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Western Federal Lands Highway Division
Vancouver, Washington

Petty Creek Road Improvement Project
MT PFH 71-1(1)
Environmental Assessment

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Petty Creek Road Improvement Project
Missoula County, Montana
Environmental Assessment

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U.S. Department of Transportation
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Cooperating Agencies
U.S. Department of Agriculture, Forest Service
Missoula County
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List of Abbreviations

AASHTO – American Association of Transportation Officials
ADT – average daily traffic
APE – area of potential impacts
BMP – best management practices
BST – bituminous surface treatment
CMT – culturally modified tree
EA – Environmental Assessment
EPA – U.S. Environmental Protection Agency
ESA – Endangered Species Act
FR – Federal Register
LNF – Lolo National Forest
MBTSG – Montana Bull Trout Scientific Group
MDT – Montana Department of Transportation
MPDES – Montana Pollutant Discharge Elimination System
MPH – miles per hour
MTDEQ – Montana Department of Environmental Quality
MTFWP – Montana Department of Fish, Wildlife, and Parks
NAAQS – National Ambient Air Quality Standards
NCDE – Northern Continental Divide Ecosystem
NEPA – National Environmental Policy Act
NRHP – National Register of Historic Places
PCE – primary constituent element
RCA – Resource Conservation Area
SAFETEA-LU – Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SEE – Social, Economic, and Environmental Team
SHPO – State Historic Preservation Officer
TMDL – Total Maximum Daily Load
USFS – U.S. Forest Service
USFWS – U.S. Fish and Wildlife Service
WFLHD – Western Federal Lands Highway Division

1 Project Description

1.1 Location of the Proposed Project

The Western Federal Lands Highway Division (WFLHD) of the Federal Higwhay Administration, in cooperation with the Lolo National Forest (LNF) of the U.S Forest Service (USFS) and Missoula County, proposes to upgrade an 11.8-mile (mi) [19-kilometer (km)] segment of the Petty Creek Road. The proposed upgrade is located in Missoula County, Montana (MT), and it leads into the eastern portion of the Ninemile Ranger District of the LNF. It begins approximately 1 mile southeast of the community of Alberton, MT and extends south roughly paralleling Petty Creek. The entire Petty Creek Road route begins at the junction of Interstate 90 and connects to Graves Creek Road at approximately MP 13 [20.1 km]. Graves Creek Road then continues approximately 5 mi [8 km] to US 12 for a total distance between Interstate 90 and US 12 of approximately 18 mi [29 km]. WFLHD proposes to improve 11.8 mi [19 km] of the total length, beginning at the south side of the Montana Rail Links railroad tracks and ending near the intersection with South Fork Petty Creek Road (Figures 1 and 2).

The first 1.3 mi [2.1 km] of the Petty Creek Road are on private land up to the LNF boundary. Beyond that point the road lies within the boundaries of the LNF and is represented by a "checkerboard" of USFS and private land. It provides access to several residences, land owned by the Plum Creek Timber Company, and portions of the LNF. The corridor can be characterized as a narrow riverine valley oriented north-south and bounded by forested slopes. Between approximately MP 6 [9.7 km] and MP 11 [17.7], the valley broadens and is characterized by irrigated agricultural lands. Unimproved pullouts leading to trails or access to Petty Creek characterize recreation areas along Petty Creek.

1.2 Scope and Nature of the Proposed Action

The proposed upgrade to Petty Creek Road would include minor realignment to move the road away from Petty Creek and soften some sharp curves, uniform roadway width, placement of aggregate base and asphalt concrete pavement, culvert and bridge structure replacement, drainage improvements, clearing and grubbing, addition of guardrails, signs, and striping, stream and floodplain enhancement, riparian and cut slope vegetation improvements, and soil stabilization and sediment delivery reduction measures. More specific information on the project alternatives is presented in Chapter 3 of this Environmental Assessment (EA).

1.3 Jurisdiction

The Petty Creek Road is the primary access to this portion of the LNF. In 2001, the project was programmed in the Forest Highway Program by the Tri-Agency, which consists of the WFLHD, the USFS, and the Montana Department of Transportation (MDT). The WFLHD, who administers the Forest Highway Program in cooperation with the FS, is designated as the lead agency and is responsible for project development and construction. Missoula County owns the right-of-way or has easements for the existing road corridor and would be responsible for maintenance and jurisdiction of the route.

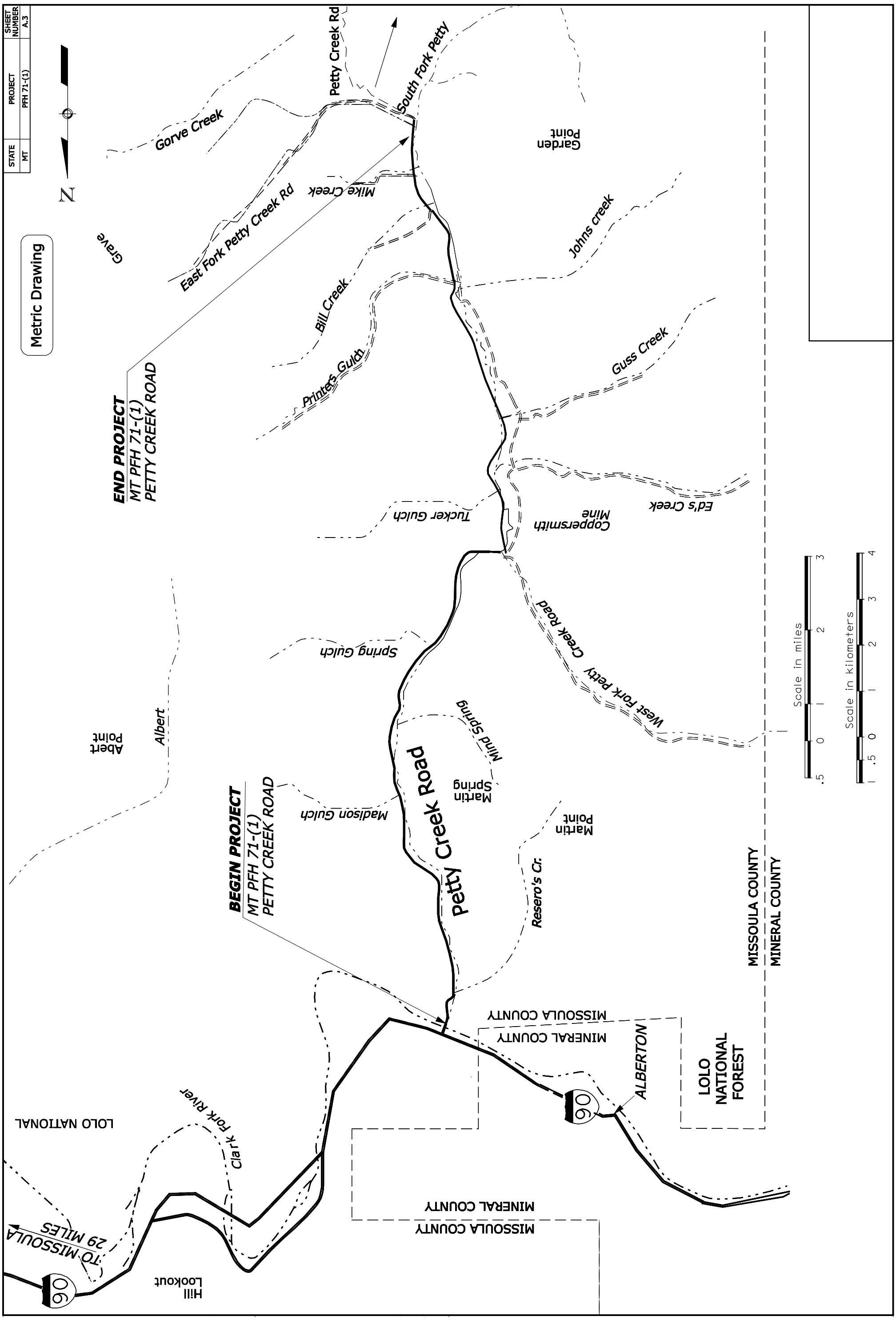

Figure 1. Location Map

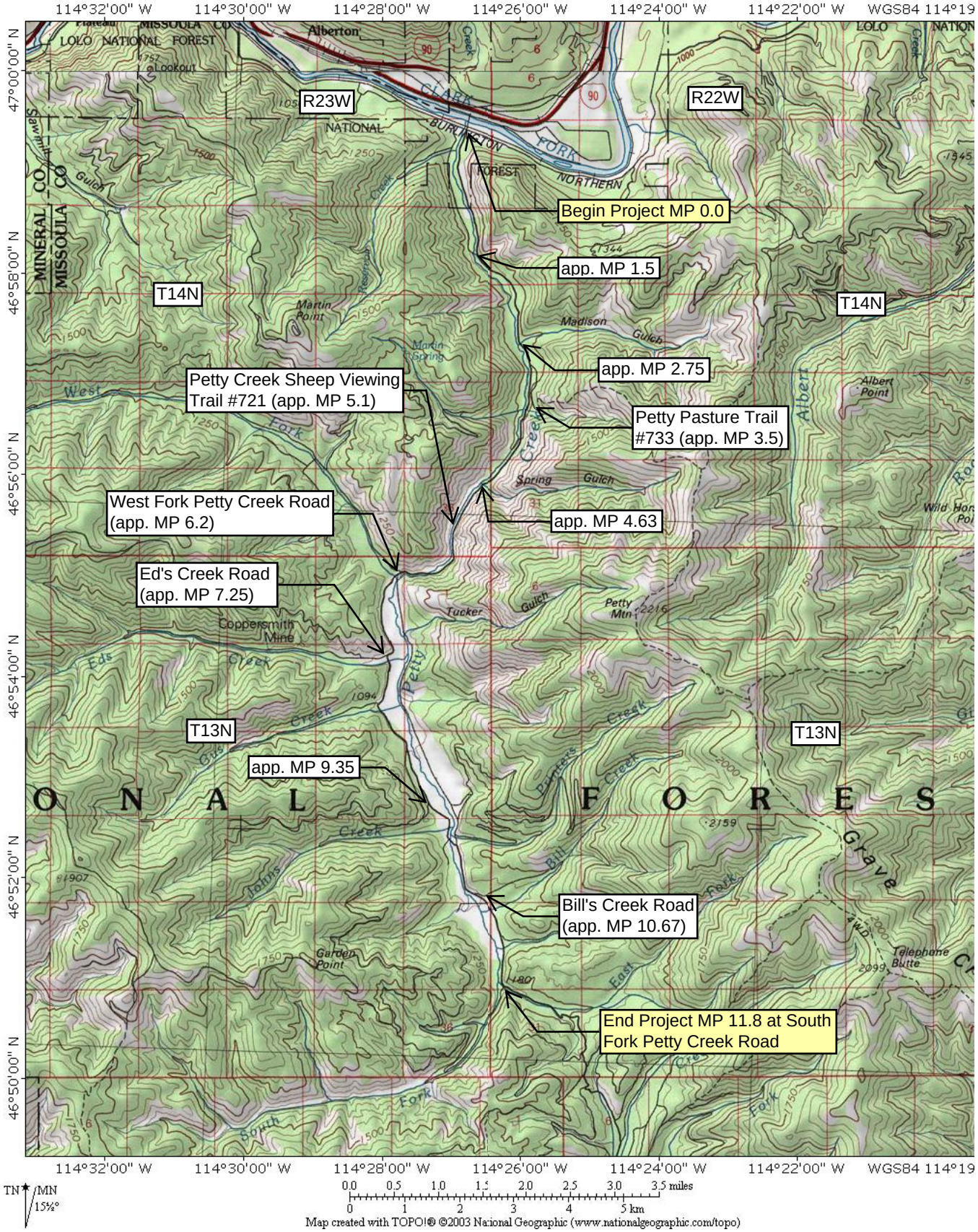

Figure 2. Topographic Map

1.4 Social, Economic, and Environmental Team

A Social, Economic, and Environmental (SEE) Team was set up in the early stages of project development to coordinate public participation, confirm engineering design criteria, identify environmental issues, and develop project alternatives. The SEE Team, composes of representatives of the USFS, Missoula County, MDT, and WFLHD, acts as a steering committee for project development activities during the conceptual and design phases of the project.

1.5 Funding

The proposed project is funded through the Forest Highway category of the Federal Lands Highway Program, which is part of the Federal Highway Trust Fund. Funding from this program aids public agencies such as county and state transportation departments in providing safe, efficient public roads that serve national forest-related traffic. To qualify for this program, a road must be located within or adjacent to a national forest and be essential for the protection, administration, and utilization of the forest and its resources. In Montana, the WFLHD, the USFS, and the MDT jointly select projects to be funded under the Public Lands Highway Program. The MDT represents the interests of counties that have nominated projects for funding.

As administrator of the Forest Highway Program, the WFLHD is responsible for the development of the proposed project and is the lead agency for compliance with requirements of the National Environmental Policy Act (NEPA). The proposed project was nominated jointly by Missoula County and the USFS. Missoula County would coordinate and finance all necessary right-of-way acquisitions.

2 Purpose of and Need for Project

The purpose of the proposed Petty Creek Road Project is to improve Petty Creek Road's operational safety, reduce its excessive maintenance efforts, and reduce its contribution of sediment to Petty Creek. To meet this purpose, several conditions of the Petty Creek Road require relief. These conditions, described in more detail in this section, include the following:

- Varying, inconsistent roadway widths
- Narrow roadway
- Lack of shoulders
- Lack of a sufficient area for errant vehicles to recover
- Excessive airborne dust
- Substandard driving surface that has potholes, wash-boarding, loose gravel, and pavement cracking
- Undersized culverts and bridges
- Inadequate bridge approach rails
- Lack of or inadequate road warning signage and lack of road markings designating travel lanes
- Lack of or inadequate drainage ditches
- Inadequate parking for users of Petty Pasture Trail (#733) and Petty Creek Sheep Viewing Trail (#721)
- Proximity of the road to Petty Creek

2.1 Project Termini

The project terminates at MP 11.8 [19 km] because of the following:

A. Traffic is very light south of the project terminus, and the grade becomes steeper as the road ascends the divide between Petty Creek and Graves Creek. The lighter traffic and steeper grade requires travel at slower speeds.
B. School bus service and mail delivery terminate at Bill's Creek Road, and South Fork Petty Creek Road is the southern most road providing access to private residences from Petty Creek Road, reducing traffic needs past this point.
C. Traffic volumes beyond this portion of the road are projected to remain low into the foreseeable future, reducing the potential need for future improvements. Neither Missoula County nor the Forest Service have current plans to improve Petty Creek Road south of South Fork Petty Creek Road nor do they anticipate the need to improve that segment of the road within the next 20 years.

2.2 Existing Road Conditions and Deficiencies

From MP 0.0 [0.0 km] to MP 1.3 [2.1 km], Petty Creek Road is in fair condition. The surface consists of a bituminous surface treatment (BST[1]) with an existing roadway width

[1] *In appearance, a BST looks much like an asphalt concrete pavement used on state highways. The BST provides a hard riding surface like an asphalt surface, however the surface texture is rougher due to exposure of the aggregate through the asphalt application. In addition, a BST has a shorter service life, is more flexible, and is less expensive than standard asphalt concrete pavement. BST is constructed with two or three applications of the following; a layer of liquid asphalt covered with aggregate for a total thickness of 1± inches.*

varying between 21.0 feet (ft) [6.4 meters (m)] and 25.0 ft [7.6 m]. Moderate alligator cracking is prevalent throughout this portion of the roadway. This cracking contributes to an uneven surface, compromising traveler safety by contributing to loss of vehicle control. Left over road millings from construction on I-90 were placed over the asphalt in the past, but cracking continues.

The Forest Service reconstructed the remainder of the route south of MP 1.3 [2.1 km] in 1972. It currently consists of a narrow and gravel surface roadbed with a width varying from 20.0 ft [6.1 m] to 24.0 ft [7.3 m]. This portion of the road tends to undergo rapid changes due to seasonal conditions, vehicular use, and maintenance operations resulting in an uneven road surface characterized by potholing and wash-boarding. The uneven road surface compromises a driver's ability to maintain vehicle control contributing to unsafe conditions. As a temporary remedy, county maintenance crews smooth the road surface with a grader, however maintaining an even surface requires frequent grading which the county cannot reasonably accommodate due to insufficient road maintenance funds, staffing, and equipment. If maintenance is not sustained, the condition worsens, making travel more hazardous and cumbersome. Also, as the gravel road has been graded, side-casting of road material has tended to widen the road, contributing to sedimentation by pushing gravel closer to Petty Creek and clogging drainage ditches.

Maintaining control of a vehicle can be difficult on the uneven and deficiently maintained surface of Petty Creek Road, particularly when turning and stopping. A loss of vehicle control can lead to collisions or road departure, and can compromise the safety of users of the road.

At numerous curves, the road does not meet the minimum safety standards of the American Association of State Highway and Transportation Officials (AASHTO) for the 35 miles per hour (mph) [56.3 kilometers per hour (kph)] current and proposed design speed of the road, which calls for a curve's radius to be no less than 410.1 ft [125.0 m] (AASHTO 2004). Additionally, there is a lack of or inadequate signage to help compensate for the deficiencies. These conditions compromise driver safety if drivers do not drive at a proper speed for successful maneuvering through the curves.

Centerlines and other pavement markings are non-existent on the graveled portion of Petty Creek Road. This lack of clearly designated lanes often produces two less desireable driving scenarios. One scenario is to drive too close to the edge of the roadway where road fill is less stable, potentially forcing vehicles off the roadway. The other scenario is to drive more in the center of the roadway, increasing the potential of running into oncoming traffic, particularly around curves in the road. Given the current and projected traffic volumes on Petty Creek road, which is discussed in Section 2.4, the absence of this feature is a critical safety compromise.

Lingering airborne dust is a considerable environmental and safety issue. Problems with airborne dust along the graveled portion of the road are the principal complaints of valley residents. Dust is more problematic in summer, however, lingering airborne dust can be observed even with patchy ice on the frozen gravel road surface. The dust severely limits

a driver's ability to see on-coming traffic, wildlife, or other objects on the road, which contributes to the road's unsafe operational conditions. Additionally, the U.S. Environmental Protection Agency (EPA) lists dust from unpaved roads as a major source of particulate matter (airborne particles less then 10 microns in diameter), which at high levels, has been shown to be harmful to lung tissue and aggravate asthma symptoms (USEPA 2006). Numerous users of Petty Creek Road have indicated during public meetings or through written comments that dust generated from the road has contributed to respiratory problems.

Petty Creek Road contributes sediment to Petty Creek and its tributaries due to its proximity to these waterways as well as to the fact that the road is composed primarily of gravel. Grinding of the gravel surface during road use creates sediment that is transported to the waterways by storm water and wind. Sediment from roads has been cited by the Montana Department of Environmental Quality as a probable source contributing to the impaired water quality designation of Petty Creek. The road parallels and is very close to the creek in several locations, contributing to sediment delivery.

Additionally, in several locations, widening of the road due to maintenance grading has resulted in encroachment into the creek, which contributes to sedimentation and is likely to continue under current conditions.

Several of the stream crossing structures along Petty Creek Road are too small for adequate water transfer during high-flow storm events. During high flows, the small crossing structures cause storm water to back up upstream, causing flooding, which compromises the road's stability and safety. There is an increased risk of structure failure due to excessive local erosion from these events, requiring additional maintenance efforts. Additionally, storm water velocity is increased as it is forced through the inadequately sized structures, resulting in increased stream bank erosion and subsequent sedimentation of the water. The inadequately sized structures are at Madison Gulch (MP 2.75 [4.43 km]), Spring Gulch (MP 4.63 [7.45 km]), West Fork Petty Creek (MP 6.28 [10.11 km]), Ed's Creek (MP 7.36 [11.84 km]), Gus Creek (MP 7.95 [12.79 km]), John's Creek (MP 9.63 [15.50 km]), Upper Petty Creek (MP 9.72 [15.64 km]), Bill's Creek (MP 10.72 [17.25 km]), Mike's Creek (MP 11.13 [17.91 km]), and East Fork Petty Creek (MP 11.63 [18.72 km]).

Both the paved and unpaved portions of Petty Creek Road consist of narrow and inconsistent roadway widths with inadequate shoulders. The inconsistent widths tend to give drivers an inaccurate sense of travel space, and the narrow road and the inadequate shoulders do not allow sufficient room for errant vehicles to recover when departing from travel lanes, all of which contribute to unsafe driving conditions. Additionally, the clear zone[2] contains numerous obstacles such as mail boxes, trees, and fences, adding to unsafe conditions when an errant vehicle departs the roadway.

[2]*The clear zone is the area paralleling the edge of the travel lane that should be free of any hazards that cannot be safely impacted by a run-off-the-road vehicle.*

Deficient road signage is also a safety problem along the road. Drivers of Petty Creek Road are often not adequately informed of travel speeds or potential roadway hazards to properly anticipate road conditions, contributing to safety compromises.

Wildlife use the areas adjacent to the roadway, and it is not uncommon for them to cross the roadway. This is especially true of bighorn sheep that reportedly enter the roadway at three general locations: MP 0.12 [0.19 km] to MP 1.62 [2.61 km], MP 2.42 [3.89 km] to MP 3.04 [4.89 km], and MP 4.85 [7.81 km] to MP 5.5 [8.85 km] (MTFWP, 2005 and Hererra, 2004c). Many unsuspecting drivers are not aware of the potential conflicts because there are no posted warning signs. Occasionally, this conflict between wildlife and drivers can lead to collisions or road departures.

Much of Petty Creek Road contains insufficient drainage measures for storm water runoff control. Runoff drains directly from the slopes and roadway onto the surrounding ground surface or into streams. This promotes erosion, and suspended sediments often are not allowed to settle out of the runoff before entering nearby streams, contributing to sedimentation. Additionally, erosion of the roadway and side slopes necessitates additional maintenance to keep the roadway stable.

The Petty Pasture Trail (#733) and the Petty Creek Sheep Viewing Trail (#721) are accessed from Petty Creek Road (Figure 2). Currently, there are no formally designated parking areas located near the trails, further compromising safe travel on the road. Trail-users park on the side of the road and walk along the road to reach the trailheads. During this time, they are at an increased risk of being hit by a vehicle, and drivers are forced to use the opposite side of the road to avoid a collision, which in turn increases the risk of collision with traffic coming from the opposite direction.

Many of the deficiencies described above require frequent maintenance efforts by Missoula County. The loose gravel, potholes, and wash boarding require frequent grading of the graveled portion, and alligator cracking requires patching of the paved portion to provide a smooth travel surface. These fixes are temporary and must be addressed regularly to maintain a smooth surface. Erosion of the roadbed and around the undersized stream crossing structures requires maintenance to keep the road and structures stable and functioning properly. Missoula County's available funding, staff, and equipment is limited, which further exacerbates the deficiencies.

2.3 Road Uses

The Petty Creek Road serves residential, commercial, forest and recreational traffic within this segment of the Lolo National Forest and connects with other Forest Development roads accessing adjacent NF lands. The route provides the principal access for the protection, administration, and utilization of this portion of the Ninemile Ranger District of the Lolo National Forest. It is not normally open during the winter months beyond the South Fork Petty Creek Road (Figures 1 and 2).

The road is primarily for residential use in providing access between homes and Interstate 90. It provides the only access to approximately 78 private property parcels along the

Petty Creek Road and approximately 59 parcels along West Fork Petty Road. It is also used for mail delivery, emergency vehicles, and school buses to these parcels. The school bus turnaround on Petty Creek Road is at Bill's Creek Road (Figures 1 and 2). The road also provides access to NF recreational facilities including dispersed camping sites, trailheads, fishing and hunting access, and scenic vistas.

The principal commercial use on the Forest and private lands is timber harvest and hauling. Petty Creek Road is the primary timber haul route for this portion of the Lolo National Forest and lands owned by Plum Creek Timber Company. Approximately 1 to 2 million board feet of timber is accessed from areas adjacent to the road corridor each year, and this level is expected to continue into the future. This translates into approximately 333 to 667 truckloads of timber annually.

The road corridor is reported to receive some use as a direct link between US 12 and Interstate 90. The amount of such use is currently unknown and cannot be differentiated from recreational and residential uses.

2.4 Traffic Volumes

Average Daily Traffic (ADT), the average number of vehicles that travel in both directions over the route each day, was calculated from data provided by Missoula County. Traffic counts were taken in August/September of 2004 to evaluate vehicle counts and patterns of travel. Table 1 enumerates a week's traffic counts in terms of daily traffic, average speed, daily average for the week, and daily average for multi-axle (5 axle or greater) vehicles. Among the observations it is evident that traffic is highest near the beginning of the project at MP 0.0 [0.0 km] (412 ADT), drops to approximately ½ (204 ADT) at MP 6.3 [10.1 km] near West Fork Petty Creek Road, and drops to approximately ¼ (104 ADT) at MP 9.9 [15.9 km] near Bills Creek Road. This count is a snapshot and is not necessarily representative of travel throughout the year.

Table 1. Traffic Counts August 31 –September 6, 2004

Location/ Direction	Average (Ave) Speed (mph)	Mon	Tue	Wed	Thu	Fri	5 day Ave	Sat	Sun	7 day Ave	Multiple Axle 7 Day Ave
MP 0.0 / North	35	210	222	229	216	220	**219**	164	183	**206**	**4.1**
MP 0.0 / South	34	206	212	220	222	226	**217**	170	183	**206**	**3.0**
South of West Fork Road (MP 6.3) /North	35	115	108	103	109	104	**107**	88	93	**103**	**4.1**
South of West Fork Road (MP 6.3) /South	37	105	108	99	107	107	**105**	98	84	**101**	**1.9**
Bills Creek Road (MP 9.9) /North	34	82	36	36	32	50	**47**	52	85	**53**	**3.9**
Bills Creek Road (MP 9.9) /South	31	70	41	31	34	52	**46**	61	71	**51**	**0.7**

Design of new highways or improvements to existing highways should not be based on current traffic volumes alone, but should consider future traffic volumes expected to occur within the design life of the facility. Twenty years is the widely accepted design life of highways such as Petty Creek Road. As described above, the highest ADT was 412 at MP 0.0 [0.0 km] based upon traffic counts in 2004. While traffic drops off considerably from the north part of the project to the south, it is also widely accepted that a road should be designed for the highest traffic count. Therefore, 412 ADT was used to calculate future traffic estimates. Future traffic volumes were computed by applying an annual growth factor to the current traffic volumes. For this project, an annual growth rate of 3 percent was assumed to account for increased traffic. The projected traffic volumes were estimated to be 492 ADT in 2010, the conceptual construction date, and 888 ADT in 2030, the 20 year design life.

2.5 Accident History

Eighteen accidents were documented within the 4 years between 1998 and 2002. Two of the accidents resulted in injury, 15 resulted in vehicle damage only, none resulted in fatalities, and 1 did list damage, injury, or fatality. Anecdotal documentation indicates 1 fatal accident occurred due to excessive speed at MP 0.5 [0.8 km] in 1997. Causes of the 18 reported accidents were: excessive speed for 9 accidents (50%), inattentive/careless driving for 7 accidents (39%), animals for 2 accidents (11%), ruts/holes/bumps in road for 1 accident (6%), alcohol for 1 accident (6%), and no cause was given for 2 accidents. The accident data did not specify if the attributions to animals had evidence of an actual collision, or if an avoidance maneuver resulted in the accident. A summary of accident data is presented in Attachment 1.

3 Alternatives Considered

This section describes the no-action alternative and the build alternatives, which includes the preferred alternative, and the alternatives considered during alternative assessment but rejected from further evaluation.

3.1 No-Action Alternative

Under the no-action alternative, no improvements would be made to the Petty Creek Road between MP 0.0 [0.0 km] and 11.8 [19.0 km]. Missoula County would continue routine maintenance, but its cost effectiveness would decrease as road conditions deteriorate further. Missoula County would have to increase the frequency of its maintenance to keep the road operational. Maintenance efforts associated with Petty Creek Road would not be reduced. Future road reconstruction could be financed by Missoula County, however, the County Board of Commissioners would make this decision, and its priority would be weighed against the reconstruction needs of other county roads.

Safety of Petty Creek Road would not be improved through the no-action alternative for the following reasons:

- roadway widths would remain narrow and inconsistent
- shoulders would remain lacking
- there would be an insufficient area for errant vehicles to recover
- potholes, wash-boarding, loose gravel, and pavement cracking would continue to result in an uneven driving surface and potentially contribute to loss of vehicle control
- the sharp curves described in Chapter 2 would not be corrected
- warning signage and pavement markings would be lacking
- safe parking for users of Petty Pasture Trail and Petty Creek Sheep Viewing Trail would not be provided
- if not treated through maintenance, road dust would continue to limit drivers' sight distance and be a source of particulate matter in the area
- crossing structures would continue to be undersized, and large storm events would continue to flood areas and compromise the stability of the road

Sediments entering Petty Creek from the existing road would not be reduced. Use of the gravel road would continue to create sediment that would subsequently be transported to the creek by runoff and wind. The road would remain close to Petty Creek in several areas, continuing easy transport of sediment to the creek. Also, undersized crossing structures would continue to result in stream bank erosion and subsequent sedimentation.

Ultimately, the no-action alternative would not meet the purpose and need of the proposed project because it would not improve the operational safety of Petty Creek Road, reduce its maintenance efforts, or reduce its contribution of sediment to Petty Creek.

3.2 Preferred Alternative

The preferred alternative was developed by the SEE Team to address project purpose and need and issues raised by the public and other government agencies, summarized in Attachment 6. It includes mitigation measures that would be performed if the project were implemented. Mitigation measures are various measures put into effect during project design and construction to avoid, minimize, or rectify harm to the natural and social environment.

The preferred alternative proposes creating a paved uniform roadway width of approximately 24 ft [7.3 m] with one travel lane in each direction and adjacent shoulders. The roadway would meet minimum AASHTO standards with the exception of three curves at:

(MP 6.71 to 6.92) [10.80 to 11.14 km] – West Fork Petty Creek
(MP 7.77 to 7.95) [12.50 to 12.79 km] – Ed Creek Road
(MP 8.39 to 8.53) [13.50 to 13.73 km] – Gus Creek Road

Full AASHTO-compliant reconstruction would require bypassing the existing alignment curvature in these three areas. However, to minimize impacts to wetlands, vegetation, wildlife, and soils, the preferred alternative would maintain the curvature in each of these segments, and the road would be posted with warning signs and lower speed limit signs as a safety measure. Along the rest of the road, additional road signage and pavement markings would be provided or upgraded, obstacles in the clear zone would be removed, and drainage would be improved.

The reconstruction would largely follow the existing alignment with small alignment adjustments primarily where Petty Creek Road is close to the creek. Where feasible, the road would be moved away from Petty Creek, and the area between the road and creek would be planted with vegetation. The appropriate types of vegetation and plant spacing would be coordinated with Forest Service staff.

The undersized stream crossing structures described in Chapter 2 would be replaced at existing locations with no major alignment changes. These structures would be designed to accommodate 100-year flood events, which would avoid excessive ponding at the inlets and excessive erosion at the outlets. The new stream crossing structures would be designed to provide a natural bank-full stream configuration and substrate within the crossing, providing passage during all life stages of fish species.

To accommodate new culvert/bridge installations, temporary detours and diversion channels would likely be constructed. The details of these detours are not currently specified, however, the following describes a typical detour and diversion channel. The detours consist of pipe culverts placed in the water body with fill placed over the culverts for traffic to pass. The channel diversions would be constructed parallel to the existing channel and lined with plastic or riprap. The old structure would be removed and once construction of the new structure is complete, the diversion channel would be backfilled and revegetated.

Given the lack of safe parking near the Petty Pasture Trail and the Petty Creek Sheep Viewing Trail, formally designated parking would be provided to improve safety. The parking areas would be constructed along side the road and sized to accommodate about five vehicles per parking area. Details would be coordinated with the USFS, and where feasible, the informal parking areas currently used by trail users would be incorporated into the final design.

Ancillary Sites

A proposed staging site for construction equipment is located along Petty Creek Road at approximately MP 2.61 [4.20 km]. It is approximately 197 ft [60 m] long x 49 ft [15 m] wide and would be used to store construction equipment and materials, and refuel vehicles. A proposed material waste site is located at approximately MP 1.04 [1.67 km]. It is approximately 197 ft [60 m] long x 66 ft [20 m] wide and would be used to dispose of excess excavated material generated during construction.

There may be some construction activities that would take place outside the construction limits that would require ground disturbance, occupation, clearing, or could result in some environmental impacts. Such activities may be material extraction, material wasting, water retrieval, staging, etc. These activities would take place at either commercial or non-commercial sources. Commercial sources are established, have provided material to public and private entities on a regular basis over the last two years, have appropriate state and local permits, and do not require expansion outside their currently established and permitted area.

Should a non-commercial source be used, use of the area: (a) would not affect properties on or eligible for listing to the National Register of Historic Places (NRHP); (b) would have *no effect* to species or habitat listed as threatened or endangered under the Endangered Species Act (ESA), and (c) would not encroach into waters of the U.S. or wetlands protected under Executive Order 11990.

Correlation with Purpose and Need

Several features of this alternative would improve the operational safety of Petty Creek Road. A paved surface would provide an even surface free from wash boarding and loose gravel and would be more resistant to potholes, affording greater vehicle control. A paved surface would also substantially reduce airborne dust, improving sight distance and reducing its potential contribution to respiratory health problems. Constructing a consistent road width with shoulders would provide increased lane space to give a buffer between opposing streams of traffic and allow drivers more room to avoid obstacles on the roadway and errant vehicles to recover from lane departures. Clearly designated lane markings on the paved surface would provide drivers with an improved sense of travel space and reduce the tendency for drivers to travel near the edge or the center of the roadway, which is particularly important when maneuvering through curves in which sight distance may be limited. A clear zone free of obstacles would improve safety for vehicles that depart the roadway. Improved road signage would help drivers anticipate

road conditions by informing them of appropriate travel speeds and potential travel hazards. Appropriately sized stream crossing structures would reduce the potential for flooding and compromised road stability. Improving substandard curves, where feasible, to meet AASHTO's minimum radius standard would improve safety by making the curves less sharp for the design speed of the road, potentially reducing road departures. Although these curves would be improved, an overall curvilinear design of the road would be retained, helping to deter excessive vehicle speeds.

Several features of this alternative would help reduce sedimentation resulting from Petty Creek Road. Providing a paved surface would eliminate the production of sediments created by the crushing of a graveled surface from road use. Where feasible and where the road is in close proximity to the creek, the road would be moved slightly away from the creek and planted with vegetation to provide a buffer to allow more sediment to be filtered out of storm water runoff before entering Petty Creek. Improved drainage ditches would also allow sediment to be filtered out of storm water runoff before entering the creek. Replacement of the undersized stream crossing structures with appropriately sized structures would reduce the velocity of water passing through the structures and the potential for flooding, thereby lessening erosion of the stream banks and the roadbed.

Several features of this alternative would reduce maintenance efforts of Petty Creek Road. A paved surface requires less frequent maintenance because it is more durable than a graveled surface; it eliminates the problem of wash boarding and is less prone to potholes. Installing appropriately sized stream crossing structures and moving the road away from the creek where feasible would better protect the stability of the road, reducing the need for future costly maintenance. Additionally, the consistent road width and designated travel lanes would concentrate the pavement load (tire tracks) farther from the road edges, protecting the pavement edges and reducing the need for surface and shoulder maintenance.

3.3 Alternatives Considered but Not Advanced

The tri-agency deliberated on other alternatives during planning and scoping for this project. Many design options were considered and most consisted of variations on the preferred alternative described above. These variations were not regarded as different enough nor did their environmental impacts vary enough to warrant discussion in this environmental assessment as stand alone alternatives. However, a graveled surface alternative was considered and is discussed here.

3.3.1 Gravel Alternative

Selection of surfacing is dependent upon a variety of factors including existing location and design, existing and projected types of traffic and speeds, structure stability, safety, climate, environmental issues, dust abatement, maintenance efforts, and ADT. AASHTO states that for traffic volumes of 250 vehicles per day or more, crash rates are generally higher for unpaved roads than paved roads (AASHTO 2001). The 2010 ADT for the northern portion of Petty Creek Road is estimated to be 492 vehicles per day and the 2030 ADT is estimated to be 888 vehicles per day.

Gravel roads with lower ADT generally last much longer while those with higher ADTs deteriorate more rapidly. Use of a gravel road eventually results in variable surfaces in the form of wash boarding and the development of potholes. To address these adverse conditions, the county responds by grading the gravel road to provide a smoother surface, and as traffic increases, this maintenance would need to be conducted more frequently. Responding to the increased maintenance demand becomes cost prohibitive for the county. Additionally, grading of gravel roads generally results in an increasing width as road shoulders are widened by grading and side-casting. Gains realized by relocation of the road away from Petty Creek and associated wetlands may be lost through such routine maintenance as the road surface widens.

Also, the project would not address the problem of air-borne dust if a gravel surface were provided. This reduces a driver's sight distance, which can lead to collisions or road departures and as described earlier, too much dust can exacerbate or lead to respiratory problems. While there are alternative methods of dust abatement such as the application of dust suppressants, they are expensive to purchase, apply, and maintain, requiring additional equipment, labor hours, and fuel. Additionally, there is limited and conflicting information about the effectiveness of these products and their environmental impacts. Given these uncertainties and the county's limited road maintenance budget, applied dust suppressants were eliminated as feasible options.

As gravels get crushed together through use of the road, fine sediments are created which are transported to nearby waterways by wind and rain, degrading the quality of the water. This affects wildlife that use the stream, particularly fish species.

There is a general impression that vehicle speeds increase on paved roads versus gravel roads. However, this is not accurate for all roads. The speeds on a paved road versus a gravel road may be relatively equal if the alignment of the road is curvy. Traffic speed data was gathered on Petty Creek Road in 2004 along the paved portion of the road as well as the graveled portion. There was very little difference in traffic speeds between the two road types, as illustrated in Table 2. Only 2% more of the traffic traveled at 35-39 mph on the paved portion versus the graveled portion, 1% less at 40-49 mph, and percentages were the same at 50-70+ mph. Therefore, if the relatively curvy alignment of the Petty Creek Road is maintained, a graveled surface would likely not result in substantially lower traffic speeds when compared with a paved surface.

Table 2. Percentages of traffic traveling at various speeds along paved and graveled portions of Petty Creek Road.

	<35 mph	**35-39 mph**	**40-49 mph**	**50-70+ mph**
Paved	52%	27%	19%	2%
Graveled	54%	25%	20%	2%

Additionally, a gravel road can compromise driver safety. Loose gravel, wash boarding, and potholes hinder a driver's ability to keep a vehicle safely under control when braking, swerving quickly, and maneuvering curves. Also, a gravel surface prevents the

placement of pavement markings on the road to designate driving lanes and shoulders, eliminating the opportunity to provide these important safety elements.

For the above reasons related to safety, maintenance, and sedimentation, the graveled surface alternative would not meet the purpose and need for the project.

4 Affected Environment and Environmental Consequences

This chapter describes the existing environment for each resource potentially affected by the no-build and preferred alternatives. The no-build information is used as a baseline on which to determine the environmental consequences of the preferred alternative. Each resource heading includes a description of the affected environment followed by a discussion of the effects on the resource. Also included are mitigation measures proposed to avoid, minimize, and/or compensate negative impacts to resources caused by the project.

4.1 Soils and Geology

4.1.1 Affected Environment

Soils in the Petty Creek project area are composed of fine wind-deposited materials influenced by volcanic ash, with alluvium and colluvium derived from moderately weathered meta-sedimentary rocks. The lower 4 miles of the canyon are relatively narrow. The stream channel dominates, interspersed with occasional intersecting small valleys. The valley above the West Branch is very broad, with deep alluvial deposits.

Lower canyon slopes are steep and complex, dominated by the exposed and underlying bedrock. Accordingly the slope gradients are typically over 60 percent. Soils have a moderately fine to medium texture and are well drained. Sub-soils contain 35 to 50 percent rock fragments, whose durability can be low in highly weathered bedrock.

The terrain along the route varies from steep and rough for the first 5 miles, hemmed in between steep slopes and the adjacent Petty Creek. Beyond MP 6.2 [10.0 km] at the confluence with West Fork Petty Creek, the creek opens to a broad, open valley for the remainder of the project. Total elevation gain is approximately 815 ft [248 m], for an average gain of 69 ft [21 m] per mile.

4.1.2 Project Impacts

No-Action Alternative. Because the no-action alternative would not expose new soils or rock cuts, it would not result in new impacts to the soils and geology of the area. The existing cuts would remain and continue to undergo the effects of erosion.

Preferred Alternative. Due to the proximity of the existing road to Petty Creek, plans to widen the roadway, move it away from Petty Creek, or soften some curves would require cutting into some of the hillsides. Exposed cut slopes would be subject to wind and water erosion over the short term until vegetation is reestablished, which is expected to be approximately 3 years. Due to steep slopes and harsh growing conditions, vegetation would not establish on 100% of the cut slope areas; however, the objective is to maximize re-vegetation of the cut slopes by using best management practices (BMP) such as staked wattle rolls, scattering wood debris, mulching, seeding, fertilizing, and planting native shrub and tree species where appropriate and feasible. Native species would improve the rate of re-vegetation over the long term, as they are more adapted to

the growing characteristics of the area. The design of the cut slopes, which would be similar to naturally occurring slopes, and incorporated vegetation pockets would serve to lessen erosion. With BMPs in place, short-term erosion at the construction site would be minimized. Overall, the preferred alternative would have only minor impacts to the soils and geology of the area.

4.1.3 Cumulative Impacts

The analysis area for cumulative impacts on soils and geology for this project is the Petty Creek watershed. In addition to the identified impacts associated with the preferred alternative, other past, present, and future impacts to the soils and geology have been identified and are discussed below.

Past activities include construction, use, and maintenance of the existing Petty Creek road, construction and uses of residential property, timber sales and related road building, agricultural activities, and recreational trail construction and use. Present and future activities include ongoing construction, maintenance, and uses of residential property and roads, agricultural activities, logging activities, and use of recreational trails. While these activities have and would continue to contribute to erosion, erosion has not been identified as a substantial problem in the area.

Along with the proposed project, all of these activities have and would likely continue to contribute to erosion as vegetated areas are exposed or disturbed for various lengths of time. Some of these activities increase the amount of impervious surfaces in the area, resulting in more storm water runoff with potentially higher velocities, further contributing to erosion. With permit requirements, BMPs, and improved drainage elements employed with many of these activities, this erosion would be diminished. The incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.1.4 Mitigation

- Cut slopes would be designed not to exceed the angle of repose (maximum angle of slope at which soils and loose materials can remain stable without sliding).
- Topsoil would be conserved and stockpiled for later use to enhance revegetation success.
- Woody debris, obtained on site or from clearing operations, would be scattered in appropriate densities to foster shade and micro-habitat zones on cut slopes and disturbed sites where appropriate and feasible.
- Following construction, cut slopes and disturbed sites would be seeded or planted with native seed, shrubs, and/or trees at appropriate distributions and spacing.
- If appropriate, fertilizer would be used to facilitate revegetation.
- If appropriate, a mulch, tackifier, or other erosion control method would be used to protect seeded areas. A fast-germinating annual plant may be added to the seed mix to provide quick ground cover.

- Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.

4.2 Water Resources

4.2.1 Affected Environment

The project area contains one main stream (Petty Creek), twelve named minor streams (Reservoir Creek, Madison Gulch, Spring Gulch, West Fork Petty Creek, Tucker Gulch, Eds Creek, Gus Creek, Johns Creek, Printers Creek, Bill Creek, East Fork Petty Creek, and South Fork Petty Creek), and several unnamed minor streams. The road roughly parallels Petty Creek, crossing from the east side to the west side of the creek at the Lower Petty Creek bridge and again back to the east at the Upper Petty Creek bridge, approximately 5.5 and 9.5 mi [8.9 and 15.3 km], respectively, south of Petty Creek's confluence with the Clark Fork River.

The Petty Creek watershed descends from approximately 3,800 feet above mean sea level at the junction of South Fork Petty Creek and East Fork Petty Creek to approximately 3,000 feet at its confluence with the Clark Fork River. The runoff average is approximately 42 inches (in) [107 centimeters (cm)] per year. At its mouth, Petty Creek has a drainage basin of approximately 73 mi^2 [189 km^2] with a 50-year peak runoff of 1580 ft^3 [45 m^3] per second (Sugnet 2000). The annual average peak discharge rate is 400 ft^3 [11 m^3] per second. Monthly temperatures average a low of 16º Fahrenheit (F) [-9º Celsius (C)] in January to an average high of 84º F [29º C] in July. Recorded extremes range from -33º F [-36º C] in January to 105º F [41º C] in June and July.

Petty Creek has been inventoried by the Montana Department of Environmental Quality (MTDEQ) as having impaired water quality and is listed on the 303(d) list. Probable causes of its impaired water quality are algal growth/chlorophyll a, flow alteration, siltation, thermal modifications, and other habitat alterations, and probable sources are grazing related agricultural sources and highway/road/bridge construction. A Total Maximum Daily Load (TMDL) level for the stream has not yet been set by the EPA, but once established it would set quantified goals for water quality conditions in the creek that may then determine what actions are needed to restore or protect the health of Petty Creek.

4.2.2 Project Impacts

No Action Alternative. With the no action alternative the water quality of Petty Creek would continue to be impaired by sediment transported from the graveled surface, existing poor drainage elements, and from erosion associated with inadequate stream crossing structures and areas of the road that are adjacent to Petty Creek.

Preferred Alternative. The short-term effect of the preferred alternative would be a temporary increase in suspended sediment in Petty Creek in the area where it runs immediately adjacent to the project route and downstream from culvert/bridge

replacement sites. With implementation of appropriate erosion and sediment control BMPs, sediment is not expected to permanently adversely affect water quality or water quality related values. Impacts would be temporary and limited to the time when soil-disturbing activities were taking place immediately adjacent to the Petty Creek. Madison Gulch, Spring Gulch, West Fork Petty Creek, Eds Creek, Gus Creek, Johns Creek, Bill Creek, and East Fork Petty Creek would also experience a temporary increase in suspended sediment during culvert/bridge replacement, however, with BMPs and sediment capture devices in place, downstream movement of sediment would be minimal. Also, new cut slopes would increase sediment transport, but BMPs such as mulching, planting native vegetation, and staking straw wattles where appropriate would help control erosion.

In the long term, paving of the road would increase slightly the amount of impervious surface that is currently in the project corridor. This would lead to increased storm water runoff and potential for increased sediment/pollutant transport to the surrounding waterways. However, given that the project proposes paving the existing graveled roadway, which already has a relatively high storm water runoff coefficient compared with the surrounding vegetated land, paving is expected to increase runoff only slightly more than the runoff from a graveled surface. Another consideration is that Missoula County uses unsalted sand on their rural roads during winter maintenance, which would likely contribute to sedimentation. However, with construction of drainage ditches and runoff directed into vegetated areas, these effects would be minimized. Also, the surface runoff at the replaced stream crossing structures would be captured and carried to the ends of these structures to run down the embankment back to the stream. Currently, the runoff at these crossings dumps directly into the stream, not allowing sediment to settle out before entering the water.

It is anticipated that paving the road would greatly reduce the amount of available sediment for transport to the waterways in the long term. Also, where feasible, the road would be moved away from Petty Creek, and the area between the road and creek would be planted with appropriate shrub seedlings and cuttings, seeded, and mulched. Some of the areas next to the creek currently consist of riprap. To reduce sedimentation, the riprap would be left in place, and seedlings would be planted between the riprap, thereby reducing disturbance while providing a vegetative buffer and stream shade. A plant and/or stream specialist would determine the appropriate types of seedlings and their locations and spacing. These actions are anticipated to have overall long-term beneficial effects on the water quality of the Petty Creek drainage.

Increased impervious surface, unsalted sand used in winter maintenance, and new cut slopes would result in minor increases in pollutants to Petty Creek, but they would be offset by eliminating the available sediments generated from a gravel surface, improved drainage and stream crossing structures, and adjusting the alignment slightly away from Petty Creek so that overall impacts would be slightly or moderately beneficial.

4.2.3 Cumulative Impacts

The analysis area for cumulative impacts on water resources for this project is the Petty Creek watershed. In addition to the identified impacts associated with the preferred alternative, other past, present, and future impacts to the water resources of the project area have been identified and are discussed below.

Past activities include construction, use, and maintenance of the existing Petty Creek road, construction and uses of residential property, timber sales and related road building, agricultural activities, and recreational trail construction and use. Present and future activities include ongoing construction, maintenance, and uses of residential property and roads, agricultural activities, logging activities, and use of recreational trails.

Along with the proposed project, these activities have or would potentially contribute to water quality degradation by adding sediment to water bodies. Road use and agricultural activities contribute other pollutants such as petroleum products, insecticides, and fertilizers. Additionally, many of these activities remove vegetation that helps control erosion, filter pollutants, and keep water temperatures low.

As mentioned above, Petty Creek is on the 303(d) list for impaired water quality and probable sources are grazing related agricultural sources and highway/road/bridge construction. A TMDL has not yet been submitted for Petty Creek, however, once established it would set quantified goals for water quality conditions in the creek that may then determine what actions are needed to restore or protect the health of Petty Creek. With implementation of the TMDL, it is expected that the water quality of Petty Creek would be improved over time. Additionally, paving the current graveled surface of Petty Creek Road, providing vegetative buffers between the road and the creek, and improving drainage along the corridor would likely help reduce sediment loading, filter other pollutants, and stabilize water temperatures in Petty Creek. Therefore, the incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.2.4 Mitigation

- Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.
- A dewatering and diversion plan would be established and would include, but would not be limited to, the following procedures:
    - Where culvert/bridge replacement is performed in flowing streams, actions to reduce sediment would be conducted.
    - Actions, such as stream diversion, would be visually assessed to assure that sediment control devices work properly.
    - Where feasible, sediment capture devices would be placed to deter downstream movement of sediment.
    - Pumping would be required to remove subsurface flow laden with sediment around the excavated areas.

    - Pump discharge would be released in an area where sediment would be unlikely to be delivered to the stream.
- Appropriate riparian vegetation would be planted and/or transplanted, and woody debris from site clearing would be scattered over disturbed surfaces where appropriate.
- There would be no storage of petroleum products within the Petty Creek floodplain.
- Prior to construction, a Hazardous Materials Spill Plan would be prepared to identify actions to take in the event of a spill. This plan would incorporate preventative measures such as the placement of refueling facilities and the storage and handling of hazardous materials.
- All disturbed sites along the project route would be revegetated promptly using species appropriate to the site. Seeded and planted sites would be protected from erosion with a tackifier or other soil protection method until vegetation becomes established.
- Erosion controls would be left in place until vegetation becomes established.
- Drainage facilities that allow ground infiltration and provide sediment filtration from storm water runoff would be provided.
- Fill material placed in waterbodies and floodplains would be minimized.
- Where feasible, the road would be shifted away from Petty Creek, leaving existing fill/riprap in place, and providing a vegetative buffer between the road and the creek.
- Where appropriate, seedlings would be planted between the riprap and at other locations where the road and stream are in close proximity.

4.3 Wetlands

4.3.1 Affected Environment

A wetland inventory of the project area was conducted in June, 2004. The survey area encompassed a minimum of 100 ft [30.5 m] on either side of the Petty Creek Road centerline. During the surveys, field biologists identified 24 jurisdictional wetlands encompassing 4.28 acres (ac) [1.73 hectares (ha)] within the study corridor (Attachment 2). No non-jurisdictional wetlands were identified. The 24 wetlands were grouped into three hydrogeomorphic classes: riverine, depressional, and slope wetlands. Nineteen of the wetlands are riverine systems associated with Petty Creek or East Fork Petty Creek, three are depressional wetlands, and two are slope wetlands (Herrera, 2004a).

Additionally, the wetlands were grouped into four classes under the U.S. Fish and Wildlife Service wetland classification system. Seven of the wetlands are palustrine scrub-shrub, four are palustrine forested, ten are palustrine emergent, one is palustrine forested/palustrine emergent, one is palustrine scrub-shrub/palustrine emergent, and one is palustrine open-water/palustrine emergent. Generally, all of the wetlands in the project corridor provide important functions such as wildlife habitat, flood storage capacity, and sediment and pollutant filtration. However, the palustrine forested and palustrine scrub-shrub wetlands have greater structural diversity and higher value wildlife habitat (Herrera, 2004a).

4.3.2 Project Impacts

No-Action Alternative. Under the no-action alternative, sediment would continue to be transported to wetlands due to the graveled surface, erosion, and existing poor drainage, which would continue to reduce the functionality of the wetlands.

Preferred Alternative. One wetland, Wetland X, would be impacted by the preferred alternative through the placement of road fill into the wetland. Approximately <0.03 ac [<0.01 ha] of Wetland X would be encroached upon by road fill. Through slight adjustment of the road alignment and steepening of road fill slopes, all 23 of the other wetlands would be avoided by the preferred alternative.

The approximately <0.03-ac [<0.01-ha] encroachment on Wetland X is <1% of the total wetland acreage identified in the project area and approximately 2% of the lower functioning palustrine emergent wetland acreage identified. None of the higher functioning palustrine scrub-shrub wetlands would be encroached upon by road fill.

In the long term, paving of the road would increase slightly the amount of impervious surface that is currently in the project corridor. This would lead to increased storm water runoff and the potential for increased sediment/pollutant transport to the nearby wetlands. However, given that the existing graveled roadway already has a relatively high storm water runoff coefficient compared with the surrounding vegetated land, paving is expected to increase runoff only slightly more than the current graveled surface. Also, new cut slopes may increase sediment transport to wetlands.

Improvement of drainage ditches, runoff directed into vegetated areas, and re-vegetating the newly exposed surfaces would minimize transport of sediment to wetlands. Also, paving the road would greatly reduce the amount of available sediment for transport to wetlands. If implemented, these project elements would have overall long-term beneficial effects on the quality of wetlands in the Petty Creek drainage.

In the short term, temporary impacts include delivery of sediment from exposed ground surface, spread of noxious and invasive weeds, and accidental spills and chemical contamination to Petty Creek and associated wetlands. With implementation of appropriate erosion and sediment control BMPs, revegetation of exposed surfaces where feasible, appropriate BMPs to control the spread of noxious weeds, and an emergency spill plan and spill containment kit, these temporary impacts would be minimized.

Wetlands Finding

In accordance with Executive Order 11990, Protection of Wetlands, WFLHD closely evaluated the proposed improvements and its wetland impacts. An estimate of approximately <0.03 ac [<0.01 ha] of jurisdictional wetlands (Wetland X) would be impacted as a result of the rehabilitation. Wetland impacts have been consciously reduced through avoidance, where possible, and minimization. Compensation, if any, for

impacts to Wetland X would be determined through partnering with the U.S. Army Corps of Engineers.

Based on the above considerations, WFLHD has determined that there is no practical alternative to the proposed construction in wetlands, and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use.

4.3.3 Cumulative Impacts

The analysis area for cumulative impacts to wetlands for this project is the Petty Creek watershed. In addition to the identified impacts associated with the preferred alternative, other past, present, and future impacts to the wetlands in the project area have been identified and are discussed below.

Past activities include construction, use, and maintenance of the existing Petty Creek road, construction and uses of residential property, timber sales and related road building, agricultural activities, and recreational trail construction and use. Present and future activities include ongoing construction, maintenance, and uses of residential property and roads, agricultural activities, logging activities, and use of recreational trails. These activities have had impacts by filling wetlands, altering their hydrologic functions, contributing to sediment loading, and/or altering their vegetation.

Although some wetlands in the Petty Creek drainage have been filled and degraded by various activities, it is assumed, given the large amount of publicly owned and relatively protected land in the region, that the majority of wetlands in the area are intact, and as a whole, not severely degraded. The incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.3.4 Mitigation

- Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.
- Fueling or storage of petroleum products would comply with permit requirements.
- To help prevent petroleum products and other chemicals from entering wetlands during construction, an emergency spill plan would be prepared and a spill containment kit would be kept onsite at all times.
- All disturbed sites along the project route would be revegetated promptly, using species appropriate to the site.
- Where appropriate, seeded and planted sites would be protected from erosion with a tackifier or other soil protection method until vegetation becomes established.
- Drainage facilities that allow ground infiltration and provide sediment filtration from storm water runoff would be provided.
- The amount of fill material placed in waterbodies and floodplains would be minimized.

- Where feasible, the road would be shifted away from Petty Creek, leaving existing fill/riprap in place, and providing a vegetative buffer between the road and wetlands.

4.4 Vegetation

4.4.1 Affected Environment

Vegetation includes riparian communities, disturbed roadside vegetation communities, cultivated and grazed valley grasslands and upland communities. Most of the conifer growth in the road corridor is second growth and reproduction. A few remnant old growth trees are scattered along the steeper slopes where they escaped earlier logging and recent large fires.

A riparian analysis was conducted as part of the wetland survey conducted by Herrera (2004a). Project biologists identified six riparian communities or habitat types within the study corridor: black cottonwood/western snowberry, black cottonwood/red-osier dogwood, Douglas-fir/red-osier dogwood, quaking aspen/red-osier dogwood, common chokeberry, and Drummund willow. In addition, two unclassified riparian habitats were identified.

The U.S. Forest Service undertook a biological evaluation for sensitive plant species in September 2004 (Capovani 2004). It identified 13 habitat types existing within the project area (Table 3). Existing information on sensitive plant species in the project area was reviewed, including aerial photographs, preliminary habitat information, and the Montana Natural Heritage Program database. From this review, five sensitive plant species (Table 4) were identified as having the potential to occur within the project area. No sensitive plants were found during the course of the survey. Also, it was noted that the project area did not appear to have suitable habitat for the listed sensitive species due to a lack of suitable habitat type, soils, the proximity to the road, and habitat alteration due to weed infestations.

In the spring of 2003, Missoula County Weed District staff met with the Missoula County Road Department, members of the Missoula County Weed Board, Citizens for a Weed Free Future, and others to discuss the development and implementation of a vegetation management plan for Missoula County maintained roads. It was determined that the first step towards developing a vegetation management plan should be a detailed inventory of noxious weeds along Missoula County maintained roads. The inventory included Petty Creek Road and documented the type and approximate amount of noxious weeds along this route (Missoula County, 2004).

Both the County inventory and the Forest Service biological evaluation noted noxious weeds along the route. Species noted included spotted knapweed (Centaurea maculosa), Canada thistle (Cirsium arvense), oxeye daisy (Chrysanthemum leucanthemum), sulphur cinquefoil (Potentilla recta), hound's tongue (Cynoglossum officinale), St. John's wort/goatweed (Hyupericum perforatum), cheatgrass (Bromus tectorum), tall buttercup (Ranunculus acris), and the common tansy (Tanacetum vulgare).

Table 3. Habitat types (Pfister 1977) along Petty Creek Road.

Scientific Name	Common Name
Pseudotsuga menziesii/Symphoricarpos albus/Calamagrostis rubescens	Douglas-fir/common snowberry/pinegrass
P. menziesii/Vaccinium globulare	Douglas-fir/globe huckleberry
P. menziesii/Vaccinium caespitosum	Douglas-fir/dwarf huckleberry
P. menziesii/Linnaea borealis/S. albus	Douglas-fir/twinflower/common snowberry
P. menziesii/Physocarpus malvaceus/P. malvaceus	Douglas-fir/ninebark/ninebark
P. menziesii/ P. malvaceus/C. rubescens	Douglas-fir/ninebark/pinegrass
P. menziesii/P. malvaceus/Agropyron spicatum	Douglas-fir/common snowberry/bluebunch wheatgrass
Abies lasiocarpa/Clintonia uniflora/V. caespitosum	Subalpine fir/queen's cup beadily/dwarf huckleberry
A. lasiocarpa/C. uniflora	Subalpine fir/queen's cup beadily
A. lasiocarpa/C. uniflora/C. uniflora	Subalpine fir/queen's cup beadily/queen's cup beadily
A. lasiocarpa/Galium triflorum	Subalpine/sweetscented bedstraw
A. lasiocarpa/C. uniflora/V. caespitosum	Subalpine/queen's cup beadily/dwarf huckleberry
Talus	Talus

Table 4. Sensitive plant species potentially along Petty Creek Road.

State Scientific Name	State Common Name
Eupatorium occidentale	Western boneset
Waldsteinia idahoensis	Idaho barren strawberry
Clarkia rhomboidia	Common clarkia
Adorxa moschatellina	Musk-root
Cypripedium fasciculatum	Clustered Lady's Slipper

4.4.2 Project Impacts

The Forest Service identified no sensitive plants or sensitive plant habitats in the project area during their survey in 2004. Therefore, no impacts to sensitive plants are anticipated.

No-Action Alternative. Under the no-action alternative, it is anticipated that inadvertent side casting of road material would continue to encroach on roadside vegetation as Missoula County continues to grade the existing gravel road. No other impacts to vegetation are anticipated with the no-action alternative.

Preferred Alternative. With cutting back slopes, placing fill in numerous locations, and establishing clearing limits, it is estimated that approximately 48 acres of low to marginal

quality roadside vegetation would potentially be removed. Less than a quarter of this would be permanently removed. The rest of it would be removed temporarily during construction until the exposed areas can be re-vegetated. To enhance re-vegetation success, a number of techniques would be employed. As appropriate for each site, native vegetation, which is expected to have a greater survival rate due to its natural adaptation to the environment, would be used. Topsoil would be conserved and stockpiled for later use on disturbed sites. A mulch or tackifier would cover seeded areas to prevent erosion prior to reestablishment of vegetation. A fast-germinating annual plant may be added to the seed mix to provide quick ground cover. Grass seed would be planted using hydroseeding or drilling. Where appropriate, straw wattles would be staked at appropriate spacing. Also, appropriate sediment and erosion control BMPs would be employed prior to construction and maintained in working order throughout the construction period and until vegetation is established.

Soil disturbance and removal of vegetation resulting from road construction could increase the risk of noxious weed invasion and the spread of weeds already existing in the project area. Construction machinery could serve as a carrier for the dispersal of weed seed from outside the project area and between sites within the project route. There is also the possibility that weed seed may be imported from infested rock and aggregate sources. Weed control within the project limits would be of limited utility absent a regional control effort by Missoula County. However, mitigation techniques, described below, would be utilized to prevent and control the spread of noxious weeds as a result of the project. These techniques would be included in the re-vegetation plan.

Given that vegetation slated for removal is of low to marginal quality, exposed soils would be re-vegetated following construction, and BMPs would be employed, impacts to the vegetation of the Petty Creek drainage would be minimal.

4.4.3 Cumulative Impacts

The analysis area for cumulative impacts to vegetation for this project is the Petty Creek watershed. In addition to the identified impacts associated with the preferred alternative, other past, present, and future impacts to vegetation have been identified and are discussed below.

Past activities include construction, use, and maintenance of the existing Petty Creek road, construction and uses of residential property, timber sales and related road building, agricultural activities, and recreational trail construction and use. Present and future activities include ongoing construction, maintenance, and uses of residential property and roads, agricultural activities, logging activities, and use of recreational trails. These activities have contributed to removal of vegetation and spread of noxious weeds, however, they have not substantially degraded the vegetation of the area.

The large amount of public land in the Petty Creek drainage and county zoning requirements have helped restrict residential development and its associated vegetation impacts. Land management, revegetation efforts, and efforts to control the spread of noxious weeds by local, state, and federal agencies would aid in minimizing impacts to

vegetation. Additionally, there are efforts to avoid, minimize, and mitigate impacts to vegetation associated with the proposed project. Therefore, the incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.4.4 Mitigation

- Topsoil would be conserved and stockpiled for later use on disturbed sites to enhance revegetation success.
- Cut slopes and disturbed sites would be seeded or planted with native vegetation appropriate for the site as soon as possible following construction.
- If appropriate, a mulch, tackifier, or other erosion control method would be used to protect seeded areas. A fast-germinating annual plant may be added to the seed mix to provide quick ground cover.
- Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.
- All seed and hay or straw used on the construction site would be free of noxious weeds.
- All construction equipment and vehicles would be cleaned to remove noxious weed propagules before moving into or out of the construction area.

4.5 Fish and Wildlife Species

An inventory examining the potential presence of threatened and endangered species (Table 5), Forest Service sensitive species (Table 6 in Section 4.5.8), and other species was conducted in June 2004 (Herrera, 2004b). Additional wildlife information was obtained from field reviews and correspondence with the Montana Chapter of The Wildlife Society, Lolo National Forest, Montana Fish, Wildlife & Parks, Montana Department of Environmental Quality, the US Fish & Wildlife Service, and the Environmental Protection Agency.

A discussion of WFLHD's effects determinations for each threatened/endangered species is provided below. The U.S. Fish and Wildlife Service (USFWS) concurred with WFLHD's effects determinations in a Biological Opinion dated September 14, 2006 (Attachment 3).

4.5.1 Bald Eagle

Affected Environment. Until recently, the bald eagle was listed as a threatened species under the Endangered Species Act. The bald eagle was de-listed from the threatened and endangered species list on August 8, 2007. Recovery of this species has continued to progress. The current nesting population in the lower 48 states represents more than a tenfold increase from the known population level in 1963. During the past 30 years, the bald eagle population has essentially doubled every 7 to 8 years.

Table 5. Threatened, endangered, proposed threatened or proposed endangered wildlife species within Petty Creek Road project influence area.

Common Name	Scientific Name	Federal Status	Critical Habitat Present	Effects Determination
Bald eagle	*Haliaeetus leucocoephalus*	De-listed	No	May affect, not likely to adversely affect
Bull trout	*Salvelinus confluentus*	Threatened	Yes	May affect, likely to adversely affect
Canada lynx	*Lynx canadensis*	Threatened	No	May affect, not likely to adversely affect
Gray wolf	*Canis lupus*	Endangered	No	May affect, not likely to adversely affect
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate		No effect

Bald eagles may achieve adult plumage and nest as early as age 4, although most data indicate that they first breed at 6 or 7 years. Long-term pairs may build and repair nests during any season, although in Montana, this typically occurs in autumn, late winter, and early spring. The sensitive nesting period for bald eagles generally extends from February 1 to August 15, and wintering activities typically occur between October 31 and March 31. Wintering habitat includes perching and roosting sites located near open water or in areas with ample carrion. Nest sites in Montana are most often found around the edge of lakes or reservoirs larger than 80 acres or along forested corridors of large rivers.

There are no bald eagle nest sites within the project corridor or the adjacent habitats (Kennedy 2004 personal communication; Kratville 2004 personal communication). Although the habitat types in the corridor are dominated by trees that are not preferred nest trees for bald eagles, they do contain tree species such as ponderosa pine and cottonwood that bald eagles have been observed nesting in near the project area.

Wintering bald eagles tend to concentrate on the Clark Fork River located immediately north of the project corridor. The Clark Fork River provides year-round open water and proximity to carrion from wildlife killed by vehicles on Interstate 90. Eagles occasionally forage along Petty Creek, but this activity is limited to periods of high flows in the spring (Kennedy 2004 personal communication).

Project Impacts.

No-Action Alternative. Because there are no known bald eagle nests in the project corridor and use of the corridor by bald eagles is expected to be incidental and limited to periods of high flows in Petty Creek during the spring, the no-action alternative would likely have no effect on the bald eagle.

Preferred Alternative. Construction activities associated with the preferred alternative may disrupt bald eagle foraging along Petty Creek during high-flow events in the spring. However, use of habitat within the project area by bald eagles is concentrated on the Clark Fork River due to its abundant food sources, and entry into the Petty Creek drainage is limited. Use of the project corridor by bald eagles is expected to be incidental and limited to periods of high flows in Petty Creek during the spring. Therefore, the level of impact to the bald eagle from the preferred alternative would be minimal.

Although the bald eagle is no longer on the threatened and endangered species list, at the issuance of the USFWS's biological opinion for the project, the bald eagle was listed as threatened. In that biological opinion, the USFWS concurred with the determination that the preferred alternative may affect, but is not likely to adversely affect the bald eagle based on the limited use of the corridor by the species.

Additionally, the USFWS has proposed a permit structure under the Bald & Golden Eagle Protection Act. In the interim, in accordance with USFWS recommendations, this project would comply with the National Bald Eagle Management Guidelines.

4.5.2 Bull Trout

Affected Environment. The USFWS listed the Columbia River and Klamath River distinct population segments of bull trout as threatened on June 10, 1998 (63 Federal Register [FR] 31647). Bull trout are native to the Pacific Northwest and Canada, and historically they were abundant and widespread throughout Pacific Northwest drainages. Even though their numbers and distribution have been reduced, bull trout still occur throughout much of the Columbia River basin, in the Klamath River in Oregon, in the headwaters of the Saskatchewan River in Alberta, and the MacKenzie River system in Alberta and British Columbia, Canada.

Bull trout exhibit both migratory and resident life-history strategies throughout much of their range. The two forms may coexist, and one particular life-history form may dominate under stable conditions, while the other may be favored under changing environmental conditions (Rieman and McIntyre 1993). Juveniles spend 1 to 4 years in the tributaries before migrating to a lake (adfluvial form of bull trout), to a river (fluvial form of bull trout), or to saltwater (anadromous form of bull trout) to mature (Rieman and McIntyre 1993). Resident fish often remain in tributary streams or smaller watersheds throughout their life cycle (Rieman and McIntyre 1993).

Five habitat characteristics are reported to be important for bull trout persistence: cover, substrate, composition, channel stability, temperature and migratory corridors (Rieman and McIntyre 1993). Bull trout are adapted to cold water, and temperatures above 59° F [15º C] are believed to limit bull trout distribution (Rieman and McIntyre 1993). Spawning begins in the fall when daily maximum temperatures drop to levels of 48.2° F [9º C] to 50° F [10º C] (63 FR 31647). Spawning adults use stable, low-gradient areas with gravel/cobble substrate and water depths from 4 to 24 in [10 to 61 cm] and velocities

from 0.3 to 2.0 ft per second [9 to 61 cm per second]. Proximity to cover for adult fish before and during spawning is an important habitat component.

The subpopulation of bull trout in Petty creek is depressed compared with historic levels, however its numbers are not alarmingly low nor are they in a rapid state of decline. The two life-history forms of bull trout, migratory and resident, may coexist, however, Petty Creek provides habitat for mostly resident populations of bull trout. Migratory bull trout from the main stem of the Clark Fork River do spawn in Petty Creek (MBTSG 1996; Spaulding 2004 personal communication). However, the number of fish entering Petty Creek is low because bull trout are rare in the main stem Clark Fork River (MBTSG 1996). Fish enter Petty Creek in June during low flows to base flows (below the ground surface) (Spalding 2004 personal communication). Fluvial fish travel upstream and stay in the upper reaches and tributaries to spawn in the fall (Spalding 2004 personal communication).

Most tributaries to Petty Creek are accessible to fish, and bull trout may be present in these systems as well. Low levels of presence in South Fork, East Fork and West Fork Petty Creek are presumed because bull trout, although rare, are in the main stem of the Clark Fork River.

Bull trout densities in Section 30, Township 14 North, Range 22 West (approximately MP 3 to 4 [4.8 to 6.4 km]) in 1981 have been estimated by the Forest Service to be at 0.8 fish per 330 ft^2 [30.7 m^2] (USDA Forest Service 2003). Electroshock fish surveys conducted in 1987, 1992 and 1994 identified bull trout, but resulted in no estimate of population density (USDA Forest Service 2003).

The crossing structures along Petty Creek and its tributaries allow fish passage in some form, however, some structures do not allow passage for all life stages of fish, restricting available habitat for fish at some life stages. These structures include Madison Gulch, Spring Gulch, West Fork Petty Creek, Ed's Creek, Gus Creek, John's Creek, Mike's Creek, and East Fork Petty Creek.

Five to 25 percent of Petty Creek does not have tree cover, contributing to increased water temperatures. Lower Petty Creek includes road densities greater than 1.7 mi [2.7 km] per square mile, and greater than 30 percent of the stream length in the watershed is within 300 ft [91.4 m] of the road. Upper Petty Creek includes road densities between 0.7 and 1.7 mi [1.1 and 2.7 km] per mi^2, and between 15 and 30 percent of the stream length in the watershed is within 300 ft [91.4 m] of the road. These conditions, coupled with the fact that the majority of the roads are graveled, have contributed to undesirable levels of sediment in the creek and toward an impaired water quality designation by the Montana Department of Environmental Quality.

Project Impacts.

No-Action Alternative. The No-Action Alternative would continue to negatively impact bull trout. The road's proximity to Petty Creek, its insufficient vegetative buffer in

various areas, and its gravel surface would continue to transport sediment to Petty Creek and its tributaries. Additionally, maintenance activities such as grading the graveled road surface would persist in encroaching on Petty Creek and further contribute to sedimentation.

While there are no absolute barriers to fish passage along the Petty Creek corridor, several of the existing crossing structures inadequately provide passage for all life stages of bull trout. These conditions would not be improved with the no-action alternative, and the structures would continue to restrict available habitat for bull trout at some life stages.

Preferred Alternative. To aid in determining the potential affects the proposed alternative would have on bull trout in the Petty Creek drainage, the USFWS Matrix of Diagnostics/Pathways and Indicators (matrix) was employed (Attachment 4). The matrix evaluates biological and habitat conditions through 24 indicators grouped under eight diagnostics/pathways.

Removal of vegetation, exposed soils, embankment reconstruction, and replacing stream-crossing structures would result in temporary increases in sediment delivery to and turbidity in streams. Suspended and deposited sediment in streams can affect adult trout by causing changes in their behavior, reducing available habitat, increasing stress, and reducing food supply. High levels of suspended sediment can result in the loss of visual capability, leading to reduced feeding and a depressed growth rate (Waters 1995). Large amounts of deposited sediment can deplete benthic invertebrate populations, reducing the food supply for fish. They can fill pools and blanket the structural cover for fish, reducing the available habitat for adult salmonids (Waters 1995). They can also affect habitat for juvenile salmonids by filling pools and intergravel spaces. Fine sediments in stream gravels affect incubating eggs and developing alevins (recently hatched embryos that still have a yolk sac) by inhibiting dissipation of metabolic wastes. Fine sediments in stream gravels may also abrade or dislodge developing embryos and emerging fry, delay the rate of egg hatching, and reduce survival during incubation (Herrera 2004a). Additionally, increased turbidity and sediment movement in streams could displace adult fish to other unaffected portions of the stream.

With the preferred alternative, these increases in sedimentation would be temporary, occurring during construction and until vegetation is re-established, expected to be approximately 3-5 years. To lessen the impacts of construction related sediment, appropriate sediment and erosion control best management practices (BMPs) would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is re-established.

The gravel road already has a relatively high surface runoff coefficient compared with the surrounding natural vegetation, and this condition would persist and likely increase with paving the road, potentially increasing road bank erosion and sedimentation. Conversely, paving the road and providing drainage facilities that allow ground infiltration and sediment filtration from storm water runoff would reduce sedimentation. Additionally, where feasible and where the two are in close proximity, the road would be realigned

slightly away from the creek and a vegetated buffer planted. Existing riprap would be left undisturbed to avoid unnecessary sedimentation and native saplings would be planted within the riprap. In the long term, these elements are expected to reduce overall sedimentation in the Petty Creek drainage.

As mentioned above, cool water temperature is an important characteristic for bull trout, and tree cover is important to keeping those temperatures low. Five to 25 percent of Petty Creek is not tree covered, however, because the proposed road would be using the existing road alignment, it is expected that this percentage, and therefore water temperature, would not be considerably impacted.

Accidental spills or leaks of materials used during construction may result in impacts on fish and stream habitat. Materials that could accidentally enter a stream or wetland during construction include petroleum fuels, lubricants, or concrete leachate and other substances used for roadway paving. The entry of these substances into a stream or wetland could result in temporary displacement of fish or fish mortality if a lethal concentration of the substance reaches the stream or wetland. BMPs and spill control plans would be developed and implemented as part of the Section 404 and Montana Pollution Discharge Elimination System (MPDES) permitting processes.

As described above, several of the existing crossing structures inadequately provide passage for all life stages of fish. To improve habitat, all new structures would be designed for passage of all life stages. Additionally, a natural bank-full stream configuration and substrate would be constructed within the crossing. No additional stream crossing structures would be constructed.

Detours and diversion channels would result in temporary displacement of fish, loss of habitat, and possible creation of a migration barrier during construction. The duration of these events would be made as brief as possible. These effects would be temporary and should result in only short-term effects on fish.

No long-term adverse impacts resulting from the proposed project are expected since all crossing structures in fish-bearing streams would be designed to allow passage during all life stages of fish, drainage facilities would be improved, and where feasible, the roadway would be moved away from Petty Creek and a vegetative buffer planted. In the long-term these design elements would have positive effects on bull trout in Petty Creek and its tributaries.

Because construction activities associated with the proposed road improvements would require in-water work resulting in temporary sedimentation to Petty Creek and its tributaries, and although implementation of BMPs and timing restrictions would reduce the effects of sedimentation on bull trout, construction activities are still likely to adversely affect bull trout in the short term during construction and until vegetation would be re-established. Therefore, the WFLHD's effects determination was may affect, likely to adversely affect bull trout due to construction activities associated with the proposed project. However, WFLHD further concluded, despite the project's short-term

negative impacts, that those impacts would not substantially reduce the potential for persistence or recovery of this population of bull trout. The USFWS concurred with these conclusions in their 2006 Biological Opinion (Attachment 3).

4.5.3 Bull Trout Critical Habitat

In September 2005, the USFWS issued a final ruling designating critical habitat for the Klamath River, Columbia River, Jarbidge River, Coastal-Puget Sound, and Saint Mary-Belly River populations of bull trout pursuant to the Endangered Species Act (70 FR 56212). For Montana, 1,058 mi [1703 km] of stream/shoreline and 31,916 ac [12916 ha] of reservoirs or lakes were designated as critical habitat. Within the project corridor, Petty Creek from its confluence with the Clark Fork River upstream 11.6 mi [18.7 km] provides spawning and rearing habitat for the Petty Creek local population of bull trout (Montana Bull Trout Scientific Group [MBTSG] 1996) and was included in the September 2005 critical habitat designation for bull trout. The final rule of designation of critical habitat was effective October 26, 2005.

Critical habitat consists of physical and biological features that are essential to the conservation of the species and that may require special management considerations or protection. These physical and biological features include but are not limited to, space for individual and population growth and for normal behavior; food, water, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring; and habitats that are protected from disturbance or are representative of the historical geographic and ecological distributions of species. All areas designated as critical habitat for bull trout are within the historical geographic range of the species and contain one or more of these physical or biological features essential to the conservation of the species (70 FR 56212). Primary constituent elements (PCEs) for bull trout were determined from studies of their habitat requirements, life-history characteristics, and population biology. PCEs may include but are not limited to, features such as spawning sites, feeding sites, and water quality or quantity. An area need not include all of the PCEs to qualify for designation as critical habitat.

Action agencies authorizing activities within lands occupied by bull trout are mandated by the Endangered Species Act of 1973, as amended, to consider effects on bull trout that would likely occur as a result of management actions. Agency biologists use the Matrix of Diagnostics/Pathways and Indicators (matrix) for bull trout to evaluate and document baseline conditions and to determine the likelihood of “take” of bull trout. Analysis of the matrix habitat indicators provides a very thorough analysis of the existing baseline condition and potential impacts on bull trout habitat. While assessing potential effects on bull trout as a species, agency biologists concurrently provide an analysis of effects on the PCEs for bull trout critical habitat and related habitat indicators. Attachment 4 provides the matrix and the crosswalk describing the eight PCEs and their related matrix indicators.

The crosswalk provides information supporting the rationale that the PCEs for bull trout critical habitat are thoroughly addressed in the current matrix (Attachment 4) analysis and

that environmental baseline and determination for effects on the species consists of biological and habitat components addressing in total the PCEs listed in the final rule designating critical habitat (70 FR 56212).

Based on the site-specific environmental baseline conditions of bull trout habitat for Petty Creek and linkage to the PCEs (Attachment 4) considering those habitat indicators and other factors as necessary, all PCEs for Petty Creek throughout the study corridor are functioning but are in less than optimal condition.

The analysis for the proposed project indicates that the activities associated with this project would have short term adverse affects on the habitat indicators *sediment* and *substrate embeddedness* during construction as stream crossing structures are replaced, slopes are exposed, and road fill is placed, all of which would likely increase sediment to surrounding waters (Attachment 4). BMPs would help to reduce these impacts, and long-term improvements of these indicators and associated PCEs 3 and 8 is expected with roadway paving, improvement of drainage facilities, and where feasible, moving the roadway away from Petty Creek and planting a vegetative buffer.

While the preferred alternative would result in short-term negative impacts during construction, these impacts would not change the functioning status of the PCEs in Petty Creek. No destruction or adverse modification of bull trout critical habitat would occur as a result of the preferred alternative. Therefore, the USFWS concurred that the project is not likely to destroy or adversely modify designated bull trout critical habitat.

4.5.4 Gray Wolf

Affected Environment. Although historically present throughout much of the West, wolves were all but eliminated from the area in the early 1900s. As a result of natural recovery and introduced packs, wolves have been recovering in the west since the 1980s. Estimated minimum numbers in 2004 in the northern Rocky Mountains was 835 wolves, with 153 of those wolves in Montana (Montana Fish, Wildlife, and Parks [MTFWP] 2006).

An “endangered” species is one that is in danger of extinction throughout all or a significant portion of its range and a “threatened” species is one that is likely to become endangered in the foreseeable future (USFWS 2008). In 2003, the USFWS reclassified the gray wolf from endangered to threatened in all areas inhabited by the western distinct population of gray wolves segment (68 FR 15804). However, in 2005, a federal court judge remanded the down-listing rule, and therefore wolves were reclassified as endangered again within the distinct population segment outside of the experimental population areas. Critical habitat for the gray wolf has not been proposed or designated.

Wolves are primarily predators of medium and large animals. Wild prey species in the northern Rocky Mountains include white-tailed deer, mule deer, moose, elk, bighorn sheep, caribou, mountain goats, beaver and snowshoe hares. Smaller mammals, birds and large invertebrates are sometimes taken (Mech 1970). Wolves are social animals,

living in packs of 2 to 12 wolves. Packs occupy a territory of 20 to 214 mi^2 [52 to 554 km^2], but their territories tend to be larger in the northern Rocky Mountains, averaging 200 to 400 mi^2 [518 to 1036 km^2] (USFWS 1987). They tend to avoid areas with heavy human use, however, some packs may be tolerant of human activity.

The average wolf pack in Montana has 4 to 7 animals, and their average territory is 200 mi^2 [518 km^2] (MTFWP 2006). The project area does not support a wolf pack; however there may be movement between packs and territories. Wolf pack activity in the vicinity of the study corridor includes the Ninemile pack, which ranges throughout the Ninemile valley located north of Interstate 90 and the Lupine pack, which ranges between Idaho and Montana. Both of these packs range within the study corridor (Kennedy 2004 personal communication; Fontaine 2004 personal communication).

Project Impacts.

No-Action Alternative. There are no known wolf packs occupying the project area, and current use of the area by wolves is considered to be incidental while moving between packs or territories. Therefore, the no-action alternative would likely have no effect on the gray wolf.

Preferred Alternative. While the project area does not support a wolf pack, wolves may use the corridor as they move between packs and territories. Ruediger (1996) identifies five factors in which highways negatively affect carnivores, including wolves. They are 1) direct mortality: auto collisions with individual carnivores, 2) displacement and avoidance: carnivores tend to avoid highways, thereby potentially avoiding suitable habitat that may be adjacent to those highways, 3) habitat fragmentation: highways often act as boundaries that may cut off segments of traditional or potential habitat, and populations may become isolated from each other, thereby reducing genetic diversity, 4) direct habitat loss: highways may physically occupy space that was once carnivore habitat, and 5) associated human development: which potentially exacerbates the four previous factors.

Ruediger, Claar, and Gore state in their 1999 Forest Service report:

> *It is known that some highways are not barriers or significant mortality factors for carnivores. These highways generally have low traffic volume and long pauses between traffic pulses. They are also two lane roads, often with minimal clearing distances. At approximately 2,000-3,000 vehicles per day, highways usually have adverse impacts on wildlife due to habitat fragmentation and mortality* (Dr. Tony Clevenger and Dr. Paul Paquet, personal communications).

Given that 1) the projected average daily traffic is relatively low, 2) the design speed is low (35 mph), 3) the proposed road is two lanes, 4) there are no known wolf packs occupying the project area, and 5) current use of the area by wolves is anticipated only as movement between packs or territories, it is not anticipated that the proposed project

would result in adverse effects to the gray wolf. Therefore, it is WFLHD's determination that the project may affect, but is not likely to adversely affect the gray wolf.

4.5.5 Canada Lynx

Affected Environment. The historical and current range of the lynx in the contiguous United States includes the Cascade Range of Washington and Oregon; the Rocky Mountain Range in Montana, Wyoming, Idaho, northern Utah, and Colorado; the western Great Lakes region; and the northeastern United States region from Maine southwest to New York (65 FR 16052). In 1998, the lynx was proposed for listing as a threatened species under the Endangered Species Act (ESA) (63 FR, July 8, 1998). The lynx was listed as threatened in the contiguous states, effective April 23, 2000 (65 FR 16052). A proposed rule to designate critical habitat for the Canada lynx was published in November 2005 (70 FR 68293), and a final rule was issued November 2006 (71 FR 66007). Portions of Missoula County are designated as Canada lynx critical habitat, however, these areas do not include the Petty Creek project area.

Lynx prefer habitat with an abundance of snowshoe hares and require a mosaic of conifer forest age-classes (Koehler and Brittell 1990). Lynx denning habitat requires a minimum of 2.4 ac [0.97 ha] of mature forest stands with minimal human disturbance in proximity to foraging areas (Koehler and Aubry 1994). Large woody debris, downed logs, and tree stumps are important characteristics for den sites and are used as thermal and escape cover by lynx kittens (Koehler and Brittell 1990).

The lynx is naturally rare in the contiguous United States, but it is believed that the northern Rockies/Cascades region supports the most viable resident lynx populations (65 FR 16052). Most lynx occurrences range in elevation from 4,920 to 6,560 ft [1500 to 2000 m] above mean sea level. In the Rocky Mountains, important lynx habitat may also include islands of coniferous forest within shrub-steppe habitat. Canada lynx may use shrub-steppe habitat to pursue alternative prey, including jackrabbits and ground squirrels (U.S. Department of Interior [USDI] 1999).

The Lolo National Forest conducted an assessment of suitable habitat for lynx in the forest using GIS data layers including habitat type, aspect, and topography. Based on this analysis, habitat areas in the forest below an elevation of 4,800 ft [1463 m] are considered unsuitable for lynx. The proposed project exists below an elevation of 4,800 ft [1463 m]. In addition, suitable habitat for lynx was not observed during field reconnaissance. Therefore, no occupied habitat for lynx is expected within the project corridor. Incidental occurrence of dispersing lynx may occur within the project corridor as they travel between territories.

Project Impacts.

No-Action Alternative. Canada lynx are not known to occur in the project area except for incidental occurrence of dispersing lynx. Additionally, there is no suitable lynx

habitat in the project area. Therefore, it is unlikely the no-action alternative would have negative impacts on Canada lynx.

Preferred Alternative. As with the gray wolf, roadways can impact Canada lynx by direct mortality, displacement and avoidance, habitat fragmentation, direct habitat loss, and associated human development (Ruediger, 1996). The project corridor does not support occupied or suitable habitat for the species and except for incidental occurrence of dispersing Canada lynx, they are not expected within the project corridor.

The risk of increased vehicle collisions with any dispersing Canada lynx is expected to be minor because the project is located in a low elevation area outside of lynx habitat, design speed of the roadway would remain low (35 mph), future traffic volumes are expected to be relatively low, and the species primarily moves at night when traffic volumes are even lower. Therefore, it is determined that the proposed Federal action may affect, but is not likely to adversely affect Canada lynx.

4.5.6 Yellow-billed Cuckoo

Affected Environment. There is limited data on the occurrence of the yellow-billed cuckoo and its habitat in the area west of the Continental Divide in Montana. There are no records that provide direct evidence of breeding in Montana, although observations of their behavior suggest that breeding may occur (Montana Natural Heritage Program [MNHP] and MTFWP 2004). Records indicate that the yellow-billed cuckoo is a migratory or transient and/or non-breeding summer resident of Montana (MNHP et al. 2004).

Suitable habitat for the yellow-billed cuckoo is available in riparian habitats along Petty Creek within the project area, however no yellow-billed cuckoos have been documented within the project corridor (MNHP et al. 2004; Kennedy 2004 personal communication).

The yellow-billed cuckoo has not yet been listed threatened or endangered, and therefore, no critical habitat has been designated or proposed for this species.

Project Impacts. The yellow-billed cuckoo has not been documented within the project area or the surrounding habitats and is not known to breed in Montana, therefore it is determined that the no-action alternative or the preferred alternative would have no effect on the yellow-billed cuckoo.

4.5.7 Grizzly Bear

Affected Environment. Although the grizzly bear is listed as threatened by the USFWS, the grizzly bear is not on the USFWS's list of threatened and endangered species for the project area. However, a grizzly was reportedly killed in 2002 near Alberton, MT, which is approximately 1 mile northwest of the beginning of the project area (Kratville 2005 personal communication; Servheen 2005 personal communication). Also, increased but unverified sightings of grizzlies have been reported over the last ten years near the Petty

Creek area (MTFWP, 2005). For these reasons, the species is discussed in this Environmental Assessment.

The grizzly bear was listed as a threatened species on July 28, 1975. Grizzly bears are habitat generalists whose key habitat requirements are the availability of food and isolation from humans. Grizzly bears are solitary wanderers, except when they are caring for young. Although they typically maintain a minimum distance from one another, their home ranges often overlap (USFWS 1993). Bears mate in late May through mid July, typically becoming reproductive at age 5. During winter months, grizzly bears hibernate at high elevations where snow accumulations are deep. The bears usually move along an elevation gradient to take advantage of seasonal foods. They emerge from hibernation in spring and move to the lowlands to forage on winter-kill carcasses and newly emerging vegetation. Grizzly bears are opportunistic feeders, foraging on carrion, squirrels, vegetation, nuts, berries, and insects. In the late summer and early fall, the bears move back up to higher elevations to forage on berries in the avalanche slides. Den digging begins in early September through November. Grizzly bears typically remain in their dens for about 5 months (USFWS 1993).

The recovery plan for grizzly bears focuses on populations in six recovery ecosystems with suitable habitat for self-sustaining populations of bears. They are the Yellowstone National Park, the Northern Continental Divide, the North Cascades, the Selkirk, the Cabinet-Yakk, and the Bitterroot. All but the Bitterroot ecosystem are currently inhabited by grizzly bears. The Yellowstone grizzly bear population is the strongest and most viable, and this population was de-listed from the threatened and endangered list in the spring of 2007. The grizzly bear population in the Northern Continental Divide ecosystem is the next most viable; this area supports 300 to 400 bears. The project corridor is located approximately 25 mi [40 km] southwest of the Northern Continental Divide ecosystem.

Grizzly bears inhabit large tracts of relatively undisturbed land. The most effective habitats consist of a wide range of vegetation that produces a varied food supply. Diversity in habitat characteristics also provides required resting, denning, and social areas and space. Cover is a key habitat component for grizzly bears.

Critical habitat for the grizzly bear has not been proposed or designated. Rather, grizzly bear recovery focuses on the establishment of populations in six areas with suitable habitat for self-sustaining populations, as described above.

Project Impacts. As with the gray wolf and lynx, roadways can impact grizzly bears by direct mortality, displacement and avoidance, habitat fragmentation, direct habitat loss, and associated human development (Ruediger, 1996). The grizzly bear is not included in the USFWS list of threatened or endangered species for the project area, and no grizzly bears have been reported within the project area. However it is possible, as evidenced by occasional grizzly bear sightings in the region, the project area could be used incidentally by grizzly bear for movement between territories. Given that 1) the projected average daily traffic is relatively low, 2) the design speed is low (35 mph), 3) the proposed road is

two lanes, 4) there are no known grizzly bears occupying the project area, and 5) use of the area by grizzly bears is incidental, it is anticipated that the no-action and preferred alternatives would have minimal impact on the species.

4.5.8 Forest Service Sensitive Species

Affected Environment. The inventory conducted by Herrera also examined Forest Service sensitive species. Table 6 lists the 14 Forest Service fish and wildlife sensitive species known or suspected in the Lolo National Forest. Refer to Chapter 4.4 "Vegetation" for Forest Service sensitive plant species.

Table 6. Forest Service sensitive fish and wildlife species within the Lolo National Forest.

Common Name	Scientific Name	Forest Status K = Known, S = Suspected[1]
Wildlife		
American peregrine falcon	Falco peregrinus anatum	K
Black-backed woodpecker	*Picoides arcticusi*	K
Coeur d'Alene salamander	*Plethodon idahoensis*	K
Common loon	*Gavia immer*	K
Fisher	*Martes pnnanti*	K
Flammulated owl	*Otus flammeolus*	K
Harlequin duck	*Histrionicus histrionicus*	K
North American wolverine	*Gule gulo luscus*	K
Northern bog lemming	*Synaptomys borealis*	K
Northern goshawk	*Accipiter gentiles*	K
Northern leopard frog	*Rana pipiens*	S
Townsend's big-eared bat	*Corynorhinus townsendii*	K
Western toad	*Bufo boreas*	K
Fish		
Westslope cutthroat	*Oncorhynchus clarki lewisi*	K

[1]Known or Suspected refers to the occurrence of a particular species within the Lolo National Forest

Peregrine Falcon. Although there appears to be suitable habitat for peregrine falcons on rock cliffs at high elevations above the project, historical and current peregrine falcon activity is concentrated at Petty Rock (Kratville 2004 personal communication). Petty Rock is the large monolith located on the Clark Fork River southwest of the mouth of Petty Creek. The pair of peregrine falcons at this site has been monitored for the past 5 years as part of the management plan implemented after the species was eliminated from the federal list of threatened and endangered species.

Black-backed Woodpecker. The black-backed woodpecker in Montana is associated with early successional burned forests of mixed conifers, lodgepole pines, Douglas-firs, and subalpine spruce (MNHP and MTFWP 2004). They are more numerous in lower elevation Douglas-fir and pine forest habitats than in higher elevation sub-alpine spruce or mixed conifer forest habitats (MNHP and MTFWP 2004).

Black-backed woodpeckers have been reported in the Lolo National Forest. Several areas of burned stands occur in the habitats surrounding the project corridor and may be

used by this species. These habitats are located on the slopes above the project corridor at MP 5.1 [8.2 km] and MP 12 [19.3 km] in the Douglas-fir/mallow ninebark habitat.

Coeur d'Alene Salamander. Coeur d'Alene salamanders have been reported in the Lolo National Forest. However, there is no suitable habitat for this species within the project corridor or the habitats immediately adjacent to the project corridor.

Common Loon. Loons are not expected within the project corridor, and there is no suitable habitat for loons within the project corridor or the surrounding habitats.

Fisher. All of the forest habitat types within the study corridor and the unclassified riparian 2 habitat type may be used by fishers; however, their preferred habitat (cedar forests) is not found within the project corridor or in the habitats adjacent to the project corridor.

Flammulated owl. Habitat for flammulated owls in Montana has been assumed on the basis of one project in the Bitterroot valley. According to this study, flammulated owls are associated with mature and old growth xeric (desert-like) ponderosa pine/Douglas-fir forests and in landscapes with higher proportions of suitable forest and forest with low to moderate canopy closure (MNHP and MTFWP 2004). They are absent from warm and humid pine forests and mesic (moderately moist) ponderosa pine/Douglas-fir forests (MNHP and MTFWP 2004).

Flammulated owls have been reported in the Lolo National Forest and may occur in all of the forest habitats identified within the project corridor but at older stages of growth. The habitat types in the project corridor are likely to be too young to provide suitable habitat.

Harlequin Duck. In Montana, most harlequin ducks inhabit fast-moving, low gradient, clear mountain streams (MNHP and MTFWP 2004). Riparian vegetation does not appear to affect their selection of habitat; however, there is a positive correlation between their choice of habitat and the presence of overhanging vegetation (MNHP and MTFWP 2004).

Suitable habitat is available for this species along Petty Creek, but breeding has not been reported (Kennedy 2004 personal communication).

Wolverine. Wolverines may occur in all of the forest and riparian habitat types identified within the project corridor. There is no suitable denning habitat for wolverines within the project corridor or within the habitats adjacent to the project corridor. Wolverines have been reported predominantly at higher elevations, and their occurrence in the project corridor is likely rare (Kennedy 2004 personal communication).

Northern Bog Lemming. Northern bog lemmings have been reported in the Lolo National Forest, but no suitable habitat for bog lemmings occurs within the project corridor or within the habitats adjacent to the project corridor.

Northern Goshawk. Few studies of goshawks have been conducted in Montana. Nesting habitat in Montana tends to include predominantly mature large tract conifer forests with a high canopy cover (69 %), relatively steep slopes (21 %), and little to sparse undergrowth (MNHP and MTFWP 2004). Goshawks are most likely to occupy the following forest habitat types within the project corridor: Douglas-fir/snowberry and Douglas-fir/pinegrass.

Northern Leopard Frog. The northern leopard frog has been reported from low-elevation and valley-bottom ponds, spillway ponds, beaver ponds, livestock reservoirs, lakes, creeks, pools in intermittent streams, warm water springs, potholes, and marshes (MNHP and MTFWP 2004). This species has been reported in high elevation wetlands in Wyoming and Colorado, but there is no evidence of its use of these habitats in Montana (MNHP and MTFWP 2004).

Northern leopard frogs have been reported in the Lolo National Forest, and there is suitable habitat for this species in Petty Creek within the project corridor and in riverine wetlands within the corridor.

Townsend's Big-eared Bat. Although habitat used by the Townsend's big-eared bat has not been studied in Montana, they are reportedly similar to habitats identified in studies in other states, which included caves and abandoned mines used for maternity roosts and winter residences (MNHP and MTFWP 2004). Forest habitats near roosts include Douglas-fir forests, lodge-pole pine forests, ponderosa pine forests, and black cottonwood riparian areas. The use of habitats in Montana by the Townsend's big-eared bat may be restricted as most caves and mines appear to be too cool in summer for use as maternity roosts.

Townsend's big-eared bats have been reported in the Lolo National Forest, and suitable habitat is available within the project corridor, including all black cottonwood riparian habitats and Douglas-fir forest habitats.

Western Toad. The western toad occupies a wide range of habitats including low-elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes; and high elevation ponds, fens, and tarns at or near the tree line (MNHP and MTFWP 2004). In Montana, toads have been documented in open canopy ponderosa pine woodlands and closed canopy dry conifer forest in Sanders County, willow wetland thickets and aspen stands bordering Engelman spruce stands in Beaverhead County, and mixed ponderosa pine/cottonwood/willow sites or Douglas-fir/ponderosa pine forests in Ravalli and Missoula Counties (MNHP and MTFWP 2004).

Western toads have been reported in the Lolo National Forest, and there is suitable habitat for this species within the project corridor in the riparian habitats along Petty Creek and in wetlands.

Westslope Cutthroat Trout. Western cutthroat trout seek out gravel substrate in riffles and pool crests for spawning habitat. Their most suitable spawning and rearing streams tend to be cold and nutrient poor.

Resident populations of westslope cutthroat trout are present in Petty Creek and the following tributaries: East Fork Petty Creek, South Fork Petty Creek, West Fork Petty Creek, Bruce Creek, Johns Creek, Printers Creek, Garden Creek, Bill Creek, and Mike Creek (MTFWP and NRIS, 2004). Westslope cutthroat trout are also expected to be present in the stream reaches within the study corridor.

Project Impacts.

No-Action Alternative. The no-action alternative is not expected to have impacts on the Coeur d'Alene salamander, common loon, fisher, northern bog lemming, or North American wolverine because these species are not known to occur in or near the project area.

Impacts to black-backed woodpecker, flammulated owl, harlequin duck, northern goshawk, American peregrine falcon, and townsend's big-eared bat would remain unchanged and minor in nature with the no-action alternative.

With the no-action alternative, sediment resulting from the roadway would not be reduced, and the crossing structures would not be improved to address fish species passage. Sedimentation of the surrounding waterways would likely continue to worsen, and certain reaches of these waterways would remain unavailable to various life stages of fish species.

Preferred Alternative. The preferred alternative is not expected to have impacts on the Coeur d'Alene salamander, common loon, fisher, northern bog lemming, or North American wolverine because these species are not known to occur in or near the project area.

Impacts primarily in the form of increased construction noise, may affect black-backed woodpecker, flammulated owl, harlequin duck, northern goshawk, American peregrine falcon, and townsend's big-eared bat. These impacts would be temporary and minor in nature. No long-term impacts to these species are expected as a result of the project.

Construction impacts in the form of increased sediment to adjacent waterways and wetlands may affect the northern leopard frog, western toad, and westslope cutthroat trout. These impacts would be temporary and the severity of the impacts would be reduced through implementation of BMPs to control sediment transport. However, it is anticipated that applying an asphalt-paved surface, improving drainage, moving the road away from Petty Creek in select areas, and improving fish passage through the replaced structures on the project would have long-term beneficial impacts to these species by reducing sedimentation and providing for passage at all life stages of fish species.

4.5.9 General Wildlife

Affected Environment. The project area is within elk, mule deer, and white-tailed deer winter range. Bighorn sheep habitat is present along both sides of the corridor, and the sheep frequent the corridor while crossing. These ungulate species utilize the area along the remainder of the road corridor for summer range. A few moose are also present in the area. Black bear, mountain lion, ruffed grouse and blue grouse are plentiful in the project area. These species are legally open to take during established hunting seasons.

White-tailed deer crossings are numerous throughout the corridor, particularly between MP 6 and 11.3 [9.7 and 18.2 km]. MTFWP (2005) reports well-defined Bighorn sheep crossings at MP 0.12 to 1.62 [0.19 to 2.61 km] and MP 2.42 to 3.04 [3.89 to 4.89 km]. The time period from December 1 to June 30 is reported by MTFWP as critical to the sheep herd in these areas. Also, Hererra (2004c) reports that sheep appear to enter the roadway corridor in the vicinity of MP 4.9 and 5.5 [7.9 and 8.9 km] where the USFS maintains a sheep observation site and trailhead. It has been reported that locals have placed salt blocks in this area to attract the sheep. The salt blocks have been removed, however, leached salt in the soils continues to attract sheep.

Petty Creek provides habitat for a number of fish species, including rainbow trout, eastern brook trout, mountain whitefish, and sculpins (USDA Forest Service, 2003). It also provides spawning and rearing habitat for fish from the Clark Fork River.

Servheen et al. (2003) have identified and assessed the Northern Continental Divide Ecosystem (NCDE) to Bitterroots wildlife linkage zone, which provides seasonal habitat containing food, shelter, and security for wildlife moving between two large blocks of public land known as the NCDE and the Selway-Bitterroot Ecosystem. Maintaining the effectiveness of this linkage is important for the long-term health of wildlife in the area. Its effectiveness is reduced as human development fragments wildlife habitat (Servheen et al, 2003). The Petty Creek Road project lies within this linkage zone. Other highways near the project area that exist within the linkage zone are Interstate 90 and Highway 12.

Project Impacts.

No-Action Alternative. The types of impacts to general wildlife currently occurring in the project area would remain essentially the same with the no-action alternative. Sedimentation of the surrounding waterways would likely continue to worsen and certain reaches of these waterways would remain unavailable to various life stages of fish species.

The projected increase in traffic coupled with not addressing deficiencies of the current road (the lack of wildlife warning signs, under-sized stream crossing structures, and compromised vehicle control on a graveled surface) would likely increase the rate of wildlife/vehicle collisions with the no-action alternative.

Also the level of development in the Petty Creek valley is expected to continue into the foreseeable future. The area's proximity to Missoula, MT and/or other social or economic factor(s) have resulted in a continued movement of people to the valley despite the existing condition of the road. Impacts to the general wildlife from development in the project area are expected to continue, however, they are not expected to be substantial due to county zoning restrictions and the large amount of publicly owned land in the area.

Preferred Alternative. As documented above, the time period from December 1 to June 30 is reported as critical to the sheep herd from 0.12 to 1.62 [0.19 to 2.61 km] and MP 2.42 to 3.04 [3.89 to 4.89 km]. Construction noise would likely discourage use of the area and disrupt herd activities during this period. To lessen temporary construction impacts to the sheep, the WFLHD, in cooperation with MTFWP, would limit construction activities in these areas from December 1 to June 30 if necessary.

Aquatic organisms may be impacted by increased sediment from construction activities and increased runoff from the paved surface of the road. However, these impacts are expected to be minimal due to implementation of BMPs during construction. Also, a paved road surface, improved drainage, and upgraded stream crossing structures would have long-term beneficial effects on fish by reducing sedimentation and providing for passage of all life stages of fish species.

While the preferred alternative would require vegetation to be removed, the vegetation slated for removal is of low to marginal quality adjacent to the roadway and is less than ideal habitat for general wildlife. Therefore, the removal of some of this marginal vegetation would have minor to negligible impacts on wildlife species.

Although the posted speed of the road would remain 35 mph, some drivers would likely exceed this limit as they do under current conditions. These excessive speeds have and would likely continue to play a part in resulting wildlife/vehicle collisions. It is a common belief that paving a road results in increased traffic speeds. However, this increase may be minimized with a curvy road. As described in Section 3.3.1, traffic speed data suggests that travelers on Petty Creek Road tend to drive the paved and graveled portions of the road at relatively similar speeds, the difference between the surface types is negligible. Because the preferred alternative would essentially maintain the existing curvilinear alignment of Petty Creek Road, a paved surface would not substantially change traffic speeds on the road. If the curves were to be straightened, it is likely that speeds would increase considerably, and this would likely occur whether the road was paved or left gravel.

A paved surface would allow the application of striped lanes, which on a curvilinear alignment would tend to slow drivers down and discourage them from cutting corners by having a 10-ft [3-m] wide lane to travel in rather than a 20+-ft [6.1+-m] wide gravel road. Additionally, a paved surface would provide improved vehicle control (i.e. shorter stopping distances and better handling during sudden changes in vehicle course). This narrowing of travel lanes and improved vehicle control is expected to help minimize wildlife/vehicle collisions.

It is common for winter road maintenance in many regions to apply salt to a road for improved traction. This activity can attract wildlife to the road potentially contributing to wildlife/vehicle collisions. However, Missoula County uses non-salted sand on its rural road system to improve traction, which would additionally help to minimize wildlife/vehicle collisions.

To further assist in reducing wildlife/vehicle collisions, warning signs would be placed along the road in areas of typically high wildlife use. The goal is to heighten the public's awareness of potential crossings of wildlife as they travel through these areas. An acceptable design of the signs and their placement would be decided in cooperation with MTFWP and USFS. Also, the increased size of stream crossing structures would allow for easier passage of wildlife under the roadway rather than over it, reducing the likelihood of wildlife/vehicle collisions.

It is anticipated that traffic volumes would increase as described in Section 2.4. And with this increase in traffic, it is anticipated that wildlife mortality would rise. However, by keeping traffic speeds similar to current traffic speeds, installing wildlife warning signs, and providing a paved surface with designated lanes that discourages excessive speed and increases vehicle control, this rise is expected to be minimal.

Human development indirectly associated with a road project can have negative impacts on wildlife, similar to the impacts discussed in Section 4.5.4. However, it is difficult to predict the amount and rate of development that would occur in the Petty Creek valley, and even more difficult to determine how much might be attributable to improvements to the road. The Petty Creek Road project is primarily a response to inadequate and unsafe features of the roadway resulting from increased use of the road as a result of development that is and has been occurring in the valley to this point even without road improvements. In short, people have and would continue to move to the Petty Creek valley with or without improvements to the road. However, improvements to the road would likely make it more attractive to potential developers. Nevertheless, development in the Petty Creek valley is controlled through county zoning.

According to the Missoula County Office of Planning and Grants, approximately 3,000 ft [914 m] of the north part of the Petty Creek corridor is designated as Suburban Residential, which allows for a maximum of two dwelling units per acre. The rest of the corridor is designated as Open and Resource land, which allows a maximum of one dwelling unit per 40 ac [16.2 ha]. According to Missoula County's planning and zoning office, there is no plan to change these designations, and the only way it might change is through a citizen-initiated proposal. Given the many public comments received at the project open houses indicating a preference for a paved road but also to retain the rural feel of the Petty Creek corridor, a citizen-initiated proposal to change the land use designations to allow for more development is not reasonably foreseeable. This, coupled with the fact that approximately 50% of the land in the Petty Creek valley is publicly owned, indicates the potential for future development in the area is limited.

Given retention of a curvilinear roadway design, efforts to improve vehicle control, addition of warning signs, and limited opportunities for development, impacts of the preferred alternative to the NCDE to Bitterroot linkage zone would be small. Additionally, the use of construction timing restrictions, BMPs during construction, efforts to reduce sedimentation, and improvements to stream crossing structures, impacts from the preferred alternative to general wildlife would not be substantial.

4.5.10 Cumulative Impacts

The analysis area for cumulative impacts to wildlife for this project is the Petty Creek watershed. In addition to the identified impacts associated with the preferred alternative, other past, present, and future impacts to fish and wildlife have been identified and are discussed below.

Past activities include construction, use, and maintenance of the existing Petty Creek road, construction and uses of residential property, timber sales and related road building, agricultural activities, and recreational trail construction and use. Present and future activities include ongoing construction, maintenance, and uses of residential property and roads, agricultural activities, logging activities, and use of recreational trails.

These activities have and/or would continue to result in cumulative impacts to aquatic species that include increased transportation of sediment and other pollutants to waterways, increased turbidity of sediments, removal of shade-providing vegetation, and construction of stream crossing structures that may provide inadequate fish passage. As discussed above, Petty Creek is on the 303(d) list for impaired water quality.

Cumulative impacts of terrestrial wildlife species in the Petty Creek area include direct mortality from causes such as hunting pressure and auto collisions; displacement from and avoidance of suitable habitat that is in proximity to human activities; and direct habitat loss and habitat fragmentation associated with human development.

Although pressures associated with these activities have and would affect wildlife species, management of the area would help to alleviate some of these impacts. Missoula County's current and projected land designation for the majority of the Petty Creek drainage is Open and Resource land, which allows a fairly conservative maximum of one dwelling unit per 40 ac [16.2 ha] of land. Additionally, large portions of the area are federal or state lands, which are unlikely to be developed or contain activities with considerable adverse impacts. The incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.5.11 Mitigation

- Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.

- Work in streams within the project corridor would comply with work windows that are protective of species as determined by the U.S. Fish and Wildlife Service and Forest Service biologists.
- When feasible, the in-stream construction activities would occur "in the dry."
- No vehicle fueling or refueling operations, or storage of hazardous materials that could accidentally enter a stream, would be permitted within Resource Conservation Areas (RCAs), defined as 300 ft [91 m] of the top of the bank of any intermittent or perennial stream channel (Diem 2005).
- Prior to construction, a Hazardous Materials Spill Plan would be prepared to identify actions to take in the event of a spill. This plan would incorporate preventative measures such as the placement of refueling facilities and the storage and handling of hazardous materials.
- Culvert replacements in fish-bearing streams would be designed to allow passage of fish at all life stages by constructing a natural bankfull stream configuration and substrate within the crossing.
- Where culvert/bridge replacement is performed in flowing streams, sediment capture devices would be placed to deter downstream movement of sediment.
- During stream culvert replacement, natural streambed material would be replaced within the crossing structure. If applicable, large substrates would be conserved and scattered to provide "shadow rocks" (habitat and resting areas) within the crossing. The stream channel would be replaced to a natural and appropriate bankfull and floodplain configuration for the site and entering stream type.
- Bioengineered riprap would be used to stabilize stream banks where appropriate instead of placing riprap.
- Drainage facilities that allow ground infiltration and provide sediment filtration from storm water runoff would be provided.
- The amount of fill material placed in water bodies and floodplains would be minimized by moving the road away from Petty Creek in areas and by providing wider stream crossing structures with a natural bank-full stream configuration.
- The project would be designed to avoid the need to relocate, realign, or recreate the Petty Creek stream channel where it flows close to the roadway corridor.
- Where feasible, the road would be shifted away from Petty Creek, leaving existing fill/riprap in place, and providing a vegetative buffer between the road and the creek.
- Electrical facilities that need to be relocated because of construction activities would be raptor-proofed to avoid electrocution of birds.
- Culverts/bridges would allow small mammal passage underneath the roadway.
- In cooperation with MTFWP and USFS, warning signs would be posted along the road in areas of typically high bighorn sheep use. Also, construction activities may be limited in these areas between December 1 and June 30.

4.6 Archaeological and Historic Resources

4.6.1 Affected Environment

Prehistory of western Montana is represented by isolated projectile points from the Folsom and Windust traditions of the Paleo Indian period (10,000 – 7,500 BP), large corner and side notched projectile points of the Middle period (7,500 – 2,000 BP), and small side notched points representative of the advent of the bow and arrow in the Late Prehistoric period (2,000 – 1,720 BP). The Proto historic period (1,700 – 1,805 BP) is represented by the introduction of the horse, increased mobility, and more trade goods including European trade goods such as beads and metal objects.

Following exploration of the surrounding area by Lewis and Clark in 1805, David Thompson in 1811, and Lt. John Mullan in 1853, prospecting and mining represent historic activities in the Petty Creek drainage. Subsequent activities included logging, saw milling, and more recently the increased establishment of residences and recreational activities.

A cultural resources survey was conducted during October 2003. The survey consisted of extensive background research and a pedestrian survey consistent with the standards set forth in the Montana State Historic Preservation Office (SHPO) approved *Site Identification Strategy for the Bitterroot, Flathead, and Lolo National Forests* (McLeod et al, 2003). Only one site, 24MO0313, a culturally modified tree (CMT), was identified during the records search. It is located outside of the Area of Potential Effects (APE) for the project and was determined not eligible for the National Register of Historic Places (NRHP) in 1989. Another CMT (24MO0910) was located and recorded in the APE during the pedestrian survey at the junction of Bill's Creek and Petty Creek Road. The site was recommended not eligible for inclusion on the NRHP, and the SHPO concurred with this determination in a letter dated February 6, 2004 (Attachment 5).

4.6.2 Project Impacts

No-Action Alternative. Given the fact that no known sites listed or eligible for listing on the NRHP are located in or near the project area, the no-action alternative would have no impacts to archaeological or historic resources.

Preferred Alternative. Given the fact that no known sites listed or eligible for listing on the NRHP are located in or near the project area, the preferred alternative was determined to have no historic properties affected. The SHPO concurred with this determination in their February 6, 2004 letter (Attachment 5).

4.6.3 Cumulative Impacts

The Petty Creek watershed is the analysis area for cumulative impacts on archaeological and historic resources for this project. Past, present, and future activities may have impacted or may impact archaeological and historic resources. Past activities include construction, use, and maintenance of the existing Petty Creek Road, construction and uses of residential property, timber sales and related road building, agricultural activities,

and recreational trail construction and use. Present and future activities include ongoing construction, maintenance, and uses of residential property and roads, agricultural activities, logging activities, and use of recreational trails.

Operation of construction equipment and excavation of soils as part of construction of roads, buildings, and trails or during logging has the potential to disturb intact cultural resources in the Petty Creek drainage. Resources may also be disturbed by increases in erosion due to potential removal of vegetation and increases in storm water runoff.

While it is evident that the Petty Creek drainage was used both prehistorically and historically, the sparseness of cultural resources identified during the cultural survey for this project suggests the drainage was not intensively used in the past. Additionally, the identified cultural resources in the project area were determined not eligible for inclusion on the NRHP. Therefore, the incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.7 Section 4(f)

4.7.1 Affected Environment

Two Section 4(f) resources are located along Petty Creek Road. They are the Petty Pasture Trail located at approximately MP 3.5 [5.7 km] and the Petty Creek Sheep Viewing Trail located at approximately MP 5.1 [8.2 km]. Both of these trails are publicly owned (administered and maintained by the USFS), open to the public, have recreation as their major purpose, and are significant as recreational facilities in this region of the Forest. The Petty Pasture Trail (Trail #733) is 3.5 mi [5.6 km] long and is open to hikers and motorcycles. The Petty Creek Sheep Viewing Trail (#721) is 0.5 mi [0.8 km] long and is used primarily to view bighorn sheep activities in the area. There are no formally designated parking areas accessing these trails. Currently, recreational users either park on the side of the road, which is inconvenient and unsafe, or in the case of the Petty Pasture Trail, cross private property to access an informal parking area near the trailhead.

Section 6009(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59, amended existing Section 4(f) legislation to simplify the processing and approval of projects that have only *de minimis* impacts on lands protected by Section 4(f). If the project is determined to have a *de minimis* impact on a property, an analysis of avoidance alternatives is not required, and the Section 4(f) evaluation process is considered complete. A project's impacts to a Section 4(f) resource is considered *de minimis* if:

1) The transportation use of the Section 4(f) resource, together with any impact avoidance, minimization, and mitigation or enhancement measures incorporated into the project, does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f);
2) The official(s) with jurisdiction over the property are informed of FHWA's intent to make the *de minimis* impact finding based on their written

concurrence that the project would not adversely affect the activities, features, and attributes that qualify the property for protection under Section 4(f); and

3) The public has been afforded an opportunity to review and comment on the effects of the project on the protected activities, features, and attributes of the Section 4(f) resource.

4.7.2 Project Impacts

No-Action Alternative. The no-action alternative would have no known impacts to any Section 4(f) resources.

Preferred Alternative. Through coordination with the USFS, formalized parking areas would be provided to enhance access to each trail and provide a safer recreational experience. During construction, access to these trails would be limited or temporarily closed but would be re-opened once construction is completed.

Given the minor effects to these Section 4(f) resources by the project and the enhancement of the trails by the addition of parking areas, the WFLHD intends to make a finding of *de minimis* impact to Petty Pasture Trail and the Petty Creek Sheep Viewing Trail. The official with jurisdiction (USFS) has been notified of this intent and their written concurrence is expected. Also, public review of this Environmental Assessment would serve as the public's opportunity to review and comment on the effects of this project on the two Section 4(f) resources.

4.7.3 Cumulative Impacts

Other than the impacts described above, no other past, present, or future impacts to Petty Pasture Trail or the Petty Creek Sheep Viewing Trail have been identified.

4.8 Noise

4.8.1 Affected Environment and Project Impacts

Noise has not been identified as a major concern in the Petty Creek area. With relatively low traffic volumes on Petty Creek Road, traffic noise has not been substantial. Traffic is expected to increase with both the no-action and preferred alternatives, but because projected traffic volumes are expected to remain relatively low, neither is expected to result in considerable increases in noise. Additionally, it is likely that the smoother surface of the preferred alternative would be lower than the noise produced on the current gravel surface.

A temporary increase in noise levels would occur due to construction activities associated with the preferred alternative in the vicinity of the project corridor. The areas not located along Petty Creek Road would have lower ambient noise levels than areas immediately adjacent to the road. To minimize the temporarily higher noise levels, all equipment would be required to comply with FHWA's standard noise mitigation measures. With this, no substantial noise problems are expected to occur.

4.8.2 Cumulative Impacts

Past, present, and future actions potentially affecting noise levels in the Petty Creek drainage are use of the Petty Creek Road, residential construction and uses, agricultural activities, and logging activities. However, these noise effects are minimal and of short duration. Therefore, the incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.8.3 Mitigation

- All equipment would be equipped with properly functioning mufflers.
- All equipment would comply with pertinent noise standards of the EPA.
- No construction would be performed within 100 ft [30 m] of any occupied residence on Sundays, legal holidays, or between the hours of 10:00 pm and 6:00 am on other days.
- Should a specific noise impact complaint occur during construction, one or more of the following measures may be required:
    - Shutting off idling equipment
    - Rescheduling construction operations to avoid periods of noise annoyance identified in complaint
    - Notifying nearby residents when extremely noisy work would be occurring
    - Installing temporary or portable acoustic barriers around stationary construction noise sources.

4.9 Air Quality

4.9.1 Affected Environment

The federal government has established National Ambient Air Quality Standards (NAAQS) to protect the public from air pollution. Designated “attainment” areas are areas that have not violated these air quality standards. Geographic areas where concentrations of a pollutant exceed the ambient air quality standards are classified as “nonattainment” areas. Areas previously designated as nonattainment that are now in compliance with air quality standards are classified as “maintenance” areas.

Air quality within the Petty Creek corridor is generally considered good to excellent for most of the year. The project corridor is situated within an EPA air quality “attainment” area for all regulated pollutants. Local adverse effects result from the dust from unpaved roads, occasional wildfires, and wood burning stoves in the area. The most common complaint from local residents is the amount of airborne dust produced with use of the Petty Creek Road. The dust has been cited by residents as a cause or exacerbation of health problems.

4.9.2 Project Impacts

No-Action Alternative. The no-action alternative would do nothing to improve the dust problem along the road, and air quality would remain unchanged. While dust could be

controlled through maintenance application of water or chemical suppressants, this is unlikely to occur due to additional costs and person hours needed.

Preferred Alternative. Providing a paved surface for the road would essentially eliminate the undesirable production of road dust. Airborne dust would likely increase during construction, however dust control procedures would be implemented to keep the dust at a minimum. No long-term or regional adverse impacts to air quality are anticipated. Overall, it is anticipated that air quality in the Petty Creek Road corridor would improve with completion of the proposed project.

4.9.3 Cumulative Impacts

The most sizeable past and present impact to air quality in the Petty Creek corridor is likely airborne dust associated with use of the Petty Creek Road and other gravel roads in the area. Emissions and airborne dust from vehicles and equipment associated with residential construction, agricultural activities, logging, and road use also have and would affect air quality. However, given the relatively low occurrence of these activities, the associated effects on air quality are minimal. This project, given its reduction in dust, is expected to have a beneficial impact on air quality in the project area. The incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.9.4 Mitigation

- An asphalt road pavement would be provided to reduce airborne dust.
- Dust control measures (e.g. water application) would be implemented during construction.

4.10 Visual

4.10.1 Affected Environment

Much of the Petty Creek Road has a scenic natural setting. It, however, has not been designated as a federal, state, or forest scenic byway nor otherwise distinguished for its scenic attributes.

4.10.2 Project Impacts

No-Action Alternative. The visual elements of Petty Creek Road would remain unchanged with the no-action alternative. However, if regular maintenance is not implemented, the road and its visual qualities could be negatively affected.

Preferred Alternative. A paved road surface and lane markings would be more visible, however, design elements to minimize these changes would be revegetating disturbed areas and providing vegetation along some portions of the stream/road bank that currently have no vegetation. Also, alignment changes would be minor, and new cut slopes would be similar in character to natural slopes and existing cut slopes in the corridor. Therefore,

the preferred alternative would not change the overall look and feel of the corridor and is expected to result in only minor impacts to its scenic attributes.

4.10.3 Cumulative Impacts

Past, present, and future actions resulting in changes to the visual quality of the Petty Creek drainage include the construction of roads and buildings, removal of vegetation associated with logging and agriculture, and introduction of non-native plant species. These actions have not nor are they expected to substantially alter the overall natural feeling of the Petty Creek drainage either separately or cumulatively. This interpretation is supported by the fact that much of the land in the drainage is relatively protected because it is Forest Service or state-owned land, because most of the private land is designated Open and Resource land by Missoula County, and because most residents of the area want to maintain Petty Creek's natural setting. The incremental impacts from this project, when added to other past, present, and reasonably foreseeable future actions, would not result in substantial cumulative impacts to the resource, or affect the ability of the resource to sustain itself.

4.11 Floodplains

4.11.1 Affected Environment

Petty Creek Road parallels much of Petty Creek, and portions of it were constructed in its floodplain and the floodplains of its tributaries. Portions of these floodplains are used for agriculture and other private development as well. None of these floodplains are designated by the Federal Emergency Management Agency as 100-year Special Flood Hazard Areas.

4.11.2 Project Impacts

No-Action Alternative. The no-action alternative would have no known additional impacts to the floodplains along Petty Creek Road. With continued maintenance grading of the gravel road, it is expected that side casting of material would continue to encroach on the floodplains as the road widens.

Preferred Alternative. Additional road material would be placed in the floodplains along Petty Creek and other streams in the project area in order to construct the preferred alternative. However, the amount of fill material would be minimized by moving the road away from Petty Creek in areas and by providing wider stream crossing structures with a natural bank-full stream configuration. Also, this would help to avert damage to the road or the natural environment (i.e., excessive erosion near the culvert outlet, excessive ponding at the inlet) and reduce flooding during large storm events. Therefore it is not expected that the preferred alternative would have adverse impacts to floodplains within the project area.

4.12 Public Services and Utilities

4.12.1 Affected Environment

Public services within the project corridor include fire and police protection, school bus service, maintenance of public facilities (including roads), health services, solid waste disposal, and mail delivery. Utilities in the corridor include overhead and buried electricity cables owned by Missoula Electric Co-op, buried fiber optic cable owned by Blackfoot Communications, and buried irrigation lines owned by private residents.

4.12.2 Project Impacts

The no-action and preferred alternatives would have no anticipated impacts or very minor impacts to these services and utilities. Access for the services would be maintained throughout the construction period with the preferred alternative. Coordination would take place with Missoula Electric Coop, Blackfoot Communications, and private residents for any needed relocation of portions of these facilities. Any relocation work would be done as necessary without disruption in service.

4.13 Land Use

Approximately 50% of the land in the Petty Creek area is publicly-owned forest land. The rest is privately-owned and exists as forested land, agricultural land, or residential property. Over past years, people have been moving into the Petty Creek area, increasing residential development.

It is evident that the Petty Creek valley has undergone a conversion from larger land holdings/ranches to smaller parcels and subdivisions. Currently, approximately 137 legal lots of record are served by the Petty Creek Road and West Fork Petty Road. Also, the Plum Creek Timber Company, which is a major landowner in the area, is offering much of its land for sale, potentially encouraging additional development. According to the Missoula County Office of Planning and Grants, approximately 3,000 ft [914 km] of the northern corridor is designated as Suburban Residential, which allows for a maximum of two dwelling units per acre. The rest of the corridor is designated as Open and Resource land, which allows a maximum of one dwelling unit per 40 ac [16.2 ha]. According to Missoula County's planning and zoning office, there is no expected planning to change these designations, and the only way it might otherwise change is through a citizen-initiated proposal. Given the many public comments received at the project open houses indicating a preference for a paved road but also to retain the rural feel of the Petty Creek corridor, a citizen-initiated proposal to change the land use designations to allow for more development is not reasonably foreseeable.

4.13.1 Project Impacts

No-Action Alternative. Given the trend of people moving to the Petty Creek area despite existing conditions, it is expected the no-action alternative would not change this tendency. Land use would be expected to continue to change from forested to more residential. However, development is limited by the percentage of publicly-owned land

in the area and by the large amount of Open and Resource land which restricts heavy development.

Preferred Alternative. The relationship between transportation improvements and land development is complex. Improved accessibility via improvement of the road may make the area more attractive for residential development. However, other factors must be analyzed, including availability and quality of water, cost of power and utilities, availability and quality of schools and public services, land prices, zoning ordinances and demand.

Development projections cannot be assumed to progress through a static formula or linear progression. Development is affected by regional and national economic and residential factors. Changes can arise from fluctuations in fuel and energy prices, interest rates, local zoning, land values, and regional home sales. Some or all of the following scenarios are possible:

- Improvement of road leads to increased development
- Increased development leads to improvement of road
- Increased interest rates reduce demand for development
- Decreased interest rates increase demand for development
- Higher real estate values in metropolitan area lead to increased rural development
- Population influx leads to increased demand for rural development

Western Montana cities have shown considerable growth and expansion into regional centers of services, finance and construction with growth rates of 35% from 1990-2000. The demand for rural development has followed suit, with a 300% increase in real estate (University of Montana 2005).

While road improvement can lead to pressure for increased subdivision, the reverse can also be true, wherein present or increased subdivision leads to demands for improvement of the road. The Petty Creek Road has essentially been unchanged over the last 30+ years, however it has been in the last 15 years or so that development in the Petty Creek valley has increased more dramatically. This suggests that forces other than road conditions (such as proximity to Missoula, improved standard of living in the region, and/or some of the dynamics described above) have more substantially influenced this increase. Based on these considerations, development in the Petty Creek valley would continue with or without improvements to the road and the proposed project is primarily in response to inadequate and unsafe features of the roadway resulting from increased use of the road as a result of the development that has occurred in the valley. It is also a response to the expected further deterioration of the roadway and safety if improvements are not made.

While improvements to the Petty Creek Road may make the corridor more attractive to current and potential homebuilders, it is expected the preferred alternative would have little influence on the trend of people moving to the area. Therefore, it is not anticipated that considerable land use changes would occur as a result of the proposed project.

Cumulatively, because much of the land in the Petty Creek valley is publicly owned (approximately 50%) and the county zoning designated for the majority of the corridor is Open and Resource land, it is expected development in the area would be limited and change in land use would be relatively controlled.

4.14 Prime Farmland, Rangeland, and Forestland

No prime or unique farmland, rangeland, or forestland is present within the project area. Therefore, either alternative would have no effect on these resources.

5 Hazardous Materials

No hazardous waste sites are known to be present in the project area, and the likelihood of undiscovered hazardous waste sites in the project area is very low. If hazardous materials are discovered during construction, the appropriate federal, state, and/or local agencies would be notified.

It is anticipated that the improved safety elements of the preferred alternative would reduce the risk of accidents along Petty Creek Road thereby reducing the potential for fuel or other hazardous materials spills. During construction, there would be a potential for hazardous material spills to occur. If this situation would arise, the Hazardous Material Spill Plan that would be developed prior to construction would be implemented to minimize the effects of the spill.

6 Environmental Justice

On February 11, 1994, President Clinton issued the Executive Order on Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898). In accordance with this order, the Petty Creek Road Improvement Project has been reviewed to determine if it would result in "disproportionately high and adverse human health and environmental effects on minorities and low-income populations."

No minority or low-income populations were identified in or near the Petty Creek project area. Also, due to the relatively narrow width of the proposed reconstruction project, no residents or businesses would need to be displaced or relocated as a result of the project. The short-term (construction related) and long-term impacts and benefits would affect all Petty Creek Road users on an equal basis. Opportunities for employment during project construction and the long-term road safety improvements would extend to minorities and people with low incomes in nearby communities and thus could benefit these groups. In conclusion, the project would not result in "disproportionately high and adverse effects on minorities and low-income populations."

7 Irreversible or Irretrievable Commitment of Resources

Construction of the road improvements would require an irretrievable commitment of fossil fuel for construction equipment operation and rock for road surfacing. However, this commitment of natural resources and energy would not be substantial. In the long term, the improved surfacing would result in a minor reduction in vehicle fuel usage and would also reduce fuel requirements for roadway maintenance.

8 Summary of Mitigation Measures

The following table summarizes the mitigation measures that would be implemented with the preferred alternative. Many of the mitigation measures are duplicative and apply to more than one resource.

Resource	Mitigation Measures
Soils and Geology	• Cut slopes would be designed not to exceed the angle of repose (maximum angle of slope at which soils and loose materials can remain stable without sliding). • Topsoil would be conserved and stockpiled for later use to enhance revegetation success. • Woody debris, obtained on site or from clearing operations, would be scattered in appropriate densities to foster shade and micro-habitat zones on cut slopes and disturbed sites where appropriate and feasible. • Following construction, cut slopes and disturbed sites would be seeded or planted with native seed, shrubs, and/or trees at appropriate distributions and spacing. • If appropriate, fertilizer would be used to facilitate revegetation. • If appropriate, a mulch, tackifier, or other erosion control method would be used to protect seeded areas. A fast-germinating annual plant may be added to the seed mix to provide quick ground cover. • Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.

Water Resources	• Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established.
	• A dewatering and diversion plan would be established and would include, but would not be limited to, the following procedures:
	  o Where culvert/bridge replacement is performed in flowing streams, actions to reduce sediment would be conducted.
	  o Actions, such as stream diversion, would be visually assessed to assure that sediment control devices work properly.
	  o Where feasible, sediment capture devices would be placed to deter downstream movement of sediment.
	  o Pumping would be required to remove subsurface flow laden with sediment around the excavated areas.
	  o Pump discharge would be released in an area where sediment would be unlikely to be delivered to the stream.
	• Appropriate riparian vegetation would be planted and/or transplanted, and woody debris from site clearing would be scattered over disturbed surfaces where appropriate.
	• There would be no storage of petroleum products within the Petty Creek floodplain.

	• Prior to construction, a Hazardous Materials Spill Plan would be prepared to identify actions to take in the event of a spill. This plan would incorporate preventative measures such as the placement of refueling facilities and the storage and handling of hazardous materials. • All disturbed sites along the project route would be revegetated promptly using species appropriate to the site. Seeded and planted sites would be protected from erosion with a tackifier or other soil protection method until vegetation becomes established. • Erosion controls would be left in place until vegetation becomes established. • Drainage facilities that allow ground infiltration and provide sediment filtration from storm water runoff would be provided. • Fill material placed in waterbodies and floodplains would be minimized. • Where feasible, the road would be shifted away from Petty Creek, leaving existing fill/riprap in place, and providing a vegetative buffer between the road and the creek. • Where appropriate, seedlings would be planted between the riprap and at other locations where the road and stream are in close proximity.
Wetlands	• Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established. • Fueling or storage of petroleum products would comply with permit requirements. • To help prevent petroleum products and other chemicals from entering wetlands during construction, an emergency spill plan would be prepared and a spill containment kit would be kept onsite at all times. • All disturbed sites along the project route would be revegetated promptly, using species appropriate to the site. • Where appropriate, seeded and planted sites would be protected from erosion with a tackifier or other soil protection method until vegetation becomes established. • Drainage facilities that allow ground infiltration and provide sediment filtration from storm water runoff would be provided. • The amount of fill material placed in waterbodies and floodplains would be minimized. • Where feasible, the road would be shifted away from Petty Creek, leaving existing fill/riprap in place, and providing a vegetative buffer between the road and wetlands.
Vegetation	• Topsoil would be conserved and stockpiled for later use on disturbed sites to enhance revegetation success. • Cut slopes and disturbed sites would be seeded or planted with native vegetation appropriate for the site as soon as possible following construction. • If appropriate, a mulch, tackifier, or other erosion control method would be used to protect seeded areas. A fast-germinating annual plant may be added to the seed mix to provide quick ground cover. • Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established. • All seed and hay or straw used on the construction site would be free of noxious weeds. • All construction equipment and vehicles would be cleaned to remove noxious weed propagules before moving into or out of the construction area.
Fish and Wildlife	• Appropriate sediment and erosion control BMPs would be put into place before construction begins and would be maintained in working order throughout the construction period and until vegetation is established. • Work in streams within the project corridor would comply with work windows that are protective of species as determined by the U.S. Fish and Wildlife Service and Forest Service biologists. • When feasible, the in-stream construction activities would occur "in the dry." • No vehicle fueling or refueling operations, or storage of hazardous materials that could accidentally enter a stream, would be permitted within Resource Conservation Areas

	(RCAs), defined as 300 ft [91 m] of the top of the bank of any intermittent or perennial stream channel (Diem 2005). • Prior to construction, a Hazardous Materials Spill Plan would be prepared to identify actions to take in the event of a spill. This plan would incorporate preventative measures such as the placement of refueling facilities and the storage and handling of hazardous materials. • Culvert replacements in fish-bearing streams would be designed to allow passage of fish at all life stages by constructing a natural bankfull stream configuration and substrate within the crossing. • Where culvert/bridge replacement is performed in flowing streams, sediment capture devices would be placed to deter downstream movement of sediment. • During stream culvert replacement, natural streambed material would be replaced within the crossing structure. If applicable, large substrates would be conserved and scattered to provide "shadow rocks" (habitat and resting areas) within the crossing. The stream channel would be replaced to a natural and appropriate bankfull and floodplain configuration for the site and entering stream type. • Bioengineered riprap would be used to stabilize stream banks where appropriate instead of placing riprap. • Drainage facilities that allow ground infiltration and provide sediment filtration from storm water runoff would be provided. • The amount of fill material placed in water bodies and floodplains would be minimized by moving the road away from Petty Creek in areas and by providing wider stream crossing structures with a natural bank-full stream configuration. • The project would be designed to avoid the need to relocate, realign, or recreate the Petty Creek stream channel where it flows close to the roadway corridor. • Where feasible, the road would be shifted away from Petty Creek, leaving existing fill/riprap in place, and providing a vegetative buffer between the road and the creek. • Electrical facilities that need to be relocated because of construction activities would be raptor-proofed to avoid electrocution of birds. • Culverts/bridges would allow small mammal passage underneath the roadway. • In cooperation with MTFWP and USFS, warning signs would be posted along the road in areas of typically high bighorn sheep use. Also, construction activities may be limited in these areas between December 1 and June 30.
Noise	• All equipment would be equipped with properly functioning mufflers. • All equipment would comply with pertinent noise standards of the EPA. • No construction would be performed within 100 ft [30 m] of any occupied residence on Sundays, legal holidays, or between the hours of 10:00 pm and 6:00 am on other days. • Should a specific noise impact complaint occur during construction, one or more of the following measures may be required: o Shutting off idling equipment o Rescheduling construction operations to avoid periods of noise annoyance identified in complaint o Notifying nearby residents when extremely noisy work would be occurring o Installing temporary or portable acoustic barriers around stationary construction noise sources.
Air Quality	• An asphalt road pavement would be provided to reduce airborne dust. • Dust control measures (e.g. water application) would be implemented during construction.
Hazardous Materials	• Prior to construction, the contractor will prepare a Hazardous Materials Spill Plan to identify actions to take in the event of a spill. This plan will incorporate preventative measures such as the placement of refueling facilities and the storage and handling of hazardous materials.

9 Permits and Approvals

Required permits and approvals would be obtained prior to construction. The following permits and approvals are expected to be required for the proposed project:

- Section 404 Authorization – U.S. Army Corps of Engineers
- Section 401 Water Quality Certification – Army Corps of Engineers/ Montana Department of Environmental Quality (MTDEQ)
- Montana Pollution Discharge Elimination System (MPDES) Permit – Montana DEQ
- Stream Protection Act (SPA 124) – Montana FWP
- Short-term Water Quality Standard for Turbidity (318 Authorization) – MT DEQ
- Section 4(f) *de minimis* concurrence – U.S. Forest Service
- Burn approval – U.S. Forest Service
- Water source approval

10 Coordination and Consultation

Social, Economic, and Environmental Team

A Social, Economic, and Environmental (SEE) Team was established during the scoping phase of the project to identify and assess the environmental effects of the proposal and recommend alternatives for evaluation. The SEE Team acts as a steering committee for project development activities during the conceptual and design phases. The team is also charged with the formulation and implementation of a comprehensive public involvement process. This team is composed of representatives from the principal land management agencies and FHWA. Team members call on available disciplines within their agencies for technical assistance as needed.

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- Missoula County Weed District Staff

Public and Agency Comments
Comments received during the public scoping and Project Checklist phases of the project are located in Attachment 6.

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Attachment 1. Accident Data

Petty Creek Road

MT PFH 71-1(1)

Accident Report Summary

Feb-04

Location	Date	Accident Type	Accident #	Conditions	Time of Day	Speed Limit	Remarks
T23WR14N Sec 13 Petty Creek Road at Bible Lane	8/22/2002	Single Vehicle Damage	200011850803	Cloudy Dry	Daylight	35 MPH	Too fast for conditions Overturn
T23WR14N Sec 12	2/21/1998	Single Vehicle	9800011210201	Cloudy Dry	Daylight	45 MPH	
T23wR14N Sec 13	12/20/1998	Two Vehicle Damage	9800014101211	Clear Dry	Daylight	30 MPH	Inattentive and careless driving Rock or Boulder
T23WR14N Sec 13	11/12/1998	Single Vehicle Damage	9800014101104	Cloudy Dry	Daylight	35 MPH	Wild animal
T23WR14N Sec 36	9/15/1999	Three Vehicle Damage	9900014570905	Clear Dry	Daylight		Inattentive driving Parked MV
T22WR14N Sec 30 Petty Creek Road MP 3-4	11/30/2001	Single Vehicle Damage/Injury	100013991117	Cloudy Dry	Daylight	35 MPH	Too fast for conditions Overturn
T22WR14N Sec 18 Petty Creek Road MP 2-3	6/1/2001	Single Vehicle Damage	100015480601	Clear Dry	Daylight	30 MPH	Exceeded Speed Limit, Too fast for conditions, careless driving
T22WR14N Sec. 30	3/6/1998	Single Vehicle Damage	9800011850304	Cloudy Dry	Daylight	35 MPH	Inattentive Too fast for conditions Tree
T22WR14N Sec. 30	9/15/1998	Single Vehicle Damage	9800014640904	Clear Dry	Daylight	35 MPH	Exceeded Speed Limit, Too fast for conditions, careless driving
T22WR14N Sec. 30	2/10/1999	Single Vehicle Damage	9900014640206	Clear Dry	Daylight	35 MPH	Vegetation Obstruction Wild animal
T23WR13N Sec. 11 Ed Creek Road	11/16/2000	Single Vehicle Damage	11211108	Clear Dry	Daylight		Icy, Tires Overturn
T23WR13N Sec. 2 6 Miles up Petty Creek	12/4/2004	Single Vehicle Damage	11851202	Clear Dry	Daylight	35 MPH	Too fast for conditions Embankment overturn
T23WT13N Sec. 1 Petty Creek Road	10/4/2000	Single Vehicle Damage	15671002	Clear Dry	Daylight	35 MPH	Rut, Holes, Bumps Embankment overturn

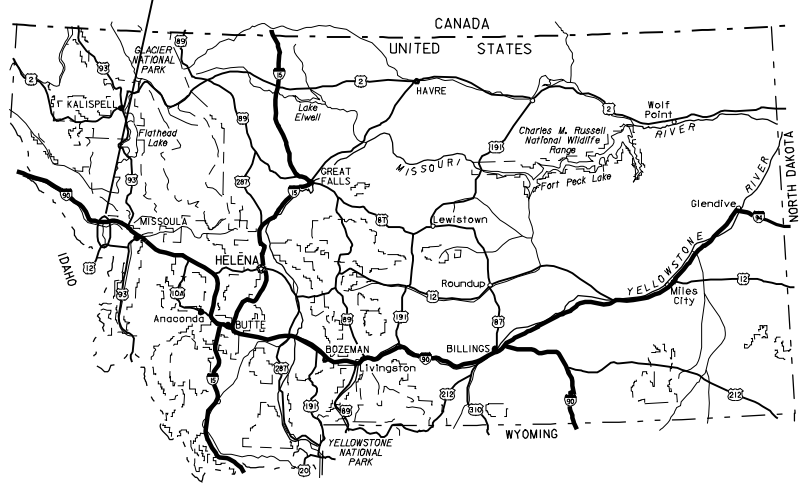
Location	Date	Accident Type	Accident #	Conditions	Time of Day	Speed Limit	Remarks
T23WR13N Sec. 2 6.5 Miles up Petty Creek Road	12/25/2001	Single Vehicle Damage	100015361211	Cloudy Dry	Daylight	35 MPH	Too fast for conditions Fence
T23WR13N Sec. 13	9/29/1999	Single Vehicle Damage	9900015350903	Clear Dry	Daylight	45 MPH	Fire/Explosion
T23WR13N Sec. 24	6/8/1998	Single Vehicle Damage	9800013870608	Cloudy Dry	Daylight	45 MPH	Careless Driving Utility Pole
T23WR13N Sec. 24	10/26/1998	Single Vehicle Damage	9800011851006	Clear Dry	Daylight		Too fast for conditions Fence
T22WR13N Sec. 31	4/21/2002	Single Vehicle Damage/Injury	200014640402	Clear Dry	Daylight	35 MPH	Alcohol, Too fast for conditions Overturn

Attachment 2. Wetland Maps

STATE	PROJECT	SHEET NUMBER
MT	PFH 71-(1)	A.1

U. S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

Project Location



MONTANA KEY MAP

PLANS FOR PROPOSED PROJECT

ST PFH PFH 71-1(1)

PETTY CREEK ROAD

LOLO NATIONAL FOREST
MISSOULA COUNTY
MONTANA

LENGTH 18.780 KILOMETERS

INDEX TO SHEETS

A. GENERAL INFORMATION
A.1 TITLE SHEET
A.2 PLAN SYMBOLS AND ABBREVIATIONS
A.3 VICINITY MAP

C. TYPICAL SECTION(S)
C.1 TYPICAL SECTION AND QUANTITIES

D. PLAN-PROFILE
D.1 QUANTITIES AND CONNECTION DETAILS
D.2-D.30 PLAN AND PROFILES

E. APPROACH ROADS
E.1-E.15 EROSION CONTROL PLANS
E.16-E.19 EROSION CONTROL DETAILS

F. EROSION CONTROL
F.1-F.5 PIPE CULVERT STANDARDS AND DETAILS

G. MATERIAL SOURCE
G.1-G.9 GUARDRAIL DETAILS

H. DRAINAGE
H.1-H.3 FENCE DETAILS

I. SAFETY FEATURES
I.1-I.3 MSE GABION-FACED WALL DETAILS

J. FENCES, GATES, AND CATTLE GUARDS
J.1 PERMANENT TRAFFIC CONTROL AND DETAILS

K. MISCELLANEOUS
K.1 PETTY CREEK BRIDGE DETAILS 16+614.572

L. WETALND MITIGATION

M. LANDSCAPING PLANS

N. TEMPORARY TRAFFIC CONTROL

O. PERMANENT TRAFFIC CONTROL

P. BRIDGE CONSTRUCTION PLANS

TYPE OF CONSTRUCTION:

Grading, drainage, base and paving

DESIGN DESIGNATION:

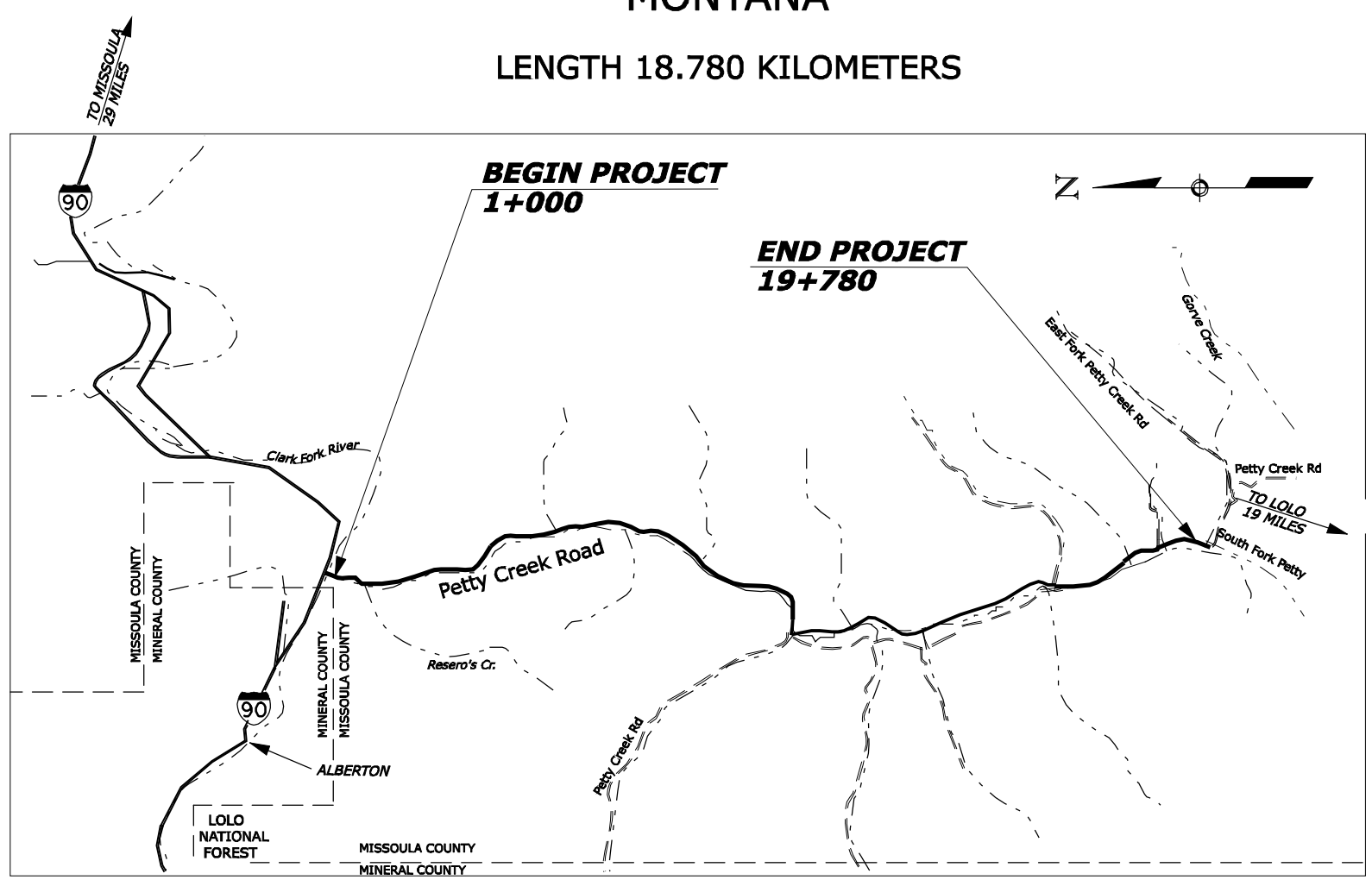
ADT (2006) =
ADT (2026) =
dhv 180
V 60 km/h
e 0.06 max.

SPECIFICATION:

Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FP-03 Metric Units

FEDERAL LANDS HIGHWAY
Metric
COMMITMENT TO EXCELLENCE

PLANS PREPARED BY
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
WESTERN FEDERAL LANDS HIGHWAY DIVISION
VANCOUVER, WASHINGTON



Scale in kilometers
1 .5 0 1 2 3 4 5

RECOMMENDED:

_____ DATE _____
Project Manager,
Western Federal Lands Highway Division

APPROVED:

_____ DATE _____
Director, Project Delivery,
Western Federal Lands Highway Division

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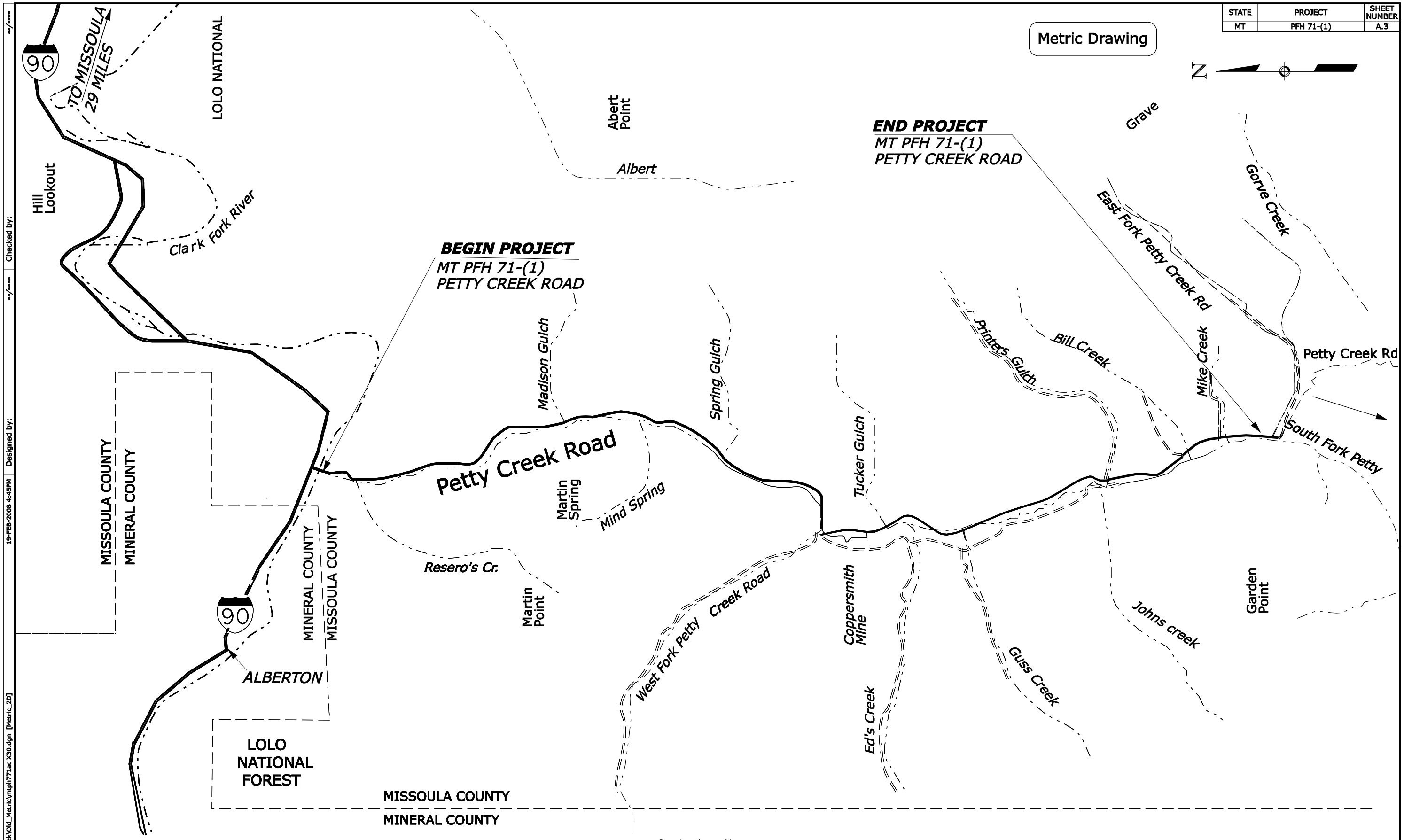
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-(1)	A.3

Metric Drawing



VICINITY MAP

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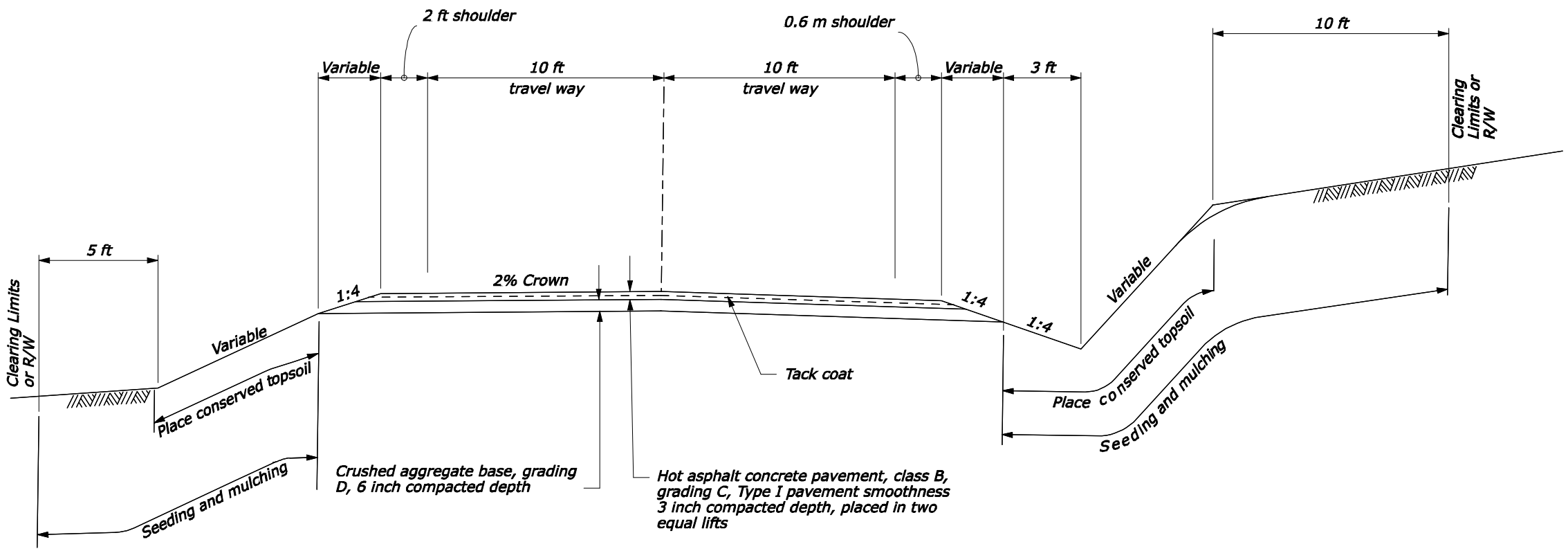
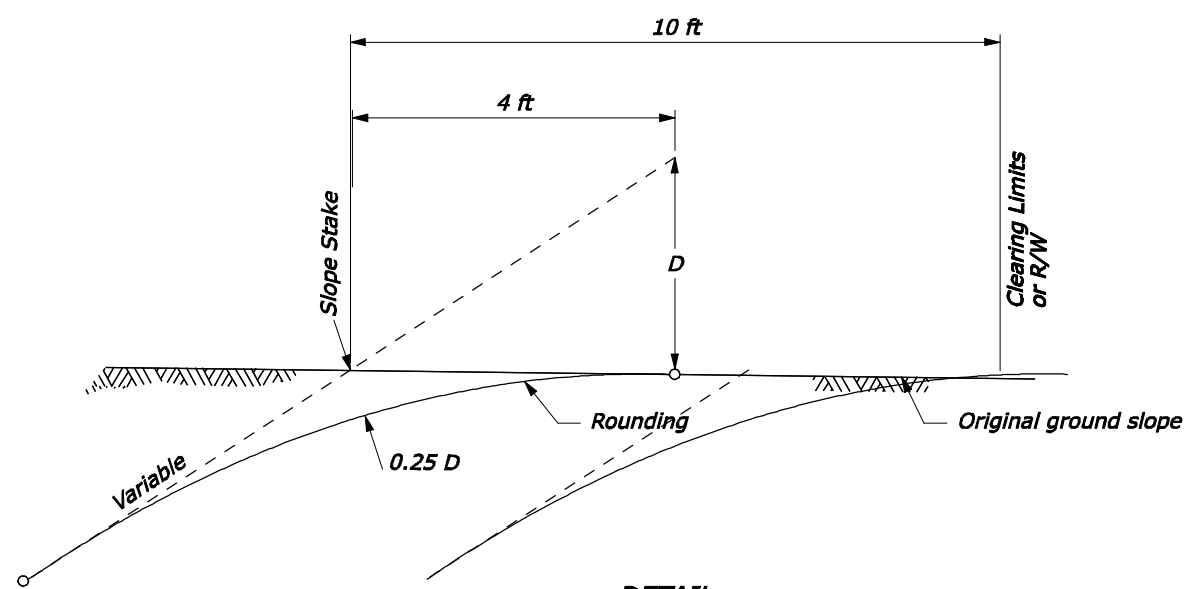
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	C.1



PETTY CREEK ROAD
1+000.00 TO 19+780



DETAIL
CUT SLOPE ROUNDING

TYPICAL SECTION

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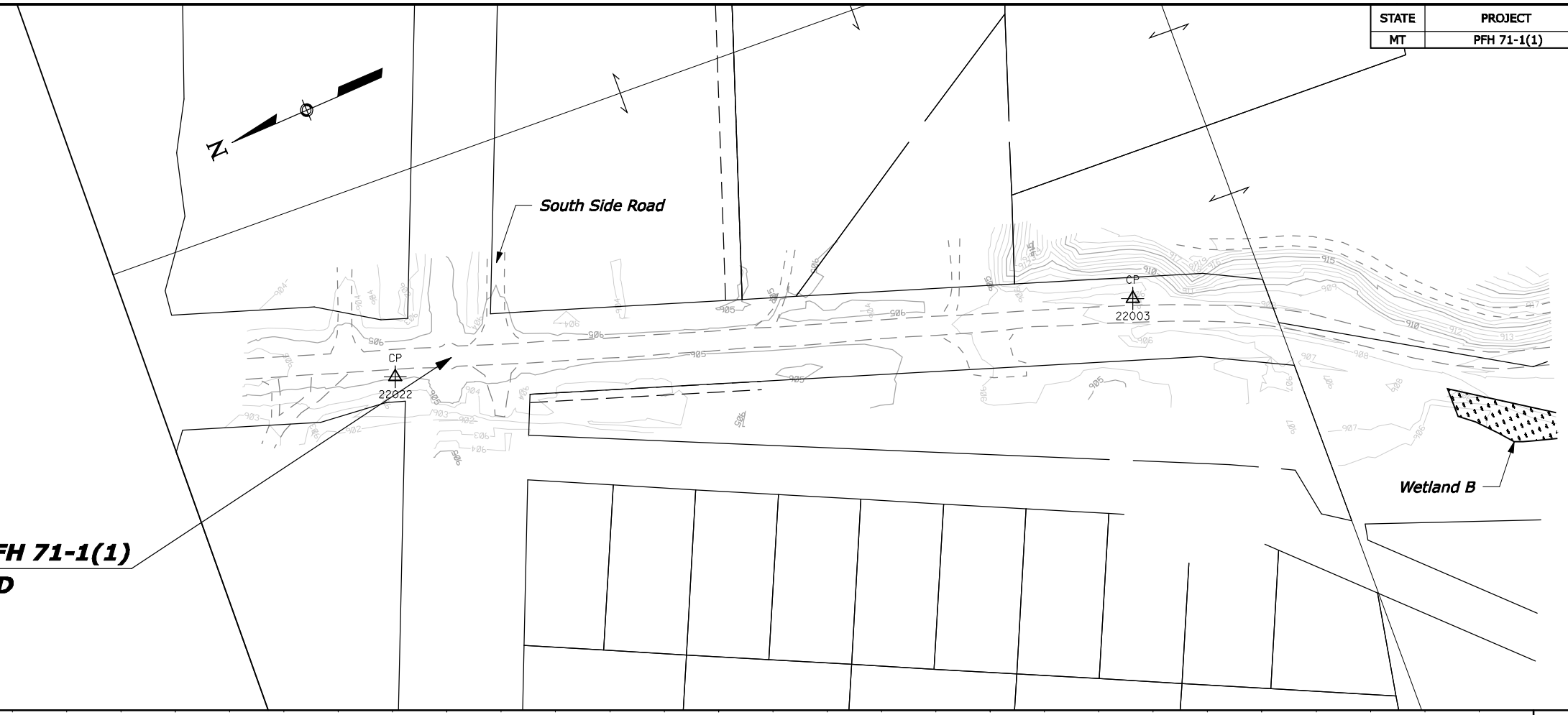
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	D.2

CONTROL POINTS

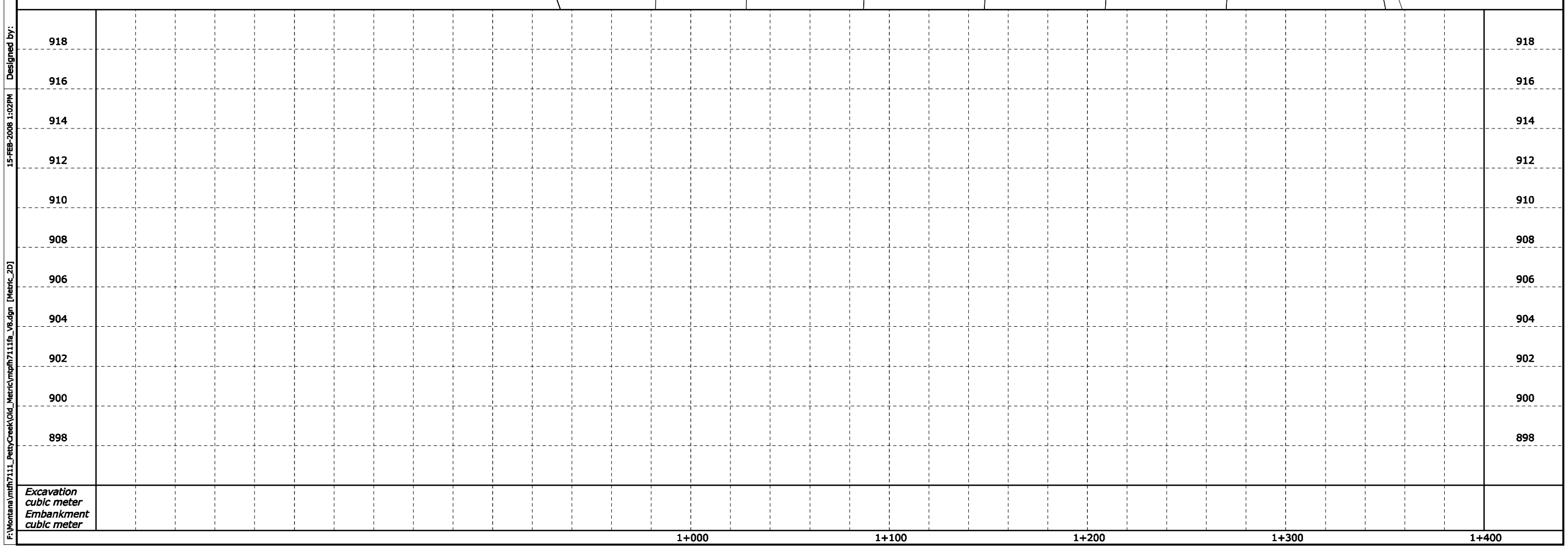
NAME	NORTHING	EASTING	ELEVATION
22022	316462.933	224176.240	905.021
22003	316202.628	224093.946	907.411



BEGIN PROJECT PFH 71-1(1)

PETTY CREEK ROAD
1+000
N 224174.5509
E 316441.1096

Metric Drawing



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STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	D.3

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22004	316059.407	224003.264	909.776
22005	315857.802	224007.180	912.855
22006	315763.327	223965.253	916.209
22007	315587.355	223971.785	918.121

926
924
922
920
918
916
914
912
910
908
906

Excavation cubic meter
Embankment cubic meter

1+400 1+500 1+600 1+700 1+800 1+900 2+000 2+100

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Checked by:
15-FEB-2008 1:02PM
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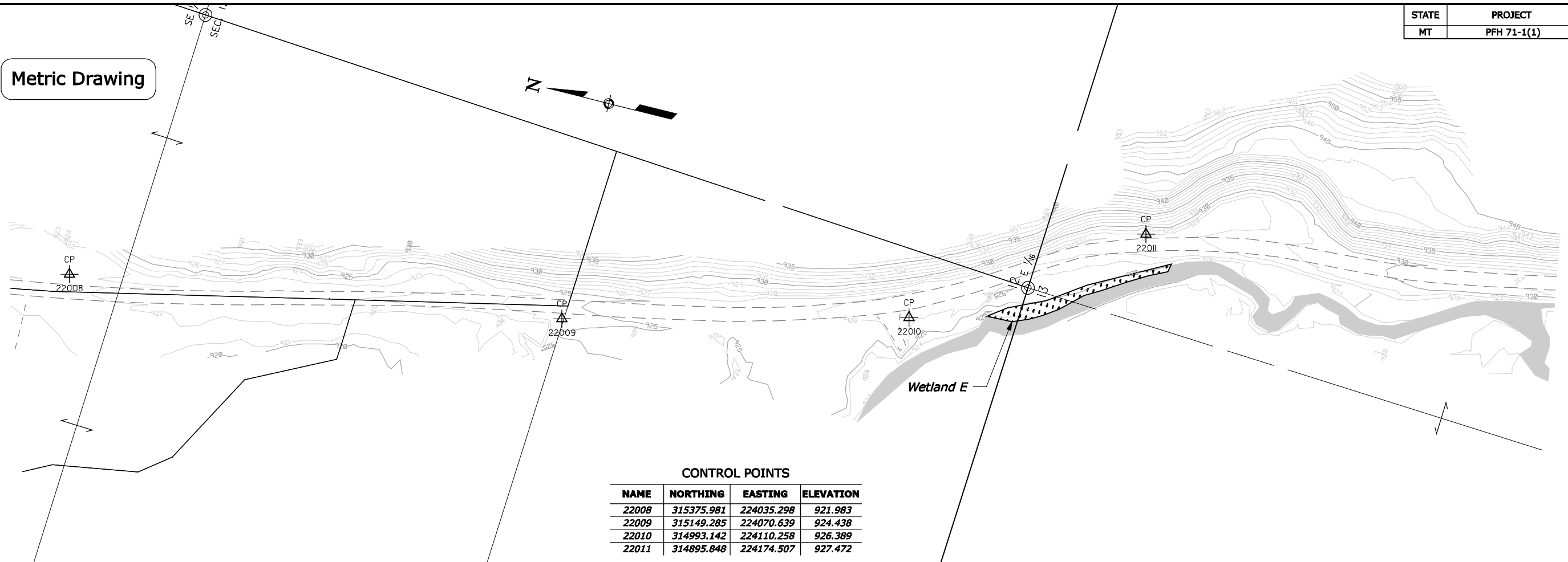
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	D.4

Metric Drawing



CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22008	315375.981	224035.298	921.983
22009	315149.285	224070.639	924.438
22010	314993.142	224110.258	926.389
22011	314895.848	224174.507	927.472

936
934
932
930
928
926
924
922
920
918
916

Excavation cubic meter
Embankment cubic meter

2+100 2+200 2+300 2+400 2+500 2+600 2+700 2+800

Designed by: 15-FEB-2008 1:02PM
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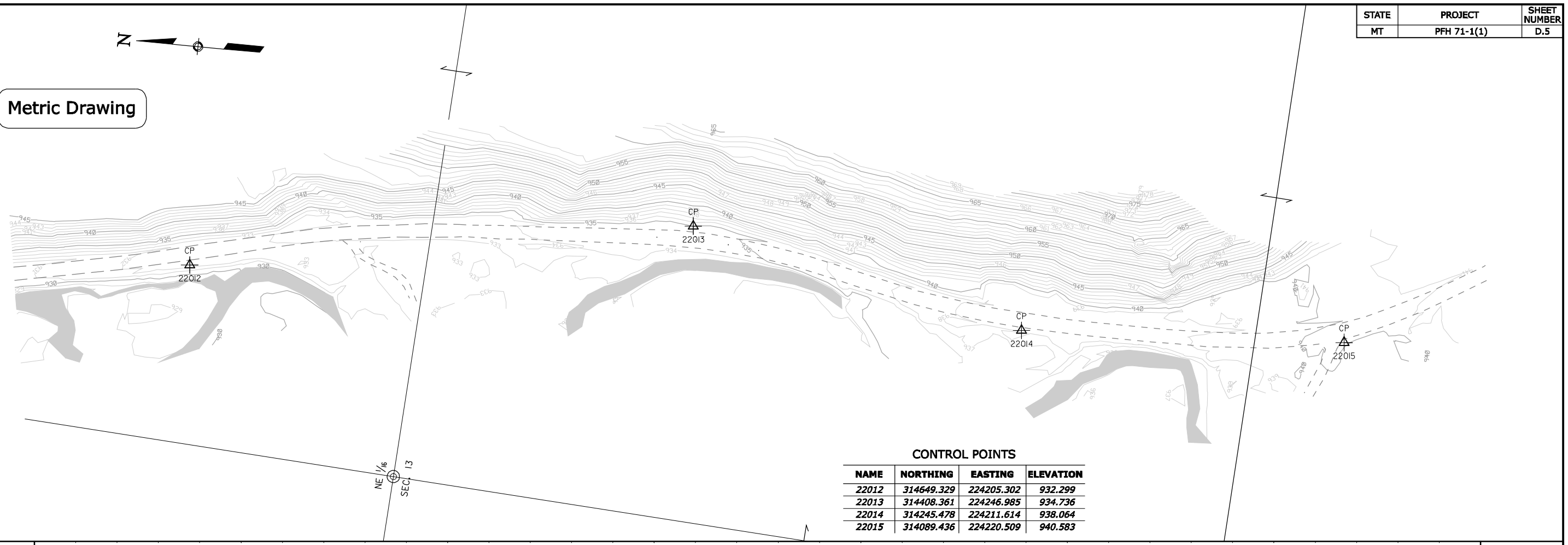
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	D.5

Metric Drawing



CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22012	314649.329	224205.302	932.299
22013	314408.361	224246.985	934.736
22014	314245.478	224211.614	938.064
22015	314089.436	224220.509	940.583

946
944
942
940
938
936
934
932
930
928
926

Excavation cubic meter
Embankment cubic meter

2+800 2+900 3+000 3+100 3+200 3+300 3+400 3+500

Designed by: --/---- Checked by: --/----

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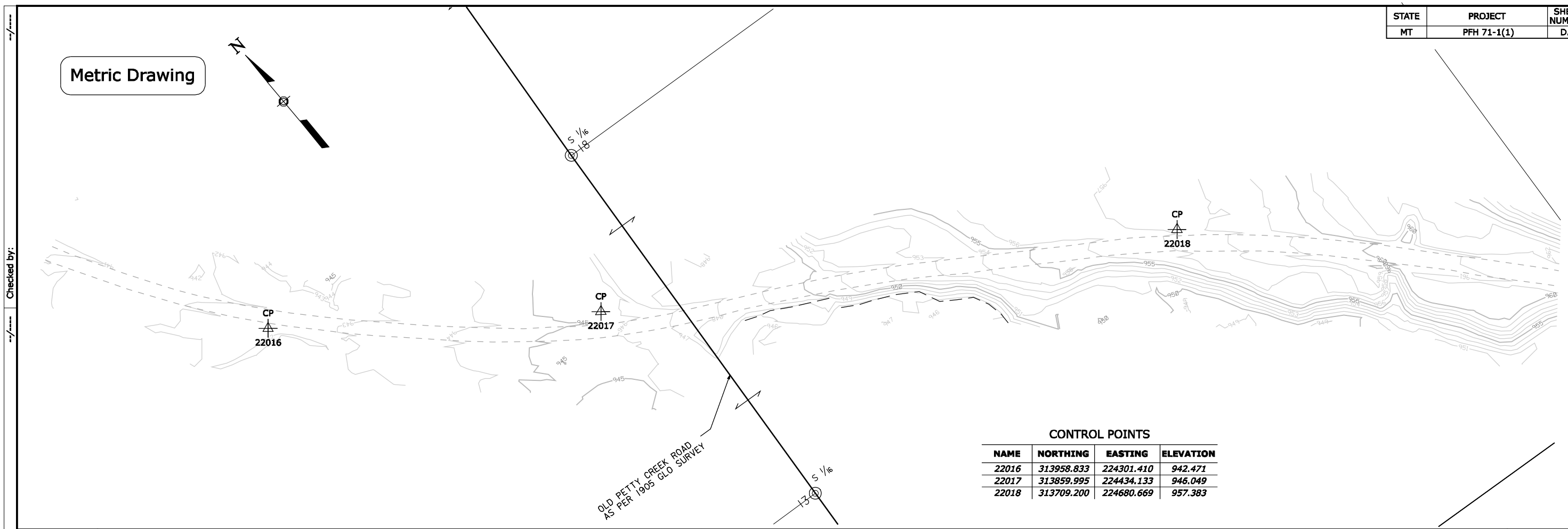
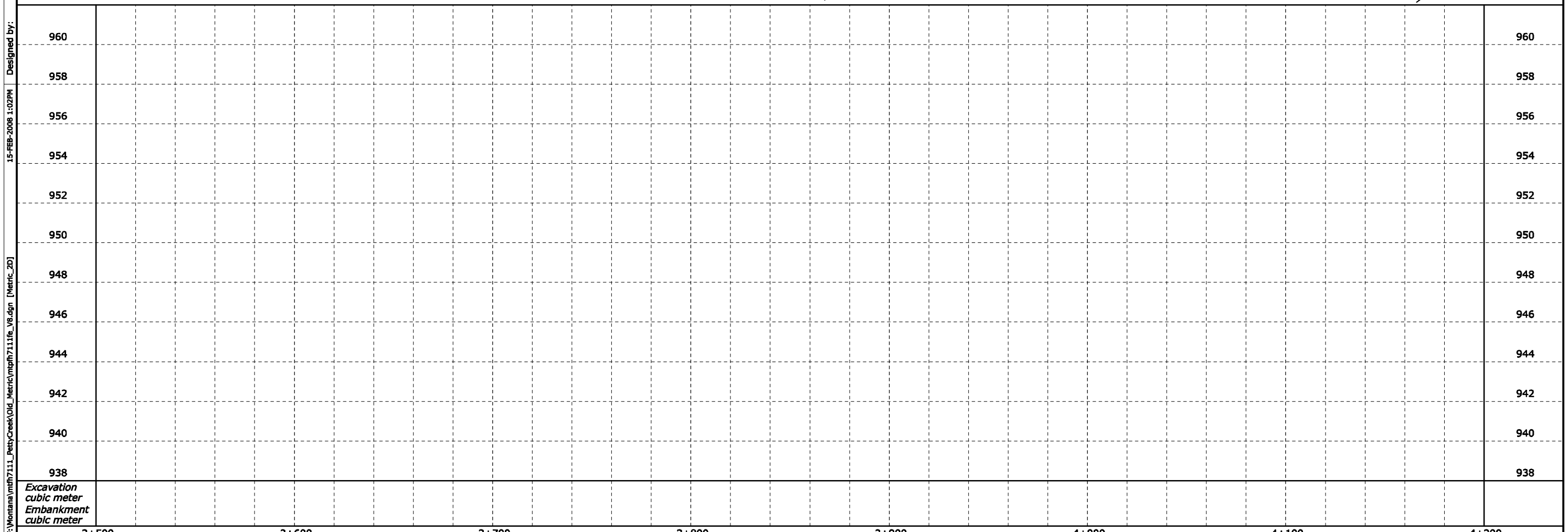


CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22016	313958.833	224301.410	942.471
22017	313859.995	224434.133	946.049
22018	313709.200	224680.669	957.383



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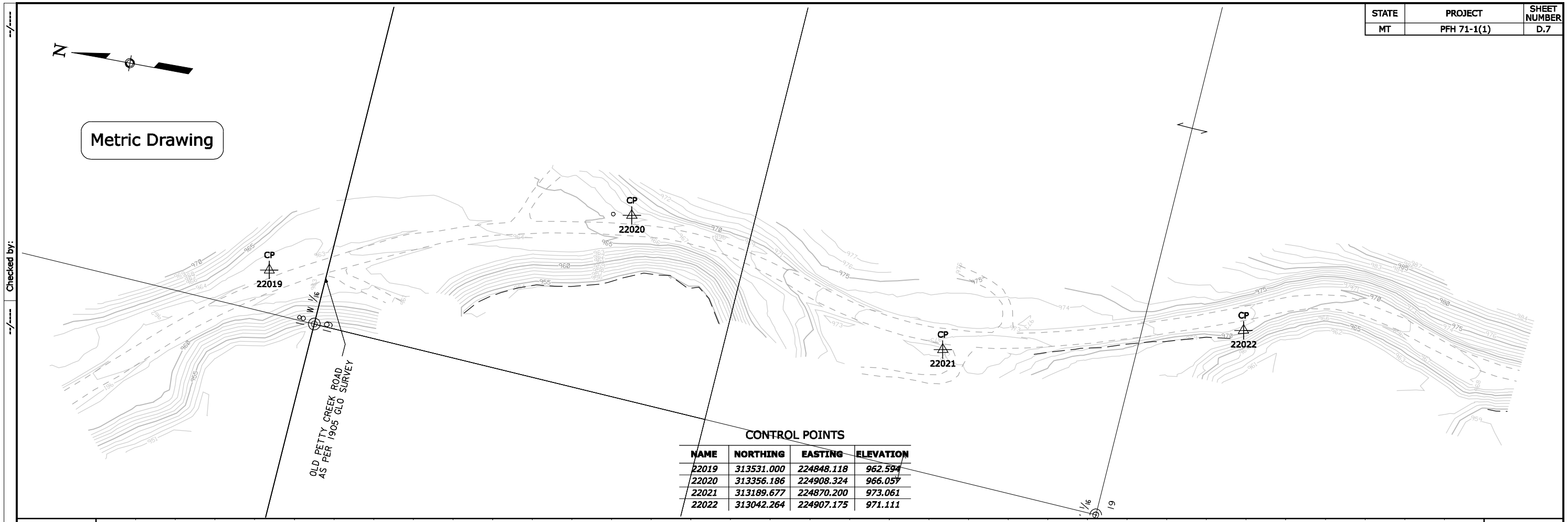
MT	PFH 71-1(1)	D.7



CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22019	313531.000	224848.118	962.594
22020	313356.186	224908.324	966.057
22021	313189.677	224870.200	973.061
22022	313042.264	224907.175	971.111

980
978
976
974
972
970
968
966
964
962
960
958

Excavation cubic meter
Embankment cubic meter

4+200 4+300 4+400 4+500 4+600 4+700 4+800 4+900

Designed by: --/---- Checked by: --/----

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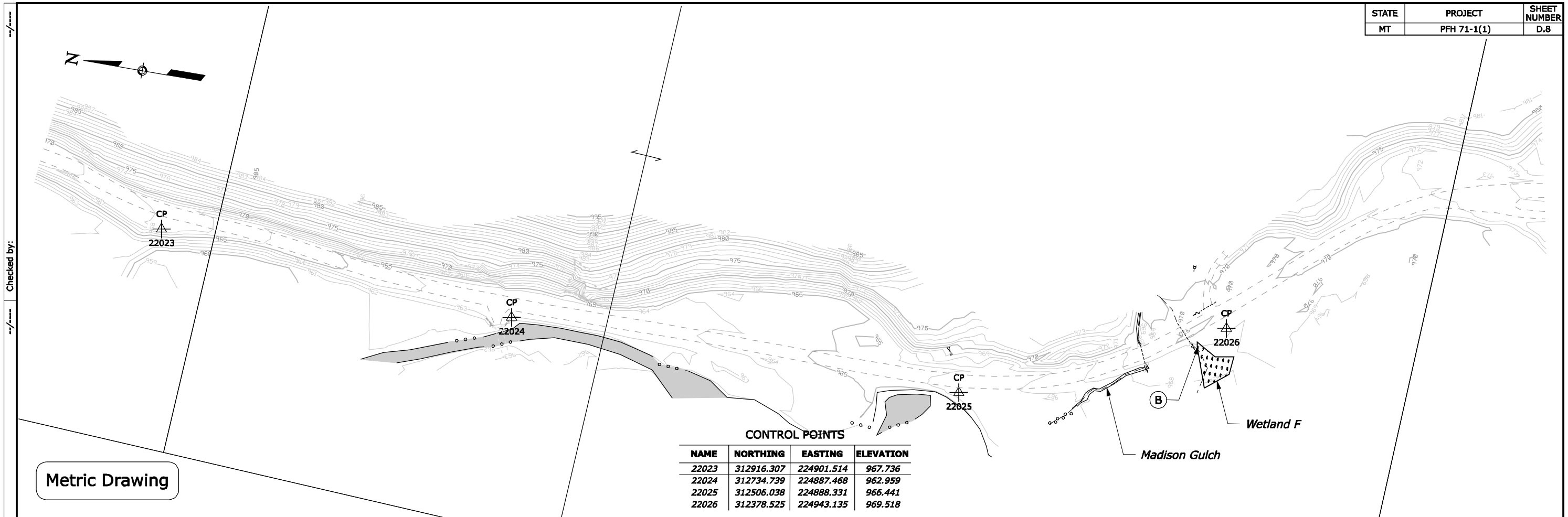
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	D.8



CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22023	312916.307	224901.514	967.736
22024	312734.739	224887.468	962.959
22025	312506.038	224888.331	966.441
22026	312378.525	224943.135	969.518

980
978
976
974
972
970
968
966
964
962
960
958

Excavation cubic meter
Embankment cubic meter

4+900 5+000 5+100 5+200 5+300 5+400 5+500 5+600

Designed by: 15-FEB-2008 1:03PM Checked by:

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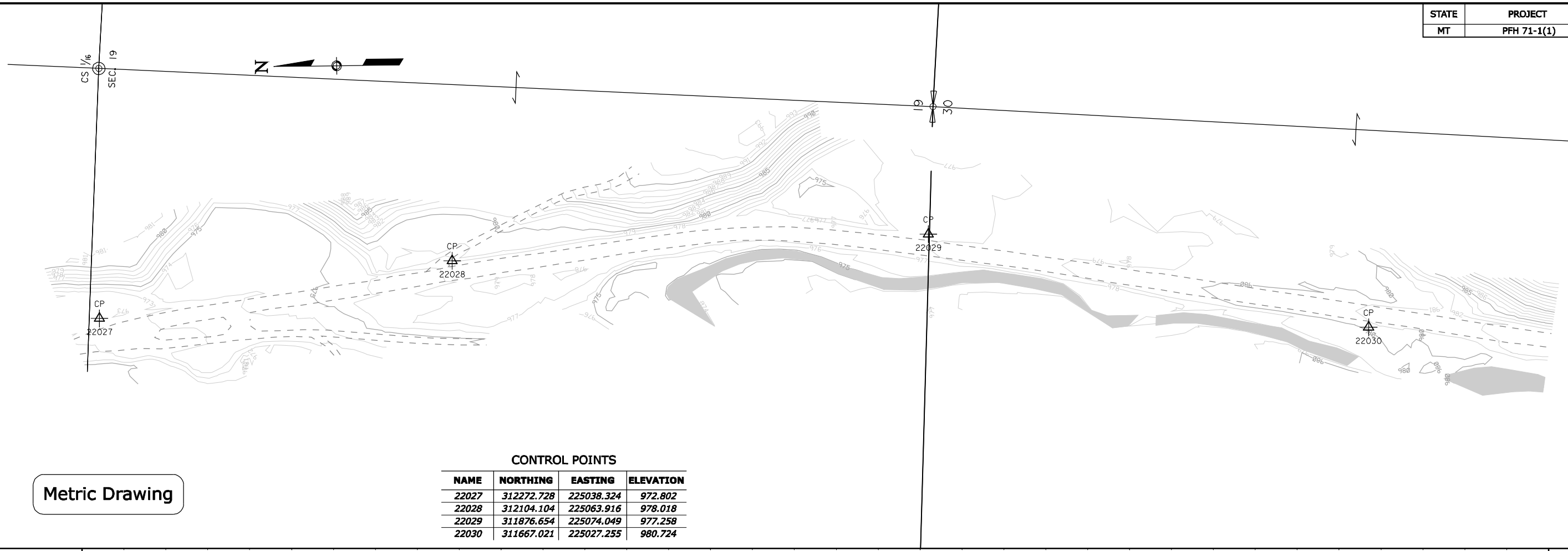

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22027	312272.728	225038.324	972.802
22028	312104.104	225063.916	978.018
22029	311876.654	225074.049	977.258
22030	311667.021	225027.255	980.724

988
986
984
982
980
978
976
974
972
970
968

Excavation cubic meter
Embankment cubic meter

5+600 5+700 5+800 5+900 6+000 6+100 6+200 6+300

Designed by: 15-FEB-2008 1:03PM Checked by: --/---- --/----

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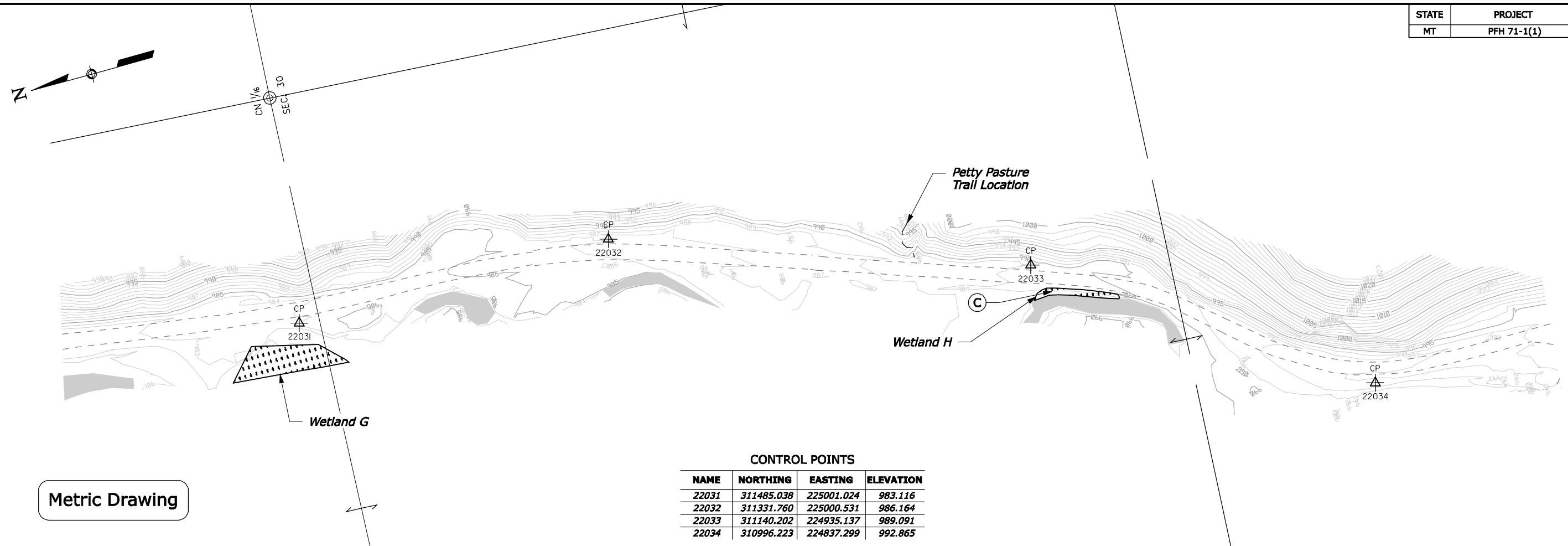

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22031	311485.038	225001.024	983.116
22032	311331.760	225000.531	986.164
22033	311140.202	224935.137	989.091
22034	310996.223	224837.299	992.865

998
996
994
992
990
988
986
984
982
980
978

Excavation cubic meter
Embankment cubic meter

6+300 6+400 6+500 6+600 6+700 6+800 6+900 7+000

Designed by: 15-FEB-2008 1:03PM Checked by: --/---- --/----

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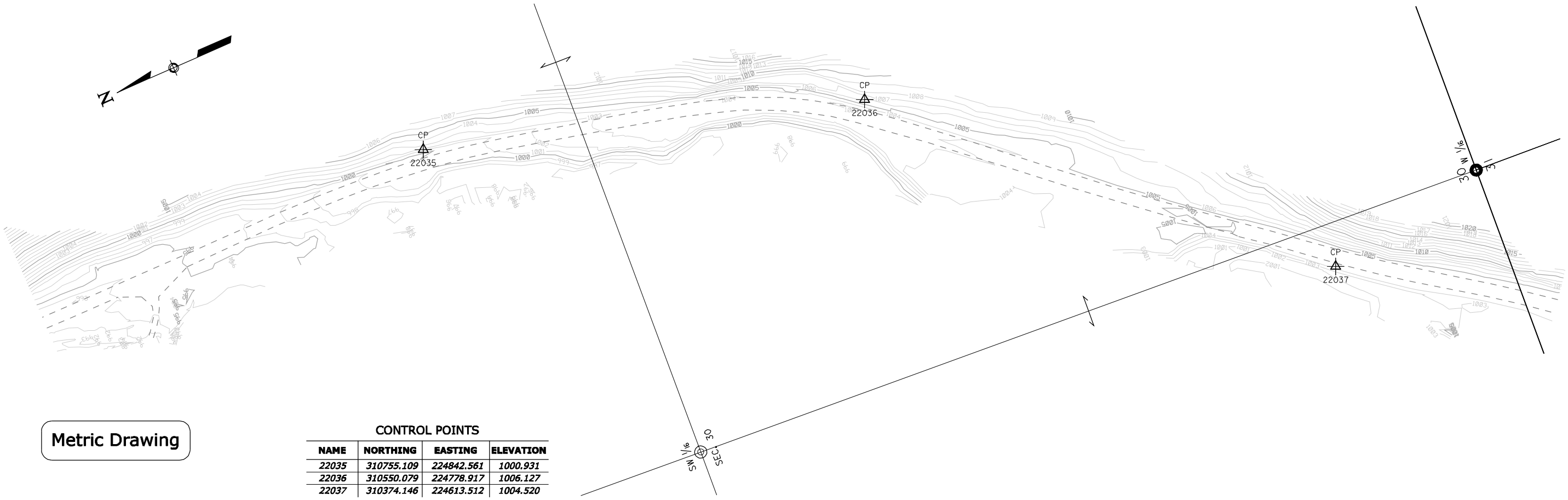
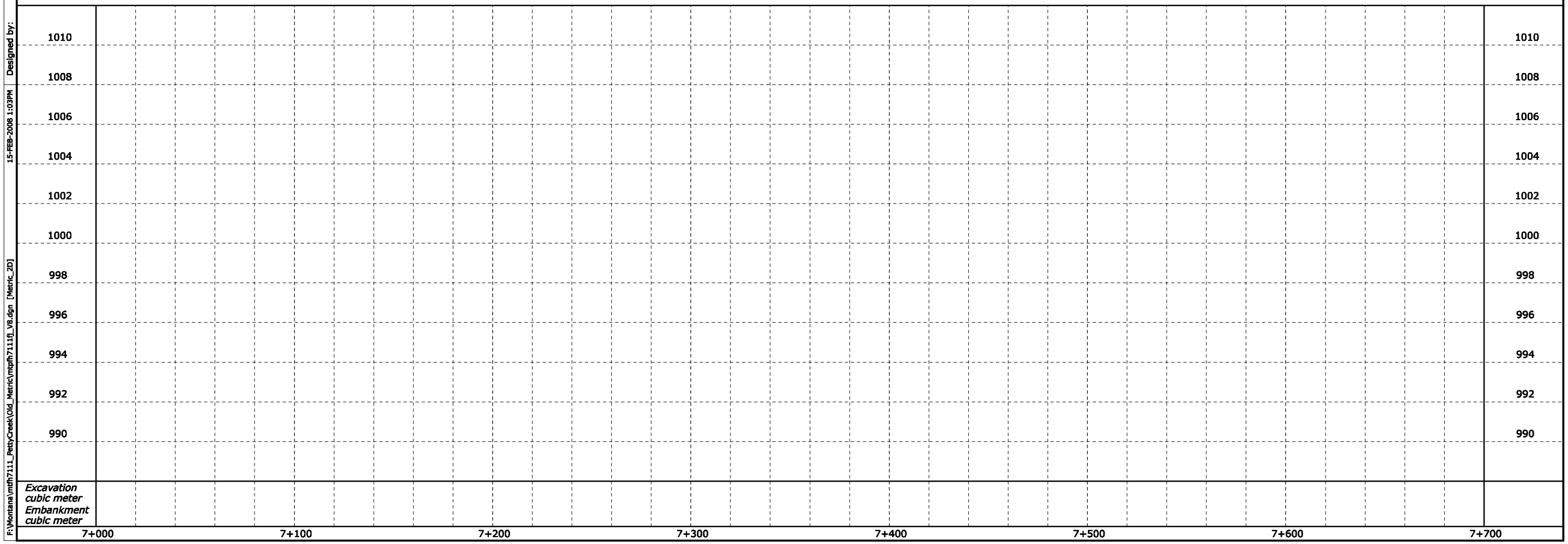


Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22035	310755.109	224842.561	1000.931
22036	310550.079	224778.917	1006.127
22037	310374.146	224613.512	1004.520



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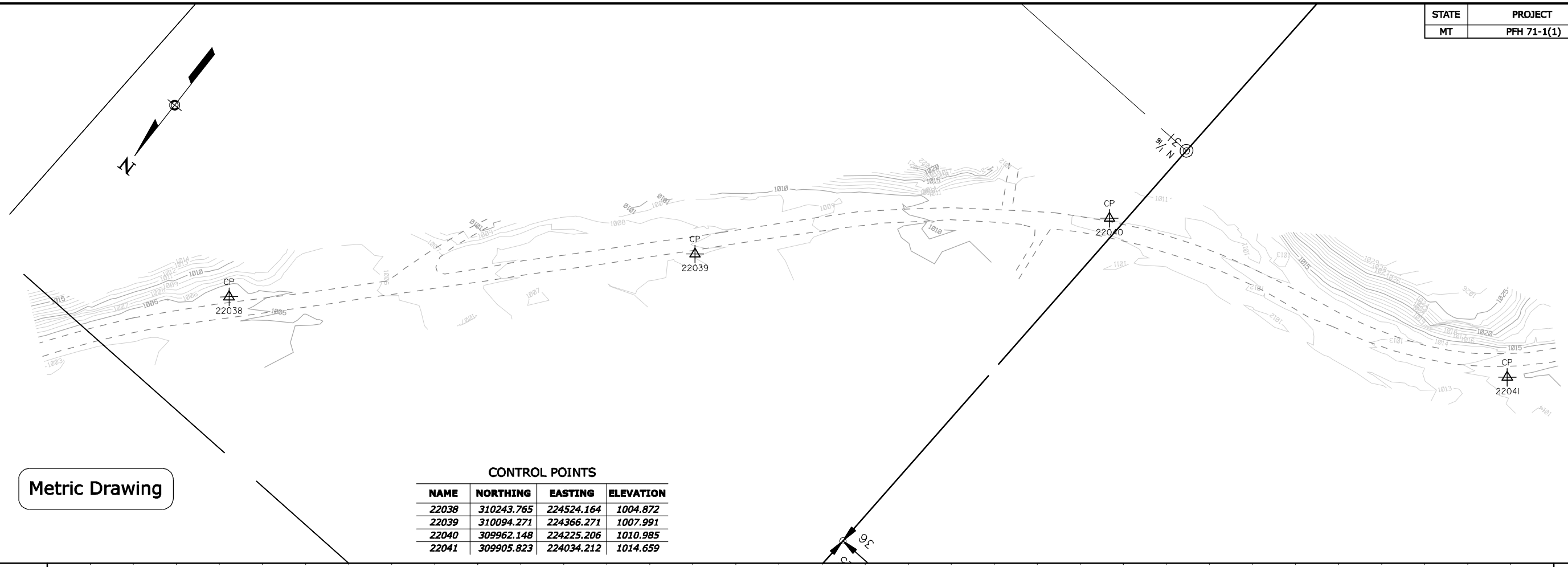
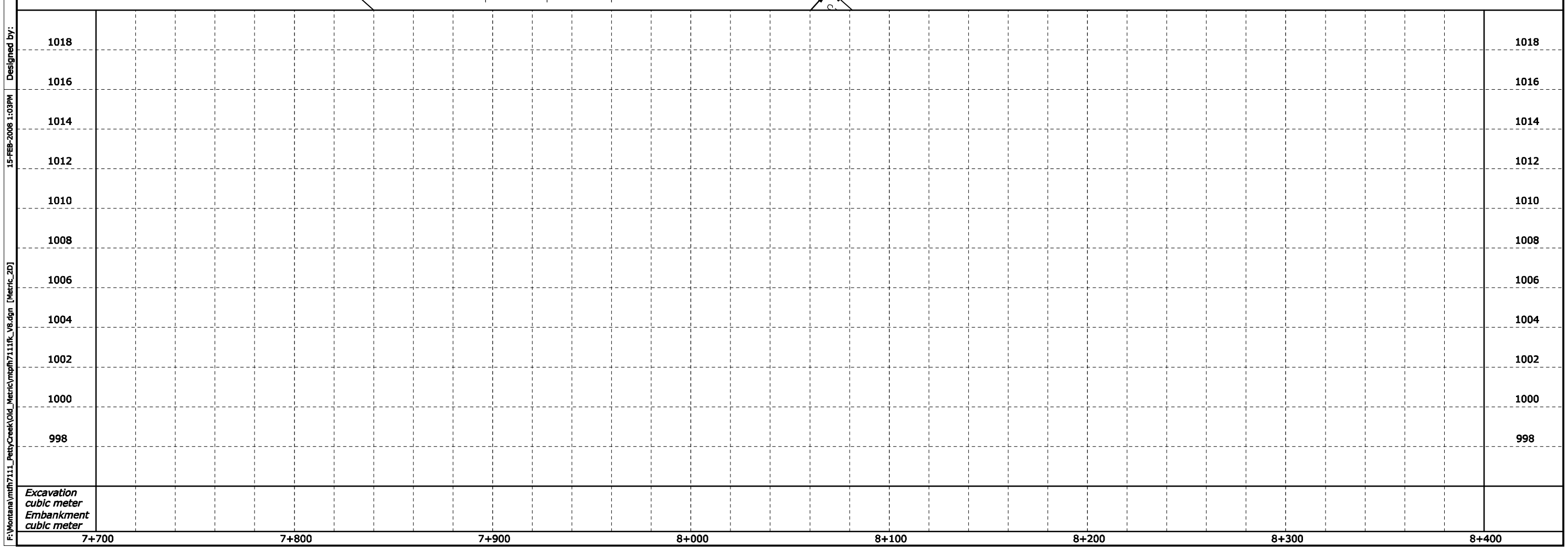


Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22038	310243.765	224524.164	1004.872
22039	310094.271	224366.271	1007.991
22040	309962.148	224225.206	1010.985
22041	309905.823	224034.212	1014.659



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MT	PFH 71-1(1)	D.13

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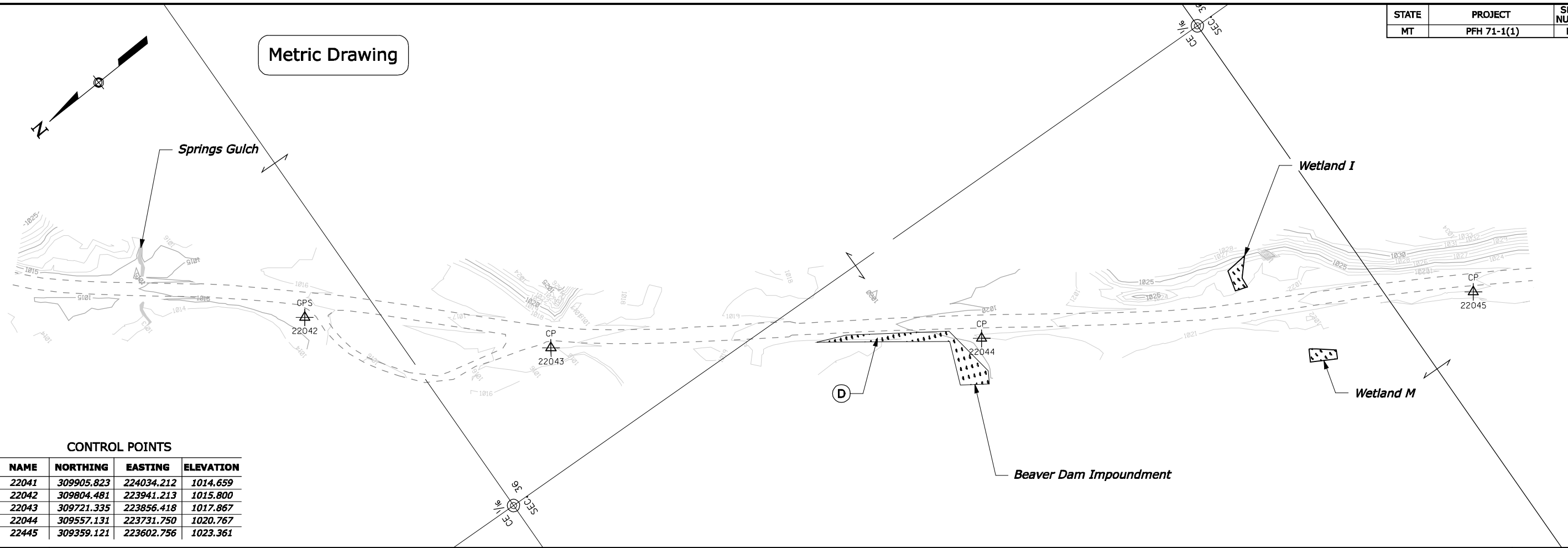
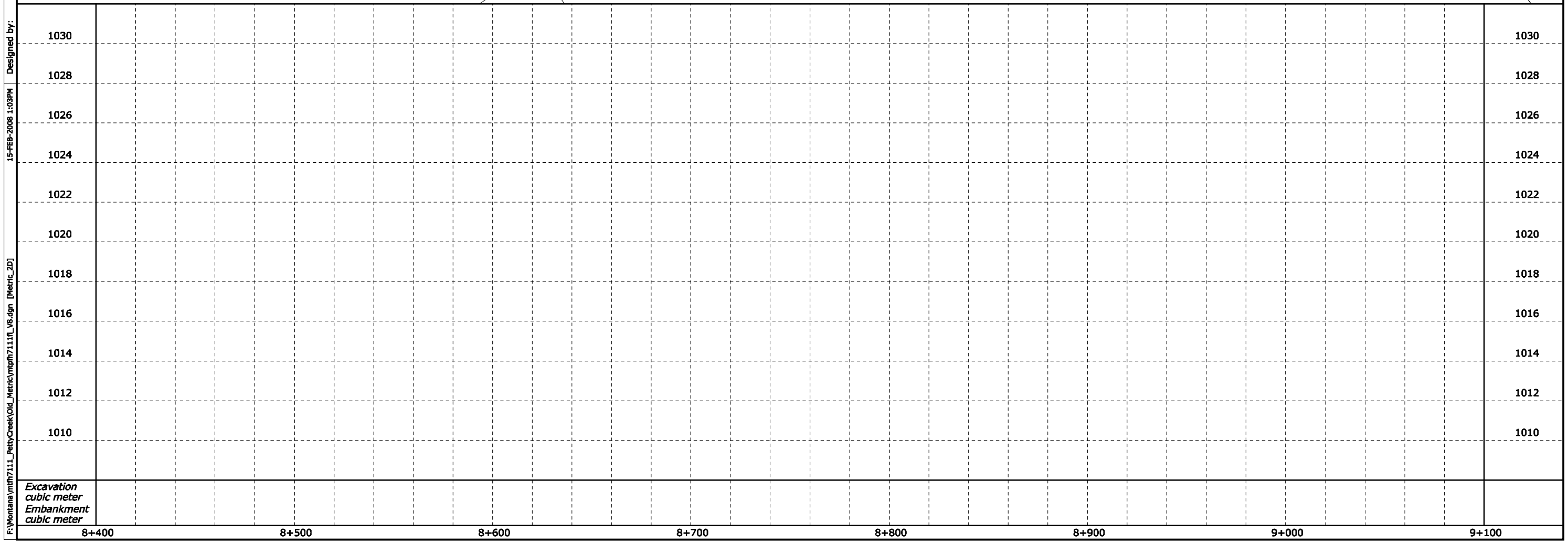


CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22041	309905.823	224034.212	1014.659
22042	309804.481	223941.213	1015.800
22043	309721.335	223856.418	1017.867
22044	309557.131	223731.750	1020.767
22445	309359.121	223602.756	1023.361



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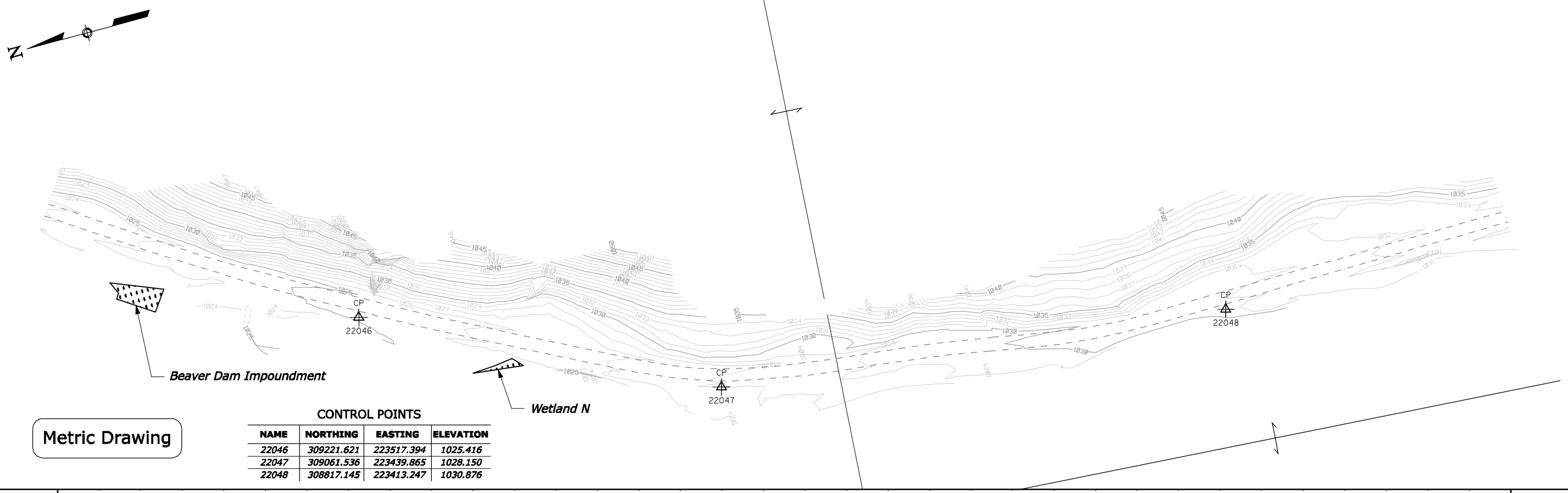
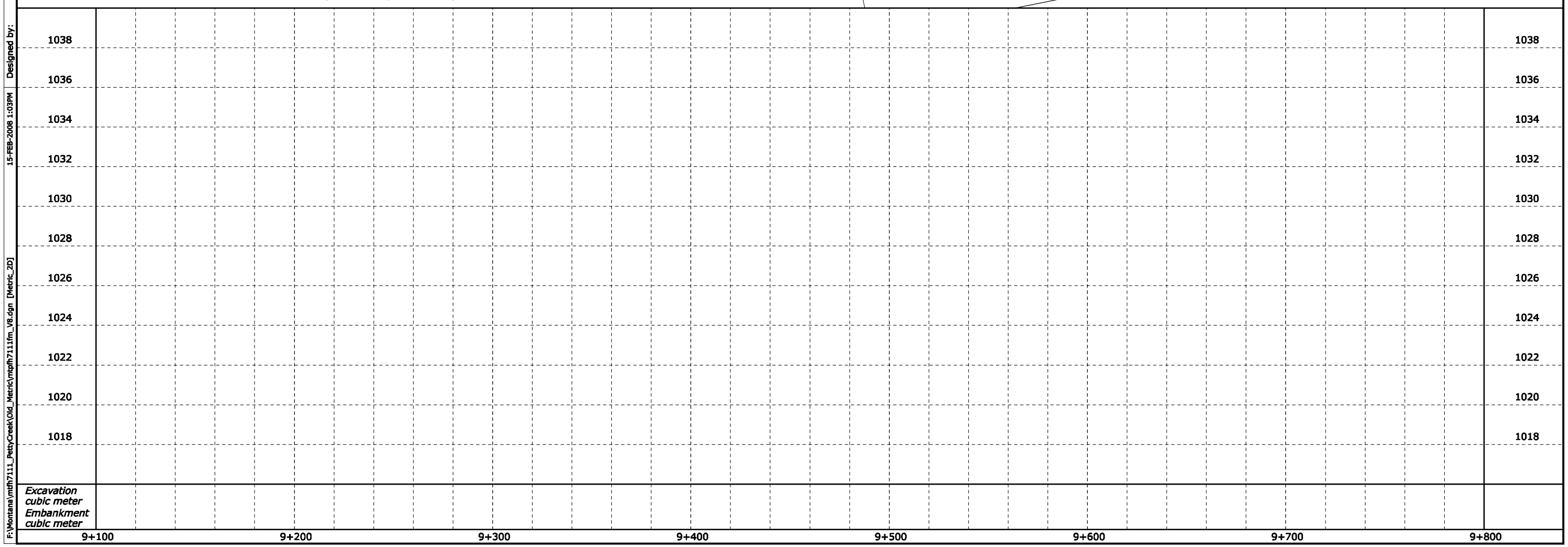


Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22046	309221.621	223517.394	1025.416
22047	309061.536	223439.865	1028.150
22048	308817.145	223413.247	1030.876



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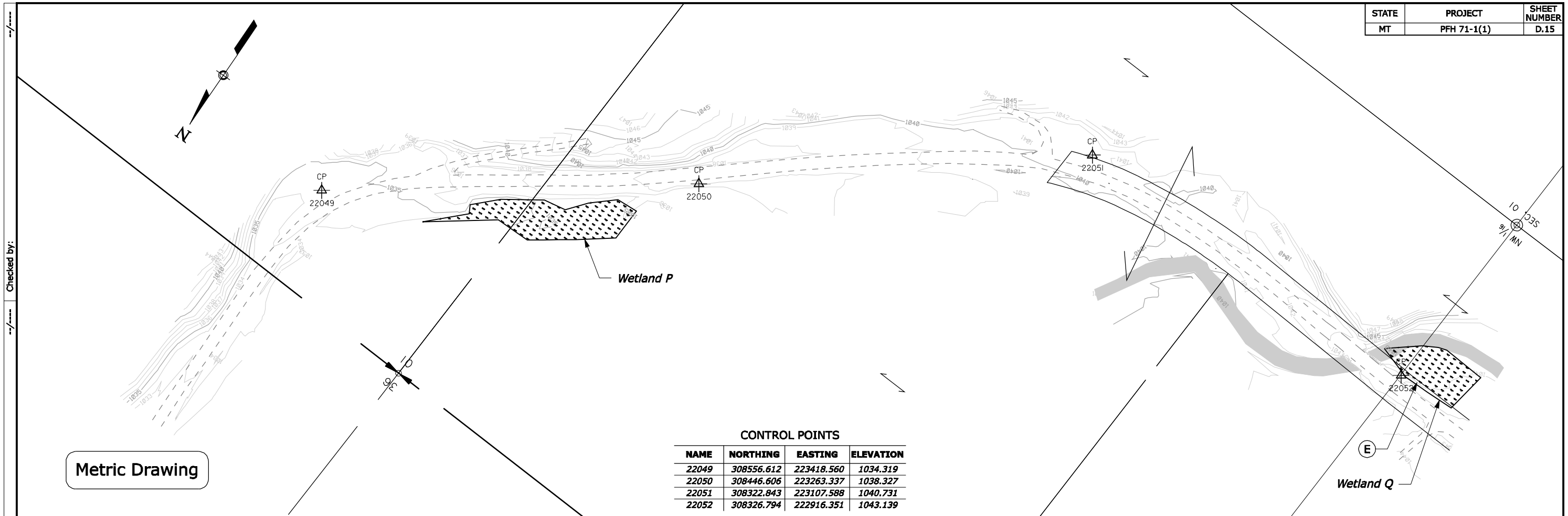
MT	PFH 71-1(1)	D.15



CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22049	308556.612	223418.560	1034.319
22050	308446.606	223263.337	1038.327
22051	308322.843	223107.588	1040.731
22052	308326.794	222916.351	1043.139

1048
1046
1044
1042
1040
1038
1036
1034
1032
1030
1028

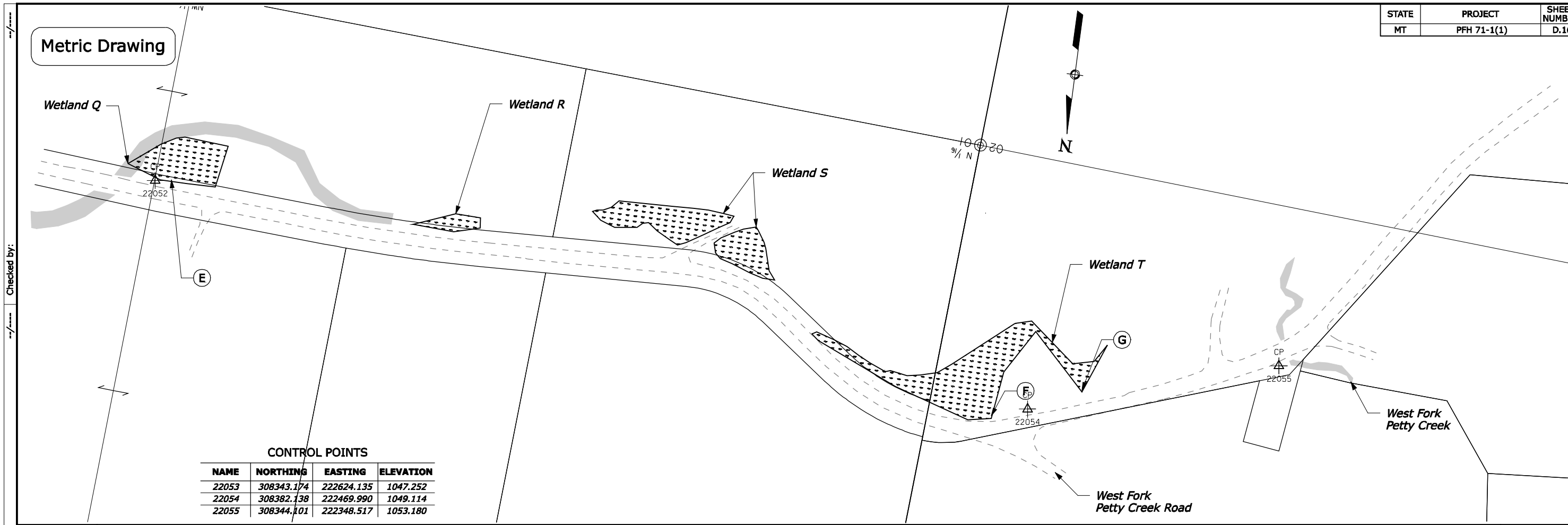
Excavation cubic meter
Embankment cubic meter

9+800 9+900 10+000 10+100 10+200 10+300 10+400 10+500

Designed by: Checked by: 15-FEB-2008 1:04PM F:\Montana\mdfh7111_PettyCreek\Old_Metric\mtpfh7111fn_V8.dgn [Metric_2D]

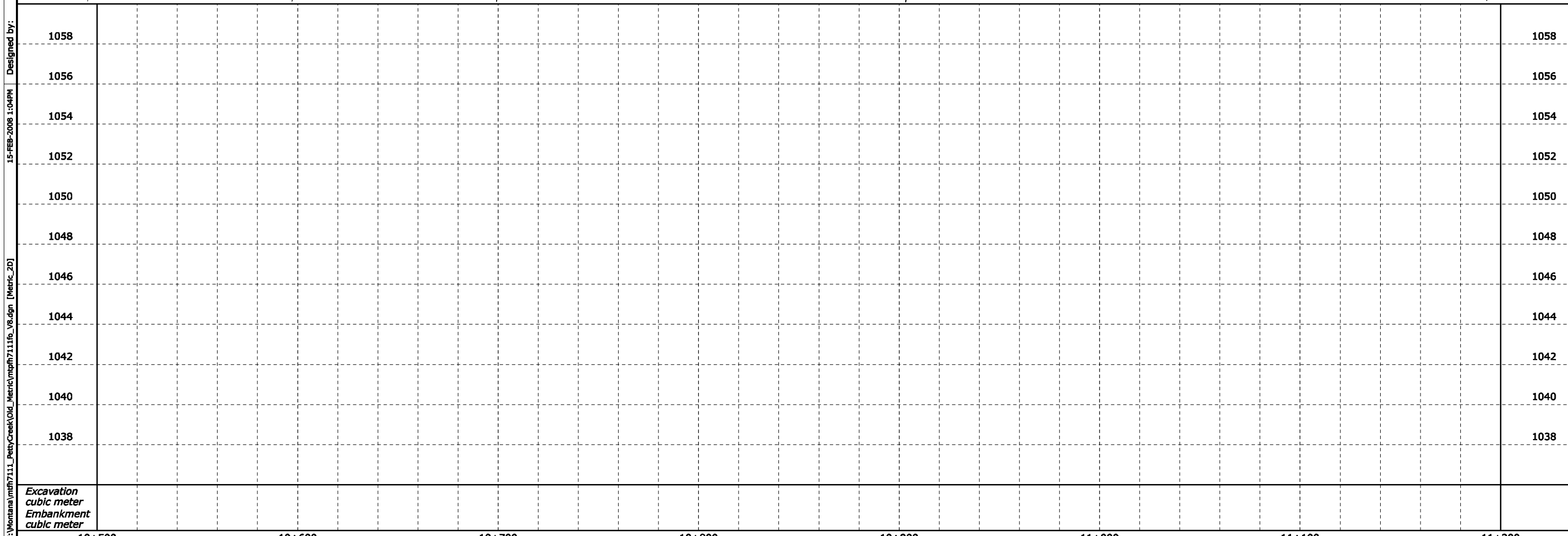
STATE	PROJECT	SHEET NUMBER
MT	PFH 71-1(1)	D.16

Metric Drawing



CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22053	308343.174	222624.135	1047.252
22054	308382.138	222469.990	1049.114
22055	308344.101	222348.517	1053.180



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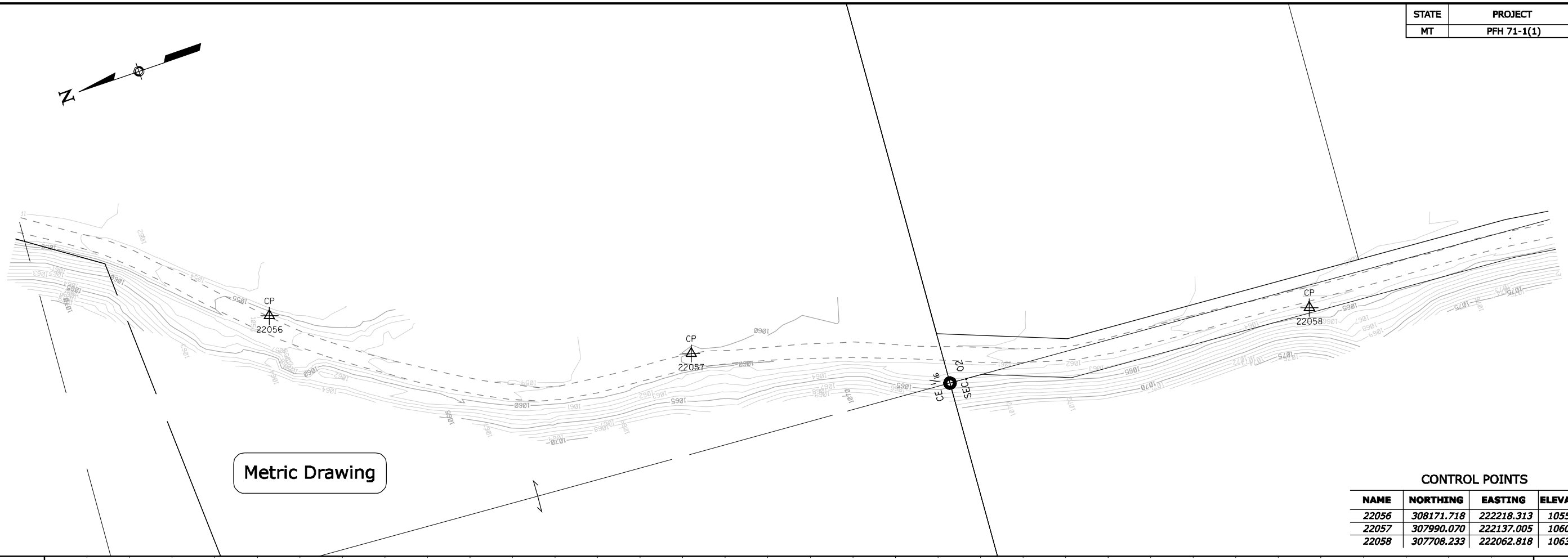
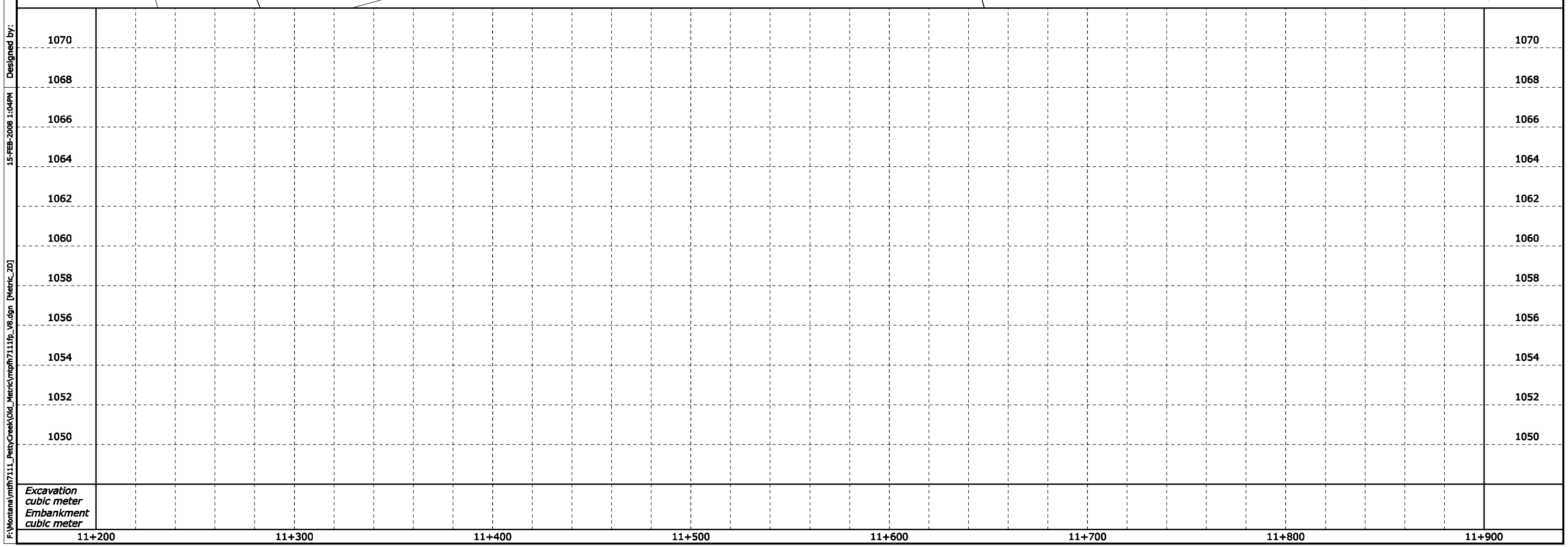


CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22056	308171.718	222218.313	1055.939
22057	307990.070	222137.005	1060.055
22058	307708.233	222062.818	1063.529



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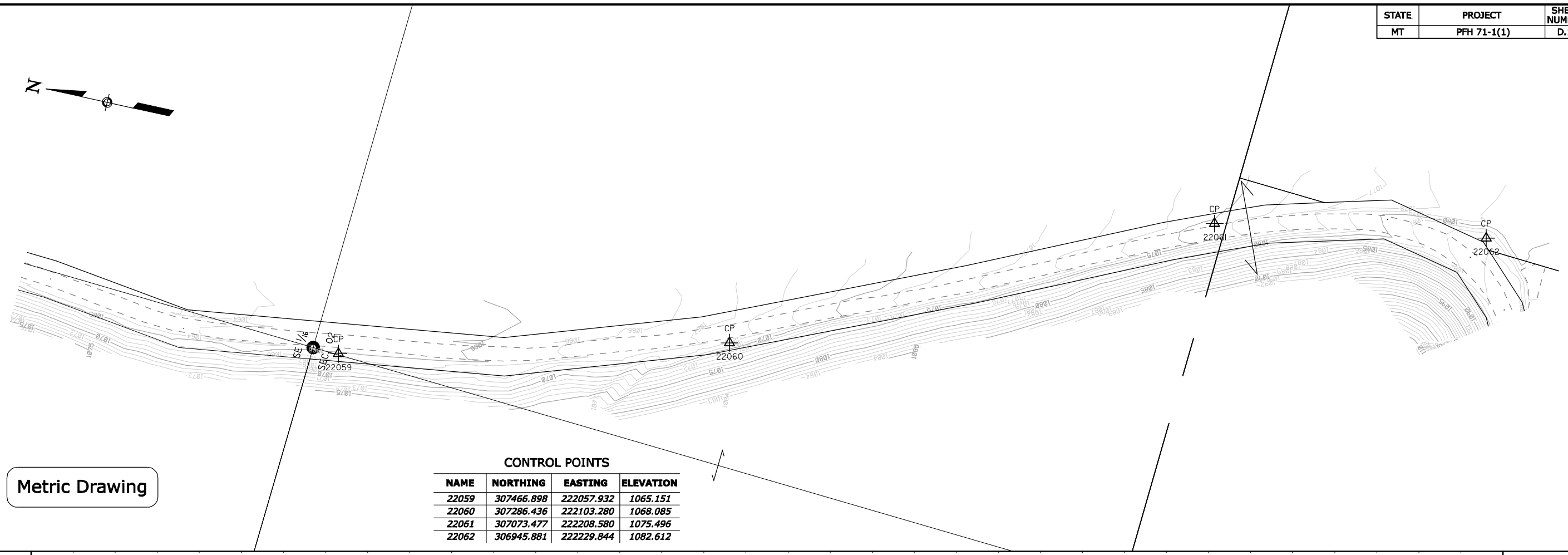
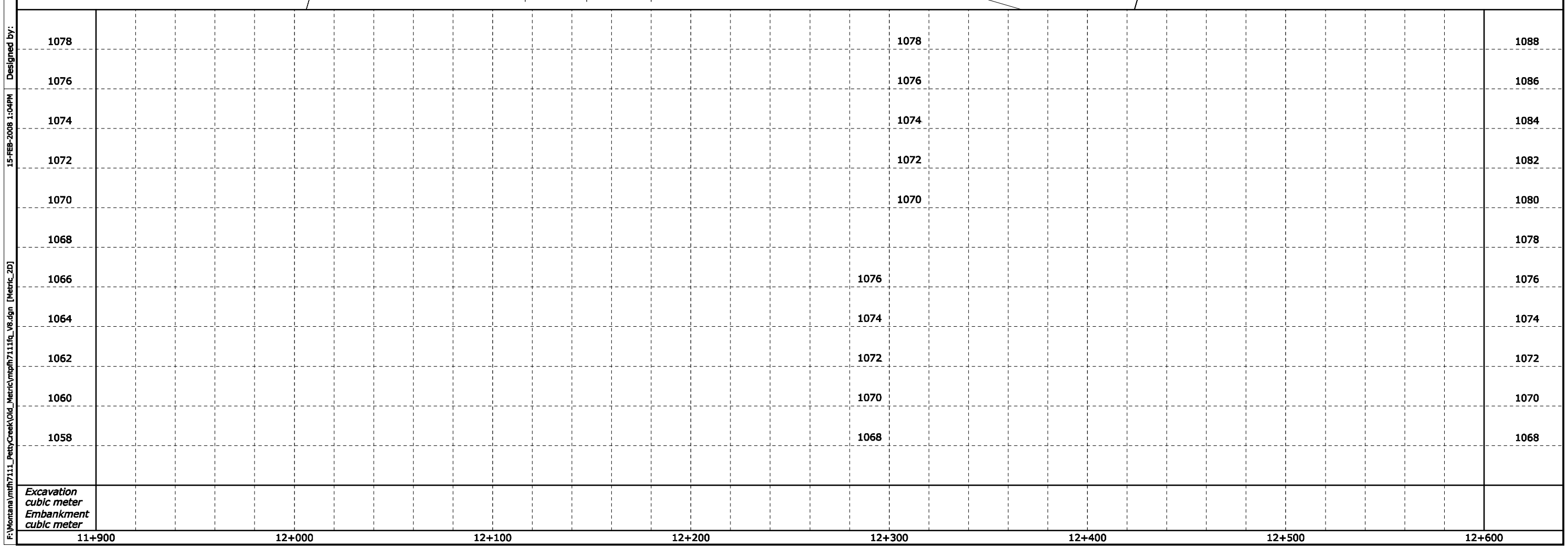


Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22059	307466.898	222057.932	1065.151
22060	307286.436	222103.280	1068.085
22061	307073.477	222208.580	1075.496
22062	306945.881	222229.844	1082.612



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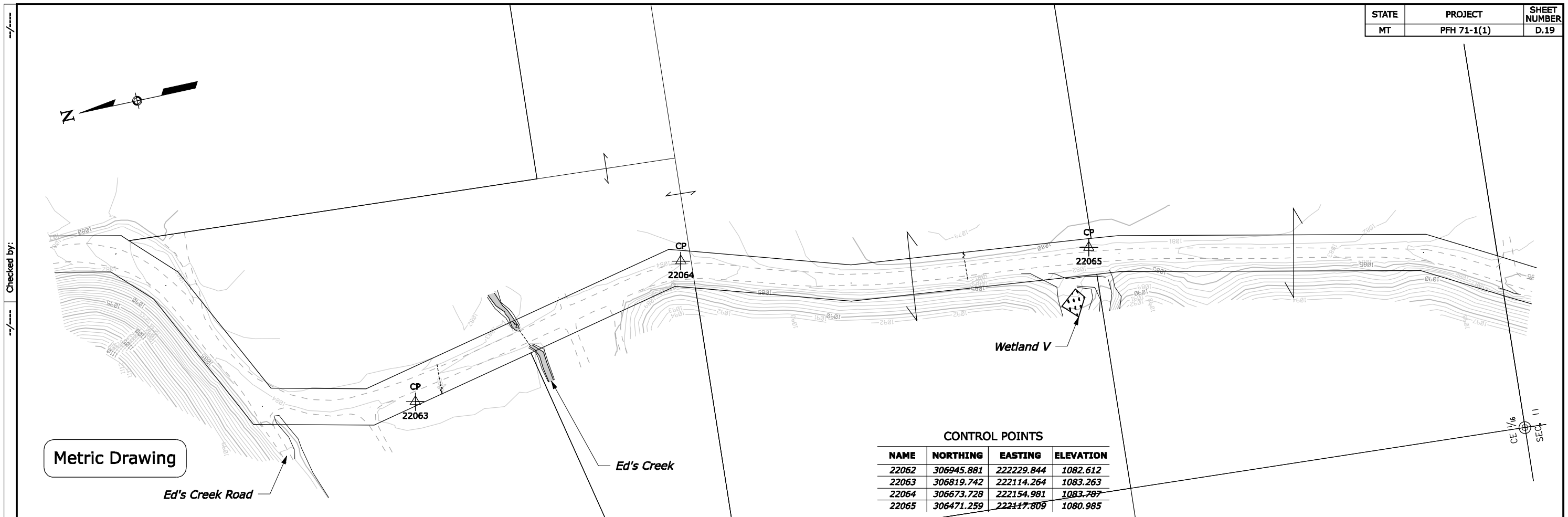

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22062	306945.881	222229.844	1082.612
22063	306819.742	222114.264	1083.263
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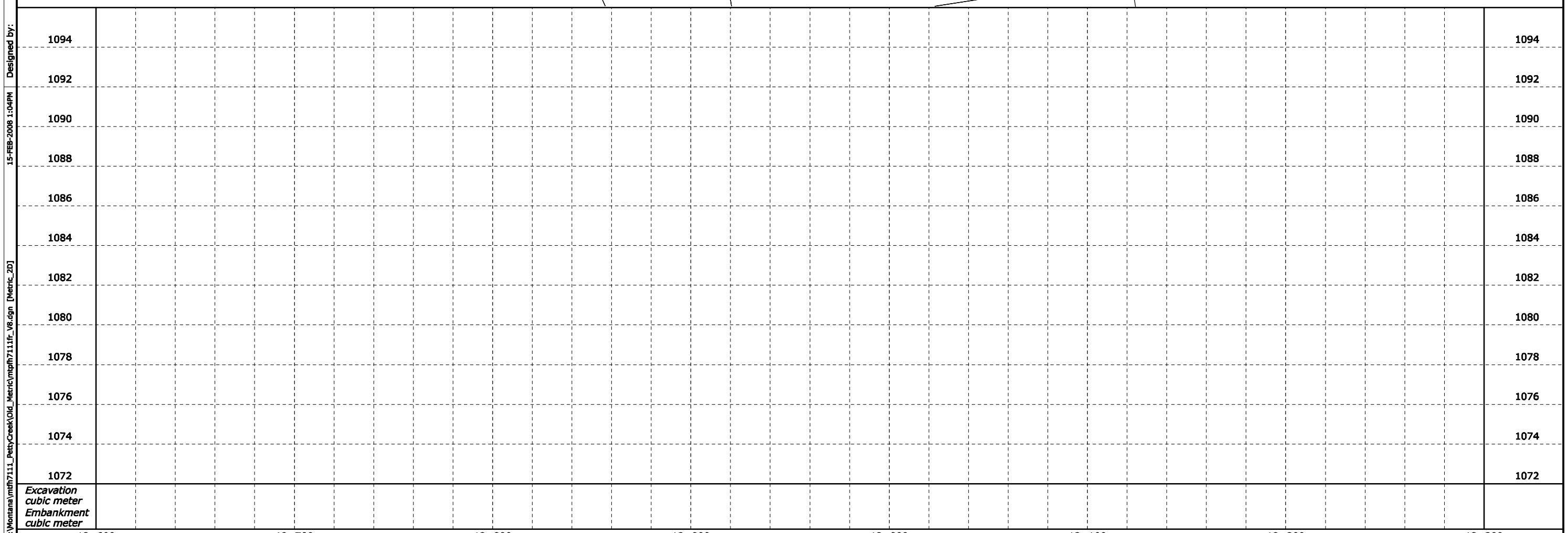

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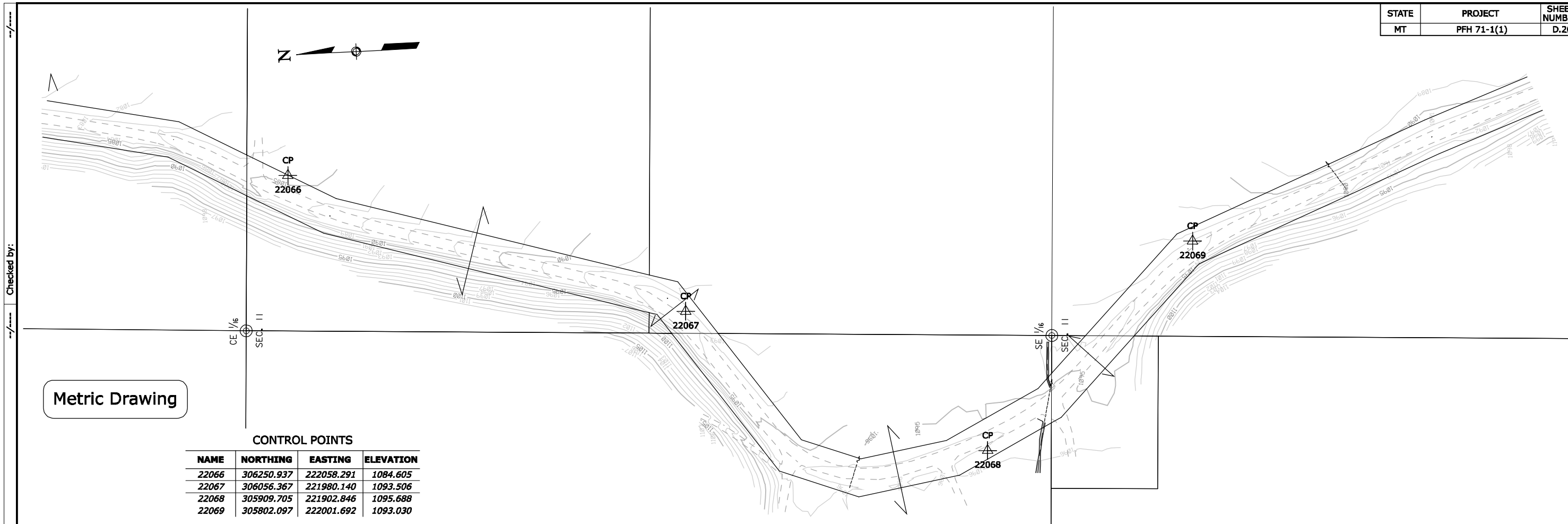

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22066	306250.937	222058.291	1084.605
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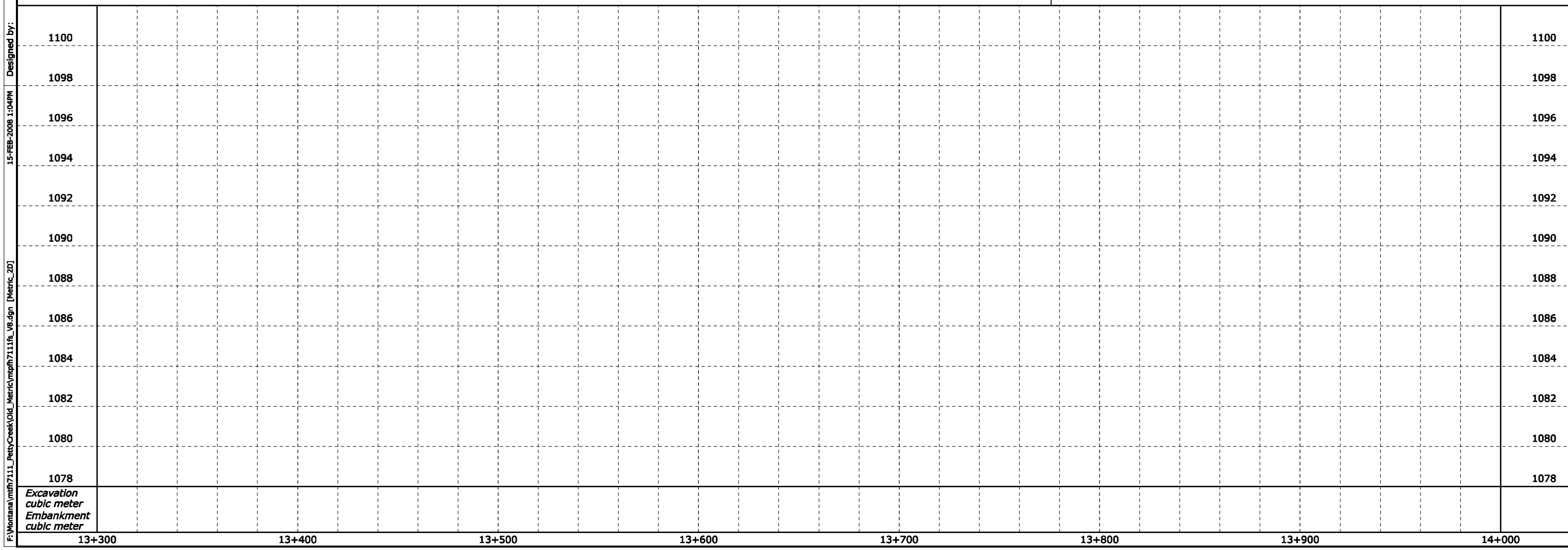
22068	305909.705	221902.846	1095.688
22069	305802.097	222001.692	1093.030



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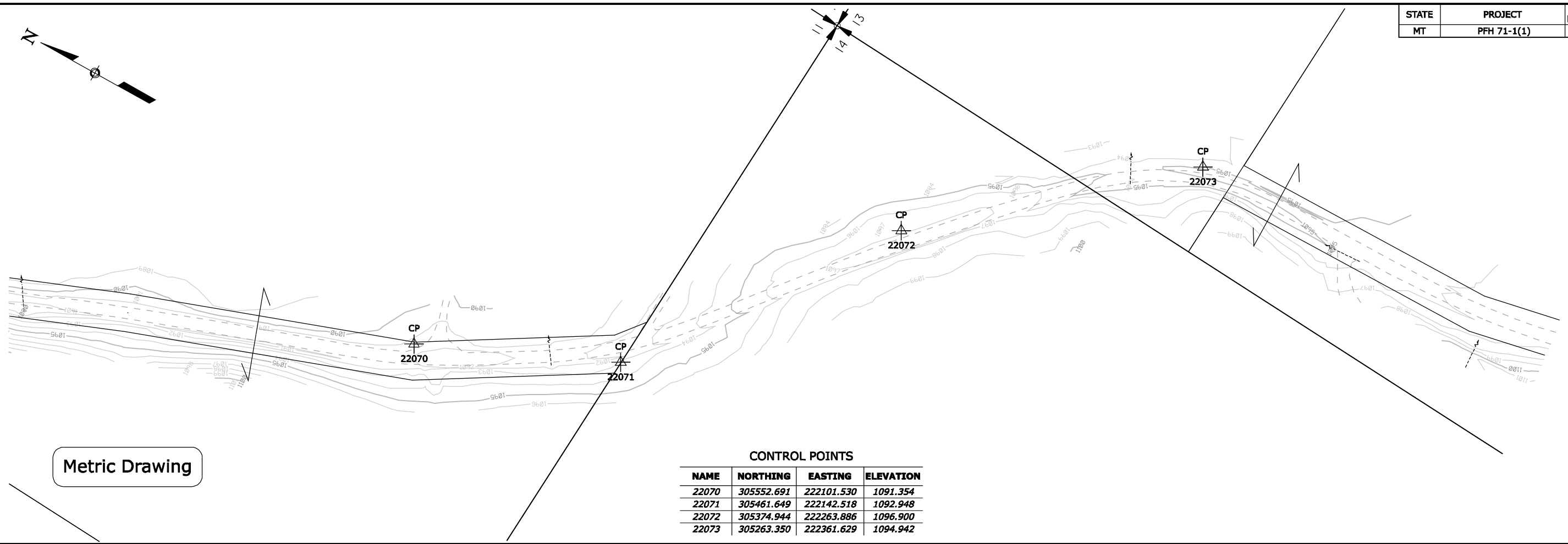

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22070	305552.691	222101.530	1091.354
22071	305461.649	222142.518	1092.948
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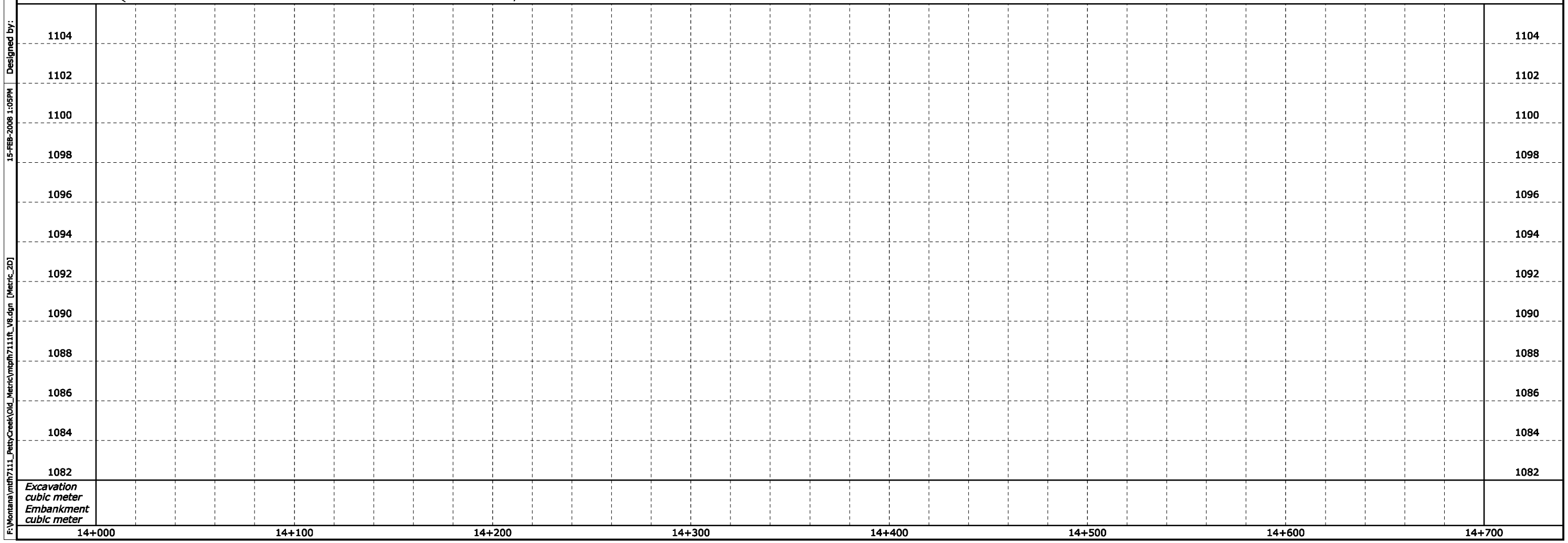
22073	305263.350	222361.629	1094.942



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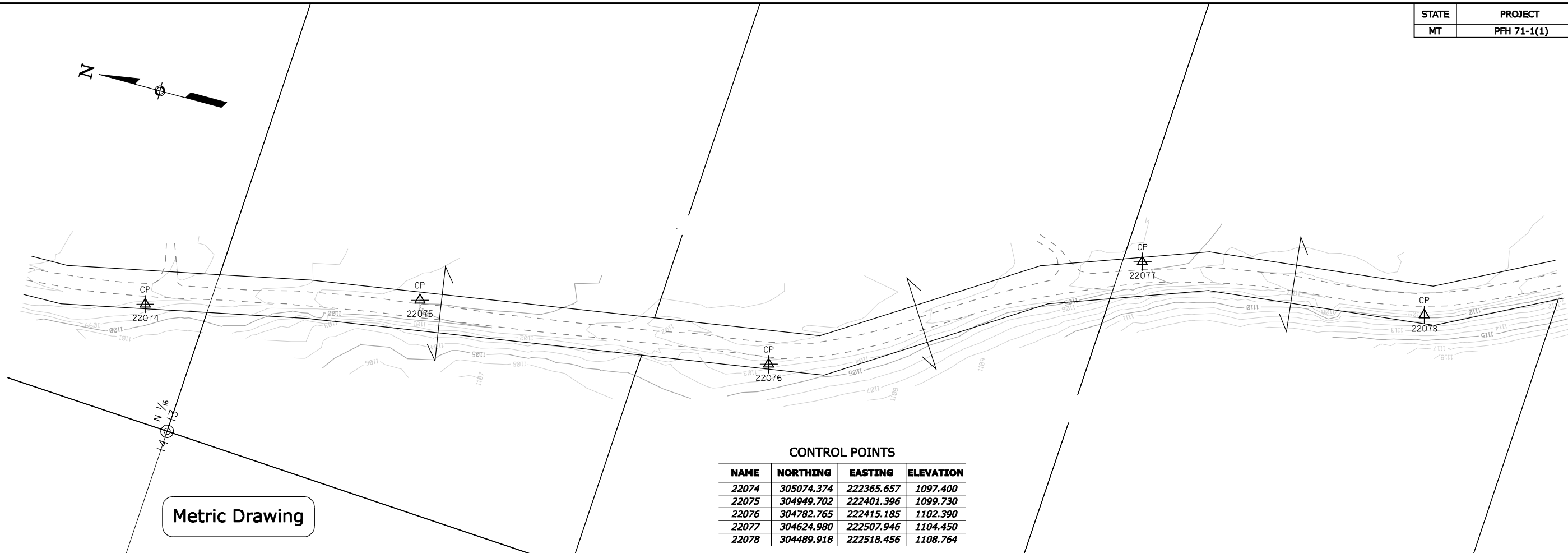
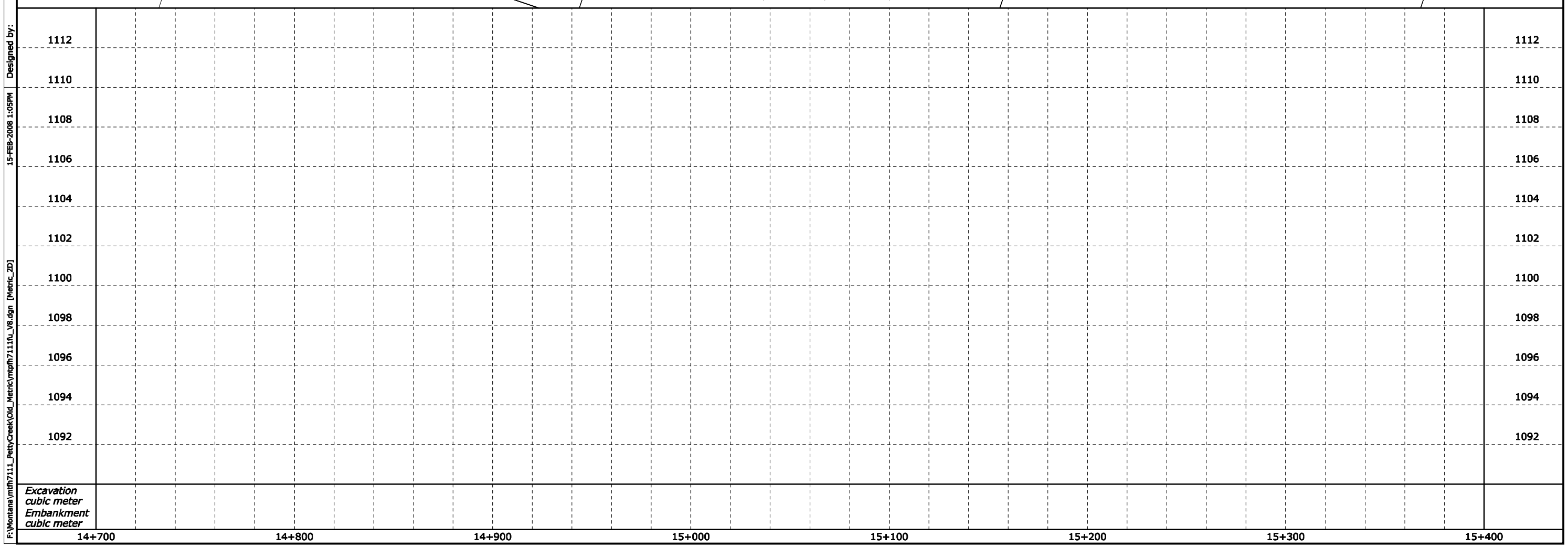


CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22074	305074.374	222365.657	1097.400
22075	304949.702	222401.396	1099.730
22076	304782.765	222415.185	1102.390
22077	304624.980	222507.946	1104.450
22078	304489.918	222518.456	1108.764



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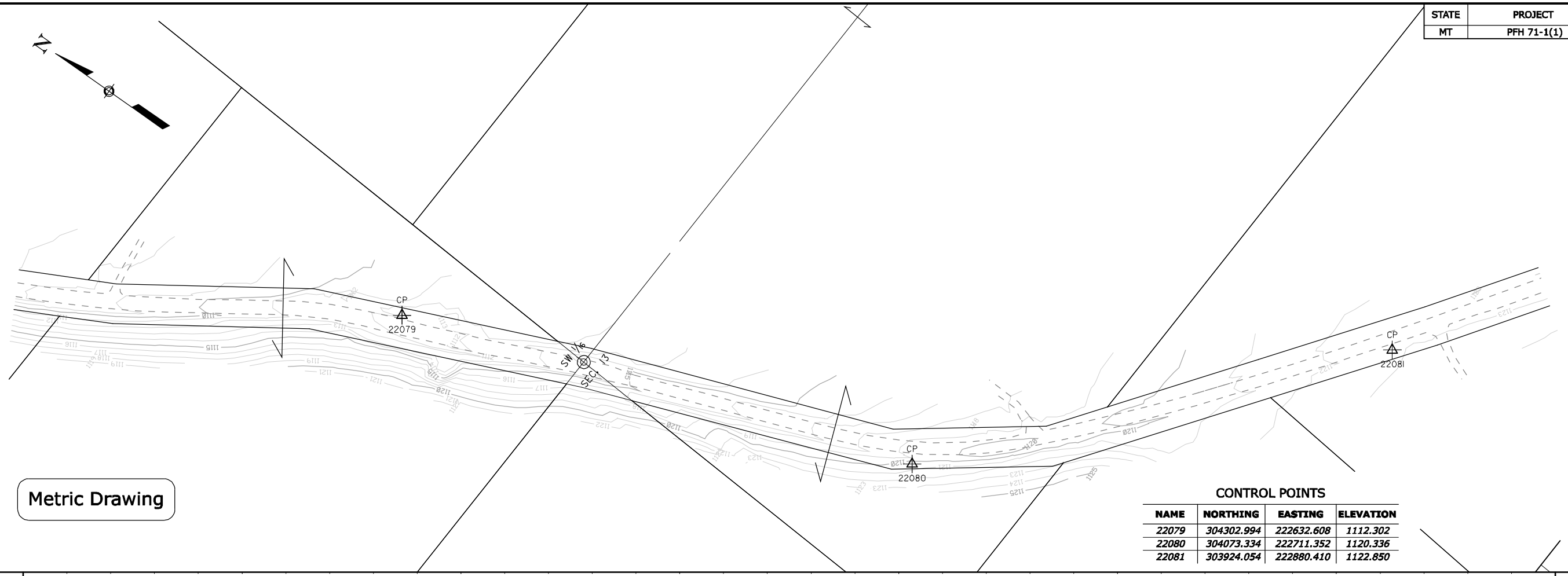

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22079	304302.994	222632.608	1112.302
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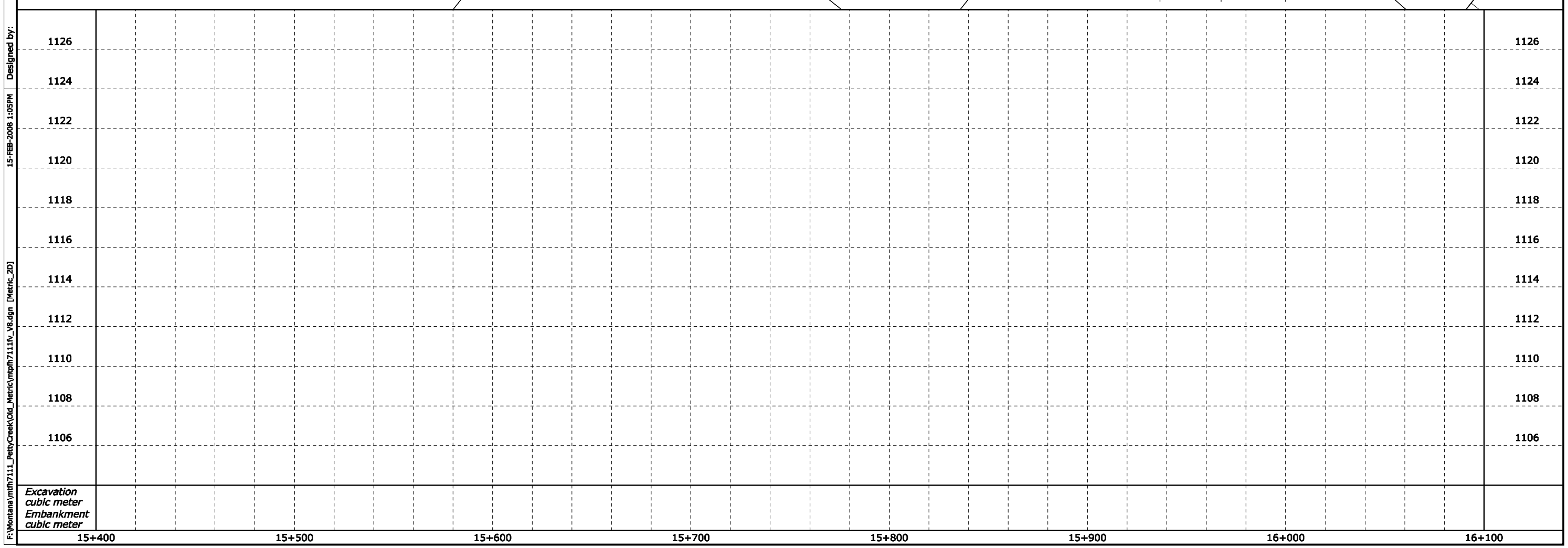

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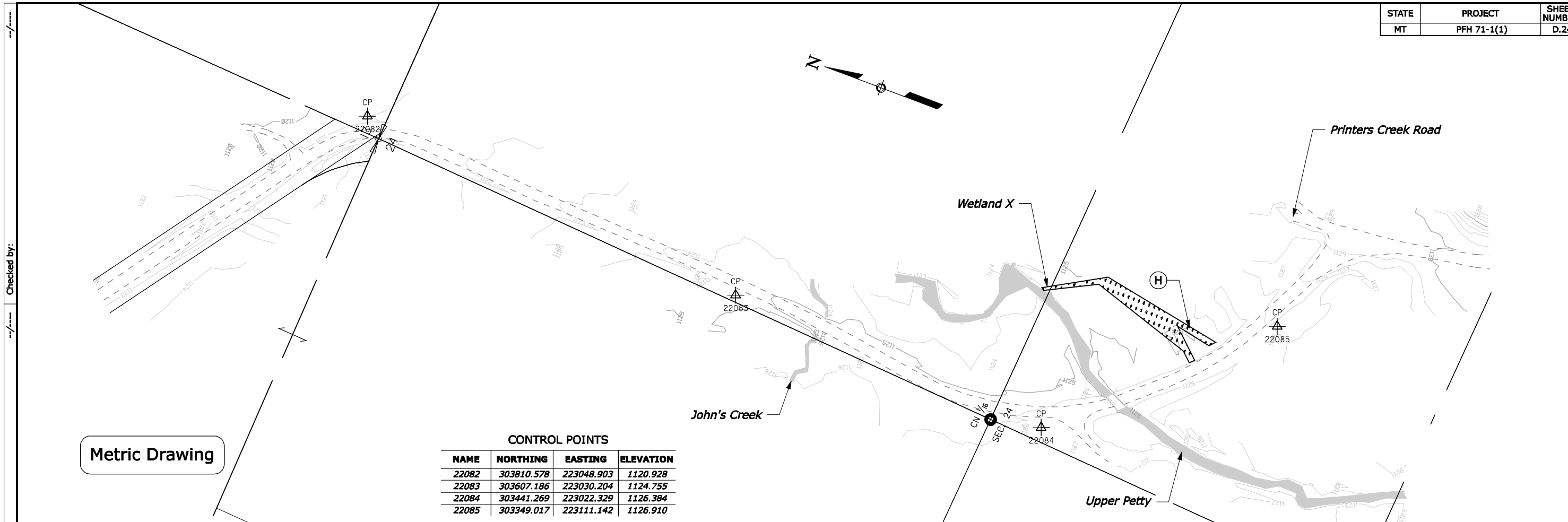

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22082	303810.578	223048.903	1120.928
22083	303607.186	223030.204	1124.755
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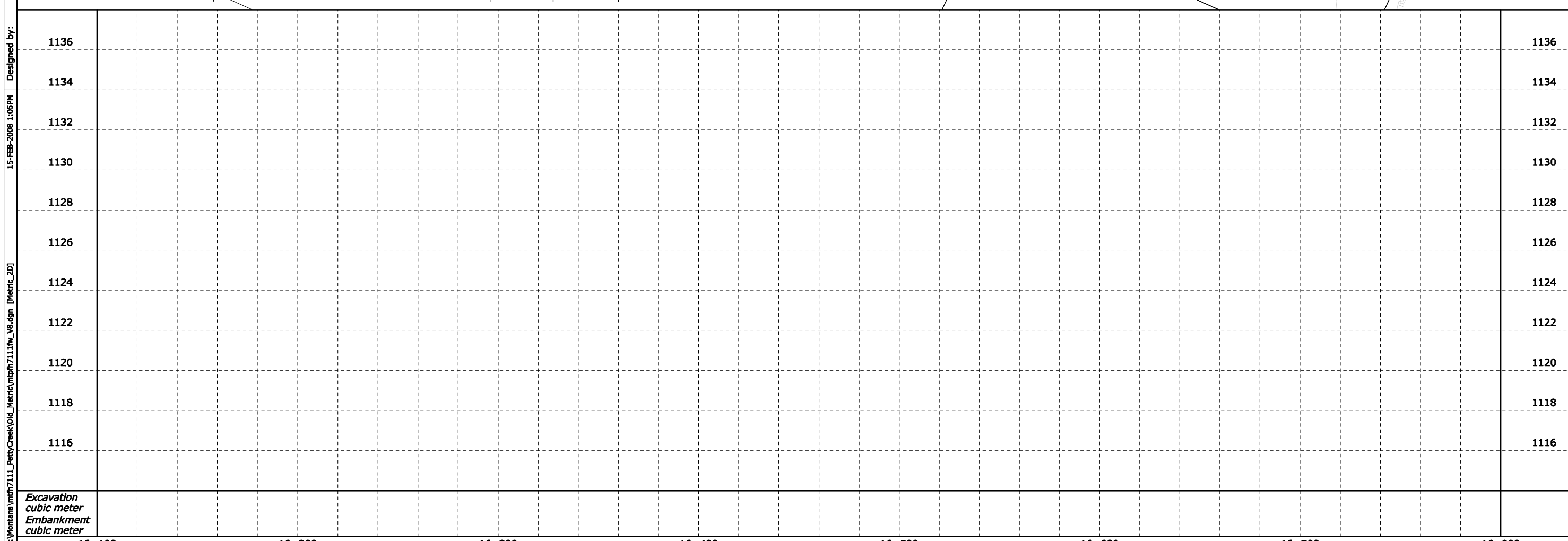

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MT	PFH 71-1(1)	D.25

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22086	303214.172	223187.274	1131.187
22087	302948.358	223227.185	1136.708
22088	302763.684	223243.275	1138.907

1146
1144
1142
1140
1138
1136
1134
1132
1130
1128
1126

Excavation cubic meter
Embankment cubic meter

16+800 16+900 17+000 17+100 17+200 17+300 17+400 17+500

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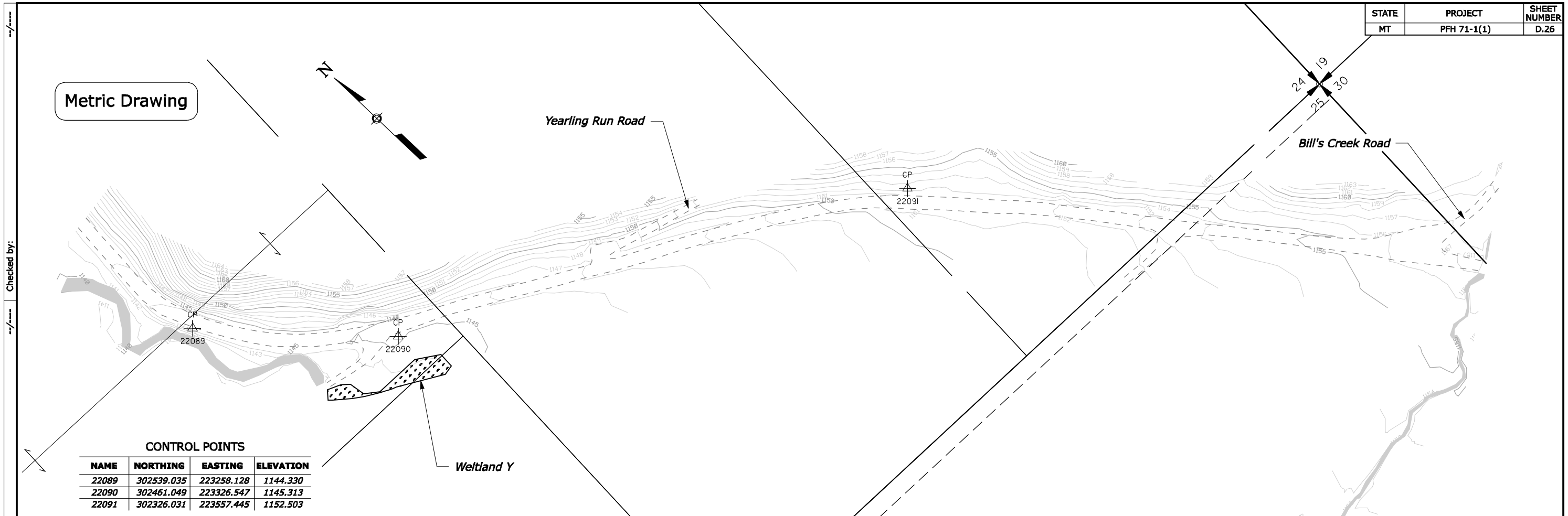

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22089	302539.035	223258.128	1144.330
22090	302461.049	223326.547	1145.313
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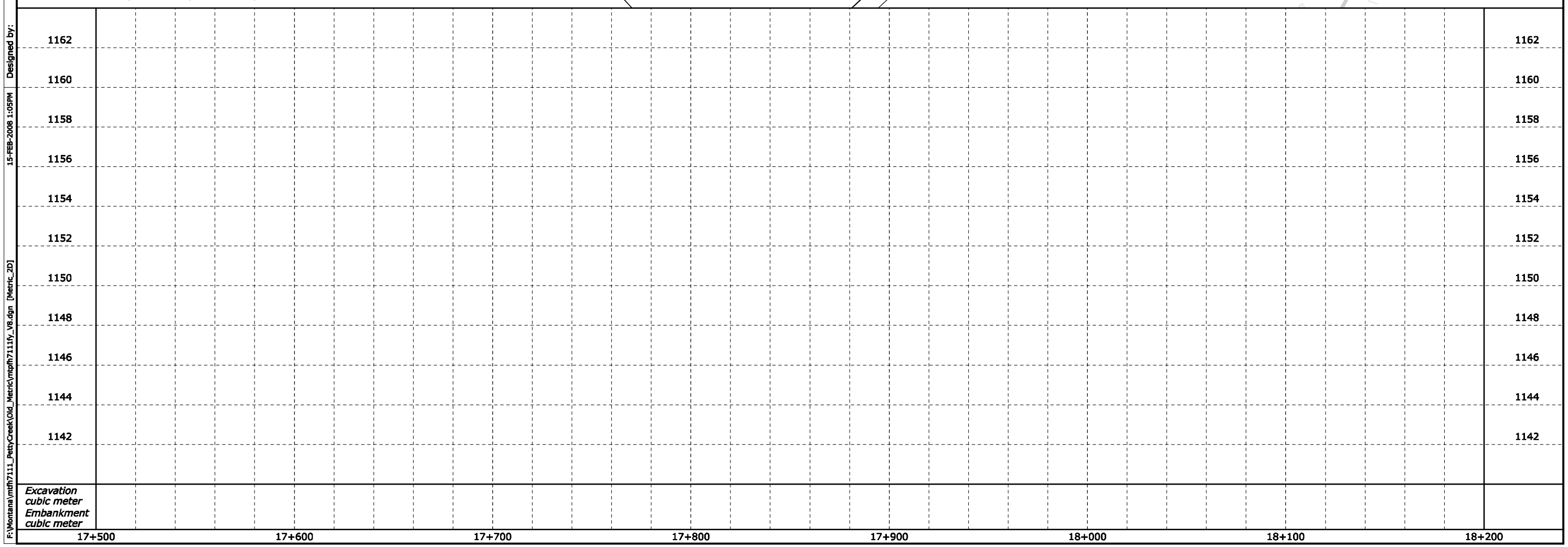

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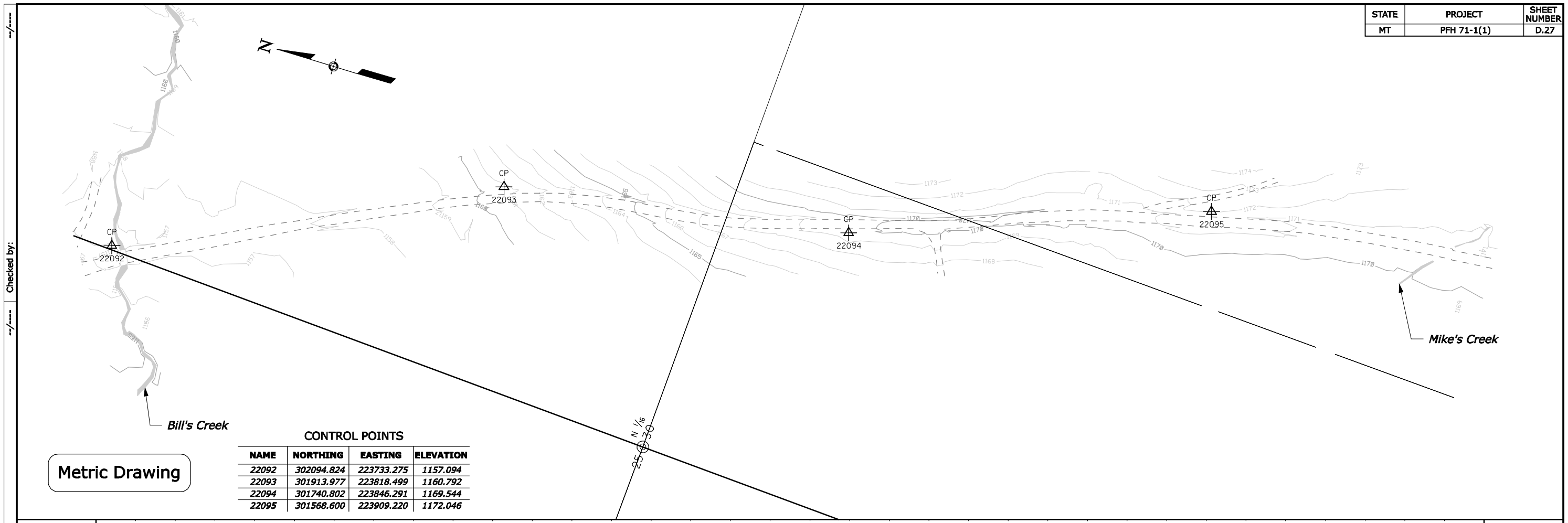

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22092	302094.824	223733.275	1157.094
22093	301913.977	223818.499	1160.792
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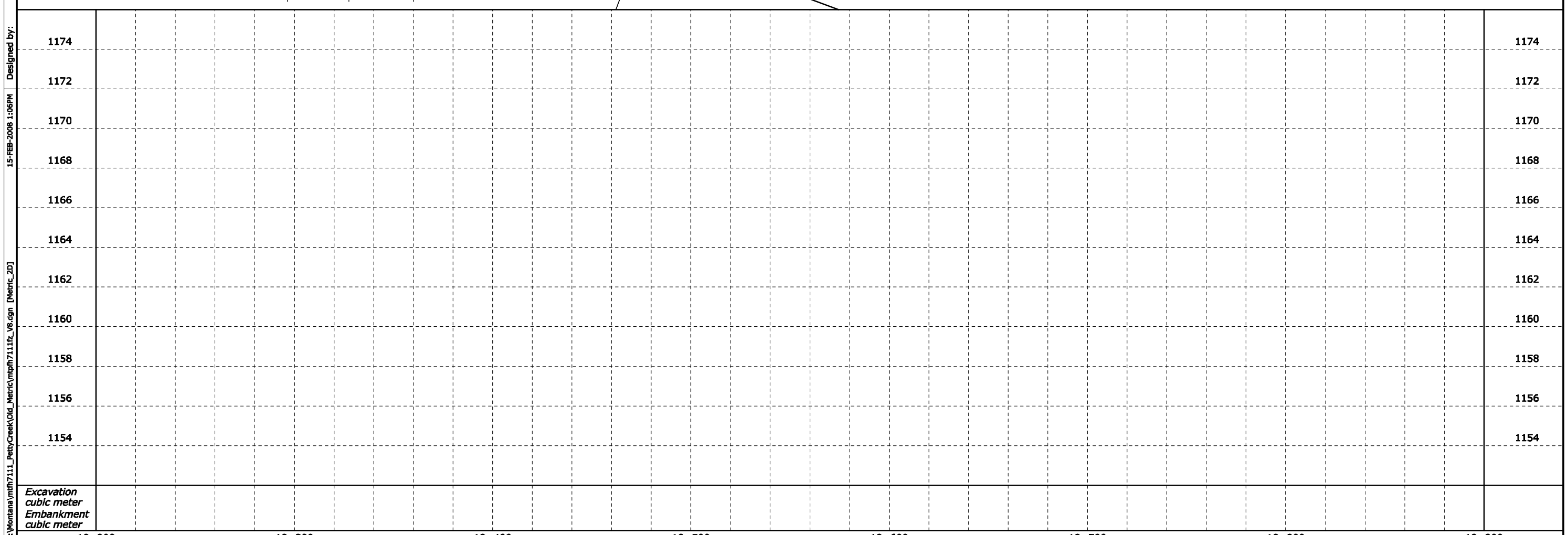
22095	301568.600	223909.220	1172.046



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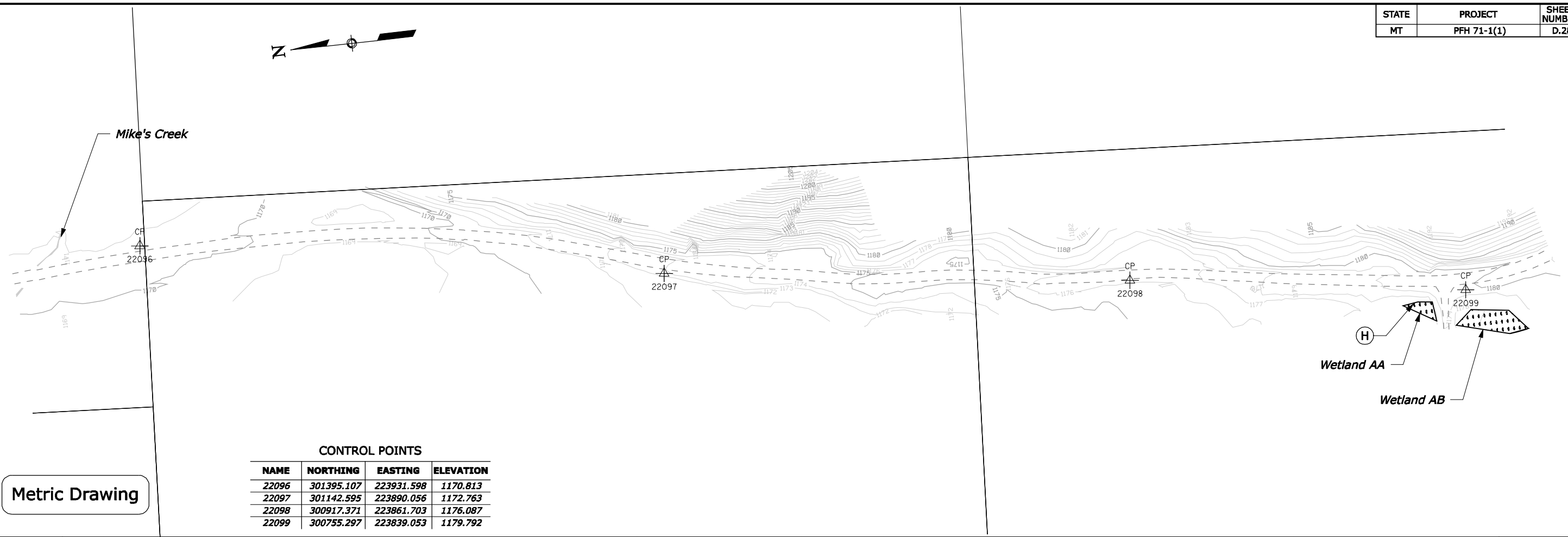

Metric Drawing

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22096	301395.107	223931.598	1170.813
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22098	300917.371	223861.703	1176.087
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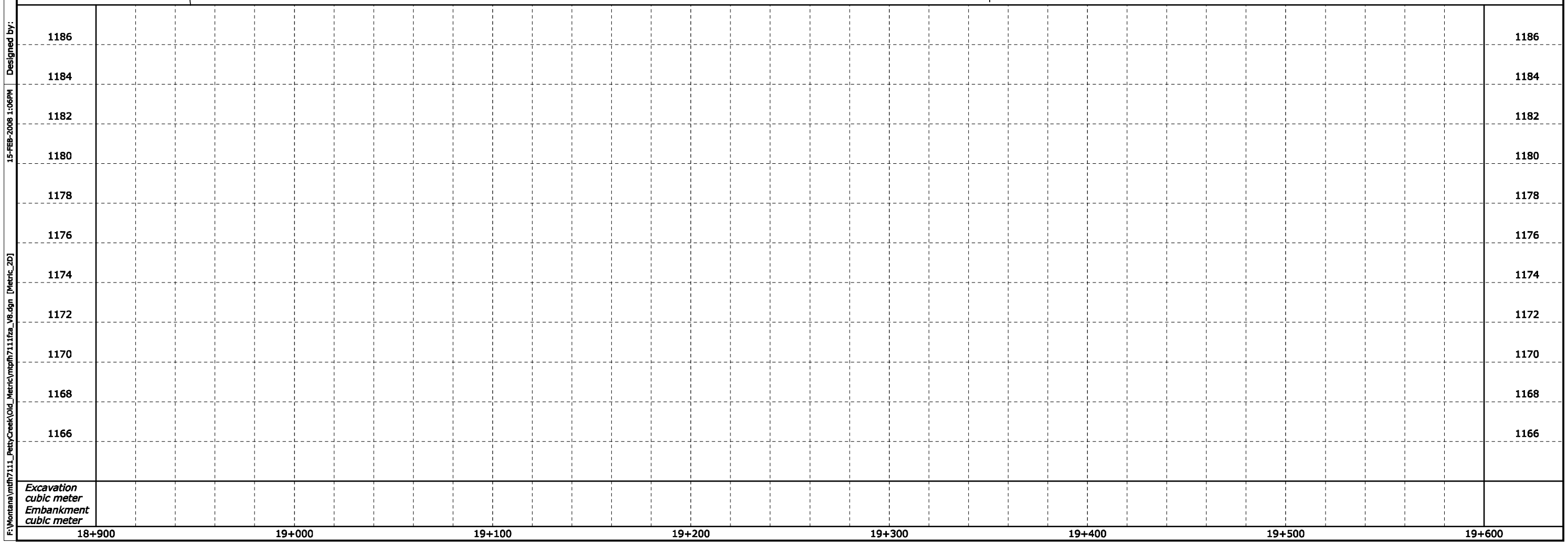

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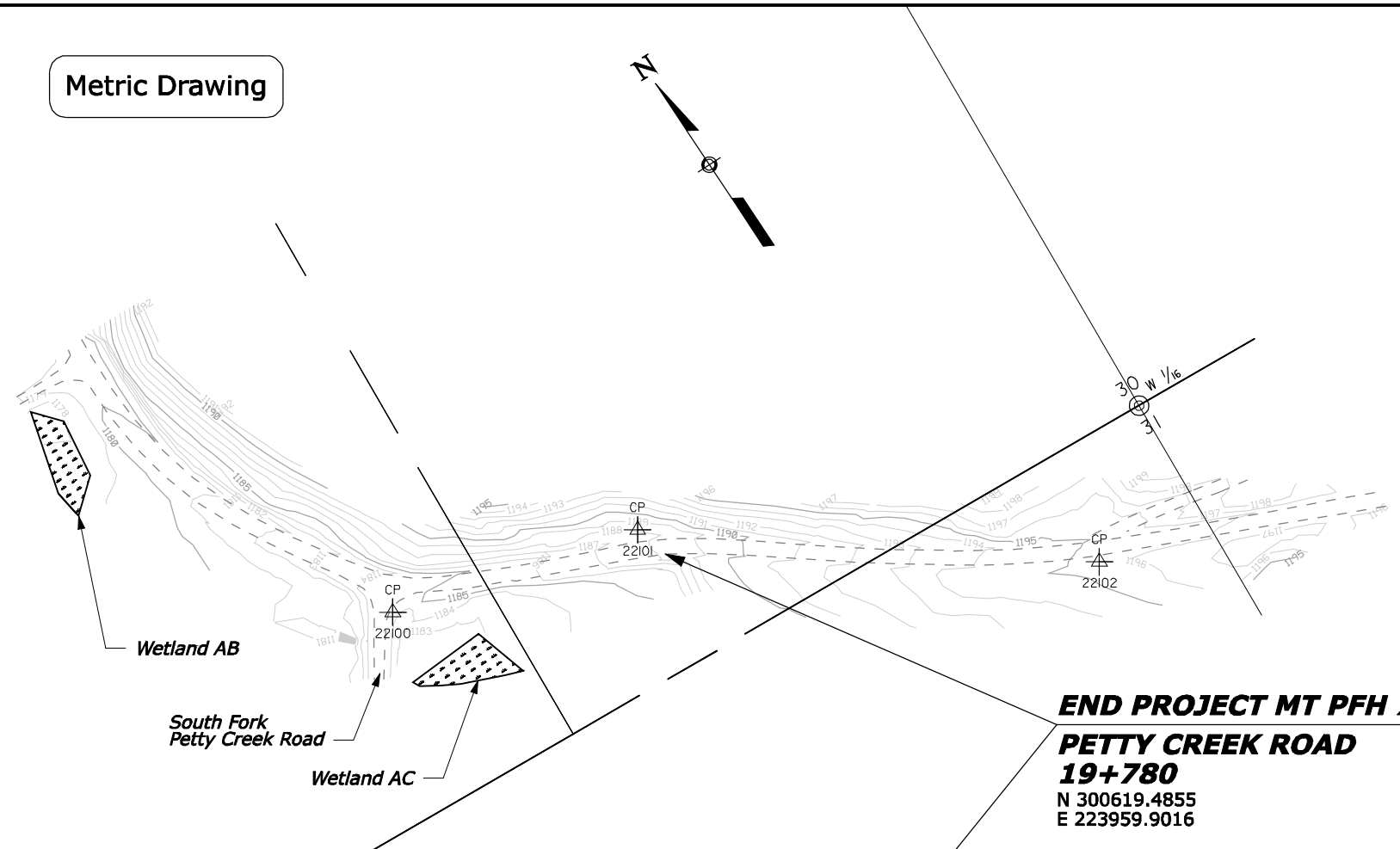
Metric Drawing

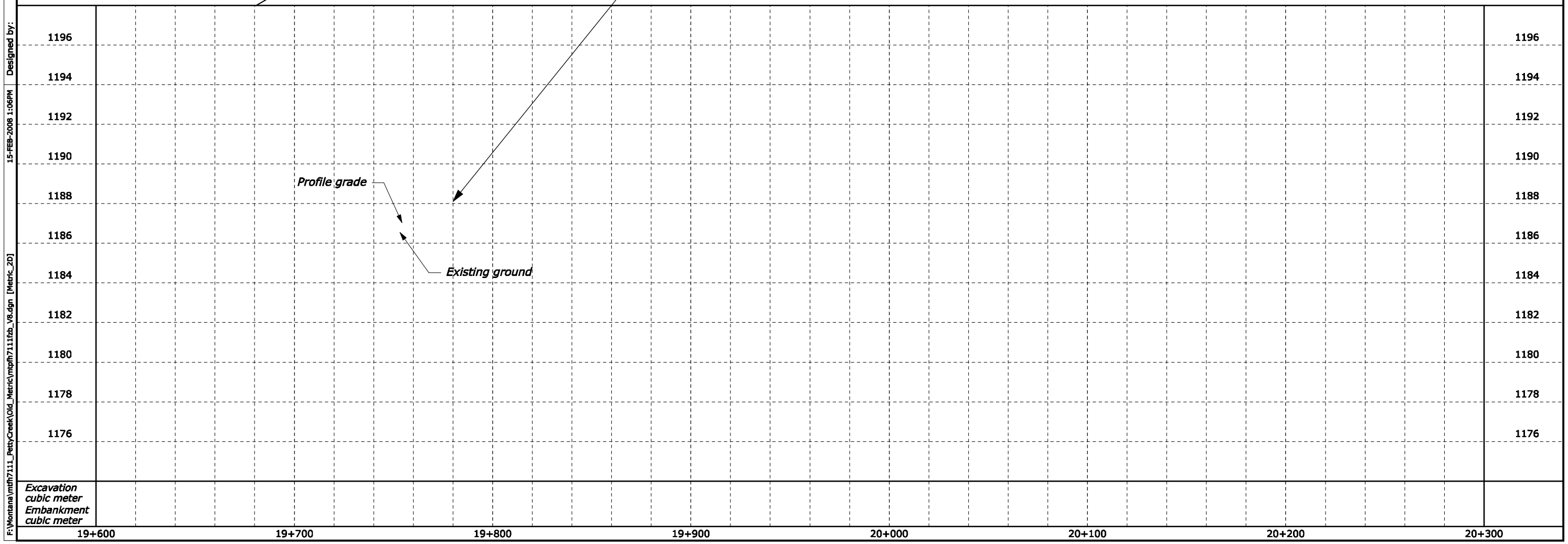


END PROJECT MT PFH 71-1(1)

PETTY CREEK ROAD
19+780
N 300619.4855
E 223959.9016

CONTROL POINTS

NAME	NORTHING	EASTING	ELEVATION
22100	300648.848	223881.103	1184.452
22101	300628.391	223957.815	1188.179
22102	300541.677	224070.795	1195.216



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Attachment 3. Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
585 SHEPARD WAY
HELENA, MONTANA 59601
PHONE (406) 449-5225, FAX (406) 449-5339

M.17 FHWA Petty Creek Road

September 14, 2006

Terry Schumann
Federal Highway Administration
Western Federal Lands Highway Division
610 East 5th Street
Vancouver, Washington 98661-3801

Dear Mr. Schumann:

This letter transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the road improvement work proposed by the Federal Highway Administration (Administration) to be conducted along an 11.8-mile section of the Petty Creek Road (Montana Forest Highway 71) in Missoula County, Montana (MT PFH 71-1(1)) and its effects on the threatened Columbia River basin population of bull trout (*Salvelinus confluentus*) and its designated critical habitat. This document was prepared in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

In a letter to the Service dated December 15, 2005, the Administration originally submitted a biological assessment (BA) and requested formal consultation relative to this project's effects to bull trout. In subsequent discussions, it was determined that the BA needed to be revised to include an evaluation of project effects to recently designated bull trout critical habitat in Petty Creek. Consequently, in a letter to the Service dated May 18, 2006, the Administration transmitted a revised BA for this project and formal consultation was continued.

Section 7(b)(3)(A) of the Act requires that the Secretary of Interior issue biological opinions on Federal agency actions that may affect listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the Act also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to jeopardize the continued existence of listed species or result in an adverse modification of critical habitat, if any has been designated. This biological opinion addresses only impacts to federally-listed species and does not address the overall environmental acceptability of the proposed actions.

This biological opinion is based on information provided in this project's revised BA, dated April 2006, conversations with State and Federal agency personnel, and other sources of information. A complete administrative record of this consultation is on file in this office.

The BA also determined that this proposed project would not be likely to adversely affect threatened bald eagles (*Haliaeetus leucocephalus*), threatened Canada lynx (*Lynx canadensis*), or endangered gray wolves (*Canis lupus*). The Service concurs with this determination and, therefore, formal consultation is not required for these species. The Service bases its concurrence on information displayed in the BA, and in particular on the conservation measures that would be implemented as a part of this project to assure that these species are not adversely affected by road reconstruction activities. The Service acknowledges the Administration's determination that this proposed project would have no effect on candidate yellow-billed cuckoos (*Coccyzus americanus*).

Your patience and cooperation in meeting our joint responsibilities under the Act are appreciated. If you have questions regarding this consultation, please contact Scott Jackson, of my staff, at (406)449-5225, extension 201.

Sincerely,

R. Mark Wilson

R. Mark Wilson
Field Supervisor

Enclosure

Copies (w/enclosure) to:
AES, R-6, MS-60120 (Bridget Fahey)
Todd Tillinger, COE, Helena, MT
File 7759

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION

BIOLOGICAL OPINION

for the effects to threatened bull trout (*Salvelinus confluentus*)
and designated bull trout critical habitat
from the reconstruction of the Petty Creek Road
(Montana Forest Highway 71)
in Missoula County, Montana

Petty Creek Road Improvement Project
MT PFH 71-1(1)

Agency: Federal Highway Administration
Western Federal Lands Highway Division
Vancouver, Washington

Consultation Conducted by: U.S. Fish and Wildlife Service
Montana Field Office
Helena, Montana

September 14, 2006

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BIOLOGICAL OPINION

I. Introduction

This document represents the U.S. Fish and Wildlife Service's (Service, USFWS) biological opinion based on our review of the proposed Petty Creek Road Improvement Project Biological Assessment (BA). This biological opinion addresses project related effects to threatened bull trout (*Salvelinus confluentus*) and designated bull trout critical habitat in accordance with the Endangered Species Act (Act) of 1973 as amended (16 U.S.C. 1531 et seq.).

Section 7(b)(3)(A) of the Act requires that the Secretary of Interior issue biological opinions on Federal agency actions that may affect listed species or critical habitat. Biological opinions determine if the action proposed by the action agency is likely to jeopardize the continued existence of listed species or destroy or adversely modify critical habitat. Section 7(b)(3)(A) of the Act also requires the Secretary to suggest reasonable and prudent alternatives to any action that is found likely to jeopardize the continued existence of listed species or result in an adverse modification of critical habitat, if any has been designated.

The Service defines destruction or adverse modification as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical." However, recent decisions by the 5th and 9th Circuit Court of Appeals have invalidated this definition. Pursuant to current national policy and the statutory provisions of the Act, destruction or adverse modification is determined on the basis of whether, with implementation of the proposed action, the affected critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role for the species.

This biological opinion addresses only impacts to bull trout and designated bull trout critical habitat and does not address the overall environmental acceptability of the proposed action.

II. Description of proposed action

The Western Federal Lands Highway Division (WFLHD) of the Federal Highway Administration (Administration, FHWA), in cooperation with the Lolo National Forest, Montana Department of Transportation (MDT) and Missoula County, is planning to improve portions of Petty Creek Road, also known as Montana Forest Highway 71. This road provides access to the eastern portion of the Ninemile Ranger District of the Lolo National Forest, and to several trailheads, commercial interests and private residences. The entire Petty Creek Road route begins at the junction of Interstate 90 and connects to Graves Creek Road at approximately milepost (MP) 13.0. Graves Creek Road then continues approximately five more miles to U.S. Highway 12, for a total of approximately 18 miles between Interstate 90 and Highway 12. The proposed project would improve 11.8 miles of this total Petty Creek Road length, between MP

0.0 near the intersection with South Side Road and MP 11.8 near the intersection with South Fork Petty Creek Road (FHWA 2006).

The project corridor can be characterized as a narrow riverine valley oriented north-south and bounded by forested slopes with abundant rock outcroppings and scree slopes. Between approximately MP 6.0 and MP 11.0, the valley broadens and is characterized by irrigated, agricultural lands. In addition, extensive private land and associated residences are found within the project corridor. Recreation areas are characterized by unimproved pullouts that lead to trails or that provide access to Petty Creek (FHWA 2006).

The proposed project terminates at MP 11.8 for several reasons: a) traffic is very light south of the project terminus, and the grade becomes steeper as the road ascends the divide between Petty Creek and Graves Creek. The lighter traffic and steeper grade, which requires travel at slower speeds, create a safer travel experience; b) South Fork Petty Creek Road is the southern-most road that provides access to private residences from Petty Creek Road. School bus service and mail delivery terminate at Bill's Creek road, approximately 0.9 miles north of South Fork Petty Creek Road, reducing traffic needs past this point; and c) traffic volumes beyond this portion of the road are projected to remain low into the foreseeable future, reducing the potential need for future improvements. Neither Missoula County nor the Forest Service anticipate the need to improve Petty Creek Road south of South Fork Petty Creek Road (towards Graves Creek Road) within the next 20 years, and there are currently no plans to improve that segment of the road (FHWA 2006).

The primary uses of Petty Creek Road are residential and recreational; the principal commercial use on public and private lands is timber harvest and hauling. The route provides the only access to approximately 78 private property parcels along the Petty Creek Road and approximately 59 parcels along West Fork Petty Road. It is also used for mail delivery, emergency vehicles, and school buses to these parcels. The road corridor is reported to receive some use as a link between U.S. Highway 12 and Interstate 90. The amount of such use is currently unknown, and cannot be differentiated from recreational and residential uses (FHWA 2006).

The purpose of the proposed project is to improve the existing roadway sufficiently to provide safe and efficient transportation for road users more consistent with accepted standards. The project would provide uniform roadway width to improve safety, reasonably provide for current and future traffic demands, facilitate snowplowing and other maintenance, reduce dust, and flatten sharp curves. Alignment modifications are proposed to move the roadway away from Petty Creek where possible, replace undersized or inadequate bridges and culverts, and would improve the vertical alignment to elevate the road above the 100-year floodplain. Curbs and guardrails would be constructed on all bridges. These improvements would provide safe travel conditions while reducing surface runoff to Petty Creek, providing aquatic and terrestrial organism passage, reduce impacts to riparian vegetation, and accommodate 50-year flood events. The intent of the project is to decrease existing unsafe driving conditions along Petty Creek Road while also reducing existing negative environmental effects resulting from current road conditions. It is anticipated that this project would require at least two construction seasons to complete (FHWA 2006).

The road has an existing paved surface from MP 0.0 to 1.3. This road segment is located on private land up to the National Forest boundary. The proposed project would overlay this segment with hot asphalt pavement. The remaining 10.5 miles of the road, from MP 1.3 to MP 11.8, are gravel and lie within the exterior boundaries of the Lolo National Forest. This segment would receive an aggregate base layer followed with a hot asphalt pavement layer over it. The alignment would follow the existing road except in those areas where the alignment can be moved away from Petty Creek to reduce potential sedimentation and create a vegetative buffer along the creek. In other areas substandard curves would be adjusted to meet standards for a 35 mile-per-hour road, but still minimize the impacts to the environment. There are four curves along the route where standards would not be met. Through those areas the road would be posted with warning signs and lower speed limit signs, and guardrail would be installed where warranted (FHWA 2006).

A uniform roadway width of 24.0 feet with 10-foot lanes and 2-foot shoulders would be attained. The existing roadway width varies between 21.0 feet and 25.0 feet with little to no shoulders from MP 0.0 to MP 1.3. From MP 1.3 to MP 11.8 the road is narrow and gravel surfaced with a width varying from 20.0 feet to 24.0 feet. The existing right-of-way varies between 60 feet and 100 feet in width (FHWA 2006).

Substandard stream crossing structures would be replaced at existing locations (no major new alignment changes or stream crossings). These include crossings at Madison Gulch, Spring Gulch, West Fork Petty Creek, Ed's Creek, Gus Creek, John's Creek, Upper Petty Creek, Bill's Creek, Mike's Creek, and East Fork Petty Creek. All new crossing structures would be designed to provide fish and amphibian passage. The lower Petty Creek Bridge meets current standards and will not be replaced. Table 1 lists the sizes of existing and proposed crossing structures for the project (FHWA 2006).

Table 1. Existing and proposed crossing structure sizes (FHWA 2006).

Crossing	Existing Structure	Proposed Structure
Madison Gulch (north culvert)	0.9meter (m) diameter	1.2m diameter/buried 0.3m
Madison Gulch (south culvert)	1.0m x 0.7m arch	1.2m diameter/buried 0.3m
Spring Gulch	0.9m diameter	1.8m diameter/buried 0.8m
West Fork Petty Creek	1.8m x 1.3m arch	2.75m diameter/buried 1.0m
Ed's Creek	1.1m x 0.7m arch	2.83m x 1.90m pipe arch/ buried 0.6m
Gus Creek	1.2m diameter	1.8m diameter/buried 0.3m
John's Creek	0.9m diameter	2.2m x 1.6m pipe arch/buried 0.3m
Upper Petty Creek	3.0m span timber bridge	This structure will be designed to allow aquatic and semi-aquatic passage by constructing a natural bankfull stream configuration and substrate within the crossing.
Bill's Creek	3.0m span timber bridge	3.0m x 1.8m box culvert/buried 0.6m
Mike's Creek	0.6m diameter	0.9m or 1.2m diameter/buried 0.3m
East Fork Petty Creek	2.0m diameter	2.4m diameter/buried 0.6m

To accommodate new culvert/bridge installations, temporary detours and diversion channels would be constructed within existing right-of-way or temporary easements. The detours would consist of pipe culverts placed in the water body with fill placed over the culverts for traffic to

pass. The channel diversions would be constructed parallel to the existing channel and lined with plastic or riprap. At the West Fork Petty Creek culvert, Ed's Creek culvert, Gus Creek culvert, and John's Creek culvert temporary detours would be placed approximately 33 feet west of the existing structures. At Bill's Creek a detour would be placed approximately 33 feet east of the existing structure. Culvert replacements at Madison Gulch, Spring Gulch, Mike's Creek, and East Fork Petty Creek would likely be constructed without detours; however, detours similar to the other crossings may be necessary. A new structure would be built adjacent to the Upper Petty Creek bridge on its northeast side. The existing bridge would be used as a detour until the new structure is constructed (FHWA 2006).

From station 17+545 to 17+565 and station 17+600 to 17+615 Petty Creek is cutting into the existing roadbed/streambank. To stabilize the bank and reduce sediment into the creek, streambank/road embankment reinforcement is proposed through a bioengineered riprap design. This design protects the toe of the bank with riprap to the bankfull elevation. It also provides a short floodplain generally above the bankfull elevation on which to plant shrubs before tapering to the top of the bank. The bank will also be vegetated (FHWA 2006).

The proposed roadway construction would require geotechnical drilling for preparation of the crossing designs at Upper Petty Creek and Bill's Creek, and approximately 25 subgrade test pits to be investigated to determine pavement rehabilitation alternatives. In addition to this, several cutslope sites would need test pits dug with a backhoe in order to investigate materials. Drilling, subgrade test pits, and cutslope test pits would be within the existing right-of-way for the roadway, and no additional clearances are required. For the subgrade test pits, drilling would be needed for about 25 conventional pavement borings every one-half mile to sample the existing pavement and subgrade. These borings would be shallow, to a maximum 5-foot depth. Backhoe test pits in the cutslopes would be less than 15 feet deep, and would be excavated from the shoulder of the road. Material excavated would be replaced and compacted once identification of the materials is recorded (FHWA 2006).

Water would be used as a drilling fluid if casing and core drilling is necessary. If needed, approximately 1,500 gallons-per-day, over a 10-day period would be pumped. As the test hole(s) is advanced, samples would be taken from within the augers/casing (FHWA 2006).

In areas where drilling occurs in proximity to water, there is a chance of loose sediment and other pollutants reaching Petty Creek. To prevent this, mitigation measures, which may include silt fencing, certified weed-free straw bales, sediment cloth and other sediment containment measures, would be used in areas where drilling occurs close to the water. Drilling would not be conducted during the fall spawning season (FHWA 2006).

All contractor equipment would be required to be cleaned before use in the area, and a hazardous spill plan would be developed prior to the start of work. Containment measures would be implemented in the event of a spill during project work in the area. All test holes would be sealed when augers/casing is removed and the holes abandoned in accordance with Montana state regulations (FHWA 2006).

Two paved parking areas are proposed along the lower half of Petty Creek Road to provide recreational users easier access to the Petty Pasture Trail and the Petty Creek Sheep Viewing Trail. These proposed parking areas would be 20 feet wide extending out from the east side of the existing road and would be about 100 feet long. Both sites are currently flat, rocky areas between the road and the hillside with little vegetation (FHWA 2006).

The Petty Creek Road has been designated by the County and the Forest Service as a primary access corridor and is managed accordingly. Missoula County owns the right-of-way or has easements for the existing road corridor and will be responsible for maintenance and jurisdiction of the route (FHWA 2006).

Conservation and Mitigation Measures: Efforts to minimize potential project impacts on biological resources began at the project planning stage. Additional project design refinements will be considered and incorporated where feasible to prevent or reduce potential adverse impacts to protected species and their habitat. The design of this proposed project was not final at the time consultation was initiated for this project (FHWA 2006).

Potential conservation and mitigation for fish and wildlife include measures to avoid disturbance to wildlife during sensitive periods such as breeding and nesting, minimizing impacts to habitat by controlling erosion and sedimentation, minimizing loss of vegetation, and reducing potential impacts to wildlife from construction activities by using best management practices. General mitigation measures incorporated into this project are described in the following two lists (FHWA 2006).

Mitigation for construction-phase and operational impacts to fisheries resources includes:

- Work in streams within the project corridor will comply with work windows that are protective of species as determined by the natural resource agency biologists.
- No vehicle fueling or refueling operations, or storage of hazardous materials that could accidentally enter a stream, will be permitted within 300 feet from the top of the bank of any intermittent or perennial stream channel.
- Ensure that culvert replacements or extensions in fish-bearing streams allow fish passage. These culverts will contain adequate water depth, velocity and outfall distance.
- Use bioengineering techniques to stabilize stream banks where appropriate instead of placing riprap.
- Provide drainage facilities that allow ground infiltration and provide sediment filtration from stormwater runoff.
- Minimize the amount of fill material placed in water bodies and floodplains.
- Avoid the need to relocate, realign, or recreate the Petty Creek stream channel where it flows close to the roadway corridor.
- There are several locations where Petty Creek Road is proximate to Petty Creek. To alleviate existing or potential road sediment problems, where feasible the road alignment would be shifted away from the creek, leaving existing fill/riprap in place and providing a vegetative buffer between the road and the creek. In areas where it is not feasible to shift the road, riprap protection would be utilized. Potential improvements would occur at the following locations:

1+560 to 1+720;	2+620 to 2+680;	3+100 to 3+200;	3+320 to 3+360;
5+100 to 5+180;	5+280 to 5+340;	5+900 to 6+080;	6+260 to 6+300;
6+440 to 6+500;	6+760 to 6+840;	10+580 to 10+650;	10+800 to 10+900;

8+920 to 8+980 no shift due to wetlands on east side of the road;
9+120 to 9+300 no shift due to talus slope on east side of the road;
17+500 to 17+620 area of proposed streambank/road embankment reinforcement (FHWA 2006).

Mitigation for construction-phase and operational impacts to wildlife resources include:

- The abundant disturbed areas that are already present within the project corridor will be used as staging areas for construction equipment to avoid the disturbance of additional areas within the project corridor.
- If electrical facilities need to be relocated because of construction activities, they will be raptor-proofed to avoid electrocution of birds.
- Modifying culverts, where feasible, to allow small mammal passage underneath the roadway.
- Posting warning signs to caution drivers about wildlife crossing the roadway (FHWA 2006).

III. Status of the species and critical habitat

Bull trout

Current known range: Please refer to the *Bull Trout (Salvelinus confluentus) Draft Recovery Plan, Chapter 1 - Introduction*, pages 6- 7 (US Department of Interior (USDI) 2002).

Listing history: Please refer to the *Bull Trout (Salvelinus confluentus) Draft Recovery Plan, Chapter 1 - Introduction*, page 7 (USDI 2002a).

Species description and life history: Please refer to the *Bull Trout (Salvelinus confluentus) Draft Recovery Plan, Chapter 1 - Introduction*, pages 8-12 (USDI 2002a).

Population dynamics: Please refer to the *Bull Trout (Salvelinus confluentus) Draft Recovery Plan, Chapter 1- Introduction,* pages 47-54 (USDI 2002a). See also *Bull Trout Recovery Planning: A review of the science associated with population structure and size* (Whitesel et al. 2004).

Status and distribution: Range-wide, local populations of bull trout within their respective core areas are often isolated and remnant. Migratory life histories have been lost or limited throughout major portions of the range (Ratliff and Howell 1992; Pratt and Huston 1993; Rieman and McIntyre 1993, 1995; Goetz 1994; Jakober 1995; Montana Bull Trout Scientific Group (MBTSG) 1998; USDI 2002b; USDI 2005a) and fluvial bull trout populations in portions of the upper Columbia River basin appear to be nearly extirpated (USDI 2002b, 2005a). Resident

populations existing in headwater tributary reaches are isolated and generally low in abundance (Thomas 1992).

Whitesel et al. (2004) noted that although there are multiple resources that contribute to the subject, Spruell et al. (2003) best summarized genetic information on bull trout population structure. Spruell et al. (2003) analyzed 1,847 bull trout from 65 sampling locations, 4 located in three coastal drainages (Klamath, Queets, and Skagit Rivers), one in the Saskatchewan River drainage (Belly River), and 60 scattered throughout the Columbia River Basin. They concluded that there is a consistent pattern among genetic studies of bull trout, regardless of whether examining allozymes, mitochondrial DNA, or most recently microsatellite loci. Typically, the genetic pattern shows relatively little genetic variation within populations, but substantial divergence between populations. Microsatellite loci analysis supports the existence of at least three major genetically differentiated groups (or lineages) of bull trout (Spruell et al. 2003). They were characterized as:

- "**Coastal**", including the Deschutes River and all of the Columbia River drainage downstream, as well as most coastal streams in Washington, Oregon, and British Columbia. A compelling case also exists that the Klamath Basin represents a unique evolutionary lineage within the coastal group.

- "**Snake River**", which also included the John Day, Umatilla, and Walla Walla Rivers. Despite close proximity of the John Day and Deschutes Rivers, a striking level of divergence between bull trout in these two systems was observed.

- "**Upper Columbia River**" which includes the entire basin in Montana and northern Idaho. A tentative assignment was made by Spruell et al. (2003) of the Saskatchewan River drainage populations (east of the continental divide), grouping them with the upper Columbia River group.

Spruell et al. (2003) noted that within the major assemblages, populations were further subdivided, primarily at the level of major river basins. Taylor et al. (1999) surveyed bull trout populations, primarily from Canada, and found a major divergence between inland and coastal populations. Costello et al. (2003) suggested the patterns reflected the existence of two glacial refugia, consistent with the conclusions of Spruell and the biogeographic analysis of Haas and McPhail (2001). Both Taylor et al. (1999) and Spruell et al. (2003) concluded that the Deschutes River represented the most upstream limit of the Coastal lineage in the Columbia River Basin.

The Service recognizes 121 bull trout core areas rangewide in Idaho, Montana, Oregon, Nevada and Washington (USDI 2002b). Core areas are defined as approximating interacting biological units for bull trout (USDI 2002b). Within the Columbia River basin, a total of 98 core areas are described. Bull trout are threatened by habitat loss and degradation, passage restrictions at dams, and competition from non-native species, especially brook trout (*S. fontinalis*) and lake trout (*S. namaycush*). The American Fisheries Society listed bull trout as a species of concern in all of its range (California, Idaho, Montana, Nevada, Oregon, Washington, Alberta, and British Columbia) except Alaska, because of present or threatened destruction, modification, or

curtailment of its habitat or range and introduction of exotic species (Williams et al. 1989). Bull trout have been categorized as an indicator species of forest and ecosystem health as they are particularly sensitive to environmental change (Rieman and McIntyre 1993).

Generally, where status is known and population data exists, bull trout populations throughout the Columbia River basin are at best stable and more often declining (Thomas 1992; Schill 1992; Pratt and Huston 1993; USDI 2005a). Presently, bull trout in the Columbia basin occupy about 45 percent of their estimated historic range (Quigley and Arbelbide 1997). Many of the bull trout core areas occur as isolated watersheds in headwater tributaries, or in tributaries where the migratory corridors have been lost or restricted. Few bull trout core areas are considered strong in terms of relative abundance and core area stability (USDI 1998c; USDI 2005a). Strong core areas are generally associated with large areas of contiguous habitat.

Please refer to the "*Bull Trout Cores Area Templates Complete Core Area by Core Area Analysis*" for a complete review of the status of bull trout core areas in the Upper Columbia River bull trout population, pages 12 to 208 (USDI 2005a). We hereby incorporate the information found in those pages into our analysis. Below we examine the Middle Clark Fork River core area within which the proposed action would occur.

Middle Clark Fork River (Section 2 – Flathead River to Milltown Dam): More intensive bull trout surveys have been conducted in recent years, primarily by Montana Fish, Wildlife and Parks (MFWP), in this portion of the Clark Fork River drainage. Local spawning populations in Cedar Creek, Fish Creek, Rattlesnake Creek, and the St. Regis River have been monitored sporadically (MFWP 2004). The surveys have identified up to 17 redds in Cedar Creek (2002), 20 redds in Fish Creek (2003), 33 redds in Rattlesnake Creek (2003), and 18 redds in the St. Regis River (2003). Counts in the high single digits or low double digits have also occurred in most systems. These results indicate adult bull trout numbers in this core area range from roughly 100-200 fish, although there's uncertainty in that estimate. No trend is indicated by the short period of record. Most local populations are well below historical levels of natural abundance and are inadequate to maintain long-term genetic viability.

Milltown Dam, which has blocked fish passage at the upper boundary of this core area since 1908, is slated for complete removal within the next few years. While benefits are more likely to accrue to the next core area upstream, by allowing bull trout that migrate to return to natal headwaters, tangible benefits to this core area will accrue as well. Benefits of restoring fish passage throughout the system, over four major dams as a result of both the Avista and Thompson Falls projects as well as the Milltown Dam removal, cannot be fully anticipated, nor will they be fully realized for several bull trout generations.

The status and trend of bull trout in this core area were both considered "unknown" based on information available at the time of listing (USDI 1998c). That is still largely the case, though since that time MFWP has conducted extensive monitoring efforts in significant portions of this core area. Preliminary conclusions are that the abundance of adult bull trout in Reach 2 of the Clark Fork River ranges from roughly 100-200 fish, although there's uncertainty in that estimate. Most local populations are well below historical levels of natural abundance, with juvenile bull

trout widely distributed but at low densities. With fish passage now provided at Rattlesnake Dam and the pending removal of Milltown Dam and additional efforts, past fragmentation of this core area is being improved. However, significant habitat limitations remain (e.g., dewatering, thermal enrichment, nonnative species, impacts of whirling disease, expanding recreational use) and full recovery of bull trout is at best an uncertain prospect. Potentially, this core area should be able to support 1,000 or more adult bull trout. Thus, the emphasis has been placed on connectivity to restore this core area as a functioning portion of a larger complex of core areas (USDI 2005a).

Six local populations have been identified within this core area, including one in Petty Creek where this project would occur (the other local populations are found in Rattlesnake Creek, Fish Creek, Trout Creek, Cedar Creek and the St. Regis River). Migratory bull trout have been observed in Petty Creek during the spawning period and this stream was identified by the MBTSG (1996) as one of the most important spawning tributaries for migratory bull trout in this reach of the Clark Fork. In addition to supporting migratory bull trout, the Petty Creek drainage supports resident bull trout populations of moderate to low density. Resident bull trout have been found in the mainstem of Petty Creek at various locations and in Spring Gulch Creek, a tributary of Petty Creek (MBTSG 1996).

Designated bull trout critical habitat

On September 26, 2005, the final rule for bull trout critical habitat was published for the Klamath River, Columbia River, Jarbidge River, Coastal Puget Sound, and Saint Mary-Belly River populations of bull trout (USDI 2005b). This final designation encompasses approximately 3,828 miles of streams, 143,218 acres of lakes in Idaho, Montana, Oregon, and Washington, and 985 miles of shoreline paralleling marine habitat in Washington. The lateral extent for rivers and streams is defined by the ordinary high water line or the bankfull elevation. The lateral extent of designated lakes is defined by the perimeter of the water body mapped on 1:24,000 scale topographic maps.

All areas designated as critical habitat for bull trout are within the species' historic geographic range and contain enough of the primary constituent elements (PCEs) identified as essential to its conservation in the area designated to enable the bull trout to carry out normal behavior. Much of what is known about the specific physical and biological requirements of bull trout are described in the proposed designation of critical habitat rule (USDI 2002c). PCEs include, but are not limited to: space for individual and population growth, and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, and rearing (or development) of offspring; and habitats that are protected from disturbance (USDI 2004). Based on our current knowledge of the life history, biology, and ecology of the species and the requirements of the habitat to sustain the essential life history functions of the species, we have determined that the bull trout's PCEs are:

1. Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72 °F (0 to 22 °C) but are found more frequently in temperatures ranging from 36 to 59 °F (2 to 15 °C). These temperature ranges may

vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches with temperatures that preclude any bull trout use are specifically excluded from designation;

2. Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures;

3. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. This should include a minimal amount of fine substrate less than 0.25 inch (0.63 centimeter) in diameter.

4. A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, currently operate under a biological opinion that addresses bull trout, or a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation;

5. Springs, seeps, groundwater sources, and subsurface water to contribute to water quality and quantity as a cold water source;

6. Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows;

7. An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish; and

8. Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited (USDI 2005b).

This designation protects PCEs necessary to support the life history functions which were the basis for the designation. Because not all life history functions require all the PCEs, not all habitat will contain all the PCEs (USDI 2005b).

The Petty Creek Road reconstruction effort affects designated bull trout critical habitat in Petty Creek within the Clark Fork River basin bull trout critical habitat unit. Project related effects to critical habitat in Petty Creek are addressed in this biological opinion.

Effects of past and ongoing projects

No new threats have been identified through section 7 consultation across the Columbia River bull trout population. Effects of projects that have been analyzed through section 7 consultation as reported in a biological opinion are summarized in this section. These effects are an important component of objectively characterizing the current status of the species and its habitat. To

assess the effects of these actions on bull trout we reviewed all of the biological opinions received by the Service's Region 1 and Region 6 offices, from the time of listing until August 2003; this summed to 137 biological opinions (USFWS 2003). Of these, 124 biological opinions (91 percent) applied to activities affecting bull trout in the Columbia River population, 12 biological opinions (9 percent) applied to activities affecting bull trout in the Coastal-Puget Sound population, 7 biological opinions (5 percent) applied to activities affecting bull trout in the Klamath River population, and 1 biological opinion (<1 percent) applied to activities affecting the Jarbidge and St. Mary Belly populations. (Note: these percentages do not add up to 100 because several biological opinions applied to more than one population). The geographic scale of these consultations varied from individual actions (e.g., construction of a bridge or pipeline) within one basin to multiple-project actions occurring across several basins.

This analysis showed that the Service consulted on a wide array of actions which had varying levels of effects. No actions that have undergone consultation were found to appreciably reduce the likelihood of survival and recovery of the bull trout. Furthermore no actions that have undergone consultation were anticipated to result in the loss of any subpopulation identified during listing (USFWS 2003).

Since August 2003, Region 6 of the Service has issued an additional 25 biological opinions relative to bull trout under section 7 for the Montana portion of the Clark Fork management unit. After review of these opinions, the Service determined that actions that had undergone consultation were not anticipated to result in the loss of any core area or listing subpopulation of bull trout. Twenty-one of the 25 biological opinions resulted in short-term adverse effects with long-term benefits for bull trout. To date, in Regions 1 and 6 of the Service, no actions that have undergone section 7 consultation for adverse effects to bull trout have resulted in a jeopardy finding (i.e., an appreciable reduction in the likelihood of both the survival and recovery of bull trout). Similarly, none have resulted in a destruction or adverse modification finding for designated bull trout critical habitat. Taken in sum, the impact of all these actions adversely affected a small portion of the overall range of the species in the Clark Fork management unit.

Analysis of the species/critical habitat likely to be affected

Bull trout are listed as threatened under the Act. The proposed action would occur within the Clark Fork River - Section 2 (Flathead River to Milltown Dam) bull trout core area. Six local populations have been identified within this core area, including one in Petty Creek. The proposed action would result in adverse effects to bull trout in the Petty Creek drainage (FHWA 2006).

Bull trout critical habitat has been designated under the Act and was divided into 29 Critical Habitat Units. The proposed action would occur in Critical Habitat Unit 2: Clark Fork River Basin. Within this project's action area, Petty Creek was included in the final rule designating bull trout critical habitat. Petty Creek from its confluence with the Clark Fork River upstream 11.6 miles provides spawning and rearing habitat for the Petty Creek local population (USDI 2002c). The proposed action would result in adverse effects to bull trout critical habitat in Petty Creek (FHWA 2006).

Other listed species

In addition to bull trout, other federally-listed species that may be present in the project area include the threatened bald eagle (*Haliaeetus leucocephalus*), endangered gray wolf (*Canis lupus*), and threatened Canada lynx (*Lynx canadensis*). Based on information provided in the BA for this project, including implementation of the stated design features and conservation measures, the Service concurs with the Administration that the proposed project may affect, but would not be likely to adversely affect bald eagles, gray wolves, and Canada lynx. Therefore, further consultation under the Act is not required relative to these species and they will not be considered further in this biological opinion. The Service acknowledges the Administration's determination that this proposed project would have no effect on the candidate yellow-billed cuckoo (*Coccyzus americanus*). If an occurrence of a listed species is newly discovered in the proximity of this project corridor as construction progresses, the Administration should consult with the Service regarding that new information.

IV. Environmental baseline

Regulations implementing the Act, as amended (16 U.S.C. 1531 et seq.) (50 CFR 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area, which have already undergone section 7 consultation, and the impacts of State and private actions in the action area, which are contemporaneous with the consultation in progress. Such actions include, but are not limited to, previous timber harvest, road construction, residential development and other land management activities.

Status of the species and critical habitat within the action area

Action area, as defined by the Act, includes the entire area that would be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action. For the purposes of this biological opinion, the action area is defined as a 0.5 mile swath on either side of the Petty Creek Road along the length of this road reconstruction project.

The action area has been defined by the potential for project-generated sediment and related impacts to influence the movement, habitat use and persistence of bull trout. The action area upstream from the proposed instream work sites would be affected by temporary disturbance of fish passage due to instream activities (e.g., culvert and bridge removal and replacement, bank stabilization, stream diversions). The action area downstream of project activities would be affected by turbidity and sediment deposition. Downstream effects are unlikely to extend far out into the Clark Fork River. The action area serves primarily as bull trout rearing and migratory habitat, although spawning activity in the mainstem of Petty Creek has been reported in the past

The subpopulation of bull trout in Petty creek is depressed compared with historic levels, however its numbers are not alarmingly low nor are they in a rapid state of decline. The two life-

history forms of bull trout, migratory and resident, may coexist; however, Petty Creek provides habitat for mostly resident populations of bull trout. Migratory bull trout from the main stem of Clark Fork River do spawn in Petty Creek. However, the number of fish entering Petty Creek is low because bull trout are rare in the main stem Clark Fork River. Fish enter Petty Creek in June during low flows to base flows (below the ground surface). Fluvial fish travel upstream and stay in the upper reaches and tributaries to spawn in the fall (FHWA 2006).

Most tributaries to Petty Creek are accessible to fish, and bull trout may be present in these systems as well. Low levels of presence in South Fork, East Fork and West Fork Petty Creek are presumed because bull trout, although rare, are in the main stem of Clark Fork River. Electroshock fish surveys conducted in 1987, 1992 and 1994 identified bull trout, but resulted in no estimate of population density (FHWA 2006).

The existing crossing structures along Petty Creek and its tributaries allow fish passage in some form. However, some structures do not allow passage for all life stages of fish, restricting available habitat for fish at some life stages. These structures include Madison Gulch, Spring Gulch, West Fork Petty Creek, Ed's Creek, Gus Creek, John's Creek, Mike's Creek, and East Fork Petty Creek (FHWA 2006).

Baseline conditions for bull trout habitat in the action area were assessed using information in the *Bull Trout Core Area Templates* (USDI 2005a), *Section 7 Consultation Watershed Baseline: Middle Clark Fork River* (US Department of Agriculture (USDA) 2000), the biological assessment (FHWA 2006), draft recovery plan (USDI 2002a; USDI 2002b), and other sources of information. These reports indicate that road construction, forestry practices, non-native species, and rural residential development all have affected bull trout habitat and populations in the action area. The impacts from these activities are reflected in the four population and 19 habitat indicators defined in *A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale* (matrix) (USDI 1998a). An evaluation of these four population and 19 habitat indicators was conducted at the sub-watershed scale to establish the environmental baseline. Table 2 displays the baseline conditions and the effects of the proposed action for the project area.

As referenced above, Table 2 displays the results of the "Matrix of Diagnostics / Pathways and Indicators" (matrix), the objective of which is to integrate the biological and habitat conditions to arrive at a determination of the potential effect of land management activities on a listed species. The columns in the matrix correspond to levels of condition of the indicator. There are three condition levels: "functioning appropriately;" "functioning at risk;" and "functioning at unacceptable risk." These three categories of function are defined for each indicator in the matrix. In concept, indicators in a watershed are "functioning appropriately" when they maintain strong and significant populations that are interconnected and promote recovery of a listed species or its critical habitat to a status that will provide self-sustaining and self-regulating populations. When the indicators are "functioning at risk," they provide for persistence of the species but in more isolated populations and may not promote recovery of a listed species or its critical habitat without active or passive restoration efforts. "Functioning at unacceptable risk" suggests the listed species continues to be absent from historical habitat, or is rare or is being

Table 2. Bull Trout Matrix of Diagnostics/Pathways and Indicators for the Petty Creek drainage (FHWA 2006)..

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Subpopulation Characteristics				
Subpopulation size	FAR	Subpopulation size is depressed relative to historic levels, but the subpopulation is not at alarmingly low numbers.	Maintain	Implementation of the proposed project is not expected to negatively affect the subpopulation size in Petty Creek because construction impacts will be temporary, best management practices (BMPs) will be employed, and instream work will be restricted to work windows determined through coordination with the USFWS. In addition, some indicators such as sediment and substrate embeddedness will likely be improved in the long term, which will likely help to maintain and potentially raise the subpopulation size.
Growth and survival	FAR	Population is depressed, but is not in a rapid state of decline.	Maintain	With application of BMPs and adherence to construction windows, the proposed project will not measurably affect bull trout growth and survival, recruitment or the recovery rate of the Petty Creek subpopulation.
Life history diversity and isolation	FAR	Migratory fish enter Petty Creek from the Clark Fork River and some genetic exchange is possible with subpopulations in Fish Creek and Ninemile Creek.	Maintain	New stream crossing structures will improve fish passage, but this is not expected to affect bull trout life history diversity or bull trout subpopulation isolation because the new structures are not opening up previously inaccessible portions of Petty Creek or its tributaries, but rather improving passage to include all life stages of fish.
Persistence and genetic integrity	FAR	Clark Fork contributes a fair number of fluvial fish to Petty Creek, but populations within Clark Fork River are fragmented. Some genetic exchange is possible with subpopulations in Fish Creek and Ninemile Creek. Rainbow and brook trout present threats to genetic integrity.	Maintain	New stream crossing structures will improve fish passage, which could enhance connectivity between the Petty Creek bull trout subpopulation and subpopulations in Fish Creek and Ninemile Creek, as well as with other trout populations. However, because the new structures are not opening up previously inaccessible portions of Petty Creek or its tributaries, but rather improving passage to include all life stages of fish, it is not expected that the proposed project will change existing genetic exchange.
Water Quality				
Temperature	FAR	Actual stream temperatures were not available. This indicator was based on 5 to 25 percent of the stream not having tree cover.	Maintain	Loss of minor amounts of vegetation including shrubs and grasses in disturbed areas will not measurably affect water temperatures in Petty Creek. Additionally, the establishment of vegetation along the creek in select areas where vegetation is currently lacking and revegetation of disturbed areas will help offset temperature changes and may improve the water temperatures in the long term.
Sediment	FUR	This indicator was evaluated based on road density, presence of mining sites, and number of culverts in the watershed. This watershed has greater than 1.7 miles per square mile road density; greater than 30 percent of stream length with roads within 300 feet, and extensive grazing.	Degrade in short term Maintain/improve in long term	The proposed project would contribute to the degradation of this indicator during construction due to expected increases in sedimentation to streams. Implementation of BMPs would reduce but not eliminate this risk. A paved road surface with stormwater runoff directed to drainage ditches would maintain and likely improve this indicator in the long term.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Chemical contamination/nutrients	FUR/FAR	Lower Petty Creek functions at an unacceptable risk because there are one or more reaches with impaired water quality. Within upper Petty Creek this indicator is functioning appropriately and there are no systems on the state list of streams with impaired water quality.	Maintain	Due to the extent of construction activities planned it is likely that chemicals will enter Petty Creek, however, levels will be minimal with the implementation of BMPs and spill control plans.
Habitat Access				
Physical barriers	FAR	This indicator was evaluated based on known barriers and culverts on fish bearing streams, however, the condition of all culverts is not known. Upper and lower Petty Creek have no known permanent barriers. Some culverts do not provide fish passage for all life stages of fish.	Maintain	Implementation of the proposed project will not create any permanent barriers to upstream and downstream fish passage. Temporary barriers to fish movement may be created during the establishment and removal of diversion channels.
Habitat Elements				
Substrate embeddedness	FUR	This indicator was evaluated the same as for sediment.	Degrade in short term Maintain/improve in long term	Structure removal, fill removal and construction of a new structure and roadway over upper Petty Creek as well as work along Petty Creek and in Petty Creek's tributaries will likely result in delivery of sediment to the stream during construction. If excess amounts of sediment reach the channel, increased substrate embeddedness may occur. However, this will be reduced with BMPs and sediment control measures in place. Also, a paved road surface with stormwater runoff directed to drainage ditches would maintain and likely improve this indicator in the long term.
Large woody debris	FUR/FAR	This indicator was evaluated based on tree cover along stream banks, number of roads within 300 feet of the stream and number of crossings in the stream. Based on these criteria, lower Petty Creek is functioning at unacceptable risk (greater than 25 percent tree cover; greater than 30 percent of roads are within 300 feet of streams; greater than 2 crossings). Based on these criteria, upper Petty Creek is functioning at risk (less than 10 to 25 percent tree cover; 15 to 30 percent of roads are within 300 feet of streams; less than 2 crossings).	Maintain	Because the project is proposing to use the existing road alignment with only slight adjustments, it is expected that very little forested riparian areas will be disturbed. Additionally, any disturbed areas will be revegetated, and some currently non-vegetated riprap areas will be planted with native saplings. Therefore, the project is expected to maintain the existing large woody debris element.
Pool frequency and quality	FA/FAR	Within lower Petty Creek, this indicator is functioning appropriately and within upper Petty Creek, it is functioning at risk.	Maintain	Because the project is proposing to use the existing road alignment with only slight adjustments, it is not expected that habitat features contributing to the formation of pools (such as large woody debris) will be significantly impacted.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Large pools	FUR	This indicator was based on ratings for sediment, large woody debris, and stream bank condition. This system is functioning at unacceptable risk for the following reasons: large woody debris is functioning at risk or unacceptable risk; stream bank condition and sediment are functioning at unacceptable risk.	Maintain	Because the project is proposing to use the existing road alignment with only slight adjustments, it is not expected that forested riparian areas or vegetation will be significantly impacted. Streambank condition is expected to be maintained since the existing road is in close proximity to Petty Creek. Sediment will increase during construction, but this will be reduced with BMPs and sediment control measures in place. Also, a paved road surface with stormwater runoff directed to drainage ditches would likely reduce sediment in the long term.
Off-channel habitat	FUR/FAR	This indicator was based on the percentage of low-gradient streams in the watershed with roads within 300 feet of the stream. Therefore the lower and upper reaches Petty Creek are functioning at unacceptable risk and at risk, respectively.	Maintain/Improve	Because the road is already in close proximity to the stream, road improvements would likely maintain this indicator. With slight road realignments away from the creek and providing vegetation where vegetation is currently lacking, it is expected there will be a minor improvement in this indicator.
Refugia	FUR	There are no habitat refugia within the subpopulation boundary.	Maintain	Implementation of the proposed project will not affect bull trout refugia.
Channel Condition and Dynamics				
Wetted width/Maximum depth ratio	FUR/FAR	This indicator was evaluated the same as for sediment unless certain conditions were met.	Maintain	Because the road is already in close proximity to the stream, road improvements would likely maintain this indicator. A paved road surface with stormwater runoff directed to drainage ditches would maintain and possibly improve this indicator in the long term.
Stream bank condition	FUR/FAR	This indicator was evaluated the same as for width/depth ratios.	Maintain	Because the road is already in close proximity to the stream, road improvements would likely maintain this indicator. Also, slight shifts in the alignment away from the creek and providing vegetation where vegetation is currently lacking may improve the indicator.
Floodplain connectivity	FUR/FAR	This indicator was evaluated the same as for width/depth ratios. However, the C type channel in upper Petty Creek would contribute to stream instability and downcutting, so this indicator is at risk.	Maintain	Because the road is already in close proximity to the stream, road improvements on the existing alignment would likely maintain this indicator.
Flow Hydrology				
Change in peak/base flows	FUR/FAR	This indicator was based on road density in the watershed (described below) and amount of regeneration harvest less than 30 years old. Lower Petty Creek is functioning at unacceptable risk (road density is at unacceptable risk and regeneration harvest is present on greater than 25 percent of the watershed). Upper Petty Creek is at risk (road density is at risk and regeneration harvest covers 10 to 25 percent of the watershed).	Maintain	Implementation of the proposed project will not result in changes to peak/base flows. Regeneration harvest is not expected to change, and while the project will include road widening, no additional miles would be added to existing road densities.
Drainage network increase	FUR/FAR	Road densities were used to evaluate this indicator (see below).	Maintain	While the project will include road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Watershed Conditions				
Road density and locations	FUR/FAR	Lower Petty Creek includes road densities greater than 1.7 miles per square mile and greater than 30 percent of the stream length in the watershed within 300 feet of the stream and is therefore at unacceptable risk. Upper Petty Creek includes road densities between 0.7 and 1.7 miles per square mile and between 15 and 30 percent of the stream length in the watershed within 300 feet of the stream and is therefore at risk.	Maintain	While the project will include road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities. Because the road is already in close proximity to the stream, road improvements on the existing alignment would likely maintain this indicator.
Disturbance history	FUR/FAR	This indicator is based on road density within sensitive landtypes and peak/base flow patterns.	Maintain	Implementation of the proposed project will not alter the existing disturbance history. While the project will include road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities.
Riparian conservation area	FUR/FAR	This indicator is based on road density and location (described above) and tree cover on stream banks (see Temperature above).	Maintain	Implementation of the proposed project would likely maintain this indicator. Minor degradation may occur if forested riparian areas are lost, however, slight shifts in the alignment away from the creek and providing vegetation where vegetation is currently lacking may help improve the indicator.
Disturbance regime	FUR/FAR	This indicator is based on road density (described above) and amount of sensitive landtypes in the watershed. Based on these criteria, lower Petty Creek is functioning at unacceptable risk (greater than 30 percent of the watershed is composed of sensitive landtypes). Upper Petty Creek is at risk (15 to 30 percent of the watershed is sensitive landtypes).	Maintain	It is not expected that implementation of the proposed project will alter the current disturbance regime in the project area. While the project will include some road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities.
Species and Habitat				
Integration of species and habitat condition	FUR	The subpopulation size is small, habitat is degraded and fragmented. With no active restoration, habitat conditions will not improve within two generations (5 to 10 years). Some connectivity remains among subpopulations.	Maintain	Implementation of the proposed project would maintain this indicator. Degradation of habitat conditions may occur in the short term under sediment and substrate embeddedness, but conditions may improve in the long term under off-channel habitat, sediment, and substrate embeddedness.

a. Analysis of baseline conditions is summarized from USDA 2000, and from coordination with USFS, MFWP, US Corps of Engineers, Environmental Protection Agency, and USFWS.
FA = indicators are functioning appropriately.
FAR = indicators are functioning at risk.
FUR = indicators are functioning at unacceptable risk

maintained at a low population level. Although the habitat may maintain the species at this low persistence level, active restoration is needed to begin recovery of the species.

Action agencies authorizing activities within lands occupied by bull trout are mandated by the Act to consider the environmental baseline in the action area and effects to bull trout that would likely occur as a result of management actions. To that end, agency biologists use the four biological indicators and the 19 physical habitat indicators in the matrix for bull trout to assess the environmental baseline conditions and determine the likelihood of take per interagency guidance and agreement on section 7 consultations on the effects of actions to bull trout (USDI 1998a, 1998b). Take could occur as direct harm or harassment of individuals or indirectly through adverse impacts to bull trout habitat. The majority of the matrix analysis consists of specific consideration of the 19 habitat indicators. Analysis of the matrix habitat indicators relative to project effects provides a very thorough assessment of the existing habitat conditions and potential impacts to bull trout habitat. A description of the status of each indicator within this project area is provided in Table 2.

While assessing the environmental baseline and potential effects to bull trout as a species, agency biologists concurrently provide a companion analysis of effects to the PCEs for designated critical habitat and related habitat indicators (Appendix A). Based on the matrix crosswalk, at least one habitat indicator in each of the eight PCEs is rated as "functioning at risk" or "functioning at unacceptable risk." Therefore, in summary, based on the site specific environmental baseline of bull trout habitat conditions provided in the biological assessment for this project, linkage to the PCEs considering those habitat indicators described in Appendix A, and other factors as necessary, all PCEs in Petty Creek within the project corridor are functioning in less than optimal condition.

Factors affecting species environment within the action area

Five to 25 percent of Petty Creek does not have tree cover, contributing to increased water temperatures. Lower Petty Creek includes road densities greater than 1.7 miles per square mile, and greater than 30 percent of the stream length in the watershed is within 300 feet of the stream. Upper Petty Creek includes road densities between 0.7 and 1.7 miles per square mile, and between 15 and 30 percent of the stream length in the watershed is within 300 feet of the stream. These conditions, coupled with the fact that the majority of the roads are graveled, have contributed to undesirable levels of sediment in the creek and toward an impaired water quality designation by the Montana Department of Environmental Quality (FHWA 2006).

For over 100 years, forestry practices have caused major impacts to bull trout habitat throughout the Clark Fork River basin. Past forestry practices (i.e., road construction, log skidding, harvest in riparian areas, clear-cutting, splash dams, and terracing) were often damaging to watershed conditions and were major contributing causes of bull trout decline. While the primary effects of these practices have been reduced by the development of more progressive techniques, the legacy effects of the past century have included lasting impacts to bull trout habitat, including increased sediment in streams, increased peak flows, thermal modifications, loss of instream

woody cover, channel instability, and increased accessibility for anglers and poachers. These impacts will continue and are irreversible in some drainages (USDI 2002b).

Transportation systems were a major contributor to the decline of bull trout in this recovery unit. Separating the direct effect of the roads and railroads from the development associated with their construction is difficult. Likewise, separating the effects of transportation corridors in forested habitat from the legacy effects of forest management is also difficult. Construction methods during the late 19th and early 20th centuries, primarily channelization and meander cutoffs, caused major impacts on many of these streams; impacts that are still being manifested. Such impacts seldom occur with new roads. However, significant problems remain and are associated with passage barriers, sediment production, unstable slopes, improper maintenance, and high road densities (USDI 2002b).

The impacts of residential development in the Clark Fork River watershed vary by location, but where impacts occur, they can be severe. Ultimately, unmanaged growth and residential sprawl may be among the biggest threats to the recovery of bull trout in this recovery unit. The entire drainage holds many of the attributes that are increasingly attractive to people seeking relief from the urban environment, and human population growth in western Montana has accelerated. The way in which this growth is managed and our ability to limit the impacts of growth, in particular on bull trout spawning and rearing streams, are pivotal to the success of the bull trout recovery effort. Increasing human populations have a direct impact on all of the other categories of risk that affect bull trout (USDI 2002b).

Of all the threats to bull trout recovery, the expanding presence of nonnative species may prove to be the most intractable. In particular, brook trout and lake trout, the two common species most closely related to bull trout, are believed to represent the greatest threat to bull trout in the Clark Fork River basin as a whole. Brook trout are present in nearly all mainstem Clark Fork River tributaries. Bull trout hybridize with brook trout, and their offspring are generally sterile. The available data indicate that brook trout presence can create an unstable situation, resulting in a dramatic decline or replacement of bull trout (USDI 2002b).

Brown trout are also suspected to adversely affect bull trout. At this point, the nature of the negative interaction between bull trout and brown trout is not well understood, but is thought to include elements of competition and predation. However, the result of the species' interaction is suspected to be detrimental to bull trout, given the apparent overlap in niches for the two species (USDI 2002b).

Scientists currently have limited tools available to deal with these intruders, and in many cases, there is strong public opposition to controlling or eliminating other salmonids that provide sport fisheries. The impacts of introductions of nonnative species in most cases may be permanent. While the status of stream habitat for bull trout in many watersheds throughout this recovery unit has had an improving trend, the effects of nonnative species introductions may permanently reduce the capacity of these waters to support bull trout. Intact native fish ecosystems are increasingly rare, and we must allocate substantial resources to protecting and restoring those that remain (USDI 2002b).

V. Effects of the action

"Effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that would be added to the environmental baseline. Direct effects are considered immediate effects of the project on the species or its habitat. Indirect effects are those caused by the proposed action and are later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consultation. The effects of the action are added to the environmental baseline to determine the future baseline and to form the basis for the determination in this opinion. Should the Federal action result in a jeopardy situation and/or adverse modification conclusion, the Service may propose reasonable and prudent alternatives that the Federal agency can take to avoid violation of section 7(a)(2). The effects discussed below are the result of direct and indirect impacts of implementing the proposed project.

General effects of transportation projects on bull trout and critical habitat

Effects associated with major transportation systems on rivers and lakes include sedimentation, loss of riparian habitat, channel modification, and chemical contamination. Effects vary widely depending on factors such as number, magnitude, and proximity of the transportation system, type of water body affected, surrounding topography, and level of use of the system. Effects from transportation systems can lead to degradation of aquatic habitat. For example, channel modifications such as bank hardening, constriction, channelization, and relocation can lead to stream instability, bank erosion, sediment deposition, and lateral stream movement (MDT 2005).

The major effects from transportation systems on bull trout and their habitat include sedimentation, channelization, bank instability, and loss of riparian vegetation. These effects generally lead to degraded habitat by increasing water temperature and reducing habitat complexity, pool quality, large woody debris recruitment, and bank stability (MDT 2005).

Direct effects are impacts caused by specific projects that occur at the same time and place and have immediate effects on the species or its habitat (e.g., construction equipment destroys eggs by running across a redd in the river channel, or fill material deposited in the stream kills a fish). Transportation improvement projects can potentially have direct impacts on bull trout in five ways: 1) direct mortality of individual fish at all life stages; 2) major disturbance of fish in the project area; 3) major temporary displacement of fish species in the vicinity of the project area; 4) major elimination of supporting aquatic and/or riparian habitat in the project area (important habitat features); and 5) project activities causing substantial, long-term reductions water quality due to excessive sedimentation and toxic substances, resulting in reduced availability of prey or increased toxicity of prey through bio-accumulation of contaminants (MDT 2004).

Indirect effects are impacts caused by or resulting from actions of specific projects that are later in time and space and are reasonably certain to occur (e.g., degradation of aquatic and riparian

habitat or water quality to the point where fish survival and/or production is substantially reduced during any life stage). Indirect effects, with the exception of direct mortality of fish, can be similar to direct effects, but are less severe and immediate in observable impacts to sensitive fish species and their habitat. Indirect impacts can also manifest themselves after completion of project activities, and can change long-term human use and resource condition. Transportation improvement projects can potentially have indirect impacts on bull trout in four ways: 1) increased seasonal disturbance of fish in the project area; 2) temporary displacement of fish in the vicinity of the project area; 3) elimination of supporting vegetation in the project area; and 4) project activities causing substantial, long-term reductions to water quality and stream habitat, due to excessive sedimentation and persistent, toxic substances (MDT 2004).

Project related activities could create disturbed areas that, over the long-term, could increase sediment loads into the water body, thereby reducing availability, quality, and abundance of substrate needed for macroinvertebrate production. Also, refueling and equipment storage areas would pose risks through possible leaks of chemical contaminants into the river, which could have long-term effects on fish production by reducing egg survival and macroinvertebrate production in stream gravel (MDT 2004).

Project specific effects on bull trout and critical habitat

As described earlier, to aid in determining the potential affects the project would have on bull trout in the Petty Creek drainage, the bull trout matrix was employed (Table 2). The matrix evaluates biological and habitat conditions through 24 indicators grouped under eight diagnostics/pathways. Project related effects of the proposed action relative to these indicators are also described in Table 2.

Removal of vegetation, exposed soils, embankment reconstruction, and replacing stream-crossing structures would result in increased sediment delivery to and turbidity in streams. Suspended and deposited sediment in streams can affect adult trout by causing changes in their behavior, reducing available habitat, increasing stress, and reducing food supply. High levels of suspended sediment can result in the loss of visual capability, leading to reduced feeding and a depressed growth rate. Large amounts of deposited sediment can deplete benthic invertebrate populations, reducing the food supply for fish. They can fill pools and blanket the structural cover for fish, reducing the available habitat for adult salmonids. They can also affect habitat for juvenile salmonids by filling pools and intergravel spaces. Fine sediments in stream gravels affects incubating eggs and developing alevins (recently hatched embryos that still have a yolk sac) by inhibiting dissipation of metabolic wastes. Fine sediments in stream gravels may also abrade or dislodge developing embryos and emerging fry, delay the rate of egg hatching, and reduce survival during incubation. Additionally, increased turbidity and sediment movement in streams could displace adult fish to other unaffected portions of the stream (FHWA 2006).

Most of these increases in sedimentation will be temporary, occurring during construction and until vegetation is established. To lessen the impacts of construction related sediment, appropriate sediment and erosion control best management practices (BMPs) will be put into

place before construction begins and will be maintained in working order throughout the construction period and until vegetation is established (FHWA 2006).

The existing gravel road has a relatively high surface runoff coefficient compared with the surrounding natural vegetation; however, paving the road will likely increase this surface runoff, potentially increasing road bank erosion and sedimentation in that respect. Conversely, paving the road and providing drainage facilities that allow ground infiltration and sediment filtration from stormwater runoff will reduce sedimentation. Additionally, where feasible and where the two are in close proximity, the road will be realigned slightly away from the creek and a vegetated buffer planted. Existing riprap will be left undisturbed to avoid unnecessary sedimentation and native saplings will be planted within the riprap. In the long term, these elements are expected to reduce overall sedimentation in the Petty Creek drainage (FHWA 2006).

Cool water temperature is an important characteristic for bull trout as mentioned above, and tree cover is important to keeping those temperatures low. Five to 25 percent of Petty Creek is not tree covered, however, because the proposed road will be using the existing road alignment, it is expected that this percentage, and therefore water temperature, will not be significantly impacted (FHWA 2006).

Accidental spills or leaks of materials used during construction may result in impacts on fish and stream habitat. Materials that could accidentally enter a stream or wetland during construction include petroleum fuels, lubricants, or concrete leachate and other substances used for roadway paving. The entry of these substances into a stream or wetland could result in temporary displacement of fish or fish mortality if a lethal concentration of the substance reaches the stream or wetland. BMPs and spill control plans will be developed and implemented as part of the Section 404 and Montana Pollution Discharge Elimination System permitting processes (FHWA 2006).

While there are no absolute barriers to fish passage in Petty Creek, several of the existing crossing structures inadequately provide passage for all life stages of fish. To improve habitat, all new structures will be designed for passage of all life stages. Table 1 exhibits the existing and new structure sizes. Additionally, a natural bankfull stream configuration and substrate will be constructed within the crossing. No additional stream crossing structures will be constructed (FHWA 2006).

Detours and diversion channels will result in temporary displacement of fish, loss of habitat, and possible creation of a migration barrier during construction. The duration of these events will be made as brief as possible. These effects would be temporary and should result in only short-term effects on fish (FHWA 2006).

Summary: Because construction activities associated with the proposed road improvements will require in-water work resulting in temporary sedimentation to Petty Creek and its tributaries, and although implementation of BMPs will reduce the effects of sedimentation on bull trout, road construction activities are still likely to have adverse effects on bull trout and bull trout habitat.

Long-term adverse impacts resulting from the proposed project are unlikely because all crossing structures in fish-bearing streams will be designed to allow passage during all life stages of fish, drainage facilities will be improved, and where feasible, the roadway will be moved away from Petty Creek and a vegetative buffer planted. It is likely that these design elements will have overall positive long-term effects on bull trout in Petty Creek and its tributaries (FHWA 2006).

In addition, the BA for this project used the population and habitat indicators from the bull trout matrix in Table 2 as the basis for determining effects to bull trout and critical habitat as a result of the proposed action. PCE analysis is based on the linkage between the PCEs and the matrix (Appendix A) and any other factors pertinent to the project analysis.

Analysis of the Petty Creek Road Improvement Project indicates that the activities associated with this project are likely to affect the matrix habitat indicators *sediment* and *substrate embeddedness*, as described in Table 2. The project-related activities are expected to result in short-term degradation of these habitat elements and subsequently PCEs 3 and 8. With paving of the roadway corridor, improvement of drainage facilities, and where feasible, moving the roadway away from Petty Creek and planting a vegetative buffer, a long-term improvement of the *sediment* and *substrate embeddedness* indicators and associated PCEs 3 and 8 is anticipated. However, the temporary impacts associated with the proposed action are not discountable, insignificant, or entirely beneficial. Therefore, the project is likely to adversely affect designated critical habitat for bull trout in Petty Creek (FHWA 2006).

VI. Cumulative effects

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they will require separate consultation pursuant to section 7 of the Act.

Past and present state or private activities that are reasonably expected to continue into the foreseeable future in the project area, which may contribute to impacts to bull trout include: road maintenance activities; logging activities; agricultural practices; recreational activities; gravel/materials mining to accommodate new development and roads; and residential construction, including increased sewage effluent and utilities/pipelines associated with increased development. Land use changes, population growth and traffic have increased in the past and will likely continue, exacerbating previously discussed impacts to bull trout. Ultimately, careful planning of land use and development in this area would limit potential threats from sedimentation to bull trout using this area.

Cumulative effects of the watershed will be reflected in bull trout population numbers and life history forms. Overall the population is expected to remain viable during the short-term impacts of this project.

VII. Conclusion

Jeopardy analysis for bull trout

The implementing regulations for section 7 (50 CFR 402) define "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

After reviewing the current status of the Columbia Basin DPS of bull trout, the environmental baseline for the action area, the effects of the road paving and reconstruction, and bridge and culvert replacement activities associated with the proposed Petty Creek Road Improvement Project in Missoula County, Montana, and the cumulative effects, it is the Service's biological opinion that this project, as proposed, would not be likely to jeopardize the continued existence of the Columbia Basin DPS of bull trout, nor any recovery subunit thereof. The Service's rationale for this conclusion includes, but is not limited to, the following factors:

1. Implementation of the proposed action is not anticipated to reduce the reproduction, numbers, or distribution of bull trout within the Clark Fork River Section 2 core area or action area to the degree that the likelihood of the local population survival or recovery is reduced.

2. The proposed action, once implemented, will reduce the amount of sediment entering Petty Creek and will decrease encroachment of the road onto Petty Creek. In addition, substandard stream crossing structures to be replaced as part of this project will allow for the passage of all life stages of bull trout, which will be an improvement from the existing condition.

3. Due to project design features and conservation measures, the proposed action is not likely to have any population level effects, or core area effects, and is not expected to affect any adjacent core areas of bull trout.

4. As implementation of the proposed action is not likely to appreciably reduce the likelihood of survival or recovery of this core area, it is unlikely that the proposed action would jeopardize the continued existence of the bull trout in the Clark Fork River – Section 2 core area or the Columbia River bull trout population and the coterminous listing of bull trout.

Adverse modification analysis for designated bull trout critical habitat

After reviewing the current status of the Clark Fork River Section 2 core area of bull trout and its relationship to the Upper Columbia River bull trout population, the status of bull trout critical habitat in Petty Creek within the Clark Fork River basin bull trout critical habitat unit, the environmental baseline for the action area, the effects of the proposed action and cumulative effects, it is the Service's biological opinion that the actions, as proposed, are not likely to

destroy or adversely modify designated bull trout critical habitat. The Service defines destruction or adverse modification as "a direct or indirect alteration that appreciably diminishes the value of critical habitat for both the survival and recovery of a listed species. Such alterations include, but not limited to, alterations adversely modifying any of those physical or biological features that were the basis for determining the habitat to be critical." However, recent decisions by the 5th and 9th Circuit Court of Appeals have invalidated this definition. Pursuant to current national policy and the statutory provisions of the Act, destruction or adverse modification is determined on the basis of whether, with implementation of the proposed action, the affected critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role for the species.

Given the design elements proposed for the Petty Creek Road and its stream crossing structures, along with the construction techniques and conservation measures that would be utilized during project implementation (i.e., best management practices and sediment control measures), adverse effects to PCEs 3 and 8 in Petty Creek would be short-term. Therefore, PCEs 3 and 8 are likely to retain their ability to be functionally established. Overall, even though some short-term construction-related impacts are anticipated, the proposed action would maintain or improve the long-term condition of bull trout critical habitat in Petty Creek within the project area in the Clark Fork River basin bull trout critical habitat unit.

Although PCEs 3 and 8 are currently not in optimal condition in Petty Creek, they are functioning and would remain functional after implementation of this proposed project. Petty Creek is considered spawning and rearing habitat for bull trout. This project would not change the functioning status of PCEs in Petty Creek, nor in the Clark Fork River basin bull trout critical habitat unit. Therefore, no destruction or adverse modification of bull trout critical habitat would occur as a result of the implementation of this proposed action.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission that creates the likelihood of injury to listed wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Federal Highway Administration so that they become binding conditions of any grant, permit or contract issued to the construction contractors who are selected to construct this project, as appropriate, for the exemption in section 7(o)(2) to apply. The Administration has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the Administration: (1) fails to assume and implement the terms and conditions; or (2) fails to require the chosen construction contractors to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit, grant or contract document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Administration must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

Amount or extent of take anticipated

The Service anticipates that activities associated with the proposed Petty Creek Road Improvement Project would result in incidental take of bull trout in the form of harm, harassment or mortality that would result from instream activities primarily related to the replacement of crossing structures over Petty Creek and its tributaries and other road reconstruction activities. Increases in sediment to the Petty Creek drainage are anticipated to adversely affect and likely result in take of bull trout life history stages by harming or impairing feeding, breeding and sheltering patterns of adult and juvenile bull trout. Direct mortality of bull trout is possible as a result of instream construction activities. The amount of take that may result from implementation of the proposed action is difficult to quantify for the following reasons:

1. identification and detection of dead or impaired individuals is unlikely;

2. aquatic habitat modifications are often difficult to ascribe to particular sources, especially in areas already degraded by other activities and facilities;

3. losses to bull trout in any life stage may be masked by wide seasonal fluctuations in numbers; and

4. measures proposed by the Administration to minimize the impacts to bull trout and bull trout habitat in the action area will likely be effective to varying degrees.

For these reasons, the actual amount or extent of the anticipated incidental take of bull trout is difficult to quantify. In cases such as these, the Service uses surrogate measures to determine the amount or extent of incidental take and whether the amount of take anticipated has been exceeded. In this biological opinion we use project design and project related construction techniques for these purposes. Thus, if the design and construction of the portions of this project that are expected to impact Petty Creek or its tributaries are not implemented as indicated in the biological assessment submitted to the Service for consultation, including implementation of the conservation measures listed on pages 10-11 of the biological assessment, the level of incidental take anticipated in this biological opinion may be considered to have been exceeded. Such

incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Administration must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

The Service anticipates that incidental take of bull trout would occur within the Petty Creek Road corridor in the vicinity of instream work activities, and would occur in Petty Creek as well as in the lower portions of tributaries crossed by this proposed road improvement project. Instream work (bridge and culvert replacement, temporary stream diversions, stream bank stabilization, etc.) is proposed to occur at numerous sites all along this road corridor. The Petty Creek drainage is used by bull trout for spawning and rearing habitat in this core area, and contains low densities of bull trout. Incidental take of bull trout is anticipated to occur during, and for a short time after, the period during which instream activities associated with this road improvement project are occurring during a minimum of two construction seasons.

Because the incidental take provisions of the Act (sections 7(b)(4) and 7(o)(2)) do not apply to designated critical habitat, no take of designated bull trout critical habitat is expected, or exempted, for this project.

Effect of the take

In the accompanying biological opinion, the Service determined the anticipated level of adverse impacts from this project would not substantially reduce the potential for persistence or recovery of the Clark Fork River – Section 2 core area encompassing the action area, and thus would not be likely to result in jeopardy to the Columbia Basin DPS of bull trout.

Reasonable and prudent measures

Incidental take statements typically provide reasonable and prudent measures which are expected to reduce the amount of incidental take. Reasonable and prudent measures are those measures necessary and appropriate to minimize the incidental take resulting from the proposed action. These reasonable and prudent measures are non-discretionary and must be implemented by the Administration in order for the exemption in section 7(o)(2) to apply.

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the potential of incidental take of bull trout that is anticipated to result from implementation of the Petty Creek Road Improvement Project.

1. The Administration shall identify and implement means to reduce the potential for incidental take of bull trout from direct mortality and from increases in the amount of sediment and other pollutants entering Petty Creek and its tributaries as a result of construction-related activities associated with this project.

2. The Administration shall monitor highway reconstruction and bridge and culvert replacement activities to ensure that these activities comply with the biological

assessment, supporting documentation, and biological opinion for this project. The Administration shall also implement the reporting requirement as described in the terms and conditions below.

Terms and conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Administration must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. To fulfill reasonable and prudent measure #1, the following terms and conditions shall be implemented:

   a) Instream work shall occur only during the period July 1 - September 15 and shall be accomplished in the shortest possible amount of time. Culverts replaced in perennial streams shall allow and promote adequate passage of all life stages of bull trout. Culvert replacement activities shall include embedding the culverts into the substrate. Temporary stream diversions shall remain in place for the shortest possible amount of time. If at all possible, schedule instream construction activities such that as many of the necessary construction activities as possible occur "in the dry."

   b) Best management practices for erosion control shall be applied to this project, including:

   - constructing silt fencing to prevent sediment from reaching water bodies;
   - using straw bales in borrow ditches to prevent erosion and sediment transport;
   - quickly reseeding and revegetating all disturbed areas with native vegetation, including embankments and borrow ditches, and adding a woody vegetation component to the riparian revegetation plans;
   - using bank stabilization measures for disturbed channel banks; and
   - maintaining and protecting riparian vegetation to the maximum extent possible within the construction zone.

   c) All waste fuels, lubricating fluids, herbicides, and other chemicals will be collected and disposed of in a manner that ensures that no adverse environmental impact will occur. Construction equipment will be inspected daily to ensure hydraulic, fuel and lubrication systems are in good condition and free of leaks to prevent these materials from entering any stream. Vehicle servicing and refueling areas, fuel storage areas, and construction staging and materials storage areas will be sited and contained properly to ensure that spilled fluids or stored materials do not enter any stream.

   d) Stream bank sections that are disturbed by construction activities shall be successfully revegetated with native riparian shrubs, trees, and grasses to the maximum extent possible. The intent of this would primarily be to retard sediment and pollutant transport,

but also to help stabilize banks, provide shade and potential large woody debris recruitment, and replicate brushy streambank cover.

2. To fulfill reasonable and prudent measure #2, the following terms and conditions shall be implemented:

   a) Structures designed to minimize sediment and pollutant runoff from sensitive areas such as settling ponds, vehicle and fuel storage areas, hazardous materials storage sites, and erosion control structures shall be visually monitored daily, especially following precipitation events, to ensure these structures are functioning properly.

   b) Upon locating dead, injured or sick bull trout, notification must be made within 24 hours to the Service's Montana Field Office at (406)449-5225. Record information relative to the date, time and location of dead or injured bull trout when found, and possible cause of injury or death of each fish and provide this information to the Service.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. With implementation of these measures, the Service expects that take of bull trout will be limited to harm or harassment and the resulting impacts to instream habitat associated with instream construction activities. If, during the course of the action, term and condition #1 outlined above is not adhered to, the level of incidental take anticipated in this biological opinion may be exceeded. Such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Administration must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. To assist in meeting the Administration's responsibilities under Section 7(a)(1) of the Act, and to utilize authorities granted within the recent transportation funding laws, the Service strongly recommends that the Administration work proactively with the Service, U.S. Forest Service, MFWP, and others to identify and remedy impacts to salmonids, including bull trout, within the Clark Fork River – Section 2 core area that are the result of transportation systems. Within this area, many streams were channelized during road and railroad construction, resulting in shortening of stream channels, increased erosion, higher water velocities, and loss of fish habitat.

2. The Service recommends the Administration explore potential opportunities to utilize their expertise and authorities to promote innovative and non-traditional fisheries enhancement projects within the middle Clark Fork River watershed by partnering in some manner with other agencies or groups to share knowledge and resources to restore or enhance fisheries habitat within the middle Clark Fork area that has been degraded by activities other than those related to transportation. The draft Bull Trout Recovery Plan recommends many recovery tasks that need to be accomplished to protect, restore, and maintain suitable habitat conditions for bull trout in this area. These tasks pertain to transportation and non-transportation related impacts to bull trout habitat (USDI 2002b).

3. The Petty Creek watershed is located within a key wildlife linkage area between large blocks of public lands. As human development continues in this drainage, including roadway improvements, this important habitat will likely become fragmented and lose its effectiveness. With that in mind, the Service recommends that the Administration continue to pursue opportunities to partner with organizations that work to conserve wildlife habitat threatened by human development through the use of land use planning tools (e.g., perpetual conservation easements) relative to maintaining and promoting wildlife connectivity at a landscape scale in western Montana.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the request. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

R. Mark Wilson

September 14, 2006

R. Mark Wilson
Field Supervisor
Montana Field Office

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Appendix A

PCEs for bull trout critical habitat and associated matrix habitat indicators.

Crosswalk to support PCE analysis through the matrix of pathway indicators for bull trout

PCEs for bull trout critical habitat and associated matrix habitat indicators.

PCE #	PCE description	Associated matrix habitat indicators
1	Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72 °F (0 to 22 °C), but are found more frequently in temperatures ranging from 36 to 59 °F (2 to 15 °C). These temperature ranges may vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches with temperatures that preclude any bull trout use are specifically excluded from designation.	- Temperature - Refugia - Average wetted width/maximum depth ratio in scour pools in a reach - Streambank condition - Change in peak/base flows - Riparian conservation areas - Floodplain connectivity
2	Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures.	- Large woody debris - Pool frequency and quality - Large pools - Off channel habitat - Refugia - Average wetted width/maximum depth ratio in scour pools in a reach - Streambank condition - Floodplain connectivity - Riparian conservation areas
3	Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. This should include a minimal amount of fine substrate less than 0.25 inch (6.3 millimeters) in diameter.	- Sediment - Substrate embeddedness - Large woody debris - Pool frequency and quality
4	A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, currently operates under a biological opinion that addresses bull trout, or a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation.	- Change in peak/base flows - Increase in drainage network - Disturbance history - Disturbance regime
5	Springs, seeps, groundwater sources, and subsurface water to contribute to water quality and quantity as a cold water source.	- Floodplain connectivity - Change in peak/base flows - Increase in drainage network - Riparian conservation areas - Chemical contamination/nutrients
6	Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows.	- Life history diversity and isolation - Persistence and genetic integrity - Temperature - Chemical contamination/nutrients - Physical barriers - Average wetted width/maximum depth ratio in scour pools in a reach - Change in peak/base flows - Refugia
7	An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	- Growth and survival - Life history diversity and isolation - Riparian conservation areas - Floodplain connectivity (importance of aquatic habitat condition-indirectly covered by previous 6 PCEs)
8	Permanent water of sufficient quantity and quality such that normal reproduction, growth, and survival are not inhibited.	- Sediment - Chemical contamination/nutrients - Change in peak/base flows

Crosswalk to Support Primary Constituent Element Analysis Through the Matrix of Pathway Indicators for Bull Trout

This matrix crosswalk provides information supporting the rationale that the primary constituent elements (PCEs) for bull trout critical habitat are thoroughly addressed and evaluated when the bull trout matrix analysis is utilized. It recognizes that the environmental baseline and determination of effect for bull trout consist of both biological and habitat components that are addressed in the PCEs listed in the Final Rule designating critical habitat (USFWS 2005). Below are the eight PCEs and the supporting rationale:

> **PCE 1. Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72 °F (0 to 22 °C) but are found more frequently in temperatures ranging from 36 to 59 °F (2 to 15 °C). These temperature ranges may vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local groundwater influence. Stream reaches with temperatures that preclude any bull trout use are specifically excluded from designation.**

This PCE is addressed directly by the analysis of *temperature*. It is addressed indirectly through consideration of *refugia*, which by definition is high quality habitat of appropriate temperature. Important components of refugia include pool frequency and quality and large pools. *Average wetted width/maximum depth ratio in scour pools* is an indication of water volume, which indirectly indicates water temperature, (i.e., low ratios indicate deeper water, which in turn indicates possible refugia). This indicator, in conjunction with *change in peak/base flows,* is an indicator of potential temperature and refugia concerns, particularly during low flow periods. *Streambank condition, floodplain connectivity* and *riparian conservation areas* address the components of shade and groundwater influence, both of which are important factors of water temperature. Stable streambanks and intact riparian areas, which include part of the floodplain, typically support adequate vegetation to maintain thermal cover to streams during low flow periods.

> **PCE 2. Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structure.**

The analysis of *large woody debris*, such as current values and sources available for recruitment, directly addresses this PCE. Large woody debris increases channel complexity and creates pools and undercut banks. *Pool frequency and quality* would also directly address this PCE, showing the number of pools per mile as well as the amount of cover and temperature of water in the pools. *Average wetted width/maximum depth ratio in scour pools in a reach* is an indicator of channel shape and pool quality. Low ratios suggest deeper, higher quality pools. *Large pools,* consisting of a wide range of water depths, velocities, substrates and cover, are typical of high quality habitat and are a key component of channel complexity (USFWS 1998b). An analysis of

off-channel habitat would describe side-channels and other off-channel areas. *Streambank condition* would analyze the stability of the banks, including such features as undercut banks. The analysis of both *riparian conservation areas* and *floodplain connectivity* would directly address this PCE. Floodplain and riparian functions include the maintenance of habitat and channel complexity, the recruitment of large woody debris and the connectivity to off-channel habitats or side channels (USFWS 1998b). Complex habitats provide refugia for bull trout and in turn, *refugia* analysis would assess complex stream channels. All of these habitat indicators consider the numerous characteristics of instream bull trout habitat and quantify critical components that are fundamental to creating and maintaining complex instream habitat over time.

PCE 3. Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. This should include a minimal amount of fine substrate less than 0.25 inch (6.3 millimeters) in diameter.

This PCE is addressed directly by analysis of *sediment* in areas of spawning and incubation and considers directly the size class composition of instream sediments, particularly fine sediments ≤6.3 mm. This PCE is also addressed directly by analysis of *substrate embeddedness* in rearing areas, which is a function of sediment size class and bedload transport. Both of these indicators would assess substrate composition and stability in relation to the various life stages of bull trout as well as sediment transportation and deposition. *Large woody debris* and *pool frequency and quality* affect sediment transport and redistribution within a stream and would indirectly affect substrate composition and amounts.

PCE 4. A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, currently operates under a biological opinion that addresses *bull trout*, or a hydrograph that demonstrates the ability to support *bull trout* populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation.

This PCE is addressed by analysis of *change in peak/base flows*, which considers changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography. Considering *increase in drainage network* and *disturbance history* provides further information. Roads and vegetation management both have effects strongly linked to a stream's hydrograph. *Disturbance regime* ties this information together to consider how a watershed reacts to disturbance and the time required to recover back to pre-disturbance conditions.

PCE 5. Springs, seeps, groundwater sources, and subsurface water to contribute to water quality and quantity as a cold water source.

This PCE is addressed by analysis of *floodplain connectivity* and *riparian conservation areas*. *Floodplain connectivity* considers hydrologic linkage of off-channel areas with the main channel and overbank flow maintenance of wetland function and riparian vegetation and succession. Floodplain and riparian areas provide hydrologic connectivity for springs, seeps, groundwater upwelling and wetlands and contribute to the maintenance of the water table (USFWS 1998b). The analysis of *changes in peak/base flows* would address subsurface water connectivity.

Increase in drainage network would address potential changes to groundwater sources and subsurface water connectivity. *Chemical contamination/nutrients* would address concerns regarding groundwater water quality.

PCE 6. Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows.

The biological indicator *life history diversity and isolation* addresses the function of migration and/or subsequent isolation with respect to the population. The biological indicator *persistence and genetic integrity* indirectly reflects the status of migratory corridors. Physical, biological or chemical barriers to migration are addressed directly through water quality habitat indicators, including *temperature*, *chemical contamination/nutrients* and *physical barriers*. The analysis of these indicators would assess if barriers have been created due to impacts such as high temperatures, high concentrations of contaminants or physical barriers. Analysis of *change in peak/base flows* and *average wetted width/maximum depth ratio in scour pools in a reach* would assess whether changes in flow might create a seasonal barrier to migration. An analysis of *refugia,* which considers the habitat's ability to support strong, well distributed, and connected populations for all life stages and forms of bull trout, would also be pertinent to this PCE.

PCE 7. An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.

An analysis of *floodplain connectivity* and *riparian conservation areas* would assess these contributions to the food base. Floodplain and riparian areas provide habitat to aquatic invertebrates, which in turn provides a forage base to bull trout (USFWS 1998a). This PCE is indirectly addressed through the biological indicator of *growth and survival* and *life history diversity and isolation*. Both of these indicators look at habitat quality and subpopulation condition, which provides information on food base. This PCE is a synthesis of the previous PCEs. It is addressed through the analysis of biological and habitat indicators in that, if a bull trout population either exists or could exist in a watershed, then there is an adequate forage base. A healthy habitat provides a forage base for the target species. Any potential impairment to the forage base has been addressed by way of summarizing the biological and habitat indicators.

PCE 8. Permanent water having low levels of contaminants such that normal reproduction, growth and survival are not inhibited.

Flow conditions, such as perennial or ephemeral would be analyzed through *changes in peak/base flows*, and addressed in consideration of current base flows. Changes in hydrograph amplitude or timing with respect to watershed size, geology, and geography would be considered. The level of contaminants is addressed directly by the analysis of *chemical contamination/nutrients* and *sediment*. Current listing under 303(d) status should be considered, as well as the causes for that listing. *Sediment* is considered a contaminant especially in spawning and rearing habitat and analysis would apply to this PCE.

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Attachment 4. Bull Trout Matrix and Matrix to PCE Crosswalk

Bull Trout Matrix of Diagnostics/Pathways and Indicators for the Petty Creek drainage.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Subpopulation Characteristics				
Subpopulation size	FAR	Subpopulation size is depressed relative to historic levels, but the subpopulation is not at alarmingly low numbers.	Maintain	Implementation of the proposed project is not expected to negatively affect the subpopulation size in Petty Creek because construction impacts will be temporary, best management practices (BMPs) will be employed, and instream work will be restricted to work windows determined through coordination with the USFWS. In addition, some indicators such as sediment and substrate imbeddedness will likely be improved in the long term, which will likely help to maintain and potentially raise the subpopulation size.
Growth and survival	FAR	Population is depressed, but is not in a rapid state of decline.	Maintain	With application of BMPs and adherence to construction windows, the proposed project will not measurably affect bull trout growth and survival, recruitment or the recovery rate of the Petty Creek subpopulation.
Life history diversity and isolation	FAR	Migratory fish enter Petty Creek from the Clark Fork River and some genetic exchange is possible with subpopulations in Fish Creek and Ninemile Creek.	Maintain	New stream crossing structures will improve fish passage, but this is not expected to affect bull trout life history diversity or bull trout subpopulation isolation because the new structures are not opening up previously inaccessible portions of Petty Creek or its tributaries, but rather improving passage to include all life stages of fish.
Persistence and genetic integrity	FAR	Clark Fork contributes a fair number of fluvial fish to Petty Creek, but populations within Clark Fork River are fragmented. Some genetic exchange is possible with subpopulations in Fish Creek and Ninemile Creek. Rainbow and brook trout present threats to genetic integrity.	Maintain	New stream crossing structures will improve fish passage, which could enhance connectivity between the Petty Creek bull trout subpopulation and subpopulations in Fish Creek and Ninemile Creek, as well as with other trout populations. However, because the new structures are not opening up previously inaccessible portions of Petty Creek or its tributaries, but rather improving passage to include all life stages of fish, it is not expected that the proposed project will change existing genetic exchange.
Water Quality				

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Temperature	FAR	Actual stream temperatures were not available. This indicator was based on 5 to 25 percent of the stream not having tree cover.	Maintain	Loss of minor amounts of vegetation including shrubs and grasses in disturbed areas will not measurably affect water temperatures in Petty Creek. Additionally, the establishment of vegetation along the creek in select areas where vegetation is currently lacking and revegetation of disturbed areas will help offset temperature changes and may improve the water temperatures in the long term.
Sediment	FUR	This indicator was evaluated based on road density, presence of mining sites, and number of culverts in the watershed. This watershed has greater than 2.7 kilometers / 2.6 square kilometers (1.7 miles/square mile) road density; greater than 30 percent of stream length with roads within 90 meters (300 feet), and extensive grazing.	Degrade in short term Maintain/improve in long term	The proposed project would contribute to the degradation of this indicator during construction due to expected increases in sedimentation to streams. Implementation of BMPs would reduce but not eliminate this risk. A paved road surface with stormwater runoff directed to drainage ditches would maintain and likely improve this indicator in the long term.
Chemical contamination/nutrients	FUR/FAR	Lower Petty Creek functions at an unacceptable risk because there are one or more reaches with impaired water quality. Within upper Petty Creek this indicator is functioning appropriately and there are no systems on the state list of streams with impaired water quality.	Maintain	Due to the extent of construction activities planned it is likely that chemicals will enter Petty Creek, however, levels will be minimal with the implementation of BMPs and spill control plans.
Habitat Access				
Physical barriers	FAR	This indicator was evaluated based on known barriers and culverts on fish bearing streams, however, the condition of all culverts is not known. Upper and lower Petty Creek have no known permanent barriers. Some culverts do not provide fish passage for all life stages of fish.	Maintain	Implementation of the proposed project will not create any permanent barriers to upstream and downstream fish passage. Temporary barriers to fish movement may be created during the establishment and removal of diversion channels.
Habitat Elements				

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Substrate embeddedness	FUR	This indicator was evaluated the same as for sediment.	Degrade in short term Maintain/improve in long term	Structure removal, fill removal and construction of a new structure and roadway over upper Petty Creek as well as work along Petty Creek and in Petty Creek's tributaries will likely result in delivery of sediment to the stream during construction. If excess amounts of sediment reach the channel, increased substrate embeddedness may occur. However, this will be reduced with BMPs and sediment control measures in place. Also, a paved road surface with stormwater runoff directed to drainage ditches would maintain and likely improve this indicator in the long term.
Large woody debris	FUR/FAR	This indicator was evaluated based on tree cover along stream banks, number of roads within 90 meters (300 feet) of the stream and number of crossings in the stream. Based on these criteria, lower Petty Creek is functioning at unacceptable risk (greater than 25 percent tree cover; greater than 30 percent of roads are within 300 feet of streams; greater than 2 crossings). Based on these criteria, upper Petty Creek is functioning at risk (less than 10 to 25 percent tree cover; 15 to 30 percent of roads are within 90 meters (300 feet) of streams; less than 2 crossings).	Maintain	Because the project is proposing to use the existing road alignment with only slight adjustments, it is expected that very little forested riparian areas will be disturbed. Additionally, any disturbed areas will be revegetated, and some currently non-vegetated riprap areas will be planted with native saplings. Therefore, the project is expected to maintain the existing large woody debris element.
Pool frequency and quality	FA/FAR	Within lower Petty Creek, this indicator is functioning appropriately and within upper Petty Creek, it is functioning at risk.	Maintain	Because the project is proposing to use the existing road alignment with only slight adjustments, it is not expected that habitat features contributing to the formation of pools (such as large woody debris) will be significantly impacted.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Large pools	FUR	This indicator was based on ratings for sediment, large woody debris, and stream bank condition. This system is functioning at unacceptable risk for the following reasons: large woody debris is functioning at risk or unacceptable risk; stream bank condition and sediment are functioning at unacceptable risk.	Maintain	Because the project is proposing to use the existing road alignment with only slight adjustments, it is not expected that forested riparian areas or vegetation will be significantly impacted. Streambank condition is expected to be maintained since the existing road is in close proximity to Petty Creek. Sediment will increase during construction, but this will be reduced with BMPs and sediment control measures in place. Also, a paved road surface with stormwater runoff directed to drainage ditches would likely reduce sediment in the long term.
Off-channel habitat	FUR/FAR	This indicator was based on the percentage of low-gradient streams in the watershed with roads within 300 feet of the stream. Therefore the lower and upper reaches Petty Creek are functioning at unacceptable risk and at risk, respectively.	Maintain/Improve	Because the road is already in close proximity to the stream, road improvements would likely maintain this indicator. With slight road realignments away from the creek and providing vegetation where vegetation is currently lacking, it is expected there will be a minor improvement in this indicator.
Refugia	FUR	There is no habitat refugia within the subpopulation boundary.	Maintain	Implementation of the proposed project will not affect bull trout refugia.
Channel Condition and Dynamics				
Wetted width/Maximum depth ratio	FUR/FAR	This indicator was evaluated the same as for sediment unless certain conditions were met.	Maintain	Because the road is already in close proximity to the stream, road improvements would likely maintain this indicator. A paved road surface with stormwater runoff directed to drainage ditches would maintain and possibly improve this indicator in the long term.
Stream bank condition	FUR/FAR	This indicator was evaluated the same as for width/depth ratios.	Maintain	Because the road is already in close proximity to the stream, road improvements would likely maintain this indicator. Also, slight shifts in the alignment away from the creek and providing vegetation where vegetation is currently lacking may improve the indicator.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Floodplain connectivity	FUR/FAR	This indicator was evaluated the same as for width/depth ratios. However, the C type channel in upper Petty Creek would contribute to stream instability and downcutting, so this indicator is at risk.	Maintain	Because the road is already in close proximity to the stream, road improvements on the existing alignment would likely maintain this indicator.
Flow Hydrology				
Change in peak/base flows	FUR/FAR	This indicator was based on road density in the watershed (described below) and amount of regeneration harvest less than 30 years old. Lower Petty Creek is functioning at unacceptable risk (road density is at unacceptable risk and regeneration harvest is present on greater than 25 percent of the watershed). Upper Petty Creek is at risk (road density is at risk and regeneration harvest covers 10 to 25 percent of the watershed).	Maintain	Implementation of the proposed project will not result in changes to peak/base flows. Regeneration harvest is not expected to change, and while the project will include road widening, no additional miles would be added to existing road densities.
Drainage network increase	FUR/FAR	Road densities were used to evaluate this indicator (see below).	Maintain	While the project will include road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities.
Watershed Conditions				
Road density and locations	FUR/FAR	Lower Petty Creek includes road densities greater than 2.7 kilometers/2.6 square kilometers (1.7 miles/square mile) and greater than 30 percent of the stream length in the watershed within 300 feet of the stream and is therefore at unacceptable risk. Upper Petty Creek includes road densities between 1.1 and 2.7 kilometers/2.6 square kilometers (0.7 and 1.7 miles/square mile) and between 15 and 30 percent of the stream length in the watershed within 90 meters (300 feet) of the stream and is therefore at risk.	Maintain	While the project will include road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities. Because the road is already in close proximity to the stream, road improvements on the existing alignment would likely maintain this indicator.
Disturbance history	FUR/FAR	This indicator is based on road density within sensitive landtypes and peak/base flow patterns.	Maintain	Implementation of the proposed project will not alter the existing disturbance history. While the project will include road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities.

Indicators	Baseline Condition [a]	Comments [a]	Effects of the Action	Comments
Riparian conservation area	FUR/FAR	This indicator is based on road density and location (described above) and tree cover on stream banks (see Temperature above).	Maintain	Implementation of the proposed project would likely maintain this indicator. Minor degradation may occur if forested riparian areas are lost, however, slight shifts in the alignment away from the creek and providing vegetation where vegetation is currently lacking may help improve the indicator.
Disturbance regime	FUR/FAR	This indicator is based on road density (described above) and amount of sensitive landtypes in the watershed. Based on these criteria, lower Petty Creek is functioning at unacceptable risk (greater than 30 percent of the watershed is composed of sensitive landtypes). Upper Petty Creek is at risk (15 to 30 percent of the watershed is sensitive landtypes).	Maintain	It is not expected that implementation of the proposed project will alter the current disturbance regime in the project area. While the project will include some road widening, no additional miles would be added and implementation of the proposed project will not result in changes to road densities.
Species and Habitat				
Integration of species and habitat condition	FUR	The subpopulation size is small, habitat is degraded and fragmented. With no active restoration, habitat conditions will not improve within two generations (5 to 10 years). Some connectivity remains among subpopulations.	Maintain	Implementation of the proposed project would maintain this indicator. Degradation of habitat conditions may occur in the short term under sediment and substrate imbeddedness, but conditions may improve in the long term under off-channel habitat, sediment, and substrate imbeddedness.

a. Analysis of baseline conditions is summarized from USDA Forest Service 2000, and from coordination with USFS, MTFWP, US Corps of Engineers, Environmental Protection Agency, and USFWS.

FA = indicators are functioning appropriately.

FAR = indicators are functioning at risk.

FUR = indicators are functioning at unacceptable risk.

Primary constituent elements for bull trout critical habitat and associated habitat indicators.

PCE No.	Description of Primary Constituent Element	Associated Habitat Indicators
1	Water temperatures that support bull trout use. Bull trout have been documented in streams with temperatures from 32 to 72ºF (0 to 22ºC), but are found more frequently in temperatures ranging from 36ºF to 59ºF (2ºC to 15ºC). These temperatures may vary depending on bull trout life history stage and form, geography, elevation, diurnal and seasonal variation, shade, such as that provided by riparian habitat, and local ground water influence. Stream reaches with temperatures that preclude any bull trout use are specifically excluded from designation.	Temperature; Refugia; Average wetted width/maximum depth ratio in scour pools in a reach; Streambank condition; Change in peak/base flows; Riparian conservation areas; Floodplain connectivity
2	Complex stream channels with features such as woody debris, side channels, pools, and undercut banks to provide a variety of depths, velocities, and instream structures.	Large woody debris; Pool frequency and quality; Large pools; Off-channel habitat; Refugia; Average wetted width/maximum depth ratio in scour pools in a reach; Stream bank condition; Floodplain connectivity; Riparian conservation areas
3	Substrates of sufficient amount, size, and composition to ensure success of egg and embryo overwinter survival, fry emergence, and young-of-the-year and juvenile survival. This should include a minimal amount of fine substrate less than 0.25 inch (6.3 millimeters) in diameter.	Sediment; Substrate embeddedness; Large woody debris; Pool frequency and quality
4	A natural hydrograph, including peak, high, low, and base flows within historic ranges or, if regulated, currently operates under a biological opinion that addresses bull trout, or a hydrograph that demonstrates the ability to support bull trout populations by minimizing daily and day-to-day fluctuations and minimizing departures from the natural cycle of flow levels corresponding with seasonal variation.	Change in peak/base flows; Increase in drainage network; Disturbance history; Disturbance regime
5	Springs, seeps, ground water sources, and subsurface water quality and quantity as a cold water source.	Floodplain connectivity; Change in peak/base flows; Increase in drainage network; Riparian conservation areas; Chemical contamination/nutrients
6	Migratory corridors with minimal physical, biological, or water quality impediments between spawning, rearing, overwintering, and foraging habitats, including intermittent or seasonal barriers induced by high water temperatures or low flows.	Life history diversity and isolation; Persistence and genetic integrity; Temperature; Chemical contamination/nutrients; Physical barriers, Average wetted width/maximum depth ratio in scour pools in a reach; Change in peak/base flows; Refugia
7	An abundant food base including terrestrial organisms of riparian origin, aquatic macroinvertebrates, and forage fish.	Growth and survival; Life history diversity and isolation; Riparian conservation areas; Floodplain connectivity (importance of aquatic habitat condition-indirectly covered by previous 6 PCEs)
8	Permanent water of sufficient quantity and quality such that normal reproduction, growth and survival are not inhibited.	Sediment; Chemical contamination/nutrients; Change in peak/base flows

PCE = primary constituent element. Effect Determination for Bull Trout Critical Habitat

Attachment 5. SHPO Concurrence Letter

MONTANA HISTORICAL SOCIETY

225 North Roberts ❖ P.O. Box 201201 ❖ Helena, MT 59620-1201
❖ (406) 444-2694 ❖ FAX (406) 444-2696 ❖ www.montanahistoricalsociety.org ❖

Friday, February 06, 2004

EDWIN WOOD
FED HIGHWAY ADMIN
WESTERN LANDS HIGHWAY DIV
610 EAST FIFTH ST
VANCOUVER WA 98661-3801

Dear Ted:

Thank you for requesting our comments on Petty Creek Road MT Forest Highway 71 (1).

We have no objection to the proposed finding of No Historic Properties Affected. In the absence of comment to the contrary from the Salish and Kootenai Tribes, we **concur** that 24MO0910 does not appear to be eligible. Should the tree be removed we would suggest that it be sectioned, or cored, in an effort to calculate the time it was cultural modified and that info added to an updated site in our state archaeological data base.

Thank you,

Stan

Stan Wilmoth, Ph.D.
State Archaeologist/Deputy, SHPO

File FED HIGHWAY ADMIN 2004

STATE HISTORIC PRESERVATION OFFICE ❖ 1410 8th Ave ❖ P.O. Box 201202 ❖ Helena, MT 59620-1202
❖ (406) 444-7715 ❖ FAX (406) 444-6575

Attachment 6. Summary of Public and Agency Comments

WFLHD received various comments from the general public, environmental groups, and governmental agencies. A summary of those comments is provided below.

Several comments were made regarding whether to pave the road or leave it gravel. WFLHD received 17 comments requesting to have the road paved and 7 wanting the road to remain gravel. Those wanting to pave the road cited road dust, compromised safety, health concerns, and automobile maintenance as reasons in favor of paving. Those against paving cited increased wildlife deaths, reduced wildlife habitat, habitat fragmentation, and increased development as reasons to leave the road graveled.

As described in the EA, paving the road would largely eliminate the dust problem currently caused by the gravel road. This would greatly improve sight distance, reduce dust resulting from the road as a contributor to respiratory and other ailments, and lessen dust impacts on vehicle operation/maintenance. Paving the road would also improve vehicle operational safety by eliminating potholes, ruts, wash boarding, and loose gravel, allowing greater vehicle control when stopping and maneuvering sudden turns. Travel lanes and shoulders would be designated, separating opposing traffic, which is a particularly important safety feature when maneuvering curves. Also, vehicle damage resulting from an uneven road surface and loose gravel would be reduced.

Impacts to wildlife are a concern, and the preferred alternative has several components built into it to help alleviate some of these impacts. The preferred alternative would be designed with a 35 mph speed limit. Currently, the road is relatively curvy, roughly following the natural terrain. This helps to discourage increased traffic speeds, and the preferred alternative would retain this curvilinear design. Presently, the road is lacking in speed limit and other traffic signs. The preferred alternative would provide appropriate traffic signage to warn drivers of speed limits, curves, and other potential dangers on the road. This would include warnings for areas where wildlife are likely to cross the roadway. Paving the road would give drivers greater vehicle control when stopping or maneuvering suddenly to avoid potential wildlife/vehicle collisions. The paving, improving drainage, moving the road slightly away from Petty Creek in areas, providing an improved vegetative buffer, and providing appropriately sized stream crossing structures would reduce the amount of sediment entering the surrounding waterways generated from the current conditions of the gravel road. The larger design size of many of the stream crossing structures would provide better opportunities for wildlife to cross beneath the road rather than over it, helping to reduce opportunities for wildlife/vehicle collisions. These structures would also allow passage of fish species at all life stages.

While the construction of roads can reduce the amount of and fragment wildlife habitat, the intent of the proposed project is not to construct a new road on new alignment. It is to essentially utilize the existing road alignment, thereby minimizing the amount of habitat loss. The current road width varies from 22-25 ft [6.7-7.6 m], and the preferred alternative would be designed to an approximate 24-ft [7.3-m] width, which further

illustrates a minimal loss of habitat. The fact that the road currently exists indicates that it currently acts to fragment wildlife habitat and this would not change with the preferred alternative since it would utilize essentially the same alignment.

All evidence indicates that people have and would continue to move to the Petty Creek area, increasing traffic and development, and leading to increased wildlife conflicts. This is likely a function of factors that are unrelated to the condition of Petty Creek Road. People have been moving to the area for many years despite the road's poor condition. WFLHD has received five comments suggesting that paving the road would cause increased development in the area while eight comments have suggested that development has occurred even without road improvements and that leaving the road graveled would not change that trend. Whether the road is paved or not, approximately 50% of the land in the Petty Creek area is publicly-owned that is unlikely to undergo development, and the vast majority of the privately-owned land is zoned by Missoula County as Open and Resource land, which limits development to a rather conservative one residence per 40 ac [16.2 ha]. Therefore, development is expected to be limited whether the road is paved or left gravel.

One comment suggested decommissioning the road, which would reduce impacts to wildlife. However, this is not feasible because access to current privately-owned land would have to be provided which would likely result in greater environmental impacts and require additional funding. Another comment suggested that impacts resulting from paving the road could only be mitigated by purchasing all of the Plum Creek land in the Petty Creek area and restricting development on that land. This mitigation is well beyond the level of impacts resulting from the preferred alternative and would not be pursued.

Eleven comments requested WFLHD to keep the basic alignment of the current road citing minimized need for additional right of way, the current curvy alignment would help control speeds and protect humans and wildlife, and less vegetation would need to be removed. All of these reasons were factored into the selection of the preferred alternative. Four comments suggested straightening the road and making it AASHTO compliant citing safety compromises with the curves and narrow roadway. However, to minimize impacts on the environment, discourage increased traffic speeds, and minimize right of way needs, the preferred alternative has been developed to optimize safety and minimize impacts.

Eleven comments requested design elements to discourage increased traffic speeds. Retaining the curvilinear alignment, installing additional speed limit signs, installing wildlife crossing and other warning signs, and providing painted lane designations would help to achieve this. There were no comments requesting an increase in design speed.

One commenter said that the stream crossing structures do not need to be replaced. However, given that many of the structures along Petty Creek Road are under-sized for certain storm events and do not provide adequate passage for all life stages of fish species, alleviating these conditions have been included as part of the preferred alternative.

We also received one request for a bike lane to be incorporated along the roadway and two requests for the shoulders to remain gravel for riding horses. Due to the relatively light traffic on Petty Creek Road and the fact that the road does not have heavy bicycle use, a bicycle lane is not justified when weighed against the additional costs. However, bicyclists may still use the road and paved shoulder with a relative degree of safety given the low traffic volume. Also, providing a gravel shoulder for horse riding is not preferable due to maintenance difficulties, compromised safety, and additional right of way needs to provide adequate space. A trail separated from the roadway was considered but dismissed due to additional costs, environmental impacts, and potential right of way needs.

One comment mentioned the need for dust control during construction. The construction contract would require the contractor to use dust control measures.

One comment indicated that wetlands should be preserved or replaced. The design for the preferred alternative would avoid and/or minimize impacts to wetlands. Depending on the total wetland impacts, coordination with the US Corps of Engineers would determine if wetlands would require replacement. Given the reduction in sedimentation and improved vegetative buffer built into the preferred alternative, it is expected that this would benefit wetlands from current conditions.