, availability of materials, etc. Construction work would be performed with conventional construction techniques in accordance with NESC codes, OSHA, Institute of Electrical and Electronic Engineers, American Concrete Institute, and other industry-specific standards.

The total workforce that would be required to complete construction would be just over 200 workers. It is assumed that construction would occur during a six day work week.

Table B.3-2 lists the major construction activities and the number of workers per crew for the transmission line. Equipment size would range from light to heavy duty. Table B.3-3 lists the equipment needed for construction of the transmission line, substation and communications facilities.

Table B.3-2. Major Construction Activities and Number of Workers per Crew

Work Item	Estimated Duration (Weeks)	Crews	Workers Per Crew	Total Workers
Construction Management	156	1	2	2
Inspection	156	1	6	6
Contractor Mobilization	6	0	0	0
Receive and Handle Materials	156	1	6	6
Survey/Stake Access Roads and Structure Pads	61	1	2	2
Construct Access Roads and Structure Pads	61	1	4	4
Survey/Stake New Structure Locations	61	1	2	2
Excavate Structure Holes	65	2	2-3	5
Blast Structure Holes	50	2	3	6
Tie and Haul Rebar	82	1	6	6
Set Forms and Pour Concrete	82	2	5	10
Portable Batch Plant(s) and Concrete Trucks	0	1	8	8
Load Steel and Materials for Field	82	1	3	3
Haul Steel and Materials	82	1	3	3
Haul Blocking and Shake Out Steel	82	2	5	10
Assemble Towers	82	7	8	56
Bottom Setting Crew (Legs and Small Body Ext)	82	1	7	7
Tower Torquing Crew	82	1	4	4
Erect Towers	82	1	10	10
Backbolt and Torque After Erection	82	1	6	6
Load, Haul, and Spot OHGW, OPGW, and Conductors	65	1	4	4
Install and Remove Guard Pole Structures	42	1	3	3
Install Shield, OPGW, and Conductors	65	1	20	20
Sag, Clip Dead End Spacers, Dampers	65	1	12	12
Final Clean Up/Gig Sheet	61	1	3	3
Reclamation/Restoration	65	1	5	5
TOTAL				**203**

OHGW = overhead ground wire; OPGW = optical power ground wire

Table B.3-3. Construction Equipment

Work Item	Construction Equipment
Construction Management	2 4x4 pickups
Inspection	5 4x4 pickups
Receive and Handle Materials	1 pickup 2 crew trucks 1 crane 1 forklift
Survey/Stake Access Roads and Structure Pads	1 helicopter 2 pickup trucks
Construct Access Roads and Structure Pads	2 bulldozers (D-6 or D-8) 2 motor graders 2 pickup trucks water trucks (construction and maintenance)
Survey/Stake New Structure Locations	1 helicopter 2 pickup trucks
Excavate Structure Holes	1 mechanic truck 2 diggers 2 crew trucks 1 backhoe/front end loader
Tie and Haul Rebar	2 flatbed trucks w/boom 2 crew trucks
Set Forms and Pour Concrete	2 crew trucks 4 concrete trucks
Load Steel and Materials for Field	1 crane and/or forklift 1 flatbed truck w/boom
Haul Steel and Materials	6 steel haul trucks 1 yard crane (heavy duty) 2 pickup trucks
Haul Blocking and Shake Out Steel	4 flatbed trucks w/boom 4 cranes and/or forklift 2 crew trucks
Assemble Towers	4 cranes (rubber tired) 4 trucks (2 ton) 4 carry alls 4 pickup trucks
Bottom Setting Crew (Legs and Small Body Ext.)	2 cranes 4 crew trucks
Tower Torquing Crew	4 air compressors 2 crew trucks
Erect Towers	2 cranes (60 ton) 2 trucks (2 ton) 3 crew trucks

Table B.3-3. Construction Equipment

Work Item	Construction Equipment
Backbolt and Torque After Erection	4 air compressors 2 crew trucks
Load, Haul, and Spot OHGW, OPGW, and Conductors	2 flatbed trucks w/boom 2 crew trucks
Install and Remove Guard Pole Structures	1 truck w/boom and trailer 1 digger 1 crew truck
Install Shield, OPGW, and Conductors	1 helicopter and fly ropes 3 drum pullers (1 light, 1 medium, 1 heavy) 2 splicing trucks double-wheeled tensioners (1 light, 1 heavy) 6 wire reel trailers 2 diesel tractors 1 crane (2 to 4 ton) 4 trucks (5 ton) 6 pickup trucks
Sag, Clip Dead End Spacers, Dampers	1 conductor puller 1 shield/fiber puller 2 cranes 2 sock line trailers 2 flatbed trucks w/boom 2 high reach boom trucks
Final Clean Up/Gig Sheet	2 trucks (2 ton) 2 pickup trucks
Reclamation/Restoration	1 bulldozer (D-8) 2 motor graders 2 crew trucks

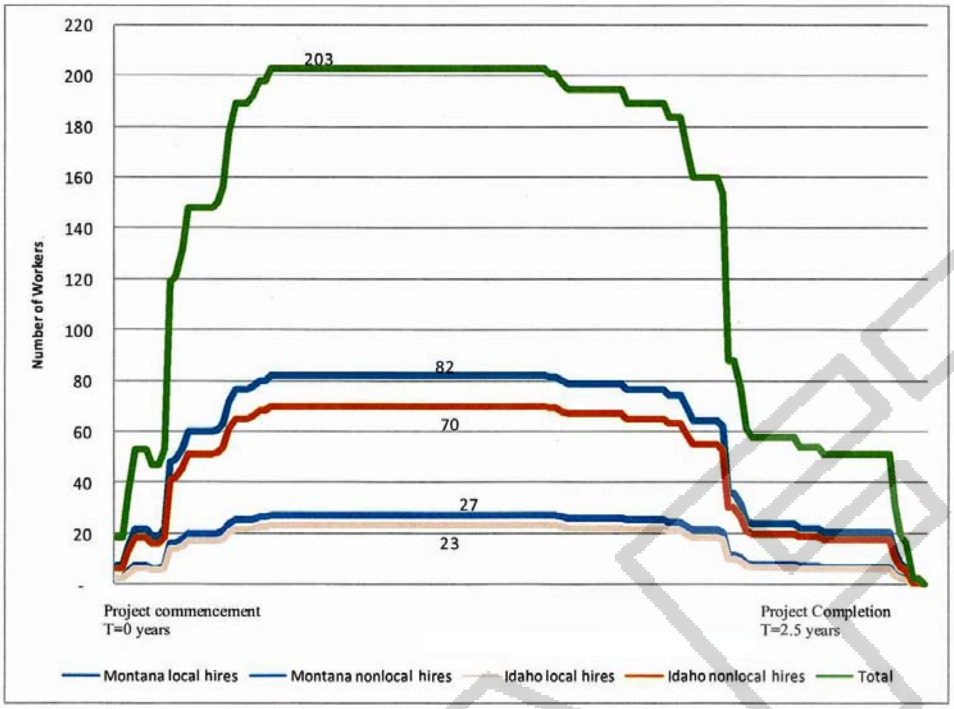

Figure B.3-3. Estimated Workforce and Duration for Transmission Line Construction

Estimated Cost

The estimated cost for transmission line construction (with escalation) is $573 million. This includes material and labor costs as well as engineering, field office, procurement, project management and construction management, aerial photogrammetry and survey and a 20 percent contingency. The cost per mile (based on a transmission line of approximately 430 miles in length) is $1.34 million per mile. Right-of-way acquisition costs are estimated at $36 million. The cost estimate was prepared using unit costs, and recent knowledge and experience with vendors and contractors.

Operation, Maintenance and Abandonment

Operational Characteristics

The nominal voltage for the MSTI transmission line would be 525kV AC. There may be minor variations of up to five percent above the nominal level depending upon load flow.

Permitted Uses

After the transmission line has been energized, land uses that are compatible with safety regulations would be permitted in, and adjacent to, the right-of-way. Existing land uses such as agriculture and grazing are generally permitted within the right-of-way. Incompatible land uses within the right-of-way include construction and maintenance of inhabited dwellings, and any use requiring changes in surface elevation that would affect electrical clearances of existing or planned facilities.

Land uses that comply with local regulations would be permitted adjacent to the right-of-way. Compatible uses of the right-of-way on public lands would have to be approved by the appropriate agency. Permission to use the right-of-way on private lands would have to be obtained from the owner of the transmission line (i.e. NorthWestern).

Safety and Grounding

Safety is a primary concern in the design of this 500kV transmission line. An AC transmission line would be protected with power circuit breakers and related line relay protection equipment. If conductor failure occurs, power would be automatically removed from the line. Lightning protection would be provided by overhead ground wires along the line.

All buildings, fences and other structures with metal surfaces located within 200 feet of the center line of the right-of-way would be grounded. Typically, residential buildings located 200 feet from the centerline would not require grounding. Other buildings or structures beyond 200 feet would be reviewed in accordance with NESC standards to determine grounding requirements. Also, all metal irrigation systems that parallel the transmission line for distances of 1,000 feet or more within 100 feet of the centerline would be grounded. If grounding is required outside of the right-of-way, land management agency or land owner consent would be obtained as necessary.

Maintenance

The 500kV transmission line would be inspected annually or as required by both ground and air patrols. Maintenance would be performed as needed. When access is required for non-emergency maintenance and repairs, NorthWestern would adhere to the same precautions that were taken during the original construction. Also, NorthWestern would comply with requirements of the land management agencies regarding the management of noxious weeds within the right-of-way and transmission line access roads.

Emergency maintenance would involve prompt movement of repair crews to repair or replace any damaged equipment. Crews would be instructed to protect crops, plants, wildlife, and other resources of significance. Restoration and reclamation procedures following completion of repair work would be similar to those prescribed for normal construction. The comfort and safety of local residents would be provided for by limiting noise, dust, and the danger caused by maintenance vehicle traffic. Details would be provided in the POD prior to line construction.

Abandonment

At the end of the useful life of the proposed project, if the facility were no longer required, the transmission line would be abandoned. NorthWestern would coordinate with the appropriate land management agencies to develop a plan for abandonment. For example, conductors, insulators and hardware would be dismantled and removed from the right-of-way. Structures would be removed and foundations broken off below ground surface.

If the line and associated right-of-way are abandoned or no longer needed at some future date, the right-of-way would be available for the same uses that existed prior to construction of the project.

Following abandonment and removal of the transmission line from the right-of-way, any areas disturbed to dismantle the line would be restored and rehabilitated as near as possible to their original condition.

Substations

Construction

Two new substations would be constructed in Montana; the 52 acre Townsend Substation located five miles south of Townsend, Montana, east of US 287 in Broadwater County and the 28 acre Mill Creek Substation located three miles south of Anaconda, Montana. Modifications to the existing Midpoint Substation in Idaho would be required to accommodate the new MSTI 500kV transmission line.

The construction of a substation typically consists of, but is not limited to the following sequence of activities:

- Cut and fill grading
- Placement and compaction of structure fill to serve as a foundation for equipment
- Grading to maintain drainage patterns
- Oil spill containment facilities
- Crushed rock surfaced yard, parking areas and roads
- Fencing and gating
- Landscaping with native plants where applicable
- Installation of equipment and structure foundations
- Subsurface grounding grids
- Subsurface conduit and raceway
- Installation of structures and equipment
- Installation of bussing materials
- Installation of control shelter
- Installation of control and relaying equipment and wiring

The maximum height of structures in the substation would be approximately 125 feet. The substation yards would be open air and could include transformers, circuit breakers, disconnect switches, lighting/surge arresters, reactors, capacitors, bus (conductor) structures, and a microwave antenna. In the case of the Mill Creek Substation a bank of phase shifting transformers to control electrical flows would be installed. The control shelter would be a structure approximately 50 feet wide, 100 feet long and approximately 12 feet high, and it would be constructed of conventional building material.

The substations would be designed and constructed in a manner to prevent and control accidental spills from oil filled equipment from affecting adjacent land uses. The ground level of the substation yard would be graded to direct the flow of water runoff away from equipment and the control shelter.

The yard would be covered with a layer of crushed rock (four or more inches thick) that would help inhibit flow of water or other liquids, and would serve as an absorbent in the event of an oil spill. Berms, or other barriers, would be used around the perimeter of the yard (along the fence line) to control runoff. Where needed, control areas such as retention ponds would be designed and constructed to contain runoff. Also, concrete containment pits would be constructed at the base of oil filled equipment to contain spills. These structures usually made of concrete would be designed to contain spills. If a large volume of oil were to leak from a piece of electrical equipment, an alarm or a failure would notify the operations center of the problem, and a trained maintenance crew would be dispatched to the substation immediately to begin repairs and cleanup. Oil Spill Contingency plans and/or Spill Prevention, Countermeasure and Control plans would be developed for the new Townsend and Mill Creek substations and updated for the additions of the Midpoint Substation. These plans explain clean-up and emergency notification procedures specific to each substation. Also the substation facilities would be enclosed by chain link fence with a locking gates, site security system and adequate night lighting.

Townsend, Mill Creek and Midpoint Substation Construction Schedules, Workforce and Cost Estimates

Construction of the entire MSTI project is anticipated to take 32 months. Construction of the substations would be performed concurrently with the transmission line and with conventional construction techniques in accordance with NESC codes, OSHA, Institute of Electrical and Electronic Engineers, American Concrete Institute, and other industry-specific standards.

It is anticipated that substation construction and additions would be preformed with two contractors, one for Montana and one for Idaho. The total workforce that would be required to complete construction of the substations would be just over 110 workers. It is assumed that construction would occur during a 6 day work week.

Figure B.3-4 illustrates the Townsend, Mill Creek and Midpoint construction work force requirements and duration for substation construction.

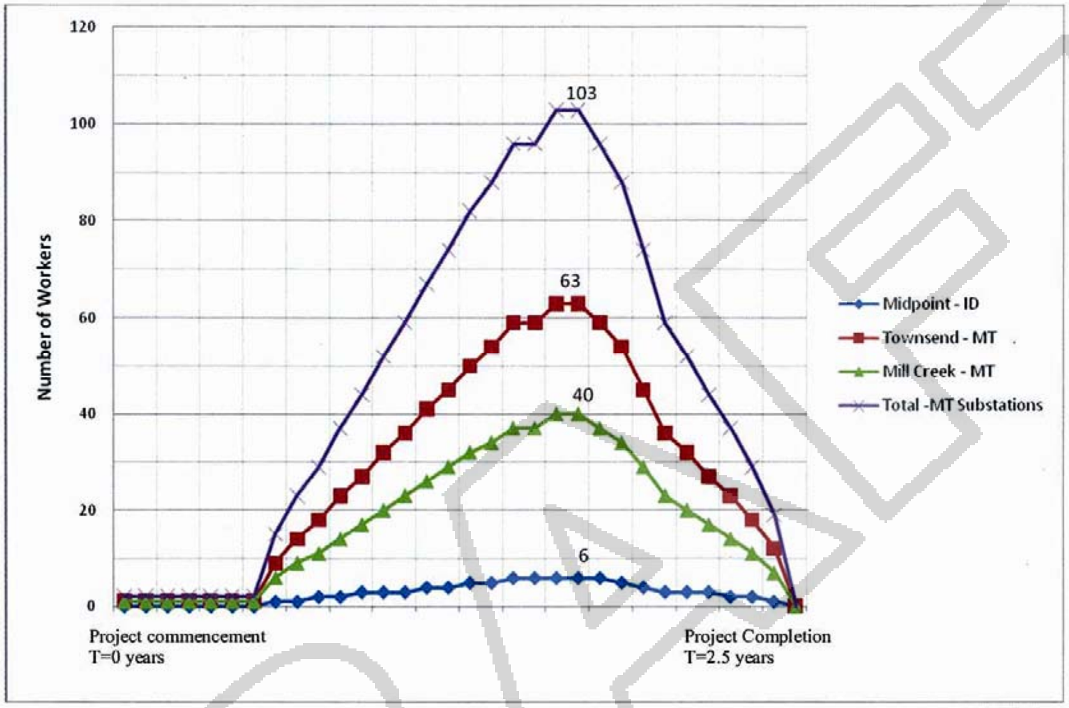

Figure B.3-4. Estimated Workforce and Duration for Townsend, Mill Creek and Midpoint Substation Construction

New Townsend Substation

Construction Schedule and Workforce

Site preparation would begin on about July of the commencement year, and conclude approximately 2.5 years later. The construction workforce would peak at an estimated 63 workers in March and April of the second year of work (assuming 50-hour work week averages) as shown in Figure B.3-4.

Estimated Cost

The estimated cost for labor and material to construct the new Townsend Substation is approximately $132 million in constant 2008 dollars. The estimate includes material costs and labor to install equipment, structures, foundations, site work, control shelter, grounding and conduit and cable. Other cost items in the estimate include, engineering, project management, procurement, construction management and testing, plus a 20 percent contingency.

New Mill Creek Substation

Construction Schedule and Workforce
Site preparation would begin on about July of the commencement year, and conclude approximately 2.5 years later. The construction workforce would peak at an estimated 40 workers in March and April of the second year (assuming 50-hour work week averages) as shown in Figure B.3-4.

Estimated Cost
The estimated cost for labor and material to construct the Mill Creek Substation is $123.5 million in constant 2008 dollars. The estimate includes material costs and labor to install equipment, structures, foundations, site work, control shelter, grounding and conduit and cable. Other cost items in the estimate include, engineering, project management, procurement, construction management and testing, plus a 20 percent contingency.

Midpoint Substation Modifications

Construction Schedule and Workforce
Site preparation would begin on about July of the commencement year, and conclude approximately 2.5 years later. The construction workforce would peak at an estimated 6 workers in March and April of the second year (assuming 50-hour work week averages) as shown in Figure B.3-4.

Estimated Cost
The estimated cost for labor and material to construct the modifications to the Midpoint Substation is $23.6 million in constant 2008 dollars. The estimate includes material costs and labor to install the equipment, structures, foundations, site work, control shelter, grounding and conduit and cable. Other cost items in the estimate include, engineering, project management, procurement, construction management and testing, plus a 20 percent contingency.

Substation Operation, Uses, and Practices
The following sections present the typical operational characteristics, permitted uses, safety, maintenance, and abandonment practices that would apply to the Townsend, Mill Creek and Midpoint Substations. More specific practices may be developed after the facilities become energized.

Operational Characteristics
The new Townsend Substation, Mill Creek Substation and the modified Midpoint Substation are switching points containing: transformers, power circuit breakers and related line relay protection equipment for the new 500kV transmission lines. The protective equipment and switches in the substations safely isolates the transmission lines for line outages due to maintenance or forced outages due to faults.

Permitted Uses
After the substation has been energized, land uses that are compatible with safety regulations would be permitted adjacent to the substation site. Existing land uses such as agriculture and grazing are generally compatible with a substation site. Incompatible land uses adjacent to a substation site include construction of facilities that would affect electrical clearances of existing or planned facilities coming into or out of the substation site.

Safety
Safety is a primary concern in the design and modifications of the 500kV substations (Townsend, Mill Creek and Midpoint). The substations will be protected with a secure perimeter fence containing the substation equipment (i.e. transformers, power circuit breakers, and related line relay protection

equipment). If a failure occurs, lines associated with the fault would be automatically isolated. Lightning protection would be provided by overhead ground wires along the substation equipment. Electrical equipment and fencing at the substations would be grounded. If applicable, grounding outside of the substation sites may also occur.

Maintenance

The 500kV substation sites would be inspected on a regular basis. The substation yards would be inspected monthly, requiring one person one work day to accomplish. Each gas circuit breaker would undergo routine annual inspections and maintenance, requiring three persons one work day to accomplish. The power transformers would receive annual maintenance taking two persons about one-half work day to complete. Capacitors would be maintained annually, requiring three persons one work day to complete. Emergency maintenance would involve prompt movement of specially trained repair crews to repair and/or replace any damaged equipment.

Abandonment

At the end of the useful life of the proposed project, if the facilities were no longer required, the substation sites would be abandoned. Subsequently, substation equipment would be dismantled and removed from the sites. Foundations and rock covering would also be removed.

Following abandonment and removal of the substation from the sites, any areas disturbed to dismantle the substation would be restored and rehabilitated as near as possible to their original condition.