MONTANA DEPARTMENT OF TRANSPORTATION
WETLAND MITIGATION MONITORING REPORT: YEAR 2015

Schrieber Lake
Lincoln County, Montana



Prepared for:

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December 2015

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Schrieber Lake
Lincoln County, Montana
Site-wide Construction: 2014

MDT Project Number NH 27(029)
Control Number 1027007

Corps #: NWO-2013-00874-MTM
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CCI Project No: MDT.006

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1. INTRODUCTION

The Schrieber Lake Wetland Mitigation 2015 Monitoring Report presents the results of the first year of post-construction monitoring at the Schrieber Lake mitigation area. The site was acquired by Montana Department of Transportation (MDT) in 2010 to provide compensatory mitigation for both stream and wetland impacts associated with the proposed Swamp Creek – East projects along the US Highway 2 corridor and to serve as a mitigation bank for future transportation projects within Watershed # 1 – Kootenai River basin.

The MDT Schrieber Lake mitigation project is located adjacent to the US Highway 2 corridor in Sections 12 and 13, of Township 27 North, Range 30 West, Lincoln County (Figure 1). The 104.6-acre site lies within the boundaries of Watershed #1 – Kootenai River Basin. This site is situated directly downstream and adjacent to the 141-acre MDT owned Schrieber Meadows aquatic mitigation project. The property is bisected by Coyote Creek, which drains into Schrieber Lake which eventually drains into the Fisher River. Schrieber Lake is situated within a narrow valley corridor bordered on the west and north sides by the Kootenai National Forest. The US Highway 2 corridor bounds the area to the east.

Prior to the construction of the Schrieber Lake Mitigation Project, the area consisted of hay grounds and historic wetlands that had been filled, graded, leveled, and drained. The stream channel had been channelized to promote and maximize hay production and grazing opportunities for livestock, as well as to flood irrigate the adjacent hay pastures. Historically, the project site was likely a large floodplain and beaver pond complex of mixed riparian scrub/shrub and emergent wetlands associated with both Coyote and Schrieber Creeks.

The goals of the mitigation project include preservation, restoration and creation of wetland and riparian habitats. Specifically MDT plans to restore the hydrology to approximately 19 acres of drained wetlands through the excavation and creation of depressional wetland cells; protect the existing 10.2 acres of fen-carr shrub land wetland vegetation community; restore previously developed agricultural areas into native wetland and upland plant communities through seeding, plantings; relocate and reconstruct approximately 3,500 linear feet of Schrieber Creek from the adjacent Schrieber Meadows site to its historic channel and outfall into Schrieber Lake; and to relocate and restore approximately 1,500 linear feet of channelized Coyote Creek to its historic channel and outfall into Schrieber Lake.

The MDT anticipates the development of 13.4 wetland credit acres from the Schrieber Lake wetland and stream restoration project (Appendix E). The plan included creation, restoration (rehabilitation and enhancement), and upland

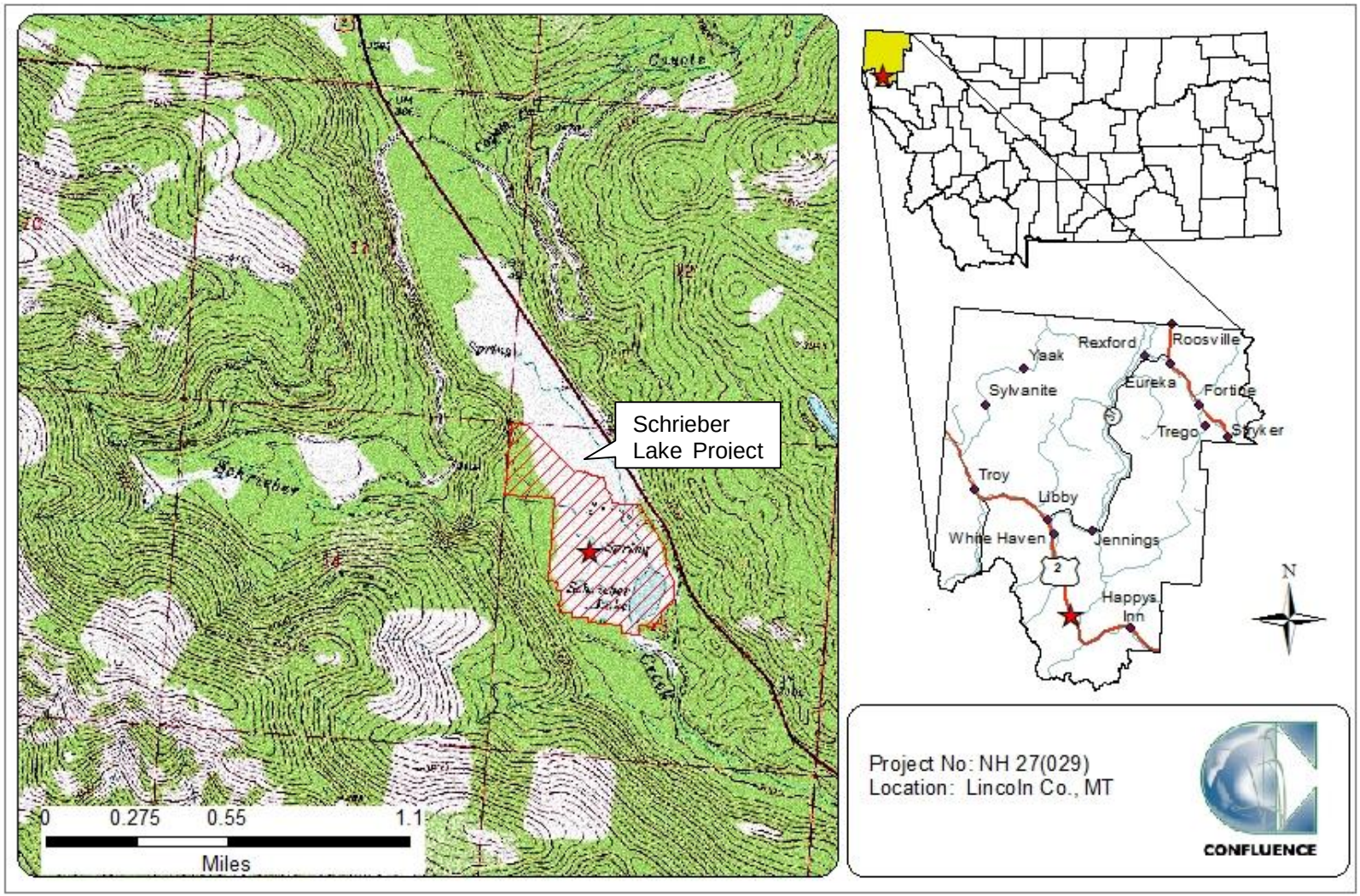


Figure 1. Project location for Schrieber Lake Mitigation Site.

buffer credits. The entire Schrieber Lake mitigation project encompassed the creation of additional depression wetland cells and buffer areas within upland and degraded wetlands, enhancement of scrub/shrub palustrine wetlands, and reconstruction of the Coyote and Schrieber Creek channels. The crediting objectives of the full Schrieber Lake stream and wetland restoration project include the following:

Wetland Mitigation

- **Creation**: Create 3.06 wetland credit acres through the excavation of shallow seasonal depressional wetland cells within the upland portions along the edges of the site. These areas will be seeded with a native wetland plant seed mix, and it is anticipated that volunteer seeds within the soil bank will colonize as well within these sites.
- **Restoration (Re-establishment)**: Provide approximately 1.69 wetland credit acres through the excavation of shallow depressions in the portions of the lower hay meadow. These shallow depressions were constructed to diversify the vegetation community, by removing non-native pasture grass sod within the site. These depressions will be flat between 1 to 2 feet deep to promote re-vegetation and establishment of *Carex* species.
- **Enhancement**: Provide 1.51 wetland credit acres will be derived from the 4.46 acres of area that will be enhanced within the site. Enhancement will be a primary tool for much of the mitigation efforts within the lower hay meadow that will provide for the natural succession of the fen-carr wetland community to expand beyond its current limitations due to haying operations. It is expected that the succession of woody species will continue along the northern edge of the fen-carr shrubland out into the former hay meadow once haying has ceased. Further enhancements within these areas will include seeding and woody plantings.
- **Preservation**: Provide approximately 6.4 wetland preservation credit acres. Approximately 25.6 acres of the property will be preserved, primarily due to the unique fen-carr areas that are present within the site.
- **Upland Buffers**: Approximately 0.76 upland buffer credits are being requested for those created wetland cells located at the northern end and within the interior of the property. These upland buffers are separated from the proposed riparian buffers for the new stream channels. The upland buffer areas will be re-seeded and planted with shrubs/trees in an effort to diversity the vegetation communities adjacent to these created wetlands.

- **Open water**: The open water area of Schrieber Lake will be protected and maintained as open water and is not considered as part of the preservation credit calculation.

Stream Mitigation

For the purposes of obtaining stream mitigation credits for the proposed Schrieber Lake mitigation project, the proposed stream restoration areas concerning Schrieber and Coyote Creeks have been divided into seven distinct reaches; Coyote Creek two reaches, Schrieber four reaches and the combined Coyote Creek/Schrieber Creek channel as the final reach.

- Restore approximately 4,505.9 linear feet of stream channel of both Coyote and Schrieber Creeks ;
- Develop approximately 36,741.85 stream mitigation credits with the restoration of Coyote and Schrieber Creeks for use within Watershed #1 – Kootenai River Basin.

The proposed performance standards for the mitigation activities are listed below (MDT 2009).

1. **Wetland Characteristics**: All restored, created, enhanced, and preserved wetlands within the project limits will meet the three parameter criteria for hydrology, vegetation, and soils established for determining wetland areas as outlined in the 1987 Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987) and 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010).

a) **Wetland Hydrology Success** will be achieved where wetland hydrology is present as per the technical guidelines in the 1987 Wetland Manual. Soil saturation will be present for at least 12.5 percent of the growing season.

b) **Hydric Soil Success** will be achieved where hydric soil conditions are present [per the most recent Natural Resource Conservation Service (NRCS) definitions for hydric soil] or appear to be forming, the soil is sufficiently stable to prevent erosion, and the soil is able to support plant cover. Since typical hydric soil indicators may require long periods to form, a lack of distinctive hydric soil features will not be considered a failure if hydrologic and vegetation success is achieved.

c) **Hydrophytic Vegetation Success** will be achieved where combined absolute cover of facultative or wetter species is ≥70 percent and Montana State-listed noxious weeds do not exceed 5 percent absolute cover.

i. Woody Plants – Plantings will be considered successful where they exceed 50% survival after 5 years. Natural colonization of woody plant species from nearby sources is expected to occur once haying and construction activities cease on the site.

2. **Open Water**: It is the intent of the project to provide open water during the spring and early summer within excavated depressions. As the growing season progresses and the groundwater levels recede, it is anticipated that vegetation will become established within the majority of the depressions. Open water with submerged and/or floating vegetation will therefore be considered successful and creditable.

3. **Channel Restoration Success** will be evaluated in terms of revegetation success.

a) **Revegetation** along the new Coyote and Schrieber Creek channel corridors will be considered successful when banks are vegetated with a majority of deep-rooting riparian plant species having root stability indexes ≥ 6 and wetland herbaceous and woody plant species.
b) **New stream channels** will be allowed to naturally migrate within the established floodplain/riparian areas and be given enough room to move and stabilize itself within the site.

4. **Bank Restoration Success** will be achieved based upon the rate of erosion encountered during the monitoring period, and will be based upon the assessed proper functioning condition assessment using methods outlined by Pritchard et al. 1998. The rate of erosion will be determined through the installation of bank pins and will be measured annually for a period of 5-years and/or until such time as the bank vegetation stabilizes.

5. **Riparian Buffer Success** will be achieved when woody and riparian vegetation becomes established, and noxious weeds do not exceed 5 percent cover within the riparian buffer areas. Any areas within the creditable buffer area disturbed by the project construction must have at least 50 percent aerial cover of non-noxious weed species by the end of the monitoring period.
a) **Vegetation Success** will be achieved where combined aerial cover of riparian and stream bank vegetation communities is ≥70 percent and Montana State-listed noxious weeds do not exceed 5 percent cover, subject to the woody standards listed below.
b) **Woody Plants** – Planted trees and shrubs will be considered successful where they exhibit 50 percent survival after 5 years.

6. **Upland Buffer Success** will be achieved when the noxious weeds do not exceed 5 percent of cover within the buffer areas on site. Any area within the creditable buffer zone disturbed by project construction must have at least 50 percent aerial cover of non-weed species by the end of the monitoring period.

7. **Weed Control** will be based upon annual monitoring of the site to determine weed species and degree of infestation within the site. Based upon the monitoring results, control measures will be implemented by MDT to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the

site. The MDT managed the property to control known weed problems (knapweed and houndstongue) prior to the initiation of wetland construction activities within the site.

The restoration efforts within the Schrieber Lake site greatly complement the Schrieber Meadows restoration efforts re-establishing a larger aquatic ecosystem across the landscape. Once complete, the two sites will increase migratory bird and endangered species habitat protection, improve water storage within the watershed, reestablish wetlands and other aquatic habitat that will increase wildlife and fisheries habitat in the Schrieber and Coyote Creek drainages, and restore historic wetland and stream functions to the altered landscape within the site.

The construction of the Schrieber Lake mitigation project was authorized under the authority of Section 404 of the Clean Water Act via permit NWO-2013-00874-MTM and in accordance with Montana's Stream Protection Act (SPA) #MDT-R1-40-2013.

2. METHODS

An initial site recon visit was conducted on May 18 and 19, 2015. During the visit photo points and transects were established and mapped using a global positioning system (GPS). The first annual monitoring event was conducted on July 22th, 2015 (wetlands) and August 26, 2015 (streams). Information collected to complete the Mitigation Monitoring Form and Wetland Determination Data Forms was recorded during the field investigation (Appendix B). Monitoring activity locations were mapped using a GPS (Figure 2, Appendix A). Data collection activities included wetland delineation; wetland/open water/aquatic habitat boundary mapping; vegetation community mapping; vegetation transect monitoring; soils, hydrology, bird and wildlife use documentation; photographs; stream cross-sections at 11 established stations; functional assessments; and a non-engineering examination of the infrastructure established within the mitigation project area.

2.1. Hydrology

Technical criteria for wetland hydrology guidelines have been established as "permanent or periodic inundation, or soil saturation within 12 inches of the ground surface for a significant period (usually 14 days or 12.5 percent or more during the growing season)" (USACE 2010). Systems with continuous inundation or saturation for greater than 12.5 percent of the growing season are considered wetlands. The growing season is defined for purposes of this report as the number of days where there is a 50 percent probability that the minimum daily temperature is greater than or equal to 28.5 degrees Fahrenheit (Environmental Laboratory 1987). The growing season recorded for the meteorological station at Libby 32 SSE (245020), located approximately eight miles northwest of the project, extends from June 7 to September 4 for a total of 82 days (NRCS 2010). Areas defined as wetlands would require 10 days of

inundation or saturation within 12 inches of the ground surface to meet the hydrology criteria and performance standards.

The presence of hydrologic indicators as outlined on the USACE Routine Wetland Determination Data Forms (USACE 2010) were documented at two data points established within the project area. The hydrologic indicators were evaluated according to features observed during the site visit. The data were recorded on electronic field data sheets (Appendix B). Onsite hydrologic assessments allowed evaluation of mitigation criteria addressing inundation/saturation requirements.

Soil pits excavated during the wetland delineation were also used to evaluate groundwater levels within 18 inches of the ground surface. The data was recorded on the Wetland Determination data form (Appendix B). Areas of surface inundation were delineated on an aerial photograph during the growing season. The extent of soil saturation was determined visually and through core sampling.

2.2. Vegetation

The boundaries of dominant species-based vegetation communities were determined in the field during the active growing season and subsequently delineated on aerial photographs. Community types were named based on the predominant vegetation species that characterized each mapped polygon (Figure 3, Appendix A). The percent cover of identified species within a community type was estimated and recorded on the monitoring form using the following ranges: 0 (less than 1 percent), 1 (1 to 5 percent), 2 (6 to 10 percent), 3 (11 to 20 percent), 4 (21 to 50 percent), and 5 (greater than 50 percent) (Appendix B).

Temporal changes in vegetation were evaluated through annual monitoring of three vegetation belt transects approximately 10 feet wide and 384, 280, and 584 feet long, respectively. The transect endpoints were monumented using T-posts and/or other easily identified features and their locations recorded with a GPS unit. Spatial changes in the vegetation communities were recorded along the stationed transect. The percent aerial cover of each vegetation species within the belt transect was estimated using the same cover ranges listed above (Appendix B). Photographs were taken at the endpoints of each transect during the monitoring event (Appendix C).

The Montana State Noxious Weed List (July 2015), prepared by the Montana Department of Agriculture, was used to categorize weeds identified within the site. The location of noxious weeds was noted in the field and mapped on the aerial photo (Figure 3, Appendix A). The noxious weed species identified are color-coded. The locations are denoted with the symbol "**x**", "▲", or "■" representing 0 to 0.1 acre, 0.1 to 1.0 acre, or greater than 1 acre in extent, respectively. Cover classes are represented on Figure 3 (Appendix A) by T, L, M, or H, for less than 1 percent, 1 to 5 percent, 6 to 25 percent, and 26 to 100 percent, respectively.

2.3. Soil

Soil information was obtained from the *Lincoln County Soil Survey* and *in situ* soil descriptions accessed from the NRCS official soil description website (USDA 2010). Soil cores were excavated using a shovel and evaluated according to procedures outlined in the 1987 wetland manual and 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010). A description of the soil profile, including hydric indicators when present, was recorded on the Wetland Determination Data form for each profile (Appendix B).

2.4. Wetland Delineation

Waters of the US (WUS) including jurisdictional wetlands and special aquatic sites were delineated throughout the project area in accordance with criteria established in the 1987 Wetland Manual and the 2010 Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010).

In order to delineate a representative area as wetland, the technical criteria for hydrophytic vegetation, hydric soil, and wetland hydrology, as described in the 1987 Wetland Manual and 2010 Regional Supplement, must be satisfied. The name and indicator status of plant species were derived from the 2014 National Wetland Plant List (NWPL) (Lichvar *et al*., 2014). A Routine Level-2 On-site Determination Method (USACE 2010) was used to delineate wetland areas within the project boundaries. The information was recorded electronically on the Wetland Determination Data form (Appendix B).

The wetland boundary was determined in the field based on changes in plant communities and/or hydrology, and changes in soil characteristics. Topographic relief boundaries within the project area were also examined and cross-referenced with soil and vegetation communities as supportive information for this delineation. Vegetation composition, soil characteristics, and hydrology were assessed at likely wetland and adjacent upland locations. If all three parameters met the criteria, the area was designated as wetland and mapped by vegetation community type. If any one of the parameters did not exhibit positive wetland indicators, the area was determined to be upland unless the site was a special aquatic site, an atypical situation, or a problem area. The wetland boundary was GPS surveyed and identified on 2015 aerial photography. Wetland areas were estimated using geographic information system (GIS) methods.

2.5. Wildlife

Observations of use by mammal, reptile, amphibian, and bird species were recorded on the wetland monitoring form during the site visit. Indirect use indicators, including tracks, scat, burrow, eggshells, skins, and bones, were also recorded. These signs were recorded while traversing the site for other required activities. Direct sampling methods, such as snap traps, live traps, and pitfall traps, were not used. A comprehensive wildlife species list for the entire site is maintained and reported each year.

2.6. Functional Assessment

The 2008 MDT MWAM has been used to evaluate functions and values on the site since post-construction monitoring began. This method provides an objective means of assigning wetlands an overall rating and provides regulators a means of assessing mitigation success based on wetland functions. Functions are self-sustaining properties of a wetland ecosystem that exist in the absence of society and relate to ecological significance without regard to subjective human values (Berglund and McEldowney 2008). Field data for this assessment were collected during the site visit. A Functional Assessment Form was completed for each wetland or group of wetlands (Assessment Areas [AAs]) (Appendix B).

2.7. Photo Documentation

Monitoring at photo points provided supplemental information documenting wetland conditions, trends, current land uses surrounding the site, upland buffer and monitored area conditions, and vegetation transect composition. Photographs were taken at established photo points throughout the mitigation site, at the transect end points, at each wetland determination data point, and at each surveyed cross-section during the site visit (Appendix C). Photo point locations were recorded with a resource grade GPS unit (Figure 2, Appendix A).

2.8. Stream Monitoring Methods

2.8.1. Channel Cross-Sections

The Schrieber Lake mitigation plan called for establishing a minimum of one stream cross-section per 500 feet of assessed stream reach or one per different stream reach segment to monitor channel form and function, natural channel migration, vertical stability (down-cutting), sediment build-up, thalweg location changes, and streambank / riparian vegetation development. Eleven permanent monitoring cross-sections were established perpendicular to the constructed streams during the 2015 spring site visit (Figure 2, Appendix A). Rebar was driven into the ground at both ends of each cross-section, marked with pink paint and flagging, and covered with a wildlife-friendly cap. In addition, t-posts were installed at either end of the cross-sections to more easily locate the cross-sections during the summer months when vegetation cover is high. Cross-sections were surveyed using survey-grade GPS with a base station established on site to improve accuracy. Photographs were taken at each cross-section and are shown in Appendix C.

2.8.2. Bank Pins

Bank pins (1/4” steel, painted fluorescent orange to enhance visibility) were installed on both sides of the channel at each of the monitoring cross sections to document the rate of erosion following construction. Pins were installed perpendicular to the flow below the bankfull elevation. The stick-out of each pin was recorded at the time of installation. Future measures of pin stick-out will permit assessment of lateral erosion during each subsequent monitoring event.

2.8.3. Vegetation Monitoring at Perpendicular Belt Transects

Riparian vegetation monitoring included establishing belt transects perpendicular to the newly constructed channel to document riparian buffer vegetative development, channel migration, and channel and riparian community diversity. Riparian belt transects were 10 feet wide and varied in length based on the width of the riparian buffer specified in the mitigation plan for each reach. The vegetation inventory within each perpendicular belt transect included documenting total percent vegetation cover and percent cover by noxious weeds.

Table 1. Riparian buffer widths for each reconstructed channel reach as specified in Schrieber Lake Mitigation Plan.

Channel Segment	Reach	Width of Riparian Buffer (Right) (ft)	Width of Riparian Buffer (Left) (ft)
Coyote Creek	1A	25	25
	1B	25	50
Schrieber Creek	1	100	100
	2A	100	100
	2B	75	75
	3	25	25
	7	25	25

2.8.4. Vegetation Monitoring at Parallel Belt Transects

Vegetation belt transects were also established parallel to the stream channel to document riparian vegetation development and community diversity within the streamside and riparian buffers. The parallel belt transects were 5 feet wide and extended 12.5 feet upstream and downstream of each monitoring cross section for a total length of 25 feet. A planted vegetation survival assessment was performed within each parallel belt transect to document survival rates of woody vegetation installed along the reconstructed stream banks. The vegetation inventory within each parallel belt transect included compiling a comprehensive species list and assigning a cover class for each species.

Results of the vegetation inventory within the parallel belt transects were used to determine vegetation communities present along the reconstructed stream banks. Dominant species present along the banks were combined to assign vegetation community types, which were cross-referenced with bank stability indices (Winward 2000). If a stability rating was not available for the assigned community, an alternate stability rating was selected based on the individual species observed within the belt transect.

2.9. GPS Data

Site features and survey points were collected with a resource grade Thales Pro Mark III GPS unit and a Trimble GeoHX GPS unit during the 2015 monitoring season. The collected data were then transferred to a personal computer,

imported into GIS, and presented in Montana State Plane Single Zone NAD 83 meters. Site features and survey points that were located with GPS included photographic points, transect endpoints, wetland boundary, and wetland data points.

2.10. Maintenance Needs

Channels, engineered structures, fencing, and other features were examined during the site visit for obvious signs of breaching, damage, or other problems. The examination was cursory rather than an engineering-level inspection.

3. RESULTS

3.1. Hydrology

Climate data from the Libby 30 SSE, Montana (245020) weather station recorded an average total annual precipitation rate of 23.79 inches from 1950 to 2014 (WRCC 2015). Annual precipitation for 2010, 2011, 2012, 2013, and 2014 was 21.93, 22.64, 27.2, 19.18 inches, and 25.75 inches respectively. Average monthly precipitation totals from January to August for the period of record was 14.99 inches. Precipitation totals recorded from January to August were 15.05 inches (2011), 16.45 inches (2012), 12.67 inches (2013), 15.9 inches (2014), and 11.14 inches (2015). In general, the region surrounding the project area exhibited above-average precipitation in 2011, 2012, and 2014 and below-average precipitation in 2013 and 2015 prior to and during the growing season.

During the July 2015 investigation, the average depth of surface water across the site was estimated at 2 feet with a range of depths from 1 to 3 feet. Approximately 80 percent of the assessment area was inundated. The surface water depth at the emergent vegetation and open water boundary was estimated at 1.1 feet. Direct precipitation also contributes to wetland hydrology, but the high seasonal groundwater table provides the majority of water driving wetland hydrology within this site. Other site wide indicators of wetland hydrology included saturation and inundation visible on aerial photographs and a seasonal high groundwater table.

Two data points were sampled in 2015 to determine the wetland/upland boundaries. Data point SP-1 was located within wetland community Type 3 (Figure 2, Appendix A). The wetland data point exhibited saturation to 9 inches below the ground surface (bgs), hydrogen sulfide odor, and geomorphic position. Upland data point SP-2 was located upslope from SP-1 within upland community Type 1. There were no hydrologic indicators at data point SP-2.

3.2. Vegetation

A comprehensive list of 86 plant species identified on the site in 2015 is presented in Table 2. Nine wetland community types and three upland community types were identified and mapped at the mitigation site in 2015 (Figure 3, Appendix A). Individual plant species observed within each community are listed on the Monitoring Form (Appendix B). Open water below the ordinary

high water mark (OHWM) of the constructed stream channels is also identified on Figure 3 (Appendix A). The vegetation community types identified on the site in 2015 are discussed below.

Upland community Type 1 – *Elymus repens/Bromus inermis* covered 30 acres of the project area. Creeping wild rye (*Elymus repens*), smooth brome (*Bromus inermis*), western-wheat grass (*Pascopyrum smithii*), common timothy (*Phleum pretense*), and flat-stem blue grass (*Poa compressa)* dominated the community. Common yarrow (*Achillea millefolium*), redtop (*Agrostis stolonifera*), meadow foxtail (*Alopecurus pratensis*), spotted knapweed (*Centaurea stoebe*), reed canary grass (*Phalaris arundinacea*), Kentucky blue grass (*Poa pratensis*), bluebunch wheatgrass (Pseudoroegneria spicata), and Douglas-fir (*Pseudotsuga menziesii*) were present at one to five percent cover. Seventeen additional species were identified in this community at less than one percent cover.

Wetland community Type 2 – *Betula pumila*/*Rhamnus alnifolia* covered 10.7 acres the project area. Bog birch (*Betula pumila*), alder-leaf buckthorn (*Rhamnus alnifolia*), and *Carex* species dominated the community. Greater than 50% of the community cover contained moss species. Eight additional species were identified in this community at less than five percent cover.

Wetland community Type 3 – *Phalaris arundinacea/Carex* sp. covered 9.2 acres of the project area. Reed canary grass, analogue sedge (*Carex simulata*), leafy tussock sedge (*Carex aquatilis*), and rough bentgrass (*Agrostis scabra*) dominated the community. Seventeen additional species were identified in this community at less than five percent to trace of the community cover. Approximately 5 percent of the community contained open water.

Wetland community Type 4 – *Carex simulata / Persicaria amphibia* covered 2.8 acres of the project area. Analogue sedge, water smartweed (*Persicaria amphibia*), and leafy tussock sedge dominated the vegetation community. Rough bent, Northwest Territory sedge (*Carex utriculata*), and moss were each present within the community at less than 10 percent cover. Eleven additional species were identified in this community at less than five percent cover each.

Upland community Type 5 - *Pseudotsuga menziesii/Larix occidentalis* covered 21.9 acres along the edges of the project area. Douglas-Fir, western larch (*Larix occidentalis*), and lodgepole pine (*Pinus contorta*) dominated the vegetation community cover. The shrub layer contained common snowberry, Woods' rose (Rosa woodsii), bearberry (*Arctostaphylos uva-ursi*), and blueberry (*Vaccinium* sp.). The understory contained Geyer's sedge (Carex geyeri), smooth brome, blue wild rye (*Elymus glaucus*), and starry false Solomon's-seal (*Maianthemum stellatum*). Two priority 2B noxious weed species were identified within the community. Spotted knapweed (*Centaurea stoebe*) occurred at 6 to 10 percent cover and Canada thistle (*Cirsium arvense*) occurred at less than one percent cover. A total of 26 species were identified within the community.

Table 2. Vegetation species identified in 2015 at the Schrieber Lake Wetland Mitigation Site.

Scientific Names	Common Names	WMVC Indicator Status[1]
Abies grandis	Grand Fir	FACU
Achillea millefolium	Common Yarrow	FACU
Agrostis scabra	Rough Bent	FAC
Agrostis stolonifera	Spreading Bent	FAC
Algae, green	Algae, green	NL
Alnus incana	Speckled Alder	FACW
Alopecurus pratensis	Field Meadow-Foxtail	FAC
Amelanchier alnifolia	Saskatoon Service-Berry	FACU
Antennaria sp.	Pussytoes	NL
Apocynum androsaemifolium	Spreading Dogbane	FACU
Aquatic macrophytes	Aquatic macrophytes	NL
Arctostaphylos uva-ursi	Red Bearberry	FACU
Berberis repens	Creeping Oregon-grape	NL
Betula pumila	Bog Birch	OBL
Bromus inermis	Smooth Brome	FAC
Calamagrostis rubescens	Pinegrass	NL
Campanula rotundifolia	Bluebell-of-Scotland	FACU
Carex aquatilis	Leafy Tussock Sedge	OBL
Carex bebbii	Bebb's Sedge	OBL
Carex geyeri	Geyer's Sedge	NL
Carex inops	Long-stolon Sedge	NL
Carex lasiocarpa	Woolly-Fruit Sedge	OBL
Carex nebrascensis	Nebraska Sedge	OBL
Carex simulata	Analogue Sedge	OBL
Carex sp.	Sedge	NL
Carex utriculata	Northwest Territory Sedge	OBL
Centaurea stoebe	Spotted Knapweed	NL
Cirsium arvense	Canadian Thistle	FAC
Comarum palustre	Purple Marshlocks	OBL
Cornus canadensis	Canadian Bunchberry	FAC
Crataegus douglasii	Black Hawthorn	FAC
Cynoglossum officinale	Gypsy-Flower	FACU
Dactylis glomerata	Orchard Grass	FACU
Deschampsia caespitosa	Tufted Hair Grass	FACW
Elymus glaucus	Blue Wild Rye	FACU

[1] 2014 NWPL (Lichvar *et al.*)

Table 2. (continued). Vegetation species identified in 2015 at the Schrieber Lake Wetland Mitigation Site.

Scientific Names	Common Names	WMVC Indicator Status[1]
Elymus repens	Creeping Wild Rye	FAC
Elymus trachycaulus	Slender Wild Rye	FAC
Fragaria virginiana	Virginia Strawberry	FACU
Galium triflorum	Fragrant Bedstraw	FACU
Geum macrophyllum	Large-Leaf Avens	FAC
Gnaphalium palustre	Western Marsh Cudweed	FACW
Hypericum perforatum	Common St. John's-Wort	FACU
Juncus nodosus	Knotted Rush	OBL
Juncus tenuis	Lesser Poverty Rush	FAC
Larix occidentalis	Western Larch	FACU
Lemna minor	Common Duckweed	OBL
Lepidium draba	Whitetop	NL
Leucanthemum vulgare	Ox-Eye Daisy	FACU
Linaria dalmatica	Dalmatian Toadflax	NL
Linaria vulgaris	Butter-and-eggs	NL
Maianthemum stellatum	Starry False Solomon's-Seal	FAC
Moss	Sphagnum/Aulacomnium moss	NL
Pascopyrum smithii	Western-Wheat Grass	FACU
Penstemon sp.	Beardtongue	NL
Persicaria amphibia	Water Smartweed	OBL
Phalaris arundinacea	Reed Canary Grass	FACW
Phleum pratense	Common Timothy	FAC
Pinus contorta	Lodgepole Pine	FAC
Pinus monticola	Western White Pine	FACU
Pinus ponderosa	Ponderosa Pine	FACU
Poa compressa	Flat-Stem Blue Grass	FACU
Poa pratensis	Kentucky Blue Grass	FAC
Poa sp.	Blue Grass	NL
Potentilla norvegica	Norwegian Cinquefoil	FAC
Pseudoroegneria spicata	Bluebunch Wheatgrass	NL
Pseudotsuga menziesii	Douglas-Fir	FACU
Rhamnus alnifolia	Alder-Leaf Buckthorn	FACW
Rosa woodsii	Woods' Rose	FACU
Rumex acetosella	Common Sheep Sorrel	FACU
Salix bebbiana	Gray Willow	FACW
Salix boothii	Booth's Willow	FACW
Salix candida	Sage Willow	OBL
Salix geyeriana	Geyer's Willow	FACW
Salix sp.	Willow	NL
Scutellaria galericulata	Hooded Skullcap	OBL
Shepherdia canadensis	Russet Buffalo-Berry	UPL
Stipa viridula	Green Needlegrass	NL
Symphoricarpos albus	Common Snowberry	FACU
Symphyotrichum spathulatum	Mountain American-Aster	FAC
Taraxacum officinale	Common Dandelion	FACU
Thlaspi arvense	Field Pennycress	UPL
Trifolium aureum	Yellow Clover	NL
Typha latifolia	Broad-Leaf Cat-Tail	OBL
Urtica dioica	Stinging Nettle	FAC
Vaccinium sp.	Blueberry	NL
Verbascum thapsus	Great Mullein	FACU

[1] 2014 NWPL (Lichvar *et al.*)

Wetland community Type 6 - *Salix bebbiana/Phalaris arundinacea* covered 0.8 acres of the project area. Gray willow (*Salix bebbiana*) and reed canary grass dominated the vegetation community. Three additional species were identified in this community and were each present at less than five percent cover.

Wetland community Type 7 - *Alnus incana/Phalaris arundinacea* covered 0.4 acres of the project area. Speckled alder (*Alnus incana*) and reed canary grass dominated the vegetation community. Water smartweed was present at less than 5 percent cover and Canada thistle was present in trace amounts.

Wetland community Type 8 - *Carex utriculata* covered 10.7 acres of the project area. This community was dominated by Northwest Territory sedge which was interspersed with *Salix* species throughout. There were a total of seven species identified within this community.

Upland community Type 9 - *Crataegus douglasii/Symphoricarpos albus* covered 0.5 acres of the project area. This community was dominated by black hawthorn (*Crataegus douglasii*) and common snowberry (*Symphoricarpos albus*) shrubs. Reed canary grass accounted for less than 10 percent of the vegetation community cover. This community had a substantial Canada thistle infestation which accounted for 6 to 10 percent of the vegetative cover. A total of 14 species were identified within the community.

Wetland community Type 10 - *Typha latifolia* covered 2.8 acres around the fringe of Schrieber Lake. This community contained broad-leaf cat-tail (*Typha latifolia)*, purple marshlocks (*Comarum palustre*), and open water.

Wetland community Type 11 – Open water/Aquatic macrophytes covered 15.4 acres of the project area and included Schrieber Lake as well as the newly constructed wetland cells. This community contained greater than 50 percent open water. Vegetation in the community included water smartweed and aquatic macrophytes.

Wetland community Type 12 – *Carex lasiocarpa* covered 1.3 acres of the project area on the south edge of Schrieber Lake, immediately adjacent to the cattail community there (Community type 10). Woollyfruit sedge (*Carex lasiocarpa)* accounted for greater than 50 percent of the vegetative cover in this community. Reed canary grass and leafy tussock sedge were each present at less than 10 percent cover. A total of 5 species were identified in the community.

Trends in plant species composition were measured on three transects (T-1, T-2, and T-3) in 2015. Photographs of the transect end points are shown on pages C-8 and C-9 of Appendix C. One 384-foot transect, T-1, was established during initial monitoring at the site in 2015. Table 3 and Charts 1 and 2 summarize the data for T-1 (Monitoring Form, Appendix B). Three vegetation communities, #3 (*Phalaris/Carex*), #7 (*Alnus/Phalaris*), and #11 (Aquatic macrophytes/Open

Water) were identified along this transect. All three vegetative communities are considered to be wetland communities.

Table 3. Data summary for transect T-1 in 2015 at the Schrieber Lake Mitigation Site.

Monitoring Year	2015
Transect Length (feet)	**384**
Vegetation Community Transitions along Transect	3
Vegetation Communities along Transect	3
Hydrophytic Vegetation Communities along Transect	3
Total Vegetative Species	10
Total Hydrophytic Species	5
Total Upland Species	5
Estimated % Total Vegetative Cover	90
Estimated % Unvegetated	10
% Transect Length Comprising Hydrophytic Vegetation Communities	100
% Transect Length Comprising Upland Vegetation Communities	0
% Transect Length Comprising Open Water	0
% Transect Length Comprising Mudflat	0

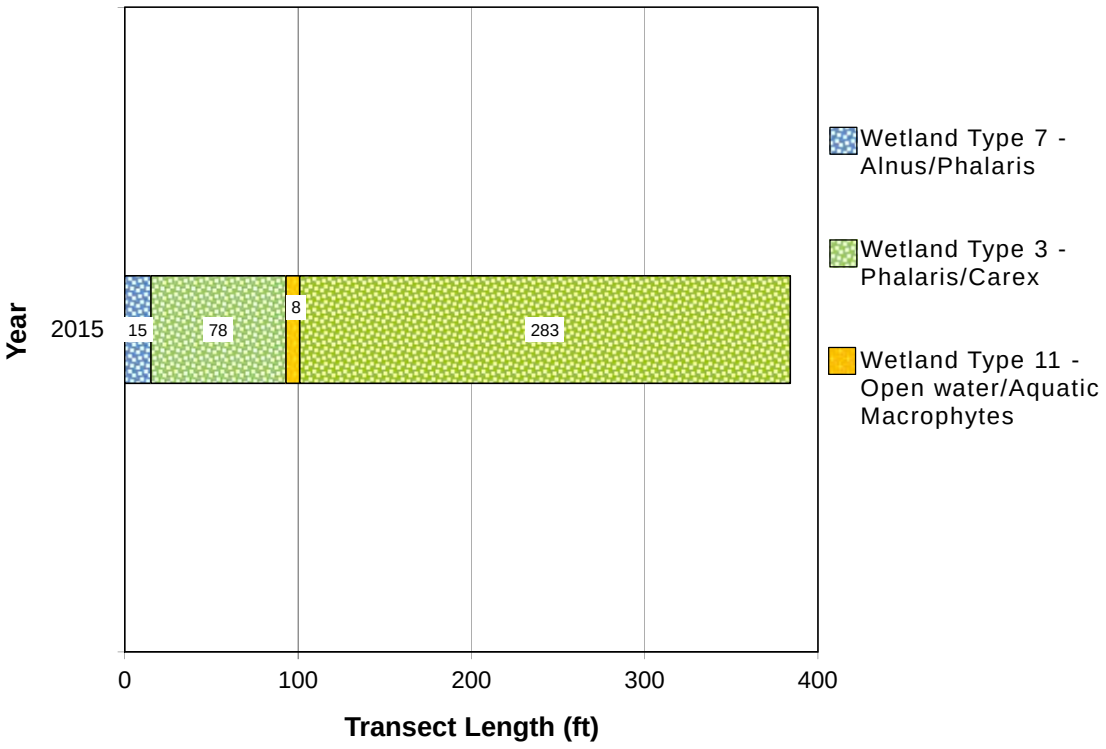


Chart 1. Transect map showing community types on transect T-1 in 2015 from start (0 feet) to end (384 feet).

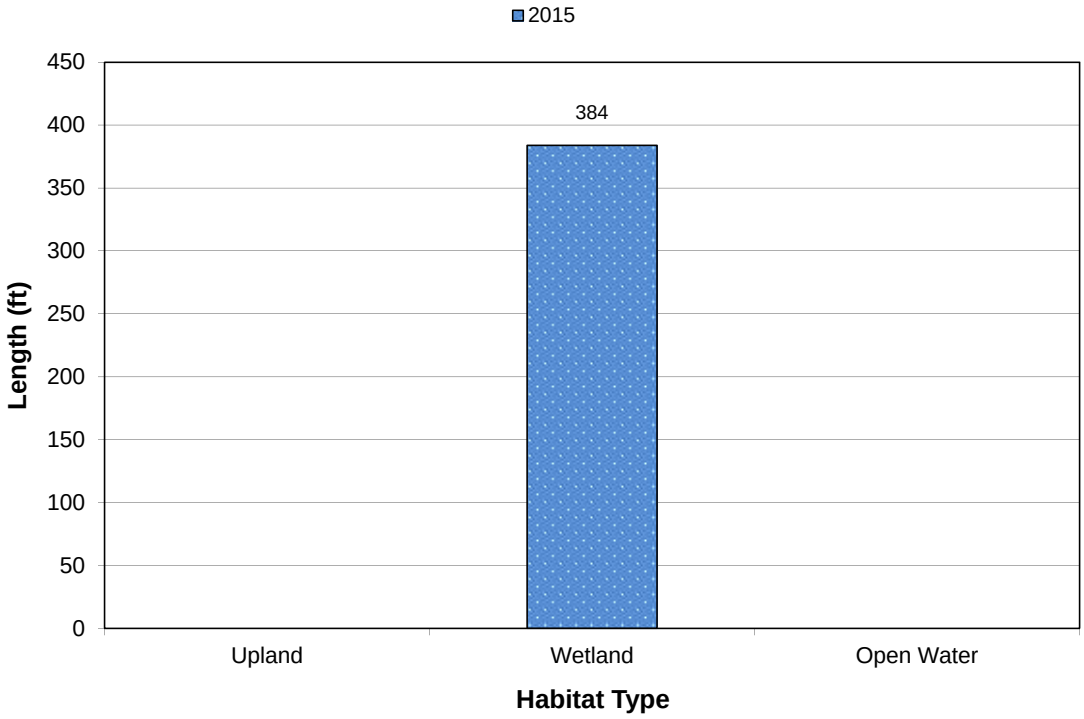


Chart 2. Length of habitat types within transect T-1 in 2015.

Transect T-2 crossed wetland community type 3 – *Phalaris arundinacea/Carex* sp. and wetland community type 6 – *Salix bebbiana/Phalaris arundinacea* in the middle of the restored wetland area (Figure 2, Appendix A). Hydrophytic vegetation communities dominated 100 percent of the transect (Figure 3, Appendix A). Details of the transect data are summarized and graphed on Table 4 and Charts 3 and 4. Photographs of the endpoints of transect T-2 are shown on page C-8 of Appendix C.

Table 4. Data summary for transect T-2 in 2015 at the Schrieber Lake Mitigation Site.

Monitoring Year	**2015**
Transect Length (feet)	**280**
Vegetation Community Transitions along Transect	1
Vegetation Communities along Transect	2
Hydrophytic Vegetation Communities along Transect	2
Total Vegetative Species	7
Total Hydrophytic Species	5
Total Upland Species	2
Estimated % Total Vegetative Cover	99
Estimated % Unvegetated	1
% Transect Length Comprising Hydrophytic Vegetation Communities	100
% Transect Length Comprising Upland Vegetation Communities	0
% Transect Length Comprising Unvegetated Open Water	0
% Transect Length Comprising Mudflat	0

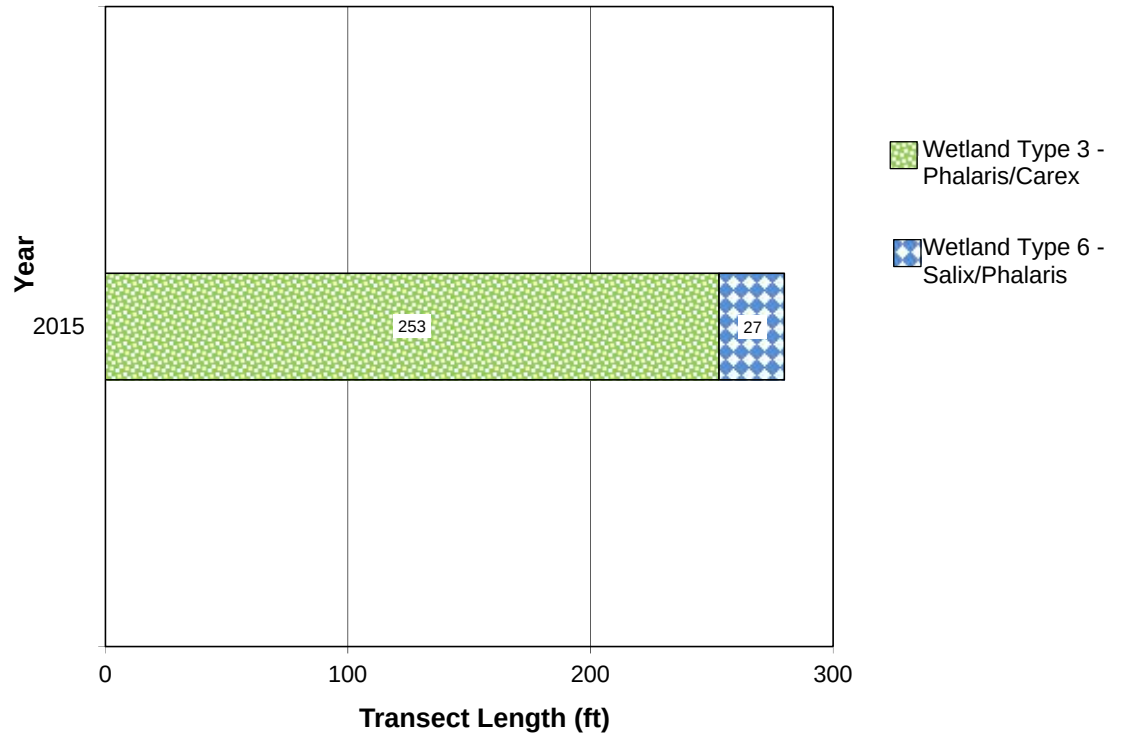


Chart 3. Transect map showing community types on transect T-2 in 2015 from start (0 feet) to end (280 feet).

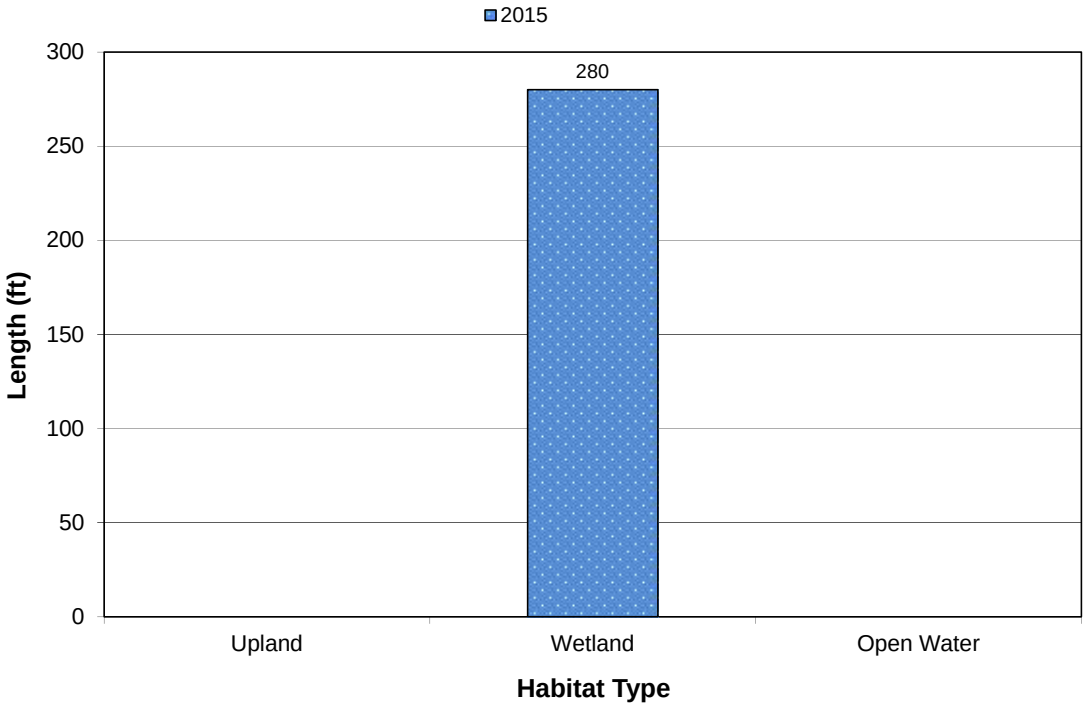


Chart 4. Length of habitat types within transect T-2 in 2015.

Transect T-3 extended 584 feet at 175 degrees on the western side of the restored area (Figure 2, Appendix A). Transect details are shown on Table 4 and Charts 5 and 6 (Monitoring Forms, Appendix B). Photographs of the transect T-3 end points are shown on page C-9 of Appendix C. The transect crossed two wetland communities, Type 3 – *Phalaris arundinacea/Carex* spp. and Type 4 – *Carex simulata*/*Persicaria amphibia* and one upland community, Type 1 - *Elymus repens/Bromus inermis*. Sixteen plant species were identified along the transect.

Table 5. Data summary for transect T-3 in 2015 at the Schrieber Lake Mitigation Site.

Monitoring Year	**2015**
Transect Length (feet)	**584**
Vegetation Community Transitions along Transect	2
Vegetation Communities along Transect	3
Hydrophytic Vegetation Communities along Transect	2
Total Vegetative Species	16
Total Hydrophytic Species	14
Total Upland Species	2
Estimated % Total Vegetative Cover	100
Estimate % Unvegetated	0
% Transect Length Comprising Hydrophytic Vegetation Communities	94
% Transect Length Comprising Upland Vegetation Communities	6
% Transect Length Comprising Unvegetated Open Water	0
% Transect Length Comprising Mudflat	0

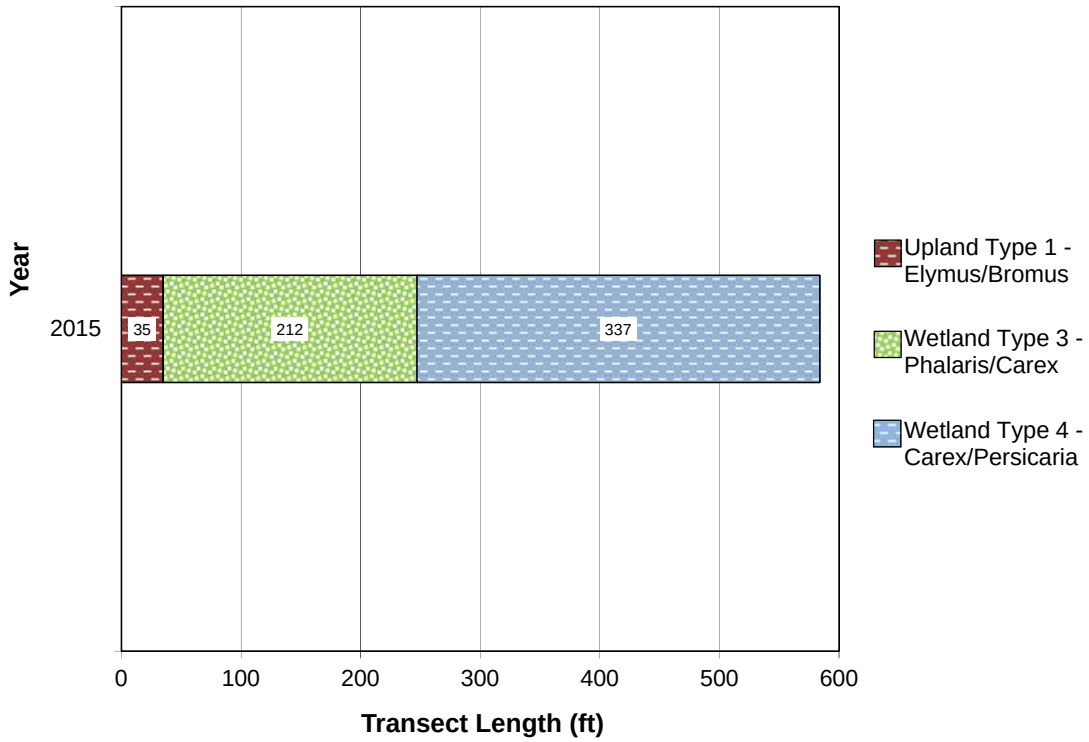


Chart 5. Transect map showing community types on transect T-3 in 2015 from start (0 feet) to end (584 feet).

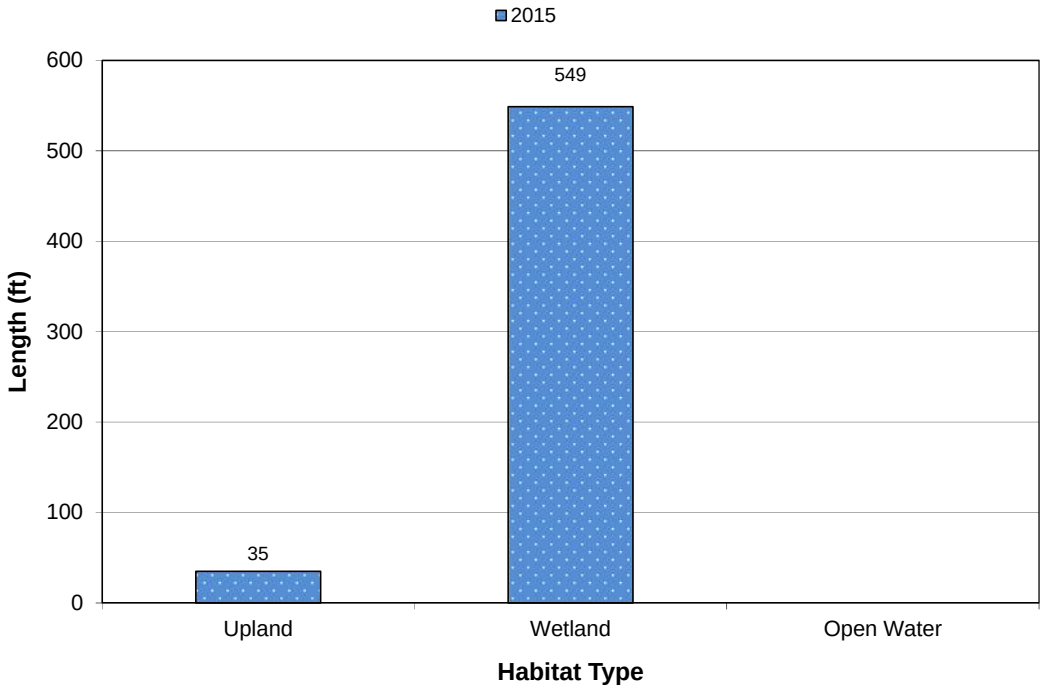


Chart 6. Length of habitat types within transect T-3 in 2015.

Priority 2B noxious weeds identified within the Schrieber Lake mitigation site included spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*), Gypsy-flower (*Cynoglossum officinale*), St. Johnswort (*Hypericum perforatum*), oxeye daisy (*Leucanthemum vulgare*), dalmatian toadflax (*Linaria dalmatica*), whitetop (*Lepidium draba*), and yellow toadflax (*Linaria vulgaris*). A total of 38 infestation areas were mapped in 2015, ranging in size from less than 0.1 acre to greater than 1 acre in size. The most common weed species found on the site were yellow toadflax (7), spotted knapweed (9), and Canada thistle (17) (Figure 3, Appendix A).

MDT planted 1,500 woody plants in the riparian buffer. Based on observations of the plantings around pond 7 the planted vegetation survival was estimated at approximately 67% site wide. Of the planted woody vegetation observed at each parallel belt transect at each cross section, 79% remained alive along Schrieber Creek and 43% remained alive along Coyote Creek.

3.3. Soil

The primary map unit on the site (approximately 70 percent) was identified as a poorly drained Aquic Udifluvent. The soil is found in intermontane basins and is classified as hydric. The NRCS soil unit Andic Dystric Eutrochrepts was mapped along the edges of the site and included silty glaciolacustrine deposits common on lacustrine terraces and glacial outwash terraces.

Two soil pits were evaluated to determine the extent of hydric soil development. One test pit, SP-1, met the three wetland criteria. The soil in SP-1 contained a 9 inch layer of sapric peat and a hydrogen sulfide odor which are both positive indicators for hydric soil. The upland data point SP-2 revealed a black (10 YR 2/1) sandy loam without redox features from 0 to 18 inches bgs. No positive indicators of hydric soil were observed at the upland data point.

3.4. Wetland Delineation

The total jurisdictional wetland and aquatic habitat acreage delineated at the Schreiber Lake mitigation site in 2015 was 52.1 acres (Table 6). This figure includes Schreiber Lake (8.26 ac), the Schreiber and Coyote Creek Stream Channels (~1 ac), wetlands that occur within the creditable riparian buffer of those stream channels (3.9 ac), and lake fringe wetlands that occur on that portion of the project site that is owned by the United States Forest Service (1.25 ac). None of those wetlands are eligible for wetland credit under the Schreiber Lake mitigation plan. The remaining acreage available for wetland crediting is 37.65 ac. The extensive development of wetlands at this site is the product of excavating the wetland cells, plugging the former stream channels, and re-meandering and raising the bed elevation of the restored creek channels. As a result, widespread inundation was present throughout the site during the July 2015 site visit.

Table 6. Project upland and delineated wetland acres, 2015.

Habitat Type	2015 Acres
Uplands	**52.60**
Wetlands &Aquatic Habitat	
Schrieber Lake	8.26
Stream Channels	1.00
Riparian Buffer	3.90
USFS wetlands	1.25
Remainig wetlands	37.65
Wetlands subtotal	**52.06**
Project Area	**104.7**

3.5. Wildlife

A list of animal species observed directly or indirectly in 2015 is presented in Table 7. Twenty bird species were identified onsite in 2015. Birds observed included Canada geese (*Branta canadensis*), ruddy ducks (*Oxyura jamaicensis*), and northern shovellers (*Anas clypeata*) noted using open water areas. Other wildlife observed directly included four Columbia spotted frogs (*Rana luteiventris)*, one common garter snake (*Thamnophis sirtalis*), one painted turtle (*Chrysemys picta*), five ground squirrels, and 1 vole. Deer (*Odocoileus* sp.) beds were observed in the upland area of the project site. Breeding western toads (*Anaxyrus boreas*) a Montana S2 species have been documented by United States Forest personnel on the project site. Montana Department of Fish, Wildlife, and Parks have documented grizzly bear (*Ursus arctos*) on the Schrieber Lake project site.

Table 7. Wildlife observed at Schrieber Lake Mitigation Site in 2015.

COMMON NAME	SCIENTIFIC NAME
AMPHIBIAN	
Columbia Spotted Frog	*Rana luteiventris*
Western Toad	*Anaxyrus boreas*
FISH	
Trout sp.	
REPTILE	
Common Gartersnake	*Thamnophis sirtalis*
Painted Turtle	*Chrysemys picta*
MAMMAL	
Deer sp.	*Odocoileus sp.*
Grizzly Bear	Ursus arctos
Ground squirrel	
Moose	*Alces americanus*
Vole sp.	
BIRD	
American Robin	*Turdus migratorius*
Barn Swallow	*Hirundo rustica*
Black-billed Magpie	*Pica hudsonia*
Blue-winged Teal	*Anas discors*
Bobolink	*Dolichonyx oryzivorus*
Bufflehead	*Bucephala albeola*
Canada Goose	*Branta canadensis*
Cedar Waxwing	*Bombycilla cedrorum*
Chimney Swift	*Chaetura pelagica*
Duck	
Flycatcher	
Great Blue Heron	*Ardea herodias*
Killdeer	*Charadrius vociferus*
Mountain Chickadee	*Poecile gambeli*
Northern Flicker	*Colaptes auratus*
Northern Shoveler	*Anas clypeata*
Osprey	*Pandion haliaetus*
Red-tailed Hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Ruddy Duck	*Oxyura jamaicensis*
Wilson's Snipe	*Gallinago delicata*
Tree Swallow	*Tachycineta bicolor*
Vaux swift	*Chaetura vauxi*
Vesper Sparrow	*Pooecetes gramineus*
Virginia Rail	*Rallus limicola*
Yellow Warbler	*Dendroica petechia*

3.6. Functional Assessment

The 2008 MDT MWAM was used to evaluate the site in 2015 (Table 8). The functional assessment completed in 2015 incorporated the created, restored and preserved wetlands into one AA. The MWAM AA included all the delineated wetlands, including the creditable wetlands (37.12 ac), the wetlands within the riparian buffers of Schreiber and Coyote creeks (3.9 ac) and the open water within Schrieber Lake (8.26 ac) and those portions of Schreiber and Coyote creeks that flow through the wetland areas (0.65 ac), and the wetlands on USFS lands (1.25 ac). The wetlands in the AA received a Category I rating with 88 percent of the total possible points in 2015. The 51.7-acre AA rated as a Category I wetland, scoring Excellent for General Wildlife Habitat and Production Export/Food Chain Support and scoring high for Listed/Proposed T&E Species Habitat, Short and Long Term Surface Water Storage, Sediment/Nutrient/Toxicant Removal, Sediment/shoreline Stabilization, Groundwater/Discharge/Recharge, and Uniqueness.

Table 8. Functions and Values of Schrieber Lake wetlands in 2015.

Function and Value Parameters from the 2008 MDT Montana Wetland Assessment Method[1]	2015
Listed/Proposed T&E Species Habitat	H(0.8)
MTNHP Species Habitat	M(0.6)
General Wildlife Habitat	E (1.0)
General Fish/Aquatic Habitat	M (0.7)
Flood Attenuation	M (0.6)
Short and Long Term Surface Water Storage	H (1.0)
Sediment/Nutrient/Toxicant Removal	H (1.0)
Sediment/Shoreline Stabilization	H (1.0)
Production Export/ Food Chain Support	E (1.0)
Groundwater Discharge/Recharge	H (1.0)
Uniqueness	H (0.9)
Recreation/Education Potential	M (0.1)
Actual Points / Possible Points	**9.7/11**
% of Possible Score Achieved	**88.2**
Overall Category	**I**
Acreage of Assessed Aquatic Habitats	**51.7**
Functional Units (acreage x actual points)	**501.49**

[1]Berglund and McEldowney 2008.

3.7. Photo Documentation

Ten photo points were initially established in the project area in 2015. In addition to established photo points, photographs were taken at each surveyed stream cross-section, each sampled data point, and at each end of the vegetation transects (T-1, T-2, and T-3) in 2015. The locations of these photographs are illustrated on Figure 2 in Appendix A. The 2015 photos are provided in Appendix C.

3.8. Stream Monitoring Results

3.8.1. Channel Cross-Sections

Several channel parameters were calculated based on the survey results at each cross section, including bankfull width, maximum depth, cross sectional area, mean depth, and width/depth ratio (Table 9). Each surveyed cross section was plotted to determine these parameters, with plots illustrated at a 1:1 vertical/horizontal scale included in Appendix D. In addition, the sinuosity of each constructed channel reach was calculated by digitizing the new channel centerline from aerial photos, and dividing the centerline length by the valley length of each reach. The following section describes each reconstructed stream reach within the mitigation site.

Schrieber Creek, Reach 1

Reach 1 of Schrieber Creek was constructed through a dry former hayfield, and is considered an ephemeral stream reach. The mitigation plan states this channel segment will be constructed to a Rosgen B/C configuration, which typically exhibit moderate width/depth ratios >12 and moderate to high sinuosities >1.2. Survey results at two cross sections within Reach 1 indicated width/depth ratios of 8.4 and 10.4, which are more typical of Rosgen E-type channels. Bankfull widths at these two cross sections were 10.9 and 11.2 feet, which fell within the range specified for channel width within the design for Reach 1. The channel sinuosity is 1.1, indicating a relatively straight channel alignment as compared to typical B and C channel types.

Schrieber Creek, Reach 2A

Reach 2 of Shrieber Creek continues through the dry, former hayfield and is considered an ephemeral stream reach. The mitigation plan indicates Reach 2A of Schrieber Creek will be constructed with a Rosgen C-type channel configuration, which typically exhibit width/depth ratios >12 and sinuosity >1.2. One cross section was surveyed through Reach 2A, and indicated a width/depth ratio of 11.0. This width/depth ratio is considered low for a C-type channel, and is more indicative of an E-type channel. The bankfull channel width surveyed at this cross section was 11.7 feet, which fell within the range specified in the design for Reach 2A. The sinuosity of the channel through Reach 2A is 1.1, which is also considered low for a C-type stream.

Schrieber Creek, Reach 2B
Reach 2B is a short, 130-foot channel segment that remains within the ephemeral reach of Schrieber Creek. The mitigation plan proposes a Rosgen A/B channel type through Reach 2B as the creek transitions from the upper to the lower hay fields. The width/depth ratios calculated for the two cross sections surveyed in Reach 2B (9.4 and 7.5) are indicative of Rosgen A-type channels, which have width/depth ratios below 12 and are usually dominated by rocky step-pool features. The sinuosity of the reach is 1.0, which is also indicative of an A-type channel. Bankfull widths surveyed in this reach (13.2 and 12.5 feet) fell within the range of widths specified in the project design for Reach 2B.

Schrieber Creek, Reach 3
Reach 3 of Schrieber Creek runs across the lower hay meadow, and appears to have perennial flows. The mitigation plan states this channel segment will be constructed with a Rosgen E-type configuration, which typically exhibit verly low width/depth ratios <12 and high sinuosities >1.5. Two cross sections were surveyed in Reach 3, and exhibited width/depth ratios indicative of an E-type channel configuration (7.1 and 9.8). Bankfull widths surveyed at these cross sections (14.5 and 16.5 feet) were higher than the widths specified in the design for Reach 3 (10.1 to 11.8 feet). Channel sinuosity through this constructed reach is 1.4, which is considered low for an E-type channel.

Schrieber Creek, Reach 7
The mitigation plan included reactivating a relic segment of Schrieber Creek that had been deactivated following historic efforts to channelize and relocate the creek to improve agricultural production. This reactivated channel segment is considered Reach 7 of Schrieber Creek. One cross section was surveyed in Reach 7, and exhibited dimensions typical of a Rosgen E-type channel flowing through a wet meadow. The cross section surveyed in Reach 7 displayed a lower width/depth ratio (6.5) and bankfull width (7.4 feet) that was approximately half of that surveyed in Reach 3. The cross sectional area of the channel surveyed in Reach 7 was less than one third the area of cross sections surveyed in Reach 3, indicating a much reduced channel capacity as compared to the reconstructed channel reach upstream. Channel sinuosity through reach 7 is 1.7, which is considerably higher than the constructed channel reaches due to the alignment cutting across the valley bottom.

Coyote Creek, Reach 1A
Reach 1 of Coyote Creek was designed as a perennial, Rosgen E-type channel through the lower hay meadow. Two cross sections were surveyed within Reach 1 of Coyote Creek, and displayed very low width/depth ratios indicative of an E-type channel. Cross section CC1A-1 displayed a bankfull width (10.2 feet) higher than the range of design widths specified for Reach 1 (6.6 - 8.2 feet). Channel sinuosity through Reach 1A is 1.8, which falls within the range often observed in E-type channels.

Coyote Creek, Reach 1B

Reach 1B of Coyote Creek is the reactivated original stream channel that runs through the lower hay meadow. One cross section was surveyed through this reach, which displayed a width/depth ratio typical for a Rosgen E-type channel. The bankfull width of this channel cross section was 11.4 feet. The alignment of the channel through Reach 1B is relatively straight with a sinuosity of 1.1.

Table 9. Surveyed cross section parameters at Schrieber Lake, 2015.

Channel Segment	Reach	Cross Section	Bankfull Width (ft)	Maximum Depth (ft)	XS Area (ft^2)	Mean Depth (ft)	W/D ratio
Schreiber Creek	1	SC1-1	11.0	2.0	14.3	1.3	8.4
		SC1-2	11.2	1.6	12.1	1.1	10.4
	2A	SC2A-1	11.6	1.6	12.4	1.1	11.0
	2B	SC2B-1	13.2	2.4	18.5	1.4	9.4
		SC2B-2	12.5	2.4	20.8	1.7	7.5
	3	SC3-1	14.5	2.6	29.9	2.1	7.0
		SC3-2	16.6	2.9	27.8	1.7	9.8
	7	SC7	7.4	2.0	8.5	1.1	6.5
Coyote Creek	1A	CC1A-1	10.2	2.4	13.6	1.3	7.7
		CC1A-2	7.5	1.8	11.3	1.5	5.0
	1B	SC1B	11.4	2.6	19.5	1.7	6.7

3.8.2. Bank Pins

Bank pins were installed perpendicular to each monitoring cross section to document lateral movement of the channel over time. The bank pins have not yet been subjected to eroding flows as they are recently installed. Lateral erosion rates will be documented in subsequent years' monitoring reports by measuring the length of bank pins exposed each year.

3.8.3. Vegetation Monitoring at Perpendicular Belt Transects

Results of the vegetation inventory within the perpendicular belt transects are summarized in Table 10. Total percent cover within the riparian buffer along Schrieber Creek was 82%, while the percent cover from noxious weeds was 8%. Riparian buffer success criteria require a minimum of 50% cover of beneficial plant species by the end of the monitoring period with 5% or less cover of noxious weeds. Vegetation composition within the riparian buffer along Schrieber Creek is currently meeting the target for total percent cover; but does not meet the target of 5% or less by noxious weeds. Noxious weeds were more prevalent along Reaches 1, 2A, and 2B of Schrieber Creek.

Total percent cover along the riparian belt transects established at Coyote Creek was 100%, with 2% cover of noxious weeds. The reconstructed segments of Coyote Creek flow through a densely vegetated wet meadow. These results

indicate the success criteria for percent cover and noxious weeds are currently being met along Coyote Creek.

Table 10. Results of vegetation inventory within perpendicular belt transects, 2015.

New Channel Segment	Cross Section	Belt Transect Length (ft)	Total Percent Cover	Percent Noxious Weed Cover
Schrieber Creek	SC1-1	200	90%	8%
	SC1-2	200	88%	10%
	SC2A-1	200	65%	15%
	SC2A-2	200	75%	5%
	SC2B-1	150	75%	5%
	SC3-1	50	100%	0%
	SC3-2	50	100%	0%
	SC7	50	100%	0%
	Subtotal - Schrieber Creek		82%	8%
Coyote Creek	CC1A-1	100	100%	3%
	CC1A-2	100	100%	0%
	CC1B-1	75	100%	3%
	Subtotal - Coyote Creek		100%	2%

3.8.4. Vegetation Monitoring at Parallel Belt Transects

Percent Vegetation Cover

Results of the percent vegetation cover within the parallel belt transects at each cross section are provided in Table 11. The parallel belt transects differ from the perpendicular belt transects, in that they provide data on how well the stream banks are vegetating as opposed to the riparian buffer. Vegetation establishment along the banks of Schrieber Creek is below 50% in Reaches 1, 2A, and 2B where the new banks were constructed using coir wrapped soil lifts and the channel is ephemeral. Vegetation along the banks of Reaches 3 and 7 of Schrieber Creek are well vegetated, as these reaches were constructed through a densely vegetated wet meadow, which precluded the need to build coir soil lifts along the banks.

Coyote Creek was also constructed through a vegetated wet meadow, which precluded the need to install coir wrapped soil lifts along the banks. Results of the parallel belt transects indicate the stream banks along Coyote are well vegetated, with 100% cover observed at each cross section.

Table 11. Results of vegetation inventory within parallel belt transects, 2015.

New Channel Segment	Cross Section	% Cover Left Bank	% Cover Right Bank	Total % Cover
Schrieber Creek	SC1-1	15%	15%	15%
	SC1-2	20%	35%	28%
	SC2A-1	65%	30%	48%
	SC2A-2	20%	50%	35%
	SC2B-1	30%	15%	23%
	SC3-1	100%	100%	100%
	SC3-2	100%	100%	100%
	SC7	100%	100%	100%
	Subtotal - Schrieber Creek	56%	56%	56%
Coyote Creek	CC1A-1	100%	100%	100%
	CC1A-2	100%	100%	100%
	CC1B-1	100%	100%	100%
	Subtotal - Coyote Creek	100%	100%	100%

Table 12 provides an area-weighted percent cover for perpendicular (riparian) and parallel (stream bank) belt transects combined. The combined percent cover of all belt transects along Schrieber Creek is currently 78% and 100% along Coyote Creek. The riparian buffer vegetation success criteria requires at least 70% of the combined aerial cover of riparian and stream bank vegetation; therefore both of the reconstructed channel segments are currently meeting this standard when results for all cross sections are combined. Results at cross sections SC2A-1 and SC2B-1 indicated a total weighted percent cover below 70%, which was primarily due to sparse vegetation along the coir wrapped steam banks. Vegetation is expected to continue establishing along the banks of the upper, ephemeral reaches of Schrieber Creek during the upcoming growing seasons.

Table 12. Combined cover for riparian and stream bank vegetation transects, 2015.

Channel Segment	Cross Section	Perpendicular Transect Length (ft)	Perpendicular Transect Total % Cover	Parallel Transect Length (Right Bank + Left Bank)	Parallel Transect Total % Cover	Total Weighted % Cover
Schrieber Creek	SC1-1	200	90%	50	15%	82%
	SC1-2	200	88%	50	28%	81%
	SC2A-1	200	65%	50	48%	63%
	SC2A-2	200	75%	50	35%	71%
	SC2B-1	150	75%	50	23%	68%
	SC3-1	50	100%	50	100%	100%
	SC3-2	50	100%	50	100%	100%
	SC7	50	100%	50	100%	100%
	Subtotal Schrieber Creek		**82%**		**56%**	**78%**
Coyote Creek	CC1A-1	100	100%	50	100%	100%
	CC1A-2	100	100%	50	100%	100%
	CC1B-1	75	100%	50	100%	100%
	Subtotal Coyote Creek		**100%**		**100%**	**100%**

Stream Bank Vegetation

Success criteria for channel restoration requires a majority of species along the banks to have a bank stability index of 6 or higher using ratings provided by Winward (2000). Stability ratings provided by Winward (2000) are provided for vegetation communities rather than for individual species; therefore, in order to utilize the Winward (2000) ratings, vegetation communities at each monitoring cross section were assigned. Vegetation communities were assigned by identifying the two dominant vegetation species within the parallel belt transect.

Table 13 includes the vegetation community identified at each cross section and the bank stability rating provided for that community (Winward 2000). The upper, ephemeral reaches of Schrieber Creek, including Reach 1, 2A, and 2B are recently constructed and thus have not fully revegetated yet. These reaches are dominated by bare ground. As a result, stability ratings for these reaches do not meet the success criteria. All reconstructed channel segments that occurred through the vegetated meadow area of the project site are dominated by reed canary grass communities, which have a bank stability rating of 9. These reaches include Schrieber Creek Reaches 3 and 7, and Coyote Creek Reaches 1A and 1B.

Table 13. Vegetation communities identified at each monitoring cross section.

Channel Segment	Monitoring Cross Section	Dominant Stream Bank Community	Community Type Stability Rating
Schrieber Creek	SC1-1	Bare Ground	1
	SC1-2	Bare Ground	1
	SC2A-1	Bare Ground/Bromus inermis	1
	SC2A-2	Bare Ground	1
	SC2B-1	Bare Ground	1
	SC3-1	Phalaris arundinacea	9
	SC3-2	Phalaris arundinacea	9
	SC7	Phalaris arundinacea	9
Coyote Creek	CC1A-1	Phalaris arundinace/Carex simulata	9
	CC1A-2	Phalaris arundinacea	9
	CC1B-1	Phalaris arundinacea	9

Woody Vegetation Survival

Planted woody vegetation was assessed within each parallel belt transect at each cross section to determine survival rates (Table 14). Of the planted woody vegetation observed, 79% remained alive along Schrieber Creek and 43% remained alive along Coyote Creek. Overall, 71% of planted vegetation observed within the belt transects has survived. Performance criteria established for planted vegetation within the mitigation site requires a minimum of 50% survival after 5 years. Planted vegetation along Schrieber Creek is currently meeting this standard; however the woody plantings along Coyote Creek do not. Due to the low number of planted shrubs located along the three monitoring cross sections at Coyote Creek, it may be advantageous to include additional cross sections in the survival assessment to increase the number of plants included in the survival assessment.

Table 14. Planted vegetation survival rates at Schrieber Lake, 2015.

Stream Bank Cross Section	Alive	Dead	Total	% Survival
SC1-1	4	5	9	44%
SC1-2	7	1	8	88%
SC2A-1	6	0	6	100%
SC2A-2	5	0	5	100%
SC2B-1	0	0	0	N/A
SC3-1	0	0	0	N/A
SC3-2	0	0	0	N/A
SC7	0	0	0	N/A
Subtotal - Schrieber Creek	**22**	**6**	**28**	**79%**
CC1A-1	2	4	6	33%
CC1A-2	0	0	0	N/A
CC1B-1	1	0	1	100%
Subtotal - Coyote Creek	**3**	**4**	**7**	43%
Total	**25**	**10**	**35**	**71%**

3.9. Maintenance Needs

Two nest boxes were installed at the site and were in good repair and were occupied. Noxious weed management will be an ongoing issue at this site. MDT completed noxious weed spraying at the Schrieber Lake site on July 20th, 2015. No other maintenance needs were identified. Priority 2B noxious weeds identified within the Schrieber Lake mitigation site included spotted knapweed (*Centaurea stoebe*), Canada thistle (*Cirsium arvense*), Gypsy-flower (*Cynoglossum officinale*), St. Johnswort (*Hypericum perforatum*), oxeye daisy (*Leucanthemum vulgare*), dalmatian toadflax (*Linaria dalmatica*), whitetop (*Lepidium draba*), and yellow toadflax (*Linaria vulgaris*). A total of 38 infestation areas were mapped in 2015, ranging in size from less than 0.1 acre to greater than 1 acre in size. The most common weed species found on the site were yellow toadflax (7), spotted knapweed (9), and Canada thistle (17) (Figure 3, Appendix A).

3.10. Current Credit Summary

Wetland Mitigation Credit

It is anticipated that a total of approximately 13.4 wetland credit acres will be generated from the full build-out of the Schrieber Lake project. Proposed mitigation credits from the 2014 Schrieber Lake Mitigation Plan included the creation of 3.06 wetland acres, re-establishment of 2.53 wetland acres, enhancement of 4.53 acres of the fen-carr shrubland expansion, preservation of 25.6 acres of existing fen-carr Carex areas, and the creation of a 50 foot upland buffer (3.81 acres).

Table 15 summarizes the estimated wetland credits based on the pending USACE-approved credit ratios and the wetland delineation completed in July 2015. The 2015 wetland delineation indicates that when Schreiber Lake, riparian

buffer and other uncreditable areas, 37.65 acres of wetland habitat exist within the mitigation site. The wetland acreages delineated in 2015 included 4.8 acres of created wetland, 2.42 acres of re-established wetlands, 4.77 acres of enhanced wetlands, 25.66 acres of preserved wetlands, and 8.42 acres of upland buffer. The 2015 estimated credit acres for this site have exceeded the proposed credit acres. A total of 16.09 credit acres have developed at this site following mitigation construction.

Table 15. Summary of Wetland Credits at the Schrieber Lake Wetland Mitigation Site in 2015.

Mitigation Type	Total Proposed Acreage	Ratio +	Proposed Credit Acres	2015 Delineated Acreage	2015 Credit Acres
Creation	3.06	1:1	3.06	4.80	4.80
Restoration (Re-establishment)	2.53	1.5:1	1.69	2.42	1.62
Enhancement areas- Carr Shrubland expansion	4.53	3:1	1.51	4.77	1.59
Preservation-Existing Fen-Carr-Carex Areas	25.60	4:1	6.40	25.66	6.42
Upland Buffer (50 feet)*	3.81	5:1	0.76	8.42	1.68
Permanent Project Impacts	0.20	None	-0.20	-0.02	-0.02
Total Mitigation Acreage	**39.51**		**13.40**	**46.05**	**16.09**

*Assuming a standard 50 foot upland buffer around the perimeter of the delineated wetland.

**No credits are being requested for the existing Schrieber Lake.

***Riparian buffer areas used to calculate stream and riparian credits.

Wetland acreages within riparian buffer subracted from wetland credit total; riparian buffer does not include upland buffer acreage.

+ Ratios utilized are from Column A of the Montana Regulatory Program Wetland Compensatory Mitigation Ratios April, 2005.

The current site conditions documented in 2015 are compared to the approved performance standards and success criteria in Table 16. The wetlands delineated in 2015 met the performance standards approved for this site, which included meeting the three parameter criteria for hydrology, vegetation, and soils. Hydrophytic vegetation success has been achieved based on the absolute cover of facultative or wetter species being greater than or equal to 70 percent. The open water area of Schrieber Lake were given no credit based on the stated goal of the project to maintain already existing open water in Schrieber Lake. Weed cover site wide and within the upland buffers did exceed 5 percent and did not met the success criteria. Isolated weed infestations were mapped throughout the mitigation site and are controlled by MDT as mandated by the performance standards. The upland buffer success criteria have not been achieved as these areas have at least 50 percent aerial cover of non-weed species and noxious weeds do exceed 5 percent cover.

Table 16. Summary of Performance Standards and Success Criteria at Schrieber Lake in 2015.

Performance Standards	Success Criteria	Criteria Achieved Y/N	Discussion
Wetland Characteristics	Meet the three parameter criteria for hydrology, vegetation, and soils as outlined in the 1987 Wetland Delineation Manual and 2010 Mountains, Valleys, Coast Region.	Y	Areas identified as wetland habitat within the mitigation site meet the three parameter criteria.
Wetland Hydrology	Soil saturation present for at least 12.5 percent of the growing season.	Y	Areas identified as wetland habitat within the mitigation site exhibit soil saturation for a minimum 12.5 percent of growing season.
Hydric Soil	Hydric soil conditions present or appear to be forming.	Y	Hydric soil characteristics have developed throughout a majority of the constructed wetlands.
	Soil is sufficiently stable to prevent erosion.	Y	Disturbed soil is stable and does not exhibit signs of erosion.
	Soil is able to support plant cover.	Y	Plant cover is well-established across disturbed soils.
Hydrophytic Vegetation	Achieved where combined absolute cover of facultative or wetter species is ≥70 percent	Y	Areas identified as wetland habitat within the mitigation site support a prevalence of hydrophytic vegetation (OBL, FACW, and FAC).
	Montana State-listed noxious weeds do not exceed 5 percent absolute cover.	Y	Montana State-listed noxious weeds is estimated well below 5 percent absolute cover within wetland areas.
	Woody plants exceed 50% survival after 5 years.	N	It has only been 1 year since construction.
Open Water	It is the intent of the project to provide open water during the spring and early summer within excavated depressions. Open water with emergent, submerged and/or floating vegetation will therefore be considered successful and creditable.	Y	Excavated depression within the upper reach of the site site experience seasonal drawdown and rooted hydrophytic vegetation development has been observed; the lower depressions appear to support perennial inundation with established aquatic macrophyte community.
Channel Restoration Success	Revegetation along the new Coyote and Schrieber Creek channel corridors will be considered successful when banks are vegetated with a majority of deep-rooting riparian and wetland herbaceous and woody plant species with a root stability indexes greater than 6.	N	Three of the five reaches of Schrieber Creek are ephemeral in nature and have yet to develop vegetation along the banks. As a result, these reaches (SC1, SC2A, and SC2B) do not currently meet the performance criteria. The downstream reaches of Schrieber Creek (Reaches SC3, and SC7) and both reaches of Coyote Creek (CC1A and CC1B) are dominated by reed canary grass, which has a root stability index of 9.
	New stream channels will be allowed to naturally migrate within the established floodplain/riparian areas and to give it enough room to move and stabilize itself within the site	Y	No lateral migration has been documented along either Schrieber or Coyote Creek to date.
Bank Restoration Success	Rates of success will be determined by the following rates: i.) Rate of less than 0.5 ft of erosion annually= Functioning ii.) Rate of less than 1.0 ft /year = Functioning ii.) Rate of less then 1.5 feet/year = Functioning at Risk iv.) Rate of less than 2.5 ft/yr = Functioning at Risk v.)Rate of greater than 2.5 ft/year= Functioning at Risk or Not Functioning vi.)Rate of less than 3 ft/year = Not Functioning	N/A	Baseline data collected during 2015 monitoring event; no lateral migration documented yet
	Ratings for the streambank will be based upon the Proper Functiong Condition rating that determine if the area is supporting a healthy and stable bank area adjacent to the stream: I.) Funtioning - supporting a healthy and stable bank area adjacent to the river. ii.) Functioning at Risk - One of more functions of the streambank are adjusting to changes in the design within the reach area, more monitoring needed. ii.) Not Functioning - Measurements of the functions indicate that the site is not achieving functional goals and is not supporting a healthy and stable bak reach.	N/A	Will be collected during the third and fifth monitoring years
Riparian Buffer Success	Creditable buffer areas must have at least 50 percent aerial cover of non-noxious weed species by the end of the monitoring period.	Y	All riparian vegetation transects exhibited 50% or greater areal cover of non-noxious weed species along both Schrieber and Coyote Creek
	Achieved where combined aerial cover of riparian and stream bank vegetation communities is ≥70 percent.	Y*	Combined areal cover of riparian and stream bank vegetation along Schrieber Creek is 56%; however two cross sections indicated a total weighted percent cover below 70%. Combined areal cover of riparian and stream bank vegetation along Coyote Creek is 100%.
	Noxious weeds do not exceed 5 percent cover within the riparian buffer areas.	Y*	Noxious weed cover along Schrieber Creek is estimated at 8%. Noxious weed cover along Coyote Creek is 2%.
	Planted trees and shrubs will be considered successful where they exhibit 50 percent survival after 5 years.	Y*	Planted trees and shrubs along Schrieber Creek exhibit 79% survival to date. Planted trees and shrubs along Coyote Creek exhibit a 43% survival rate to date
Upland Buffer	Noxious weeds do not exceed 5 percent cover within upland buffer area.	N	Noxious weed cover is more than 5 percent within the upland buffer.
	Any area disturbed within creditable buffer zone must have at least 50 percent aerial cover of non-weed species by end of monitoring period.	Y	Disturbed areas have established greater than 50 percent cover by non-weed species.
Weed Control	Will be based upon annual monitoring of the site to determine weed species and degree of infestation within the site, and control measures based upon the monitoring results will be implemented by MDT to minimize and/or eliminate the intrusion of State Listed Noxious weed species within the site.	Y	State-listed noxious weed species across the site have been monitored and mapped during each post-construction monitoring event. MDT administers an on-going weed-control program.

* The majority of monitoring transects met performance criteria for this category

Stream Mitigation Credit

The goal of the stream mitigation component of the Schrieber Lake project includes the restoration of approximately **2,130 linear feet** of Schrieber Creek, **1,397 feet** of Coyote Creek, and **978 feet** of Schrieber Creek below the Schrieber / Coyote Creek confluence, resulting in an overall increase of **3,108 linear feet** of stream length. When combined with establishment and protection of a riparian buffer of varying width on both sides of the restored channels, the project is expected to generate a total of **36,741.87** stream and riparian credits (Table 17). The stream mitigation project has been separated into seven distinct reaches, including:

1. **Coyote Creek, Reach 1A**, which involves re-constructing a new channel through the lower hay meadow between the MDT-owned Schrieber Meadows property line to its confluence with an existing, relic segment of Coyote Creek (974.5 feet),

2. **Coyote Creek, Reach 1B**, which consists of a relic segment of Coyote Creek that has been reactivated as a result of this project (423.0 feet),

3. **Schrieber Creek, Reach 1**, which consists of a newly constructed channel configuration extending from the existing channel downstream to Reach 2A (531.6 feet),

4. **Schrieber Creek, Reach 2A**, which consists of a newly constructed channel configuration extending from the downstream end of Reach 1 to the upstream end of Reach 2B (544.5 feet),

5. **Schrieber Creek, Reach 2B**, which consists of a newly constructed channel configuration that transitions between Reach 2A and Reach 3 (121.4 feet),

6. **Schrieber Creek, Reach 3**, which consists of a newly constructed channel configuration that extends from Reach 2B to the confluence with Coyote Creek (932.9 feet),

7. **Schrieber Creek, Reach 7**, which consists of a relic channel that extends from the confluence of Schrieber and Coyote Creeks to Schrieber Lake (978 feet).

Table 17. Anticipated riparian and stream credits generated from the Schrieber Lake Mitigation Site.

Channel Segment	Reach	Side	Predicted Credits
Coyote Creek	1A	A	4,141.63
		B	4,141.63
	1B	A	1,586.25
		B	1,692.00
Schrieber	1	A	2,392.20
		B	2,392.20
	2A	A	2,722.50
		B	2,722.50
	2B	A	576.65
		B	576.65
	3	A	3,964.83
		B	3,964.83
	7	A	2,934.00
		B	2,934.00
Total			**36,741.87**

This 2015 monitoring report for the Schrieber Lake Mitigation Site provides a first year, baseline assessment of the site's condition less than one year following the project's completion. As a result of the relatively short timeframe between the completion of the project and the first monitoring event, much of the area had yet to revegetate, particularly in the ephemeral upper reaches of Schrieber Creek that were constructed through upland meadows. Reaches 1, 2A, and 2B of Schrieber Creek have yet to meet performance criteria established for 1) the establishment of bank-stabilizing vegetation communities, and 2) percent cover of noxious weeds within the riparian corridor. Reaches 3 and 7 of Schrieber Creek and Reaches 1A and 1B of Coyote Creek are currently meeting all success criteria, and are expected to generate the predicted credits outlined in the monitoring plan. Future monitoring of the site will determine whether vegetation establishment within Reaches 1, 2A and 2B of Schrieber Creek results in achieving the success criteria and generation of all anticipated credits.

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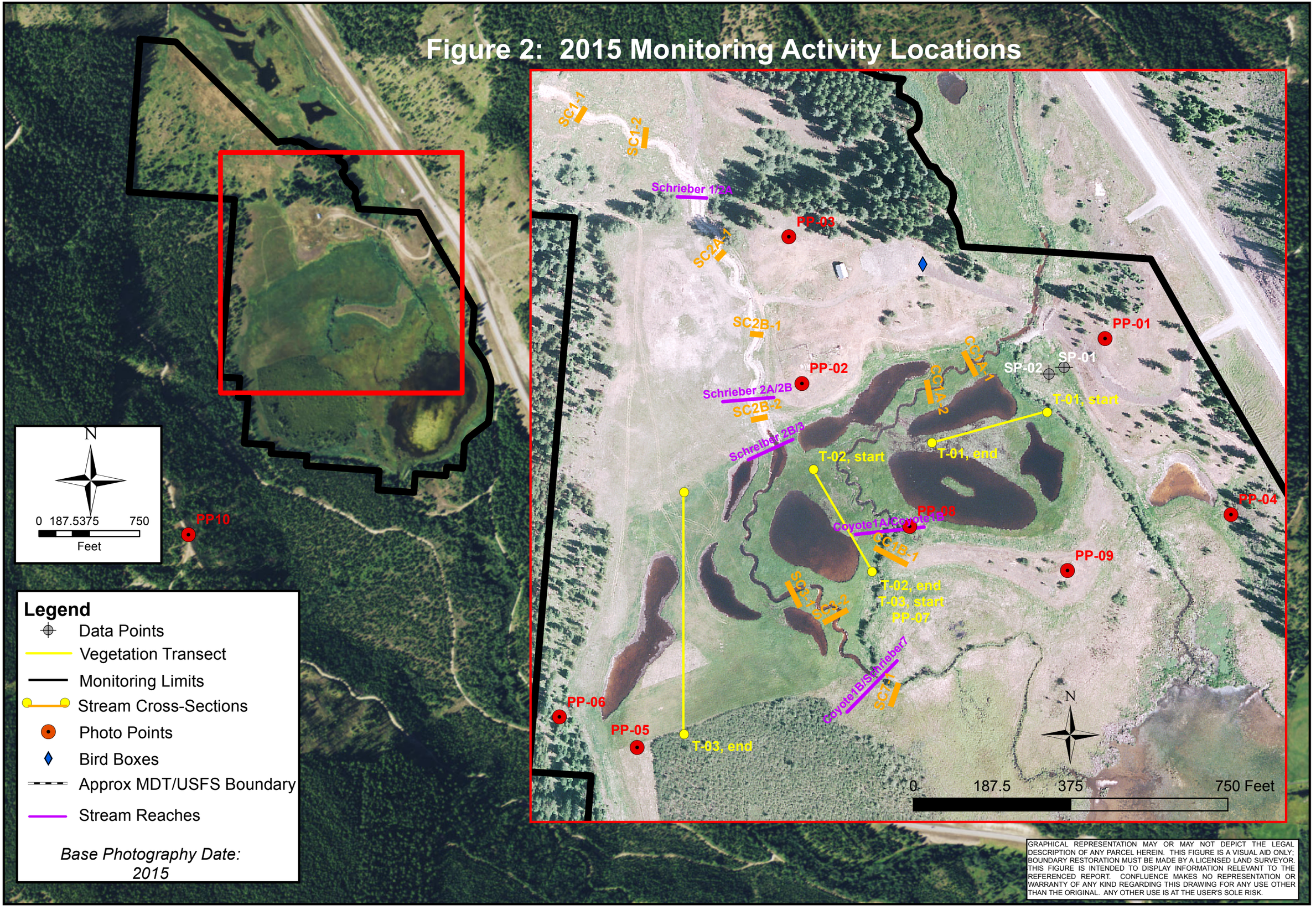
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Appendix A

Project Area Maps – Figures 2, 3, and 4

MDT Wetland Mitigation Monitoring
Schrieber Lake
Lincoln County, Montana

Figure 2: 2015 Monitoring Activity Locations



Legend

- Data Points
- Vegetation Transect
- Monitoring Limits
- Stream Cross-Sections
- Photo Points
- Bird Boxes
- Approx MDT/USFS Boundary
- Stream Reaches

Base Photography Date: 2015

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. CONFLUENCE MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

LOCATION: Lincoln Co., MT

PROJECT NO: NH 27(021)

FILE: SchrieberLK/Monitor2015.mxd

Project Name: Schrieber Lake Mitigation Site

Drawing Title: 2015 Monitoring Activity Locations

DRAWN	CHECKED	APPROVED
JJ	JJ	JJ

SCALE: As Shown

Drawn: October 16, 2015

PROJ MGR: J Johnson

CONFLUENCE consulting incorporated

Figure 2

REV -

Figure 3: 2015 Mapped Site Features

Acreages

Project Area	104.7
Uplands	52.6
Total Wetlands and WUS	52.0
Schreiber Lake	8.26
Stream Channels	1.00
Riparian Buffers	3.9
USFS Wetlands	1.25
Creditable Wetlands	37.65

Vegetation Community Types

1. Elymus/Bromus
2. Betula/Rhamnus
3. Phalaris/Carex
4. Carex/Persicaria
5. Pseudostuga/Larix
6. Salix/Phalaris
7. Alnus/Phalaris
8. Carex utriculata
9. Craetagus/Symphoricarpus
10. Typha/Open Water
11. Open Water/Aquatic Macrophytes
12. Carex lasiocarpa

99 Stream Channel

Legend

- Monitoring Limits
- Wetland Limits
- Vegetation Communities
- Stream Channel

Base Photography Date: 2015

N

0 290 580 1,160

Feet

Noxious Weeds

- Centaurea stoebe
- Cirsium arvense
- Cynoglossum officinale
- Hypericum perforatum
- Leucanthemum vulgare
- Linaria dalmatica
- Linaria vulgaris

Infestation Size

- X = <0.1 acre
- ▲ = 0.1 to 1 acre
- ■ = 1 to 5 acre

Cover Class

- T = Trace (<1% cover)
- L = Low (1-5% cover)
- M = Moderate (6-25% cover)
- H = High (26-100% cover)

LOCATION: Lincoln Co., MT

PROJECT NO: NH 27(021)

FILE: SchreiberLK/Veg2015.mxd

Project Name: Schrieber Lake Mitigation Site

Drawing Title: 2015 Mapped Site Features

DRAWN JJ | CHECKED JJ | APPROVED JJ

SCALE: As Shown

Drawn: October 16, 2015

PROJ MGR: J Johnson

CONFLUENCE consulting incorporated

Figure 3

REV -

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. CONFLUENCE MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

Appendix B

2015 MDT Wetland Mitigation Site Monitoring Form
2015 USACE Wetland Determination Data Forms
2015 MDT Wetland Assessment Forms

MDT Wetland Mitigation Monitoring
Schrieber Lake
Lincoln County, Montana

MDT WETLAND MITIGATION SITE MONITORING FORM

Project Site: Schrieber Lake Assessment Date/Time 7/22/2015

Person(s) conducting the assessment: S. Wall, R. McEldowney

Weather: clear, 55 degrees F at 8 am, light Location: Highway 2, Swamp Creek East

MDT District: Missoula Milepost: 53.8

Legal Description: T 27N R 30W Section(s) 13

Initial Evaluation Date: 5/18/2015 Monitoring Year: 1 #Visits in Year: 2

Size of Evaluation Area: 105 (acres)

Land use surrounding wetland:

US Highway 2, US Forest Service, forested watershed, Plum Creek lands to the south of the site.

HYDROLOGY

Surface Water Source: Schrieber Creek, Coyote Creek, precipitation, groundwater

Inundation: ☑ Average Depth: 2 **(ft)** Range of Depths: 1 - 3 **(ft)**

Percent of assessment area under inundation: 80 %

Depth at emergent vegetation-open water boundary: 1.1 **(ft)**

If assessment area is not inundated then are the soils saturated within 12 inches of surface: Yes

Other evidence of hydrology on the site (ex. – drift lines, erosion, stained vegetation, etc**:**

Groundwater Monitoring Wells

Record depth of water surface below ground surface, in feet.

Additional Activities Checklist:

☑ Map emergent vegetation-open water boundary on aerial photograph.

☑ Observe extent of surface water during each site visit and look for evidence of past surface water elevations (drift lines, erosion, vegetation staining, etc.)

☐ Use GPS to survey groundwater monitoring well locations, if present.

Hydrology Notes:

Water depth refers to ponds, not including Schreiber Lake. 80% innundation does not include the extensive uplands in the northern "panhandle" of the project area.

VEGETATION COMMUNITIES

Site Schrieber Lake

(Cover Class Codes **0** = < 1%, **1** = 1-5%, **2** = 6-10%, **3** = 11-20%, **4** = 21-50% , **5** = >50%)

Community # 1 **Community Type:** Elymus repens / Bromus inermis **Acres** 30

Species	Cover class	Species	Cover class
Achillea millefolium	1	Agrostis stolonifera	1
Alopecurus pratensis	1	Antennaria sp.	0
Apocynum androsaemifolium	0	Arctostaphylos uva-ursi	0
Berberis repens	0	Bromus inermis	3
Carex inops	0	Centaurea stoebe	1
Cirsium arvense	0	Crataegus douglasii	0
Cynoglossum officinale	0	Elymus repens	4
Larix occidentalis	0	Lepidium draba	0
Leucanthemum vulgare	0	Linaria dalmatica	0
Linaria vulgaris	0	Pascopyrum smithii	3
Penstemon sp.	0	Phalaris arundinacea	1
Phleum pratense	3	Pinus contorta	0
Pinus ponderosa	0	Poa compressa	3
Poa pratensis	1	Pseudoroegneria spicata	1
Pseudotsuga menziesii	1	Rumex acetosella	0
Shepherdia canadensis	0	Stipa viridula	0
Thlaspi arvense	0	Trifolium aureum	0
Verbascum thapsus	0		

Comments:

Community # 2 **Community Type:** Betula pumila / Rhamnus alnifolia **Acres** 10.7

Species	Cover class	Species	Cover class
Betula pumila	5	Carex sp.	2
Comarum palustre	1	Moss	5
Persicaria amphibia	1	Phalaris arundinacea	0
Pinus contorta	0	Rhamnus alnifolia	2
Salix boothii	1	Salix candida	1
Salix sp.	0	Symphyotrichum spathulatum	0

Comments:

Community # 3 **Community Type:** Phalaris arundinacea / Carex sp. **Acres** 9.2

Species	Cover class	Species	Cover class
Agrostis scabra	2	Algae, green	0
Alopecurus pratensis	1	Bare Ground	0
Carex aquatilis	1	Carex simulata	5
Carex sp.	1	Comarum palustre	0
Deschampsia caespitosa	0	Geum macrophyllum	0
Gnaphalium palustre	0	Juncus nodosus	0
Juncus tenuis	0	Lemna minor	1
Linaria vulgaris	0	Moss	1
Open Water	1	Persicaria amphibia	1
Phalaris arundinacea	5	Poa sp.	0
Potentilla norvegica	0	Scutellaria galericulata	0
Symphyotrichum spathulatum	1	Taraxacum officinale	0

Comments:

Community # 4 **Community Type:** Carex simulata / Persicaria amphibia **Acres** 2.8

Species	Cover class	Species	Cover class
Agrostis scabra	2	Betula pumila	0
Carex aquatilis	3	Carex bebbii	0
Carex nebrascensis	1	Carex simulata	5
Carex utriculata	2	Comarum palustre	1
Geum macrophyllum	1	Juncus nodosus	0
Moss	2	Persicaria amphibia	3
Phalaris arundinacea	1	Potentilla norvegica	1
Potentilla norvegica	1	Salix geyeriana	0
Symphyotrichum spathulatum	1		

Comments:

Community # 5 **Community Type:** Pseudotsuga menziesii / Larix occidentalis **Acres** 21.9

Species	Cover class	Species	Cover class
Abies grandis	2	Achillea millefolium	0
Alnus incana	1	Amelanchier alnifolia	1
Arctostaphylos uva-ursi	2	Berberis repens	1
Bromus inermis	2	Calamagrostis rubescens	1
Campanula rotundifolia	0	Carex geyeri	3
Centaurea stoebe	2	Cirsium arvense	0
Cornus canadensis	0	Crataegus douglasii	1
Elymus glaucus	2	Fragaria virginiana	1
Hypericum perforatum	0	Larix occidentalis	4
Maianthemum stellatum	2	Phleum pratense	0
Pinus contorta	4	Pinus monticola	2
Pseudotsuga menziesii	4	Rosa woodsii	1
Symphoricarpos albus	2	Taraxacum officinale	0
Vaccinium sp.	1		

Comments:

Upland forested community.

Community # 6 **Community Type:** Salix bebbiana / Phalaris arundinacea **Acres** 0.8

Species	Cover class	Species	Cover class
Alnus incana	1	Crataegus douglasii	1
Persicaria amphibia	1	Phalaris arundinacea	5
Salix bebbiana	5		

Comments:

Community # 7 **Community Type:** Alnus incana / Phalaris arundinacea **Acres** 0.4

Species	Cover class	Species	Cover class
Alnus incana	5	Cirsium arvense	0
Persicaria amphibia	1	Phalaris arundinacea	5

Comments:

Community # 8 **Community Type:** Carex utriculata / **Acres** 10.7

Species	Cover class	Species	Cover class
Carex aquatilis	1	Carex utriculata	4
Persicaria amphibia	1	Phalaris arundinacea	1
Salix bebbiana	1	Salix candida	1
Salix sp.	1		

Comments:

Community # 9 Community Type: Crataegus douglasii / Symphoricarpos albus **Acres** 0.5

Species	Cover class	Species	Cover class
Achillea millefolium	0	Alopecurus pratensis	1
Cirsium arvense	2	Crataegus douglasii	5
Cynoglossum officinale	0	Dactylis glomerata	0
Elymus trachycaulus	1	Galium triflorum	0
Geum macrophyllum	0	Lepidium draba	0
Phalaris arundinacea	2	Symphoricarpos albus	4
Taraxacum officinale	0	Urtica dioica	0

Comments:

Riparian thicket.

Community # 10 Community Type: Typha latifolia / Open Water **Acres** 2.8

Species	Cover class	Species	Cover class
Comarum palustre	4	Open Water	4
Typha latifolia	5		

Comments:

Fringes Schreiber Lake.

Community # 11 Community Type: Open Water / Aquatic macrophytes **Acres** 15.4

Species	Cover class	Species	Cover class
Aquatic macrophytes	4	Open Water	5
Persicaria amphibia	3		

Comments:

Community # 12 Community Type: Carex lasiocarpa / **Acres** 1.3

Species	Cover class	Species	Cover class
Carex aquatilis	2	Carex lasiocarpa	5
Carex utriculata	1	Phalaris arundinacea	2
Typha latifolia	1		

Comments:

Total Vegetation Community Acreage **106.5**

(Note: some area within the project bounds may be open water or other non-vegetative ground cover.)

VEGETATION TRANSECTS

Site: Schrieber Lake Date: 7/22/2015

Transect Number: 1 **Compass Direction from Start:** 251

Interval Data:

Ending Station 15 **Community Type:** Alnus incana / Phalaris arundinacea

Species	Cover class	Species	Cover class
Cirsium arvense	0	Phalaris arundinacea	5

Ending Station 93 **Community Type:** Phalaris arundinacea / Carex sp.

Species	Cover class	Species	Cover class
Carex simulata	5	Persicaria amphibia	1
Phalaris arundinacea	5	Poa sp.	0

Ending Station 101 **Community Type:** Open Water / Aquatic macrophytes

Species	Cover class	Species	Cover class
Aquatic macrophytes	0	Open Water	5
Persicaria amphibia	3		

Ending Station 384 **Community Type:** Phalaris arundinacea / Carex sp.

Species	Cover class	Species	Cover class
Algae, green	0	Bare Ground	2
Carex simulata	4	Lemna minor	0
Open Water	2	Persicaria amphibia	5
Phalaris arundinacea	5		

Transect Notes:

Transect Number: 2 **Compass Direction from Start:** 152

Interval Data:

Ending Station 253 **Community Type:** Phalaris arundinacea / Carex sp.

Species	Cover class	Species	Cover class
Agrostis scabra	0	Alopecurus pratensis	0
Bare Ground	0	Carex simulata	4
Carex sp.	4	Persicaria amphibia	4
Phalaris arundinacea	4		

Ending Station 280 **Community Type:** Salix bebbiana / Phalaris arundinacea

Species	Cover class	Species	Cover class
Persicaria amphibia	1	Phalaris arundinacea	5

Transect Notes:

Standing water >1 inch in places.

Transect Number: 3 **Compass Direction from Start:** 175

Interval Data:

Ending Station 35 **Community Type:** Elymus repens / Bromus inermis

Species	Cover class	Species	Cover class
Bromus inermis	5	Phalaris arundinacea	5

Ending Station 247 **Community Type:** Phalaris arundinacea / Carex spp.

Species	Cover class	Species	Cover class
Agrostis scabra	2	Alopecurus pratensis	1
Carex aquatilis	1	Carex simulata	5
Carex sp.	1	Comarum palustre	0
Geum macrophyllum	0	Persicaria amphibia	0
Phalaris arundinacea	5	Potentilla norvegica	0
Symphyotrichum spathulat	1	Taraxacum officinale	0

Ending Station 584 **Community Type:** Carex simulata / Persicaria amphibia

Species	Cover class	Species	Cover class
Agrostis scabra	2	Betula pumila	0
Carex aquatilis	3	Carex nebrascensis	1
Carex simulata	5	Comarum palustre	1
Geum macrophyllum	1	Juncus nodosus	0
Moss	2	Persicaria amphibia	3
Phalaris arundinacea	1	Potentilla norvegica	1
Symphyotrichum spathulat	0		

Transect Notes:

PLANTED WOODY VEGETATION SURVIVAL

Schrieber Lake

Planting Type	#Planted	#Alive	Notes
Various woodies	1500		shrub survival was approximately 67%, based on a tally of plantings around pond 7

Comments

Schrieber Lake

WILDLIFE

Birds

Were man-made nesting structures installed? Yes

If yes, type of structure: Bird Boxes

How many? 2

Are the nesting structures being used? Yes

Do the nesting structures need repairs? No

Nesting Structure Comments:
Two bird boxes were in good repair and were occupied by unidentified species.

Species	#Observed	Behavior	Habitat
American Robin	2		SS, UP, WM,
Barn Swallow	1		UP, WM,
Black-billed Magpie	1		SS, UP,
Canada Goose			
Cedar Waxwing	1		SS,
Duck	15		OW, UP,
Flycatcher	1		SS,
Great Blue Heron	1		OW, WM,
Killdeer	2		UP, WM,
Mountain Chickadee	2		SS,
Osprey	1		OW,
Red-tailed Hawk	1		UP,
Red-winged Blackbird	1		WM,
Tree Swallow	5		SS, UP, WM,
Wilson's Snipe	3		UP, WM,

Bird Comments

BEHAVIOR CODES

BP = One of a breeding pair **BD** = Breeding display **F** = Foraging **FO** = Flyover **L** = Loafing **N** = Nesting

HABITAT CODES

AB = Aquatic bed **SS** = Scrub/Shrub **FO** = Forested **UP** = Upland buffer **I** = Island

WM = Wet meadow **MA** = Marsh **US** = Unconsolidated shore **MF** = Mud Flat **OW** = Open Water

Mammals and Herptiles

Species	# Observed	Tracks	Scat	Burrows	Comments
Columbia Spotted Frog	4	No	No	No	
Common Garter snake	1	No	No	No	
Deer sp.		Yes	Yes	No	deer beds
Grizzly Bear		Yes	No	No	Documented by MDFWP, tracks observed by CCI on site.
Ground squirrel sp.	5	No	No	No	
Trout sp.		No	No	No	fingerlings in Coyote Creek
Vole sp.	1	No	No	No	
Western Toad		No	No	No	Breeding documented by USFS personnel.

Wildlife Comments:

Schrieber Lake

PHOTOGRAPHS

Take photographs of the following permanent reference points listed in the check list below. Record the direction of the photograph using a compass. When at the site for the first time, establish a permanent reference point by setting a ½ inch rebar or fencepost extending 2-3 feet above ground. Survey the location with a resource grade GPS and mark the location on the aerial photograph.

Photograph Checklist:

☑ One photograph for each of the four cardinal directions surrounding the wetland.

☑ At least one photograph showing upland use surrounding the wetland. If more than one upland exists then take additional photographs.

☑ At least one photograph showing the buffer surrounding the wetland.

☑ One photograph from each end of the vegetation transect, showing the transect.

Photo #	Latitude	Longitude	Bearing	Description
062	48.104242	-115.413401	355	Transect 3 end
063	48.105866	-115.413539	175	Transect 3 start
070	48.105398	-115.411692	332	Transect 2 end
8564	48.107033	-115.409592	242	PP-1 photo 1
8565	48.107033	-115.409592	197	PP-1 photo 2
8566	48.107033	-115.409592	164	PP-1 photo 3
8567	48.106526	-115.410102	251	Transect 1 start
8568	48.106268	-115.411205	71	Transect 1 end
8570	48.106037	-115.412335	152	Transect 2 start
8571	48.104136	-115.413847	173	PP-5 photo 1
8572	48.104136	-115.413847	53	PP-5 photo 2
8573	48.104136	-115.413847	359	PP-5 photo 3
8575	48.104297	-115.414628	150	PP-6 photo 1
8576	48.104297	-115.414628	103	PP-6 photo 2
8577	48.104297	-115.414628	53	PP-6 photo 3
8578	48.106591	-115.412511	323	PP-2 photo 1
8579	48.106591	-115.412511	205	PP-2 photo 2
8580	48.106591	-115.412511	162	PP-2 photo 3
8581	48.106591	-115.412511	113	PP-2 photo 4
8582	48.106591	-115.412511	69	PP-2 photo 5
8584	48.10754	-115.412747	187	PP-3
8585	48.105398	-115.411691	228	PP-7 photo 1
8586	48.105398	-115.411691	299	PP-7 photo 2
8587	48.105398	-115.411691	355	PP-7 photo 3
8588	48.105714	-115.411356	320	PP-8 photo 1

8589	48.105714	-115.411356	49	PP-8 photo 2
8590	48.105714	-115.411356	79	PP-8 photo 3
8591	48.105502	-115.409787	328	PP-9 photo 1
8592	48.105502	-115.409787	120	PP-9 photo 2
8593	48.105948	-115.408236	287	PP-4
8597	48.106783	-115.4101126	135	SP-1 wet
8599	48.106833	-115.409964	135	SP-2 upl
8604	48.100529	-115.415406	17	PP-10 photo 1
8605	48.100529	-115.415406	39	PP-10 photo 2
8606	48.100529	-115.415406	57	PP-10 photo 3 PP-10 photo 3 PP-10 photo 3

Comments:

Schrieber Lake

ADDITIONAL ITEMS CHECKLIST

Hydrology

☑ Map emergent vegetation/open water boundary on aerial photos.
☑ Observe extent of surface water. Look for evidence of past surface water elevations (e.g. drift lines, vegetation staining, erosion, etc).

Photos

☑ One photo from the wetland toward each of the four cardinal directions
☑ One photo showing upland use surrounding the wetland.
☑ One photo showing the buffer around the wetland
☑ One photo from each end of each vegetation transect, toward the transect

Vegetation

☑ Map vegetation community boundaries

☑ Complete Vegetation Transects

Soils

☑ Assess soils

Wetland Delineations

☑ Delineate wetlands according to applicable USACE protocol (1987 form or Supplement)
☑ Delineate wetland – upland boundary onto aerial photograph.

Wetland Delineation Comments

Functional Assessments

☑ Complete and attach full MDT Montana Wetland Assessment Method field forms.

Functional Assessment Comments:

Maintenance

Were man-made nesting structure installed at this site? Yes

If yes, do they need to be repaired? No

If yes, describe the problems below and indicate if any actions were taken to remedy the problems

Were man-made structures built or installed to impound water or control water flow into or out of the wetland? Yes

If yes, are the structures in need of repair? No

If yes, describe the problems below.

No maintenance issues identified.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Schrieber Lake | City/County: Lincoln | Sampling Date: 7/22/2015

Applicant/Owner: MDT | State: Montana | Sampling Point: SP-1

Investigator(s): R. McEldowney, S. Wall | Section, Township, Range: S 13 T 27N R 30W

Landform (hillslope, terrace, etc.): Floodplain | Local relief (concave, convex, none): flat | Slope (%): 2

Subregion (LRR): LRR E | Lat: 48.106783 | Long: -115.4101126 | Datum: NAD 83

Soil Map Unit Name: aquic udifluvents, poorly drained | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☑ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑ No ☐	**Is the Sampled Area within a Wetland?** Yes ☑ No ☐
Hydric Soil Present?	Yes ☑ No ☐	
Wetland Hydrology Present?	Yes ☑ No ☐	

Remarks:
All three wetland parameters are present.

VEGETATION - Use scientific names of plant

Tree Stratum Plot size (30 Foot Radius) — Absolute % Cover: | Domiant Species? | Indicator Status

Sapling/Shrub Stratum Plot size (30 Foot Radius)

Herbaceous Stratum Plot size (3 Foot Radius)

Agrostis scabra	1	☐	FAC
Alopecurus pratensis	70	☑	FAC
Pascopyrum smithii	1	☐	FACU
Persicaria amphibia	1	☐	OBL
Potentilla gracilis	1	☐	FAC

Woody Vine Stratum Plot size (30 Foot Radius)

Percent Bare Ground 30

Dominance Test worksheet

Number of Dominant Species that are OBL, FACW or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet

Total % Cover of:			Multiply by:
OBL species	1	X 1	1
FACW species	0	X 2	0
FAC species	72	X 3	216
FACU species	1	X 4	4
UPL species	0	X 5	0
Column Totals	74 (A)		221 (B)

Prevalence Index = B/A = 2.98649

Hydrophytic Vegetation Indicators

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is <= 3.0
- ☐ 4 - Morphological Adaptations (Provide supporting data in remarks or on separate sheet.
- ☐ 5 - Wetland Non-Vascular Plants
- ☐ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric sil and wetland hydrology must be present, unless disturbed or problematic for #3, 4, 5.

Hydrophytic Vegetation Present? Yes ☑ NO ☐

Remarks:

SOIL

Sampling Point: SP-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	10YR 2/2	100					Loam	
9-18		100					sapric peat	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☑ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☑ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☑ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☑ No ☐

Remarks:
Hydrogen sulfide odor in the organic layer.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☑ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☑ No ☐ Depth (inches): 9

Wetland Hydrology Present? Yes ☑ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Soil is saturated within the top 12 inches.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Schrieber Lake | City/County: Lincoln | Sampling Date: 7/22/2015

Applicant/Owner: MDT | State: Montana | Sampling Point: SP-2

Investigator(s): R. McEldowney, S. Wall | Section, Township, Range: S 13 T 27N R 30W

Landform (hillslope, terrace, etc.): Hillside | Local relief (concave, convex, none): convex | Slope (%): 3

Subregion (LRR): LRR E | Lat: 48.106833 | Long: -115.409964 | Datum: NAD 83

Soil Map Unit Name: aquic udifluvents, poorly drained | NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☑ No ☐ (If no, explain in Remarks.)

Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☑ No ☐

Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☑	No ☐	**Is the Sampled Area within a Wetland?** Yes ☐ No ☑
Hydric Soil Present?	Yes ☐	No ☑	
Wetland Hydrology Present?	Yes ☐	No ☑	

Remarks:
Hydrophytic vegetation present, but hydric soils and wetland hydrology are lacking. Plot is approximately 16 inches higher in elevation than SP-1.

VEGETATION - Use scientific names of plant

Tree Stratum Plot size (30 Foot Radius) — Absolute % Cover: | Domiant Species? | Indicator Status

Sapling/Shrub Stratum Plot size (30 Foot Radius)

Herbaceous Stratum Plot size (3 Foot Radius)

Alopecurus pratensis	5	☐	FAC
Elymus repens	90	☑	FAC
Phleum pratense	5	☐	FAC

Woody Vine Stratum Plot size (30 Foot Radius)

Percent Bare Ground 0

Dominance Test worksheet

Number of Dominant Species that are OBL, FACW or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 % (A/B)

Prevalence Index worksheet

Total % Cover of:			Multiply by:
OBL species	0	X 1	0
FACW species	0	X 2	0
FAC species	100	X 3	300
FACU species	0	X 4	0
UPL species	0	X 5	0
Column Totals	100 (A)		300 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is <= 3.0
- ☐ 4 - Morphological Adaptations (Provide supporting data in remarks or on separate sheet.
- ☐ 5 - Wetland Non-Vascular Plants
- ☐ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric sil and wetland hydrology must be present, unless disturbed or problematic for #3, 4, 5.

Hydrophytic Vegetation Present? Yes ☑ NO ☐

Remarks:

SOIL

Sampling Point: SP-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-18	10YR 2/1	100					Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ☐ 2 cm Muck (A10)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ☐ No ☑

Remarks:
No hydric soil indicators present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Stunted or Stressed Plants (D1) **(LRR A)**
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Raised Ant Mounds (D6) **(LRR A)**
- ☐ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ☐ No ☑ Depth (inches): _____

Water Table Present? Yes ☐ No ☑ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ☐ No ☑ Depth (inches): _____

Wetland Hydrology Present? Yes ☐ No ☑

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No hydrology indicators present.

MDT Montana Wetland Assessment Form (revised March 2008)

1. Project name Schrieber Lake **2. MDT project#** NH 27(29) **Control#** 1027007

3. Evaluation Date 7/22/2015 **4. Evaluators** R. Mceldowney, S. Wall **5. Wetland/Site# (s)** Schreiber Lake

6. Wetland Location(s): T 27N **R** 30W **Sec1** 13 **T** **R** **Sec2**

Approx Stationing or Mileposts Approximately Milepost 53.8

Watershed Kootenai-1 17010101 **Watershed/County** Kootenai, Lincoln County (MDT Watershed #1 - Kootenai River Basin)

7. Evaluating Agency MDF for Confluence

8. Wetland size acres 51.7

Purpose of Evaluation

How assessed: Measured e.g. by GPS

☐ **Wetlands potentially affected by MDT project**

9. Assesssment area (AA) size (acres) 51.7

☐ **Mitigation Wetlands: pre-construction**

How assessed: Measured e.g. by GPS

☑ **Mitigation Wetlands: post construction**

☐ **Other**

10. Classification of Wetland and Aquatic Habitats in AA

HGM Class (Brinson)	Class (Cowardin)	Modifier (Cowardin)	Water Regime	% of AA
Depressional	Aquatic Bed		Permanent/Perennial	20
Depressional	Emergent Wetland		Permanent/Perennial	10
Riverine	Unconsolidated Bottom		Permanent/Perennial	5
Slope	Emergent Wetland		Permanent/Perennial	30
Slope	Emergent Wetland		Seasonal/Intermittant	10
Slope	Scrub-Shrub Wetland		Seasonal/Intermittant	25

11. Estimated Relative Abundance Common

12. General Condition of AA

i. Disturbance: (use matrix below to determine [circle] appropriate response – see instructions for Montana-listed noxious weed and aquatic nuisance vegetation species (**ANVS**) lists)

Conditions within AA	*Predominant conditions adjacent to (within 500 feet of) AA*		
	Managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or buildings; and noxious weed or ANVS cover is <=15%.	Land not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to minor clearing; contains few roads or buildings; noxious weed or ANVS cover is <=30%.	Land cultivated or heavily grazed or logged; subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >=30%.
AA occurs and is managed in predominantly natural state; is not grazed, hayed, logged, or otherwise converted; does not contain roads or occupied buildings; and noxious weed or ANVS cover is <=15%.	low disturbance	low disturbance	moderate disturbance
AA not cultivated, but may be moderately grazed or hayed or selectively logged; or has been subject to relatively minor clearing, fill placement, or hydrological alteration; contains few roads or buildings; noxious weed or ANVS cover is <=30%.	moderate disturbance	moderate disturbance	high disturbance
AA cultivated or heavily grazed or logged; subject to relatively substantial fill placement, grading, clearing, or hydrological alteration; high road or building density; or noxious weed or ANVS cover is >=30%.	high disturbance	high disturbance	high disturbance

Comments: (types of disturbance, intensity, season, etc)

Highway 2 and USFS roads are adjacent to the AA.

ii. Prominent noxious, aquatic nuisance, other exotic species:

Spotted knapweed and Canada thistle infestations in the uplands surrounding the AA.

iii. Provide brief descriptive summary of AA and surrounding land use/habitat

Site is in a realtively flat valley bottom that has historically been used for agriculture and hay production. The valley sides are heavily forested with secondary growth coniferous forest. The entire AA is very wet and is dominated primarily by emergent vegetation. PSS wetlands occur immediately along the pre-existing creek channels and in the southwest corner of the site where a large remanant patch of bog birch occurs.

13. Structural Diversity: (based on number of "Cowardin" ***vegetated*** classes present [do not include unvegetated classes], see #10 above)

Existing # of "Cowardin" Vegetated Classes in AA	Initial Rating	Is current management preventing (passive) existence of additional vegetated classes?		Modified Rating
>=3 (or 2 if 1 is forested) classes	H	NA	NA	NA
2 (or 1 if forested) classes	M	NA	NA	NA
1 class, but not a monoculture	M	<NO	YES>	L
1 class, monoculture (1 species comprises>=90% of total cover)	L	NA	NA	NA

Comments: aquatic bed, emergent, scrub-shrub

SECTION PERTAINING to FUNCTIONS VALUES ASSESSMEN

14A. Habitat for Federally Listed or Proposed Threatened or Endangered Plants or Animals:

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (list species)	◉ D ◉ S	
Secondary habitat (list Species)	◉ D ○ S	Grizzly bear
Incidental habitat (list species)	○ D ○ S	
No usable habitat	☐ S	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [check] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
Functional Points and Rating	1H	.9H	.8H	.7M	.3L	.1L	0L

Sources for documented use USFS personnel observed a boar grizzly upstream of the AA in the Shhrieber Creek drainage in 2010. Wolverines could potentially be in the area.

14B. Habitat for plant or animals rated S1, S2, or S3 by the Montana Natural Heritage Program: (not including species listed in14A above)

i. AA is Documented (D) or Suspected (S) to contain (check one based on definitions contained in instructions):

Primary or critical habitat (list species)	◉ D ○ S	Salix candida (S3/S4),Western toad (S2);
Secondary habitat (list Species)	◉ D ○ S	Townsend's big-eared bat (S3), hoary bat (S3)
Incidental habitat (list species)	○ D ◉ S	Westslope cuthoat trout (S2), fisher (S3)
No usable habitat	☐ S	

ii. Rating (use the conclusions from i above and the matrix below to arrive at [check] the functional points and rating)

Highest Habitat Level	doc/primary	sus/primary	doc/secondary	sus/secondary	doc/incidental	sus/incidental	None
S1 Species: *Functional Points and Rating*	1H	.8H	.7M	.6M	.2L	.1L	0L
S2 and S3 Species: *Functional Points and Rating*	.9H	.7M	.6M	.5M	.2L	.1L	0L

Sources for documented use MDT BRR. USFS, MNHP, and MFWP databases and discussions with regional wildlife and fisheries biologists. Western toads were observed by MDT and Kootenai Natioal Forest personel in April 2011.

14C. General Wildlife Habitat Rating:

i. Evidence of overall wildlife use in the AA (check substantial, moderate, or low based on supporting evidence): Substantial

Substantial (based on any of the following [check]):

- ☑ observations of abundant wildlife #s or high species diversity (during any period)
- ☑ abundant wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ presence of extremely limiting habitat features not available in the surrounding area
- ☑ interviews with local biologists with knowledge of the AA

Minimal (based on any of the following [check]):

- ☐ few or no wildlife observations during peak use periods
- ☐ little to no wildlife sign
- ☐ sparse adjacent upland food sources
- ☐ interviews with local biologists with knowledge of the AA

Moderate (based on any of the following [check]):

- ☐ observations of scattered wildlife groups or individuals or relatively few species during peak periods
- ☐ common occurrence of wildlife sign such as scat, tracks, nest structures, game trails, etc.
- ☐ adequate adjacent upland food sources
- ☐ interviews with local biologists with knowledge of the AA

ii. Wildlife habitat features (Working from top to bottom, check appropriate AA attributes in matrix to arrive at rating. Structural diversity is from #13. For class cover to be considered evenly distributed, the most and least prevalent **vegetated** classes must be within 20% of each other in terms of their percent composition of the AA (see #10). Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; T/E = temporary/ephemeral; and A = absent [see instructions for further definitions of these terms])

Structural diversity (see #13)	High								Moderate								Low			
Class cover distribution (all vegetated classes)	Even				Uneven				Even				Uneven				Even			
Duration of surface water in ñ 10% of AA	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A	P/P	S/I	T/E	A
Low disturbance at AA (see #12i)	E	E	E	H	E	E	H	H	E	H	H	M	E	H	M	M	E	H	M	M
Moderate disturbance at AA (see #12i)	H	H	H	H	H	H	H	M	H	H	M	M	H	M	M	L	H	M	L	L
High disturbance at AA (see #12i)	M	M	M	L	M	M	L	L	M	M	L	L	M	L	L	L	L	L	L	L

iii. Rating (use the conclusions from i and ii above and the matrix below to arrive at [check] the functional points and rating)

Evidence of wildlife use (i)	*Wildlife habitat features rating (ii)*			
	Exceptional	High	Moderate	Low
Substantial	1E	.9H	.8H	.7M
Moderate	.9H	.7M	.5M	.3L
Minimal	.6M	.4M	.2L	.1L

Comments Good habitat diversity with substantial wildlife evidence.

14D. General Fish Habitat Rating: (Assess this function if the AA is used by fish or the existing situation is "correctable" such that the AA could be used by fish [i.e., fish use is precluded by perched culvert or other barrier, etc.]. If the AA is not used by fish, fish use is not restorable due to habitat constraints, or is not desired from a management perspective [such as fish entrapped in a canal], then check ☐ **NA** here and proceed to 14E.) Cold Water

i. Habitat Quality and Known / Suspected Fish Species in AA (use matrix to arrive at [check the functional points and rating)

Duration of surface water in AA	Permanent / Perennial						Seasonal / Intermittent						Temporary / Ephemeral					
Aquatic hiding / resting / escape cover	Optimal		Adequate		Poor		Optimal		Adequate		Poor		Optimal		Adequate		Poor	
Thermal cover optimal / suboptimal	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S	O	S
FWP Tier I fish species	1E	.9H	.8H	.7M	.6M	.5M	.9H	.8H	.7M	.6M	.5M	.4M	.7M	.6M	.5M	.4M	.3L	.3L
FWP Tier II or Native Game fish species	.9H	.8H	.7M	.6M	.5M	.5M	.8H	.7M	.6M	.5M	.4M	.4M	.6M	.5M	.4M	.3L	.2L	.2L
FWP Tier III or Introduced Game fish	.8H	.7M	.6M	.5M	.5M	.4M	.7M	.6M	.5M	.4M	.4M	.3L	.5M	.4M	.3L	.2L	.2L	.1L
FWP Non-Game Tier IV or No fish species	.5M	.5M	.5M	.4M	.4M	.3L	.4M	.4M	.4M	.3L	.3L	.2L	.2L	.2L	.2L	.1L	.1L	.1L

Sources used for identifying fish sp. potentially found in AA:

ii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1)
a) Is fish use of the AA significantly reduced by a culvert, dike, or other man-made structure or activity ***or*** *is the waterbody included on the current final MDEQ list of waterbodies in need of TMDL development with listed "Probable Impaired Uses" including cold or warm water fishery or aquatic life support,* ***or*** *do aquatic nuisance plant or animal species (see* ***Appendix E****) occur in fish habitat?* **Y** ○ **N** ◉ *If yes, reduce score in* ***i*** *above by 0.1:* **Modified Rating**

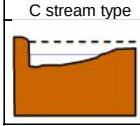
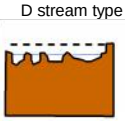
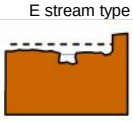
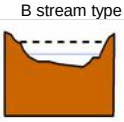
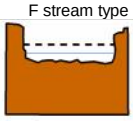
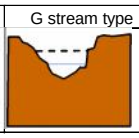
b) Does the AA contain a documented spawning area or other critical habitat feature (i.e., sanctuary pool, upwelling area, etc.- specify in comments) for native fish or introduced game fish? ○ **Y** ◉ **N** *If yes, add 0.1 to the adjusted score in* ***i*** *or* ***iia*** *above:*
Modifed Rating

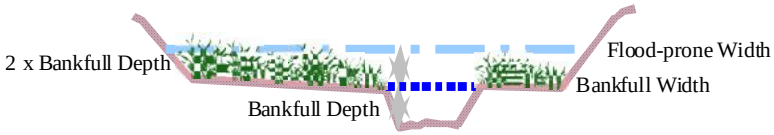
iii. Final Score and Rating: .7 M **Comments:** Salmonids observed in creek during monitoring. Assumed to be brook trout, but is unverified.

14E. Flood Attenuation: (Applies only to wetlands subject to flooding via in-channel or overbank flow. If wetlands in AA are not flooded from in-channel or overbank flow, click ☐ **NA** here and proceed to 14F.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Estimated or Calculated Entrenchment (Rosgen 1994, 1996)	Slightly entrenched - C, D, E stream types			Moderately entrenched – B stream type			Entrenched-A, F, G stream types		
% of flooded wetland classified as forested and/or scrub/shrub	75%	25-75%	<25%	75%	25-75%	<25%	75%	25-75%	<25%
AA contains **no outlet or restricted outlet**	1H	.9H	.6M	.8H	.7M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	.8H	.5M	.7M	.6M	.4M	.3L	.2L	.1L

Slightly Entrenched ER = >2.2			**Moderately Entrenched ER = 1.41 – 2.2**	**Entrenched ER = 1.0 – 1.4**		
C stream type	D stream type	E stream type	B stream type	A stream type	F stream type	G stream type
						



Floodprone width 25 **/** **Bankfull width** 10 **=** **Entrenchment ratio** 2.5

ii. Are ≥10 acres of wetland in the AA subject to flooding **AND** are man-made features which may be significantly damaged by floods located within 0.5 mile downstream of the AA (check)? **Y** ○ **N** ◉

Comments: The stream channels in the AA have free access to their floodplains. The floodplains are dominated by herbaceous vegetation.

14F. Short and Long Term Surface Water Storage: (Applies to wetlands that flood or pond from overbank or in-channel flow, precipitation, upland surface flow, or groundwater flow. If no wetlands in the AA are subject to flooding or ponding, click ☐ **NA** here and proceed to 14G.)

i. Rating (Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating. Abbreviations for surface water durations are as follows: P/P = permanent/perennial; S/I = seasonal/intermittent; and T/E = temporary/ephemeral [see instructions for further definitions of these terms].)

Estimated maximum acre feet of water contained in wetlands within the AA that are subject to periodic flooding or ponding	>5 acre feet			1.1 to 5 acre feet			≤1 acre foot		
Duration of surface water at wetlands within the AA	P/P	S/I	T/E	P/P	S/I	T/E	P/P	S/I	T/E
Wetlands in AA flood or pond ñ **5 out of 10 years**	1H	.9H	.8H	.8H	.6M	.5M	.4M	.3L	.2L
Wetlands in AA flood or pond **< 5 out of 10 years**	.9H	.8H	.7M	.7M	.5M	.4M	.3L	.2L	.1L

Comments: Extensive areas of inundation were observed.

14G. Sediment/Nutrient/Toxicant Retention and Removal: (Applies to wetlands with potential to receive sediments, nutrients, or toxicants through influx of surface or ground water or direct input. If no wetlands in the AA are subject to such input, click ☐ **NA** here and proceed to 14H.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating [H = high, M = moderate, or L = low])

Sediment, nutrient, and toxicant input levels within AA	AA receives or surrounding land use with potential to deliver levels of sediments, nutrients, or compounds at levels such that other functions are not substantially impaired. Minor sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.				Waterbody on MDEQ list of waterbodies in need of TMDL development for "probable causes" related to sediment, nutrients, or toxicants **or** AA receives or surrounding land use with potential to deliver high levels of sediments, nutrients, or compounds such that other functions are substantially impaired. Major sedimentation, sources of nutrients or toxicants, or signs of eutrophication present.			
% cover of wetland vegetation in AA	≥ 70%		< 70%		≥ 70%		< 70%	
Evidence of flooding / ponding in AA	Yes	No	Yes	No	Yes	No	Yes	No
AA contains **no or restricted outlet**	1H	.8H	.7M	.5M	.5M	.4M	.3L	.2L
AA contains **unrestricted outlet**	.9H	.7M	.6M	.4M	.4M	.3L	.2L	.1L

Comments: AA nearly 100% vegetated with reed canarygrass, presence of flooding/ponding, restricted outlet.

14H Sediment/Shoreline Stabilization: (Applies only if AA occurs on or within the banks or a river, stream, or other natural or man-made drainage, or on the shoreline of a standing water body which is subject to wave action. If 14H does not apply, click ☐ **NA** here and proceed to 14I.)

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

*% Cover of **wetland** streambank or shoreline by species with stability ratings of ≥6 (see **Appendix F**).*	*Duration of surface water adjacent to rooted vegetation*		
	Permanent / Perennial	Seasonal / Intermittent	Temporary / Ephemeral
ñ **65%**	1H	.9H	.7M
35-64%	.7M	.6M	.5M
< 35%	.3L	.2L	.1L

Comments: Shorelines and banks are well vegetated.

14I. Production Export/Food Chain Support:

i. Level of Biological Activity (synthesis of wildlife and fish habitat ratings [check])

General Fish Habitat Rating (14D.iii.)	**General Wildlife Habitat Rating (14C.iii.)**		
	E/H	M	L
E/H	H	H	M
M	H	M	M
L	M	M	L
N/A	H	M	L

ii. Rating (Working from top to bottom, use the matrix below to arrive at [check] the functional points and rating. Factor A = acreage of vegetated wetland component in the AA; Factor B = level of biological activity rating from above (14I.i.); Factor C = whether or not the AA contains a surface or subsurface outlet; the final three rows pertain to duration of surface water in the AA, where P/P, S/I, and T/E are as previously defined, and A = "absent" [see instructions for further definitions of these terms].)

A	Vegetated component >5 acres						Vegetated component 1-5 acres						Vegetated component <1 acre					
B	High		Moderate		Low		High		Moderate		Low		High		Moderate		Low	
C	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
P/P	1E	.7H	.8H	.5M	.6M	.4M	.9H	.6M	.7H	.4M	.5M	.3L	.8H	.6M	.6M	.4M	.3L	.2L
S/I	.9H	.6M	.7H	.4M	.5M	.3L	.8H	.5M	.6M	.3L	.4M	.2L	.7H	.5M	.5M	.3L	.3L	.2L
T/E/A	.8H	.5M	.6M	.3L	.4M	.2L	.7H	.4M	.5M	.2L	.3L	.1L	.6M	.4M	.4M	.2L	.2L	.1L

iii. Modified Rating (**NOTE:** Modified score cannot exceed 1 or be less than 0.1.) **Vegetated Upland Buffer (VUB)**: Area with ≥ 30% plant cover, ≤ 15% noxious weed or ANVS cover, and that is not subjected to periodic mechanical mowing or clearing (unless for weed control).

a) Is there an average ≥ 50 foot-wide vegetated upland buffer around ≥ 75% of the AA circumference? **Y** ◉ **N** ○ *If yes, add 0.1 to the score in **ii** above and adjust rating accordingly:* **Modified Rating** 1 E

Comments: High level of biological activity, veg component > 5 ac, perennial, has surface and subsurface outlets

14J. Groundwater Discharge/Recharge: (check the appropriate indicators in i & ii below)

i. Discharge Indicators

- [x] The AA is a slope wetland
- [x] Springs or seeps are known or observed
- [x] Vegetation growing during dormant season/drought
- [x] Wetland occurs at the toe of a natural slope
- [ ] Seeps are present at the wetland edge
- [x] AA permanently flooded during drought periods
- [ ] Wetland contains an outlet, but no inlet
- [x] Shallow water table and the site is saturated to the surface
- [ ] Other:

ii. Recharge Indicators

- [ ] Permeable substrate present without underlying impeding layer
- [ ] Wetland contains inlet but no outlet
- [ ] Stream is a known 'losing' stream; discharge volume decreases
- [ ] Other:

iii. Rating (use the information from i and ii above and the table below to arrive at [check] the functional points and rating)

	Duration of saturation at AA Wetlands *FROM GROUNDWATER DISCHARGE OR WITH WATER THAT IS RECHARGING THE GROUNDWATER SYSTEM*			
Criteria	P/P	S/I	T	None
Groundwater Discharge or Recharge	1H	.7M	.4M	.1L
Insufficient Data/Information	NA			

Comments: AA with perennial inundation/saturation to the surface.

14K. Uniqueness:

i. Rating (working from top to bottom, use the matrix below to arrive at [check] the functional points and rating)

Replacement potential	AA contains fen, bog, warm springs or mature (>80 yr-old) forested wetland **or** plant association listed as "S1" by the MTNHP			AA does not contain previously cited rare types **and** structural diversity (#13) is high **or** contains plant association listed as "S2" by the MTNHP			AA does not contain previously cited rare types or associations **and** structural diversity (#13) is low-moderate		
Estimated relative abundance (#11)	rare	common	abundant	rare	common	abundant	rare	common	abundant
Low disturbance at AA (#12i)	1H	.9H	.8H	.8H	.6M	.5M	.5M	.4M	.3L
Moderate disturbance at AA (#12i)	.9H	.8H	.7M	.7M	.5M	.4M	.4M	.3L	.2L
High disturbance at AA (#12i)	.8H	.7H	.6M	.6M	.4M	.3L	.3L	.2L	.1L

Comments: This wetland complex contains a fen, is relatively undistrubed, and so is fairly unique in the watershed. It supports a high nu

14L. Recreation/Education Potential: (affords "bonus" points if AA provides recreation or education opportunity)

i. Is the AA a known or potential rec./ed. site: (check) **Y** (●) **N** (○) (if 'Yes' continue with the evaluation; if 'No' then click ☐ **NA** here and proceed to the overall summary and rating page)

ii. Check categories that apply to the AA: ☑ Educational/scientific study; ☐ Consumptive rec.; ☐ Non-consumptive rec.; ☐ Other

iii. Rating (use the matrix below to arrive at [check] the functional points and rating)

Known or Potential Recreation or Education Area	Known	Potential
Public ownership or public easement with general public access (no permission required)	.2H	.15H
Private ownership with general public access (no permission required)	.15H	.1M
Private or public ownership without general public access, or requiring permission for public access	.1M	.05L

Comments:

This site does not have public access, but it has a high potential for educaiton, especially for birders since there is a great hill at the entrance to the site that provides a good vantage point for low impact bird viewing.

General Site Notes

FUNCTION & VALUE SUMMARY & OVERALL RATING FOR WETLAND/SITE #(S): Schreiber Lake

Function & Value Variables	Rating	Actual Functional Points	Possible Functional Points	Functional Units: (Actual Points x Estimated AA Acreage)	Indicate the four most prominent functions with an asterisk (*)
A. Listed/Proposed T&E Species Habitat	H	.8	1	41.36	☑
B. MT Natural Heritage Program Species Habitat	M	.6	1	31.02	☐
C. General Wildlife Habitat	E	1	1	51.7	☑
D. General Fish Habitat	M	.7	1	36.19	☐
E. Flood Attenuation	M	.6	1	31.02	☐
F. Short and Long Term Surface Water Storage	H	1	1	51.7	☑
G. Sediment/Nutrient/Toxicant Removal	H	1	1	51.7	☐
H. Sediment/Shoreline Stabilization	H	1	1	51.7	☐
I. Production Export/Food Chain Support	E	1	1	51.7	☑
J. Groundwater Discharge/Recharge	H	1	1	51.7	☐
K. Uniqueness	H	.9	1	46.53	☐
L. Recreation/Education Potential (bonus points)	M	.1	NA	5.17	☐
Totals:		9.7	11	501.49	
Percent of Possible Score			**88.18** %		

Category I Wetland: (must satisfy **one** of the following criteria; otherwise go to Category II)
- ☐ Score of 1 functional point for Listed/Proposed Threatened or Endangered Species; **or**
- ☐ Score of 1 functional point for Uniqueness; **or**
- ☐ Score of 1 functional point for Flood Attenuation **and** answer to Question 14E.ii is "yes"; **or**
- ☑ Percent of possible score > 80% (round to nearest whole #).

Category II Wetland: (Criteria for Category I not satisfied **and** meets any **one** of the following criteria; otherwise go to Category IV)
- ☐ Score of 1 functional point for MT Natural Heritage Program Species Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Wildlife Habitat; **or**
- ☐ Score of .9 or 1 functional point for General Fish Habitat; **or**
- ☐ "High" to "Exceptional" ratings for **both** General Wildlife Habitat **and** General Fish/Aquatic Habitat; **or**
- ☐ Score of .9 functional point for Uniqueness; **or**
- ☐ Percent of possible score > 65% (round to nearest whole #).

Category III Wetland: (Criteria for Categories I, II, or IV not satisfied)

☐

Category IV Wetland: (Criteria for Categories I or II are not satisfied and all of the following criteria are met; otherwise go to Category III)
- ☐ "Low" rating for Uniqueness; **and**
- ☐ Vegetated wetland component < 1 acre (do not include upland vegetated buffer); **and**
- ☐ Percent of possible score < 35% (round to nearest whole #).

OVERALL ANALYSIS AREA RATING:
(check appropriate category based on the criteria outlined above)

I **II** **III** **IV**

Appendix C

Project Area Photographs

MDT Wetland Mitigation Monitoring
Schrieber Lake
Lincoln County, Montana



Photo Point 1 – Photo 1 Bearing: 242°

Location: Northwest Boundary Taken in 2015



Photo Point 1 – Photo 2 Bearing: 197°

Location: Northwest Boundary Taken in 2015



Photo Point 1 – Photo 3 Bearing: 164°

Location: Northwest Boundary Taken in 2015



Photo Point 2 – Photo 1 Bearing: 323°

Location: Near Corral Taken in 2015



Photo Point 2 – Photo 2 Bearing: 205°

Location: Near Corral Taken in 2015



Photo Point 2 – Photo 3 Bearing: 162°

Location: Near Corral Taken in 2015



Photo Point 2 – Photo 4 Bearing: 104°

Location: Near Corral Taken in 2015



Photo Point 2 – Photo 5 Bearing: 69°

Location: Near Corral Taken in 2015



Photo Point 3 Bearing: 183°

Location: Edge of willow carr Taken in 2015



Photo Point 4 Bearing: 287°

Location: East corner of cell 10 Taken in 2015



Photo Point 5 – Photo 1 Bearing: 143°

Location: Corner of carr Taken in 2015

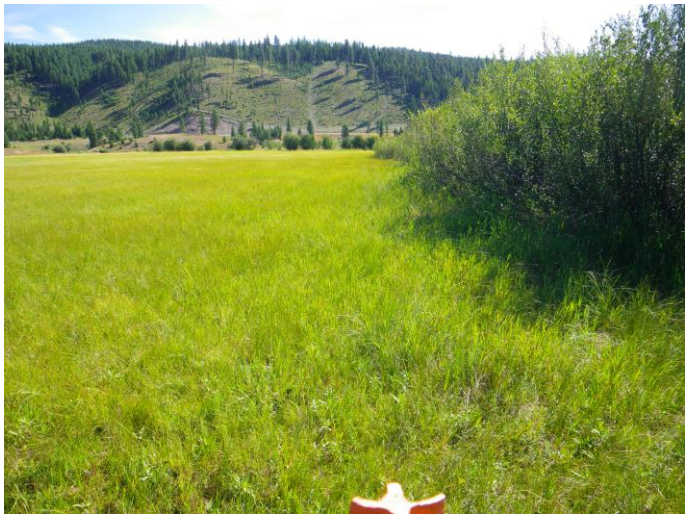


Photo Point 5 – Photo 2 Bearing: 35°

Location: Corner of carr Taken in 2015



Photo Point 5 – Photo 3 Bearing: 359°

Location: Corner of carr Taken in 2015



Photo Point 6 – Photo 1 Bearing: 150°

Location: South end of cell 1 Taken in 2015



Photo Point 6 – Photo 2 Bearing: 103°

Location: South end of cell 1 Taken in 2015



Photo Point 6 – Photo 3 Bearing: 52°

Location: South end of cell 1 Taken in 2015



Photo Point 7 – Photo 1 Bearing: 228°

Location:South end of Transect 2 Taken in 2015



Photo Point 7 – Photo 2 Bearing: 299°

Location: South end of Transect 2 Taken in 2015



Photo Point 7 – Photo 3 Bearing: 355°

Location: South end of Transect 2 Taken in 2015



Photo Point 8 – Photo 1 Bearing: 320°

Location: Edge of corral Taken in 2015



Photo Point 8 – Photo 2 Bearing: 49°

Location: Edge of corral Taken in 2015



Photo Point 8 – Photo 3 Bearing: 79°

Location: Edge of corral Taken in 2015



Photo Point 9 – Photo 1 Bearing: 323°

Location: Veg. Community 1 Taken in 2015



Photo Point 9 – Photo 2 Bearing: 120°

Location: Veg. Community 1 Taken in 2015



Photo Point 10 – Photo 1 Bearing: 45°

Location: Overlook Taken in 2015



Photo Point 10 – Photo 2 Bearing: 45°

Location: Overlook Taken in 2015



Photo Point 10 – Photo 3 Bearing: 45°

Location: Overlook Taken in 2015



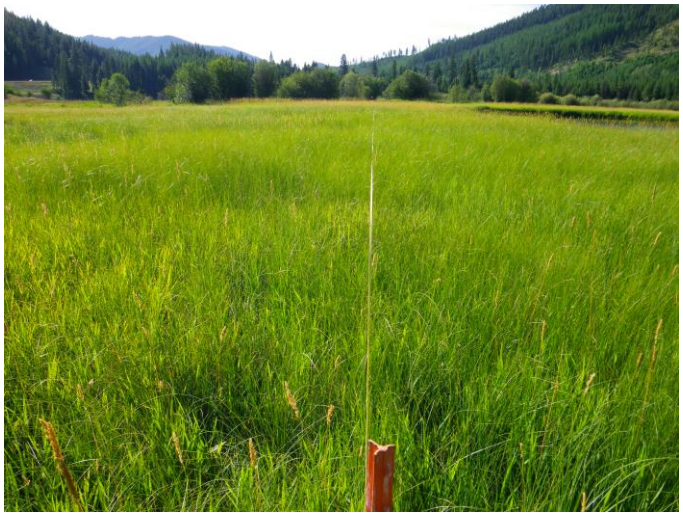
Transect 1: Start Bearing: 285°

Taken in 2015



Transect 1: End Bearing: 251°

Taken in 2015



Transect 2: Start Bearing: 332°

Location: South End Taken in 2015



Transect 2: End Bearing: 152°

Location: South End Taken in 2015



Transect 3: Start Bearing: 581°

Location: West Side Taken in 2015



Transect 3: End Bearing: 355°

Location: South End Taken in 2015



SP-1 Wet Bearing: 135°

Location: North Side Taken in 2015



SP-2 Up Bearing: 135°

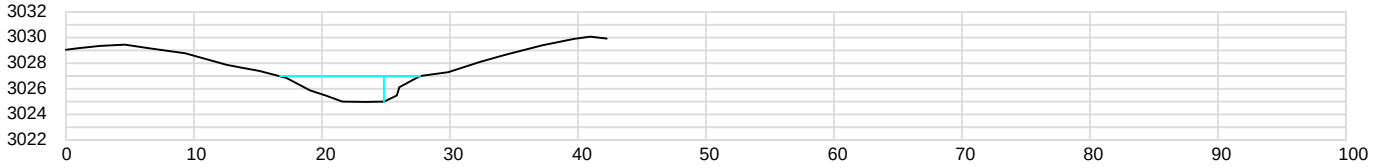
Location: North Side Taken in 2015

Appendix D

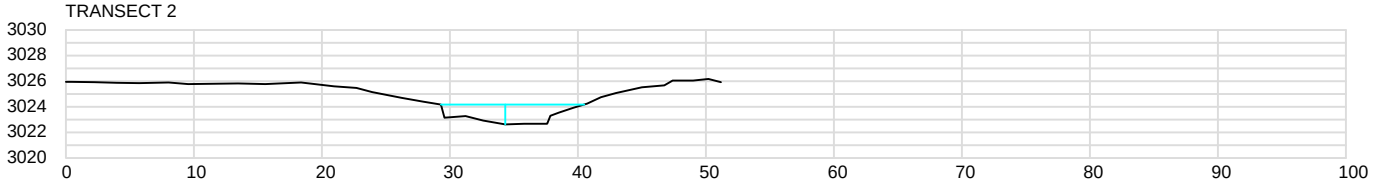
Surveyed Stream Cross Sections

MDT Wetland Mitigation Monitoring
Schrieber Lake
Lincoln County, Montana

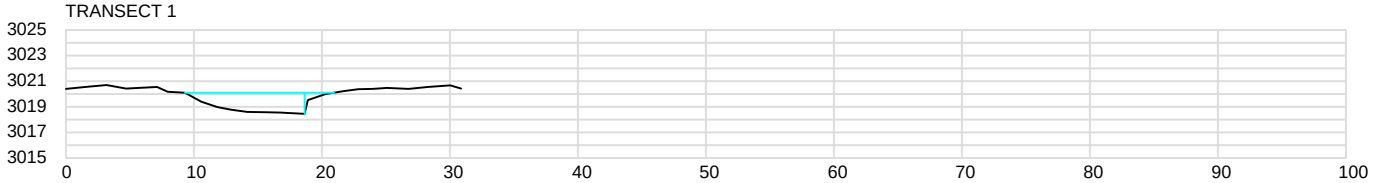
SCHRIEBER CREEK
REACH 1
TRANSECT 1



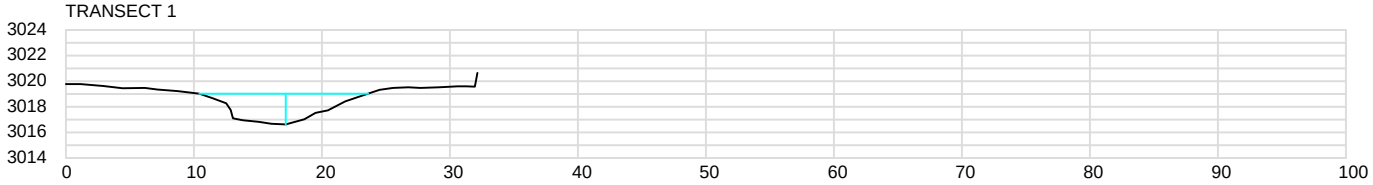
SCHRIEBER CREEK
REACH 1
TRANSECT 2



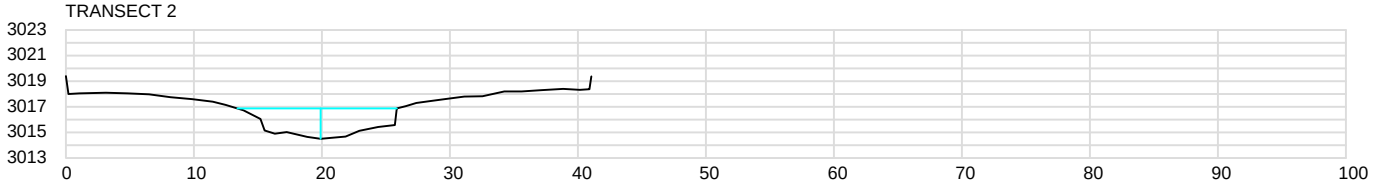
SCHRIEBER CREEK
REACH 2A
TRANSECT 1



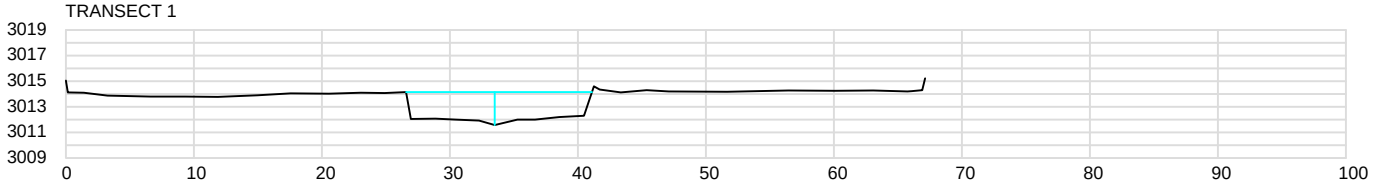
SCHRIEBER CREEK
REACH 2B
TRANSECT 1



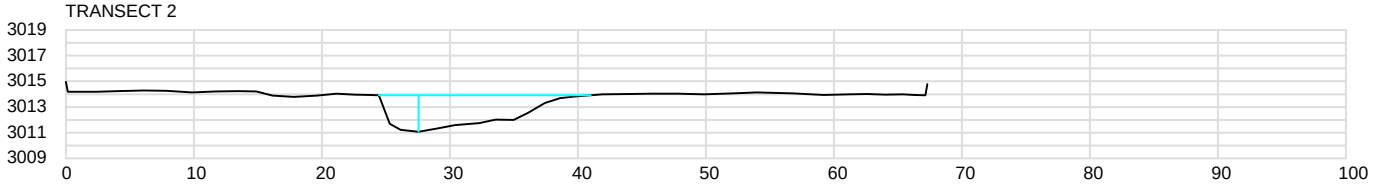
SCHRIEBER CREEK
REACH 2B
TRANSECT 2



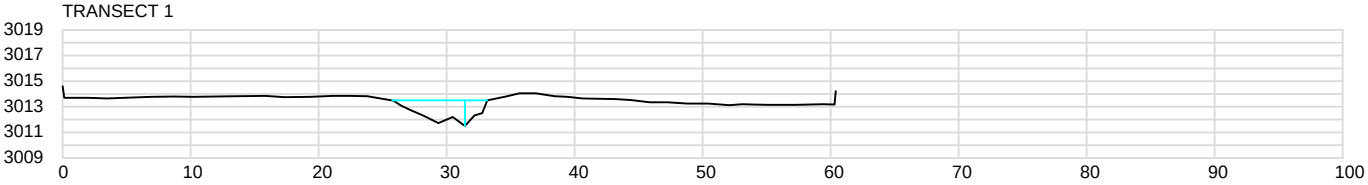
SCHRIEBER CREEK
REACH 3
TRANSECT 1



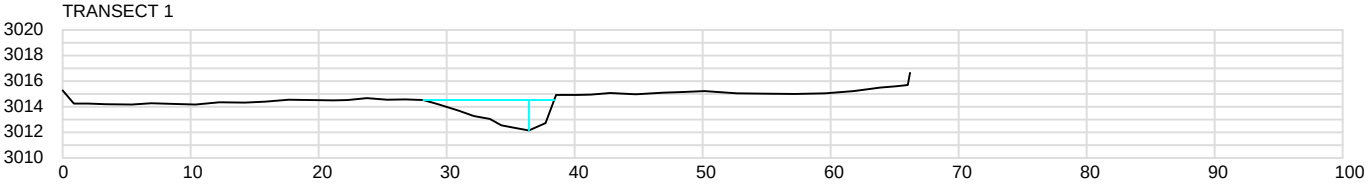
SCHRIEBER CREEK
REACH 3
TRANSECT 2



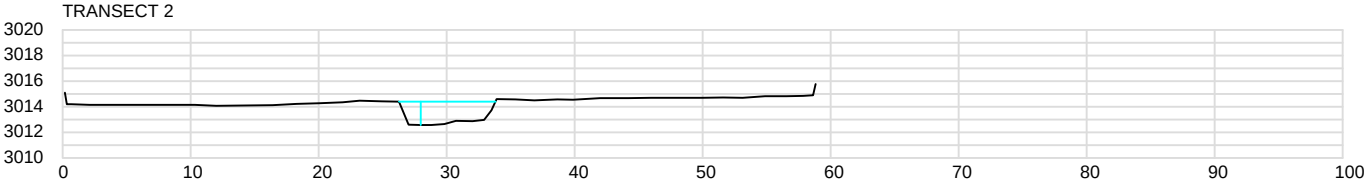
SCHRIEBER CREEK
REACH 7
TRANSECT 1



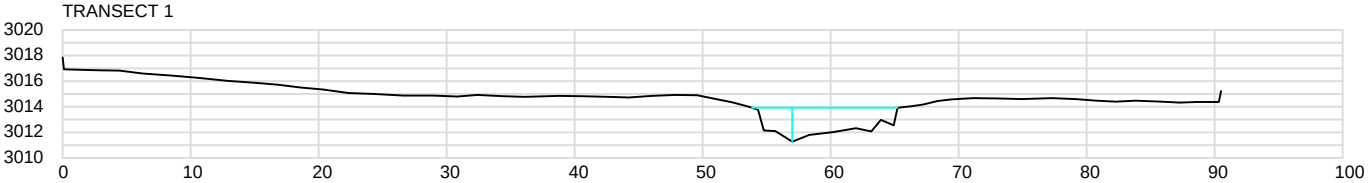
COYOTE CREEK
REACH 1A
TRANSECT 1



COYOTE CREEK
REACH 1A
TRANSECT 2



COYOTE CREEK
REACH 1B
TRANSECT 1



Appendix E

Project Plan Sheet

MDT Wetland Mitigation Monitoring
Schrieber Lake
Lincoln County, Montana

FOR MDT INTERNAL DISTRIBUTION ONLY

04/08/2014
Highways & Engineering
Division

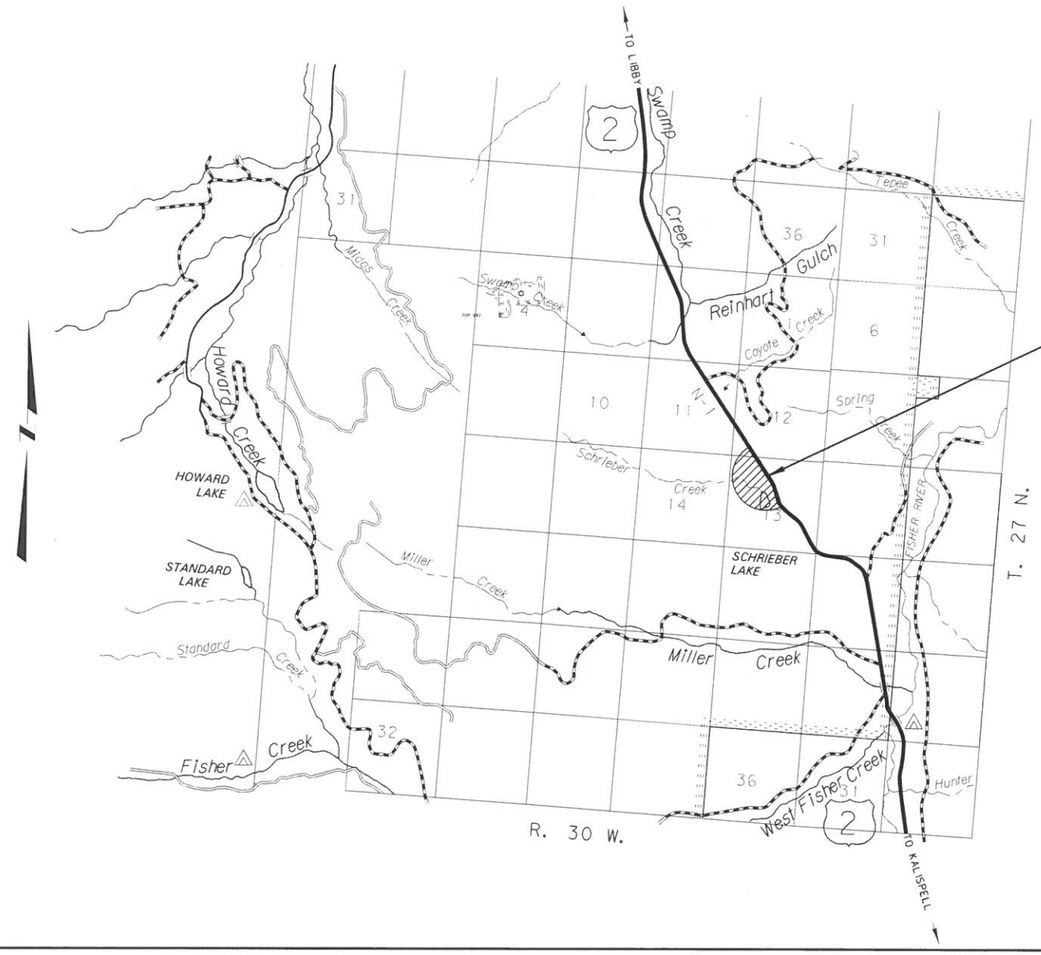
MONTANA DEPARTMENT OF TRANSPORTATION

CSF•0.99943246

FEDERAL AID PROJECT NO. NH 27(39)
AQUATIC RESOURCES MITIGATION
SCHRIEBER LAKE MITIGATION
LINCOLN COUNTY

LENGTH N/A kilometers





THIS CONTRACT
AQUATIC RESOURCES MITIGATION
NH 27(39)

ASSOCIATED PROJECT AGREEMENT NUMBERS	
R/W & I.C.	NH 1-1(34)45 F NH 1-1(52)45 F
P.E.	NH 27(29)

MONTANA DEPARTMENT OF TRANSPORTATION

APPROVED :

_____ 20____

MIKE TOOLEY
DIRECTOR OF TRANSPORTATION

BY _____

ENVIRONMENTAL SERVICES BUREAU CHIEF

MONTANA
THOMAS S. MARTIN
11228PE
REGISTERED PROFESSIONAL ENGINEER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED :

_____ _____
DIVISION ADMINISTRATOR DATE

MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

1	3	PS	07/13
	N	CHECKED BY	
		REVIEWED BY	
	4/8/2014 11:09:09 AM	DESIGNED BY	W. SALYARDS

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FOR MDT INTERNAL DISTRIBUTION ONLY
04/08/2014
Highways & Engineering
Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	2

MDT MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD

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NOTES

UTILITIES

CALL THE UTILITIES UNDERGROUND LOCATION CENTER (1-800-424-5555) OR OTHER NOTIFICATION SYSTEM FOR THE MARKING AND LOCATION OF ALL LINES AND SERVICES BEFORE EXCAVATING. ALL CLEARANCES OR DEPTHS PROVIDED FOR UTILITIES ARE FROM THE EXISTING GROUND LINE.

WETLANDS

ALL WETLANDS WITHIN THE PROJECT AREA HAVE BEEN DELINEATED.
WETLANDS DO EXIST BEYOND THE PROJECT LIMITS AND ANY ACTION AFFECTING SUCH WETLANDS IS THE RESPONSIBILITY OF THE CONTRACTOR.

MONITOR WELLS

ALL MONITOR WELLS - DO NOT DISTURB
SEE SITE PLAN FOR MONITOR WELL LOCATIONS.

SOILS INFORMATION

SOILS INFORMATION IS INCLUDED WITH THE SPECIAL PROVISIONS FOR THIS PROJECT.

SURVEY DATA

DTM FILES FORMATTED FOR TRIMBLE, LEICA, AND TOPCON SURVEY CONTROLLERS ARE AVAILABLE UPON REQUEST.
CONTACT WADE SALYARDS, MDT WETLAND ENGINEER AT 406-444-0451.

LINEAR & LEVEL DATA

BEARING SOURCE

ALL COORDINATES ARE METRIC STATE PLANE COORDINATES
HORIZONTAL COORDINATES ARE METERS (NAD83-2007)
CSF = 0.99943246

LEVEL DATUM SOURCE

ELEVATIONS ARE METERS (NADV88)
ALL ELEVATIONS ARE GPS DERIVED

2			
1			

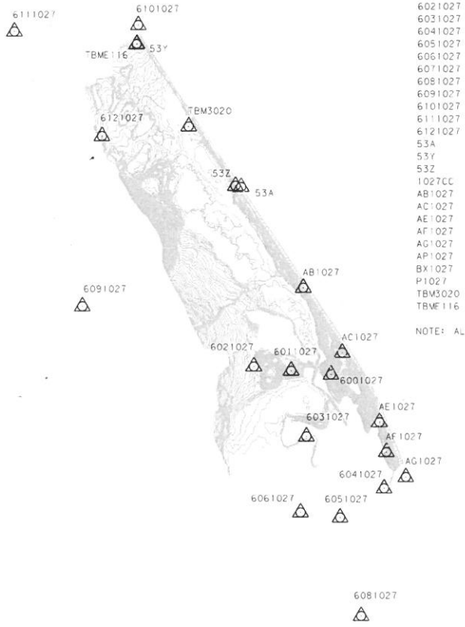
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04/08/2014
Highways & Engineering Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	3

CONTROL DIAGRAM



NH 27(39)
Schreiber Lake Aquatic Resource Mitigation
UPN 1027007

NOTE: STATE PLANE COORDINATES
HORIZONTAL COORDINATES ARE METERS (NAD83-2007)
ELEVATIONS ARE METERS (NADV88)

CSF = 0.99943246

MARK	NORTHING	EASTING	ELEV.
6001027	445177.266	160512.539	931.020
6011027	445190.927	160372.938	924.761
6021027	445205.854	160242.330	920.752
6031027	444958.852	160427.585	918.389
6041027	444775.396	160701.548	918.905
6051027	444672.572	160547.309	918.775
6061027	444690.731	160408.271	918.447
6071027	444335.298	161149.476	942.617
6081027	444324.655	160623.246	922.108
6091027	445418.721	159638.199	1038.536
6101027	446408.976	159831.012	925.570
6111027	446386.818	159394.328	973.444
6121027	446018.482	159704.500	922.103
53A	445838.557	160194.527	922.717
53Y	446341.315	159825.517	923.201
53Z	445842.732	160174.816	922.293
1027CC	443917.895	161434.052	924.698
AB1027	445483.139	160414.093	927.050
AC1027	445254.405	160552.117	932.702
AE1027	445008.875	160684.445	934.629
AF1027	444903.382	160708.985	929.287
AG1027	444815.352	160778.495	938.821
AP1027	443815.721	161860.558	905.713
BX1027	443828.385	161738.904	911.000
P1027	444394.462	161077.171	955.982
TBM3020	446051.832	160010.668	920.016
TBME116	446342.676	159826.455	923.310

NOTE: ALL ELEVATIONS ARE GPS DERIVED.

MARK DESCRIPTION

6001027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6001027 2011
ON US HIGHWAY 2 AT MILEPOST 54.00 TURN LEFT AND HEAD WEST 280 FEET THEN WALK NORTH 185 FEET
AND THE MARK IS AT THE TOP OF A RIDGE. FROM PP# 13470! MARK IS WEST 55 FEET.
SET WITNESS POST 4 FEET NORTH.
HAND HELD GPS N 48-06-25.4 W 115-24-34.7

6011027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6011027 2011
ON US HIGHWAY 2 AT MILEPOST 54.00 TURN LEFT AND HEAD WEST FOLLOW ROAD 1015 FEET TO AN
ABANDONED HOUSE. MARK IS 60 FEET SOUTH OF AN ABANDONED HOUSE. MARK IS 30 FEET SOUTHEAST OF
AN OLD PUMPHOUSE. SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-06-25.4 W 115-24-41.4

6021027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6021027 2011
ON US HIGHWAY 2 AT MILEPOST 54.00 TURN LEFT AND HEAD WEST 1450 FEET DOWN THE DIRT ROAD.
MARK IS WEST 58 FEET FROM A GATEPOST. SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-06-25.7 W 115-24-47.7

6031027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6031027 2011
AT MILEPOST 54.00 TURN LEFT AND HEAD WEST FOLLOW THE ROAD PAST THE ABANDONED HOUSE
TURN AND HEAD SOUTH TO THE APPROX. CENTER OF MEADOW MARK IS 30 FEET NORTH OF SCHREIBER CREEK.
SET WITNESS POST 5 FEET NORTH

6041027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6041027 2011
AT MILEPOST 54.11 TURN LEFT AND HEAD WEST 550 FEET. MARK IS 55 FEET WEST OF THE ROAD.
MARK IS 80 FEET FROM THE TREELINE AT THE SOUTH EDGE OF MEADOW.
SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-06 12.9 W 115-24-24.0

6051027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6041027 2011
AT MILEPOST 54.11 TURN LEFT AND HEAD WEST 1350 FEET AND TAKE THE RIGHT FORK OF THE
ROAD CONTINUE TO THE END OF THE ROAD. A GAUGING STATION WILL BE DIRECTLY IN FRONT OF
YOU. MARK IS 220 FEET EAST OF THE GAUGING STATION AT THE SOUTHWEST EDGE OF SCHREIBER LAKE.
APPROXIMATELY 10 FEET SOUTH OF THE SOUTHERN EDGE OF SCHREIBER LAKE.
SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-06-09.3 W 115-24-31.0

6061027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6061027 2011
ON US HIGHWAY 2 AT MILEPOST 54.11 TURN LEFT AND HEAD WEST AT 1350 FEET TAKE THE
RIGHT FORK AND CONTINUE TO THE END OF THE ROAD. A GAUGING STATION WILL BE DIRECTLY
IN FRONT OF YOU CROSS THE CREEK AND HEAD NORTH 400 FEET FROM THE STATION. MARK IS
100 FEET EAST OF THE TREELINE. SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-06-09.4 W 115-24-37.8

6071027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6071027 2011
MARK IS AT U.S. HWY 2 MILEPOST 54.66 25 FEET RIGHT OF CENTERLINE.
SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-06-00 W 115-24-01

6081027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6081027 2011
FROM U.S. HWY 2 MILEPOST 54.11 TURN LEFT AND HEAD WEST ON UNMARKED ROAD
GO 0.26 MILES, LEFT TURN GO 1.04 MILES, RIGHT TURN GO 1.08 MILES, RIGHT TURN CONTINUE
AND STOP AT 1.76 MILES FROM HWY 2. MARK IS 15 FEET EAST OF DIRT ROAD.
SET WITNESS POST 5 FEET NORTH.
HAND HELD GPS N 48-05-58 W 115-24-26

6091027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6091027 2011
AT MILEPOST 52.58 ON U.S. HWY 2 TURN LEFT AND HEAD WEST 1.11 MILES ON SCHREIBER CREEK ROAD.
MARK IS 12 FEET SOUTH OF CENTERLINE AT A BEND IN THE ROAD.
SET WITNESS POST 5 FEET WEST.
HAND HELD GPS N 48-06-29 W 115-25-17

6101027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6101027 2011
U.S. HWY 2 MILEPOST 53.076 60 FEET LEFT. MARK IS LOCATED ON SOUTHERLY EDGE OF TURNOUT AT
WEATHER STATION SET WITNESS POST 4 FEET WEST.

6111027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6111027 2011
TURN LEFT AND HEAD WEST ON SCHREIBER CREEK ROAD AT MILEPOST 52.58. FOLLOW THE ROAD
0.456 MILES TO THE MARK LOCATED ON THE EAST SHOULDER.
SET WITNESS POST 4 FEET SOUTH.

6121027
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED 6121027 2011
MARK IS LOCATED ON WESTERLY EDGE OF MEADOW 150+/- FEET SOUTHERLY FROM TREE LINE
AND 40 FEET EASTERLY OF A NORTH-SOUTH ROAD AT BOTTOM OF LOGGED HILLSIDE.
SET WITNESS POST 4 FEET EAST.

53Z
FOUND 2" ALUMINUM CAP STAMPED 53Z 1987 25 FEET RIGHT OF HIGHWAY 2 CENTERLINE ON THE
NORTH EDGE OF A PULLOUT AT MILEPOST 53.48. WITNESS POST SET 3 FEET WEST.

53A
FOUND 2" ALUMINUM CAP STAMPED 53A 17 FEET LEFT OF HIGHWAY 2 CENTERLINE AT MILEPOST 53.50.
WITNESS POST SET 2 FEET EAST.

53Y
FOUND 2" ALUMINUM CAP STAMPED 53Y 75 FEET RIGHT OF HIGHWAY 2 CENTERLINE AT MILEPOST 53.10.
TWO WITNESS POSTS THE FIRST IS ONE FOOT NORTH AND THE OTHER IS ONE FOOT SOUTH.

1027CC
FOUND 2" MDT ALUMINUM CAP STAMPED 1027CC 2006. HAND HELD GPS N48-05-47 W115-23-45

AB1027
FOUND 2" MDT ALUMINUM CAP STAMPED AB1027 2006. HAND HELD GPS N48-06-35 W115-23-45

AC1027
FOUND 2" MDT ALUMINUM CAP STAMPED AC1027 2006. HAND HELD GPS N48-06-28 W115-24-33

AE1027
FOUND 2" MDT ALUMINUM CAP STAMPED AE1027 2006. HAND HELD GPS N48-06-20 W115-24-26

AF1027
FOUND 2" MDT ALUMINUM CAP STAMPED AF1027 2006. HAND HELD GPS N48-06-17 W115-24-24

AG1027
FOUND 2" MDT ALUMINUM CAP STAMPED AG1027 2006. HAND HELD GPS N48-06-14 W115-24-20

AP1027
FOUND 2" MDT ALUMINUM CAP STAMPED AC1027 2006. HAND HELD GPS N48-05-44 W115-23-25

BX1027
FOUND 2" MDT ALUMINUM CAP STAMPED BX1027 2006. HAND HELD GPS N48-05-45 W115-23-30

TBME116
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED TBME116 2012
1.65M SOUTHWEST OF 53Y. E116 FOUND PER NGS DATASHEET.

TBM3020
SET 5/8" X 30" REBAR WITH 2" MDT ALUM HORIZ CONTROL CAP STAMPED TBM3020 2012
3020 FOUND PER NGS DATASHEET.

MONTANA DEPARTMENT OF TRANSPORTATION
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STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	4

SUMMARY

FENCING

STATION		meters					each			meters		REMARKS
		FARM FENCE				REMOVE FENCE	FARM FENCE PANEL		DEADMAN	FARM GATE		
FROM	TO						SINGLE	DOUBLE		TYPE G2	TYPE G3	
						1902						SEE PROJECT SITE PLAN
TOTAL						1902	~	~		~	~	

REMOVE STRUCTURE

STATION		lump sum	cubic meters	REMARKS
			UNCL. EXC.	
FROM	TO			
		1	50	ACCESS ROAD BRIDGE REMOVAL
TOTAL		1	# 50	

ESTIMATED QUANTITY - FOR INFORMATION ONLY - COST INCLUDED IN LUMP SUM FOR REMOVE STRUCTURE

CHANNEL CONSTRUCTION

STATION		square meters		lin. meters	cubic meters			each	REMARKS
		COIR EROSION CONTROL NETTING	COCONUT BLANKET	FASCINE	# STREAM-BED MATERIAL	# RIFFLE MATERIAL	UNCL. CHANNEL EXC.	* GRADE CONTROL STRUCTURE	
FROM	TO								
0+24.76	1+81.24	1090	1090	218	40.2	65.5	885.2	7	SCHRIEBER CREEK (SEGMENT 1)
1+81.24	3+52.82	715	715	238	43.5	110.9	382.0		SCHRIEBER CREEK (SEGMENT 2A)
3+52.82	3+89.82	240	240	74	7.4	21.7	188.0	7	SCHRIEBER CREEK (SEGMENT 2B)
3+89.82	4+20.67					3.1	124.1		SCHRIEBER CREEK (TRANSITION POOL)
4+20.67	6+74.25						399.7		SCHRIEBER CREEK (SEGMENT 3)
0+10.00	3+07.10						451.5		COYOTE CREEK
TOTAL		2 045	2 045	530	91.1	201.2	2 430.5	14	

* INCLUDES ALL ITEMS NECESSARY TO CONSTRUCT GRADE CONTROL STRUCTURE INCLUDING LOGS, COIR FABRIC AND ANCHOR ROCKS
# SUBEXCAVATION FOR RIFFLE MATERIAL AND STREAMBED MATERIAL INCLUDED IN UNCL. CHANNEL EXC.

* CONSTRUCTION SURVEY & LAYOUT

STATION		LUMP SUM	REMARKS
FROM	TO		
		1	PROJECT SITE
TOTAL		1	

* SEE SPECIAL PROVISIONS

REVEGETATION

FOR	cubic meters	hectares		lump sum	square meters	REMARKS
	TOPSOIL SALVAGING & PLACING	WETLAND SEEDING - UPLAND	WETLAND SEEDING-WETLAND	TREE & SHRUB PLANTING #	WETLAND SOD	
WETLAND CELLS			1.87			
SCHRIEBER CREEK SEGMENTS 1 AND 2	107	0.11		0.7		INCL. 2 DIVERSION STRUCTURES
ACCESS ROAD AND OLD HOME SITE	653	0.24				
SCHRIEBER CREEK SEG. 3 AND COYOTE CREEK				0.3	2 326	
TOTAL	760	0.35	1.87	1	2 326	

PLANTING LOCATIONS TO BE STAKED BY MDT BOTANIST (SEE SPECIAL PROVISIONS)

* GRADING

STATION	cubic meters			REMARKS
	UNCL. EXC.	UNCL. BORROW	EMB.+	
CELL 1	1 830			
CELL 2	673			
CELL 3	316			
CELL 4	344			
CELL 5	1 847			
CELL 6	1 170			
CELL 7	2 635			
CELL 8	986			
CELL 9	568			
CELL 10	1 694			
DIV. STRUCTURE		117		
TOTAL	12 063	117	~	

* ALL UNCL. EXC. NOT USED FOR TOPSOIL TO BE STOCKPILED ON SCHRIEBER MEADOWS SITE

* LOG & ROOT WAD

STATION			LOG & ROOT WAD (each)	BANK HABITAT LOG (each)	REMARKS
FROM	TO				
			30	45	SCHRIEBER LAKE PROJECT SITE
			75	100	SCHRIEBER MEADOWS PROJECT SITE
TOTAL			105	145	

* PLACEMENT OF LOG & ROOT WADS AND BANK HABITAT LOGS DETERMINED BY SRS

CLEARING & GRUBBING

STATION		hectares	REMARKS
		CLEARING AND GRUBBING	
FROM	TO		
		0.23	SCHRIEBER CREEK SEG. 1 AND 2
TOTAL		0.23	

CULVERT SUMMARY RECAP

BASIC BID	meters				cubic meters				square meters	
	NEW PIPE (TOTAL)	RELAY CULVERT	CLEAN CULVERT	REMOVE CULVERT	FOUND-ATION MATERIAL	BEDDING MATERIAL	CLASS "DD" CONCRETE	CULVERT RIPRAP	GEOTEXTILE	
									PERM. EROS. CNTRL.	
								CLASS	SURV. CLASS	
914 mm CMP				21						
TOTAL	~	~	~	# 21	~	~	~	~	~	

FOR INFORMATION ONLY, INCLUDED IN THE COST OF REMOVE STRUCTURE

DIVERSION STRUCTURE

STATION		cubic meters		square meters		REMARKS
		DIVERSION STRUCT. FILL #	RIFFLE MATERIAL	PERM. EROSION CONTROL FABRIC	EROSION CONTROL BLANKET - BIO	
FROM	TO					
		59	10.8		135	SCHRIEBER CREEK
		58		75		COYOTE CREEK
TOTAL		# 117	10.8	75	135	

FOR INFORMATION ONLY, INCLUDED IN COST OF GRADING

MONTANA DEPARTMENT OF TRANSPORTATION

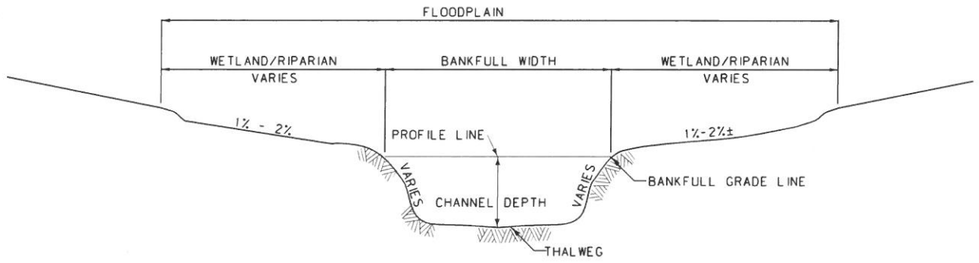
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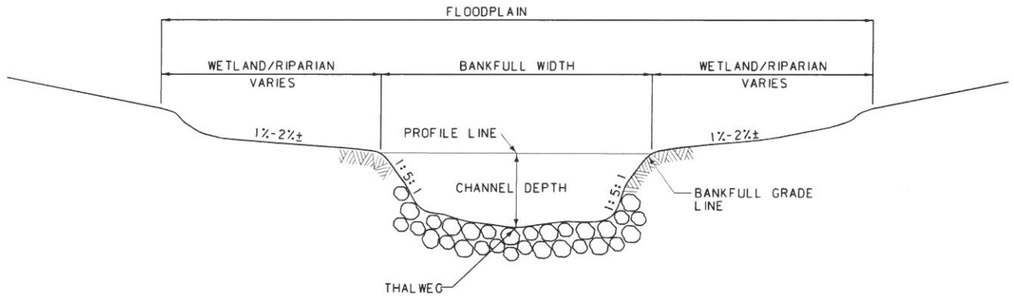
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STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH-27(39)	5

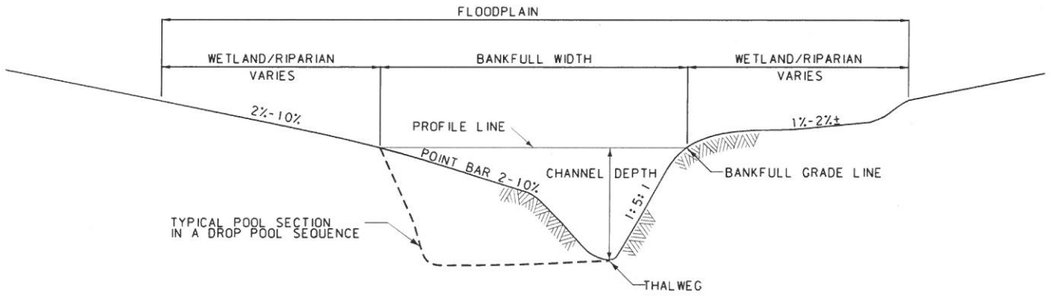
DETAIL



TYPICAL SECTION
RUN



TYPICAL SECTION
RIFFLE/DROP



TYPICAL SECTION
POOL

NOTES: (1) TYPICAL SECTION DRAWINGS ARE PROVIDED TO INDICATE THE GENERAL SHAPE AND ORIENTATION OF THE CROSS-SECTIONAL CHANNEL FEATURES. THEY DO NOT INDICATE THE PLACEMENT OF IN-STREAM STRUCTURES, SUCH AS GRADE CONTROL STRUCTURES, WOODY DEBRIS, LIVE FASCINES, AND SOIL WRAPS.

(2) THE TABLES BELOW PROVIDE DIMENSIONS AND SLOPES FOR EACH CHANNEL REACH, SPECIFIC LOCATIONS OF CHANNEL FEATURES (RUN, RIFFLE, DROP, POOL) TO BE DETERMINED DURING CONSTRUCTION BASED ON SITE CONDITIONS AND AT THE DISCRETION OF THE STREAM RESTORATION SPECIALIST (SRS).

(3) CHANNEL DIMENSIONS MAY VARY WITHIN THE RANGE SHOWN AT THE DISCRETION OF THE SRS.

(4) SEE THE SPECIAL PROVISION FOR CHANNEL CONSTRUCTION SEQUENCING REQUIREMENTS.

SCHRIEBER CREEK				
BANKLINE SLOPE = 0.9%				SEGMENT 1
FLOODPLAIN	POOL	RUN	RIFFLE	STA.0+24.76 TO 1+81.24
8.25 - 10.25	3.0 - 3.8	2.4 - 2.8	2.8 - 3.3	WIDTH
~	0.3 - 0.36	0.25 - 0.29	0.22 - 0.25	DEPTH
~	1.5:1	1.5:1	1.5:1	INSLOPE

SCHRIEBER CREEK				
BANKLINE SLOPE = 0.50%				SEGMENT 2A
FLOODPLAIN	POOL	RUN	RIFFLE	STA.1+81.24 TO 3+52.82
~	3.6 - 4.2	2.6 - 3.1	3.3 - 3.9	WIDTH
~	0.34 - 0.40	0.28 - 0.34	0.23 - 0.26	DEPTH
~	1.5:1	1.5:1	1.5:1	INSLOPE

SCHRIEBER CREEK				
BANKLINE SLOPE = 0.50%				SEGMENT 2B
FLOODPLAIN	POOL	RUN	RIFFLE	STA.3+52.82 TO 3+89.82
~	3.6 - 4.2	2.6 - 3.1	~	WIDTH
~	0.34 - 0.40	0.28 - 0.34	~	DEPTH
~	1.5:1	1.5:1	~	INSLOPE

SCHRIEBER CREEK				
BANKLINE SLOPE = 0.19%				SEGMENT 3
FLOODPLAIN	POOL	RUN	RIFFLE	STA.3+89.82 TO 6+74.25
~	*3.6	3.1	~	WIDTH
~	0.70	0.35	~	DEPTH
~	VERTICAL	VERTICAL	~	INSLOPE

* 3.1 TO 9.0 m TRANSITION POOL STA.3+89.82 TO 4+20.67 (SEE PLANS)

COYOTE CREEK				
BANKLINE SLOPE = 0.10%				
FLOODPLAIN	POOL	RUN	RIFFLE	STA.0+10.00 TO 3+07.10
~	2.5	2.0	~	WIDTH
~	0.72	0.38	~	DEPTH
~	VERTICAL	VERTICAL	~	INSLOPE

TYPICAL CHANNEL
SECTION DIMENSIONS
(NOT TO SCALE)

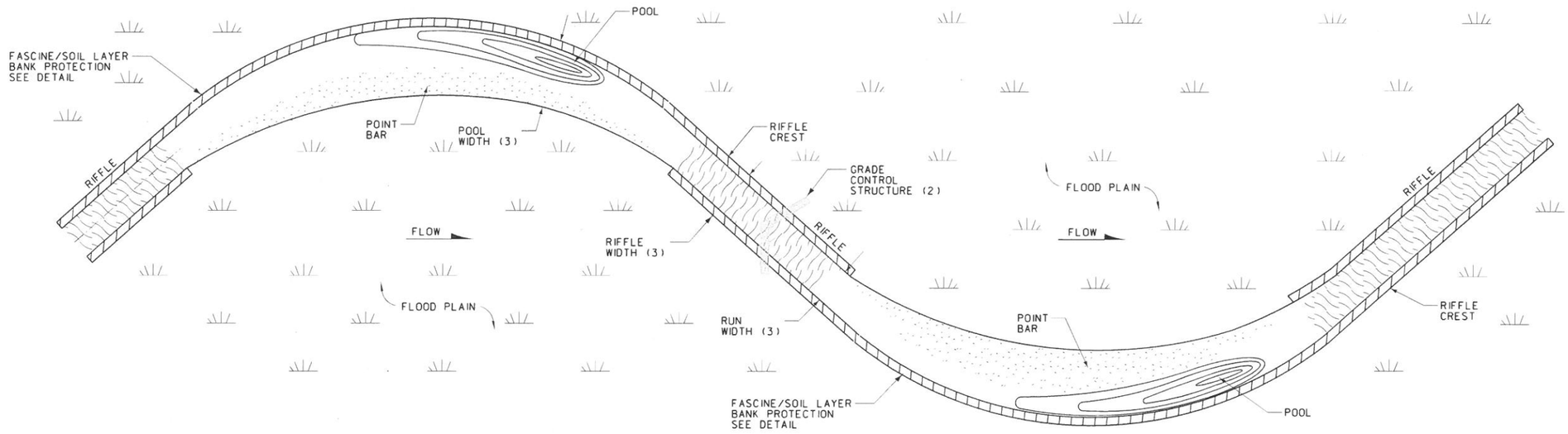
MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

3	3-19-2013	DESIGNED BY	D. Hedstrom	
2	3-19-2014	REVIEWED BY	D. Hedstrom	
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		REVISED BY		

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STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH-27(39)	6

CHANNEL DETAILS



SCHEMATIC - CHANNEL BANK PROTECTION PLAN
SEGMENTS 1 AND 2A

NOTES

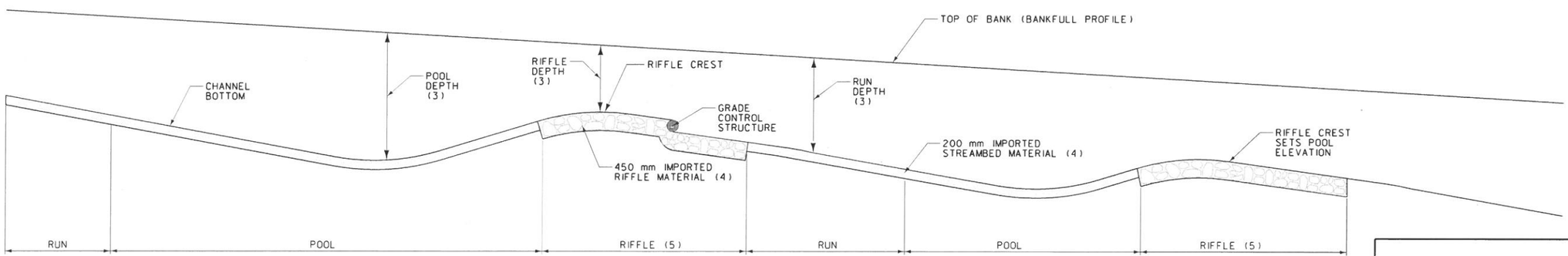
(1) THIS DETAIL SHOWS TYPICAL BANK PROTECTION INSTALLATION. SEE PLANS, SPECIALS, AND SUMMARIES FOR MORE INFORMATION.

(2) GRADE CONTROL STRUCTURES IN SEGMENT 1 WILL BE LOCATED PER PLANS OR AS DIRECTED BY THE SRS.

(3) SEE TYPICAL CHANNEL SECTION DIMENSIONS DETAIL FOR CHANNEL DEPTHS & WIDTHS.

(4) SEE SPECIAL PROVISIONS FOR MATERIAL AND CONSTRUCTION REQUIREMENTS FOR IMPORTED STREAMBED AND RIFFLE MATERIALS.

(5) RIFFLE LENGTH VARIES BUT IS APPROXIMATELY 2 TIMES THE BANKFULL WIDTH. THE EXACT LENGTH TO BE DETERMINED BY THE SRS.



SCHEMATIC - CHANNEL PROFILE - SEGMENTS 1 AND 2A
NOT TO SCALE

BANK PROTECTION PLAN
(NOT TO SCALE)

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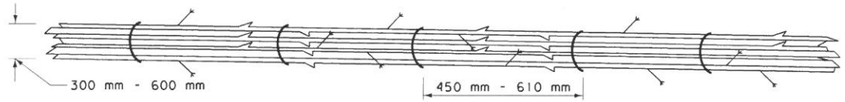
04/08/2014
Highways & Engineering
Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH-27(39)	7

MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD

DETAIL



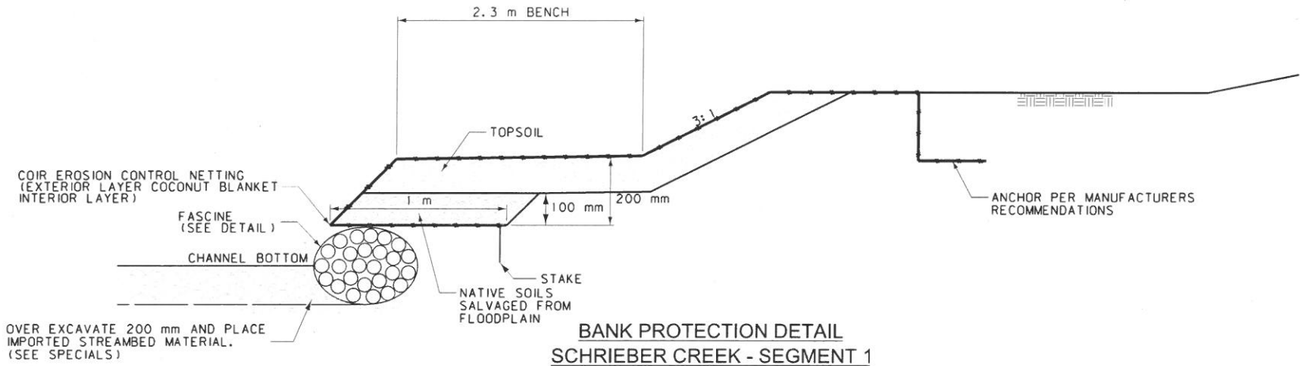
FASCINE

NOTE: OBTAIN LIVE CONIFER BRANCHES 13 mm TO 50 mm DIAMETER, 1.5 m TO 3.0 m LONG.

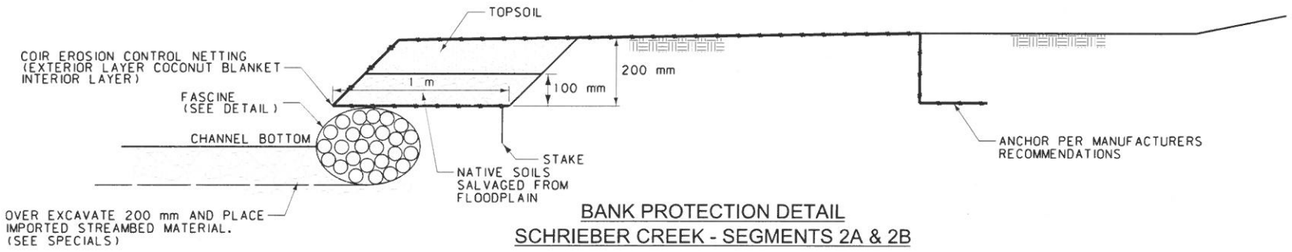
SIDE BRANCHES CAN BE LEFT INTACT.

STAGGER CUTTINGS IN A UNIFORM BUNDLE, 1.5 m TO 6.0 m LONG DEPENDING ON SITE CONDITIONS AND HANDLING CAPABILITIES. VARY ORIENTATION OF CUTTINGS.

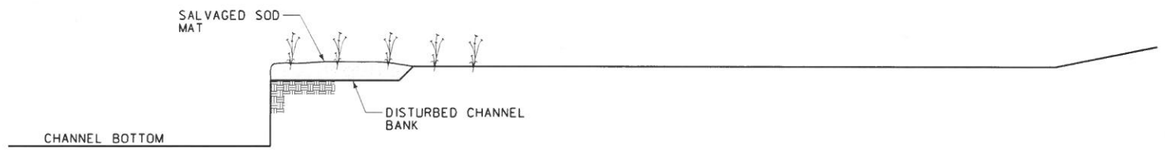
TIE BUNDLE WITH 100% BIODEGRADABLE BINDING MATERIAL



BANK PROTECTION DETAIL
SCHRIEBER CREEK - SEGMENT 1



BANK PROTECTION DETAIL
SCHRIEBER CREEK - SEGMENTS 2A & 2B



BANK PROTECTION DETAIL
SCHRIEBER CREEK - SEGMENT 3
COYOTE CREEK

CHANNEL STRUCTURE
AND STREAM BANK
PROTECTION DETAILS
(NOT TO SCALE)

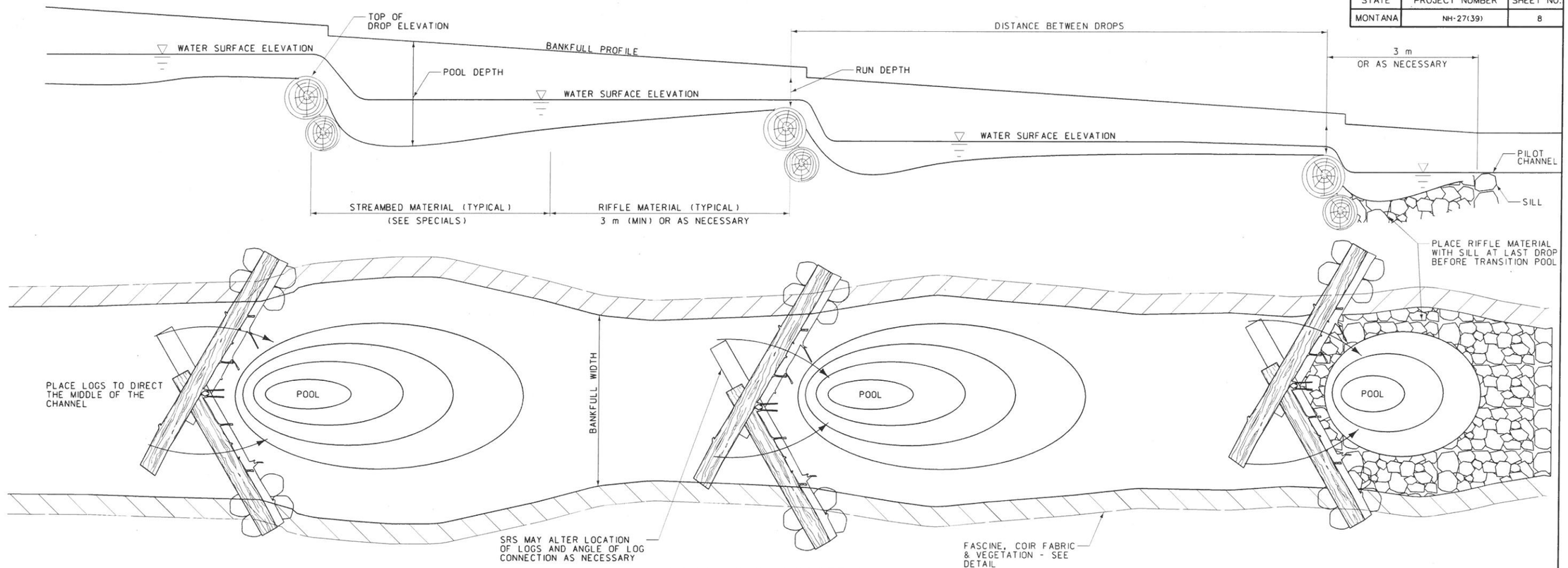
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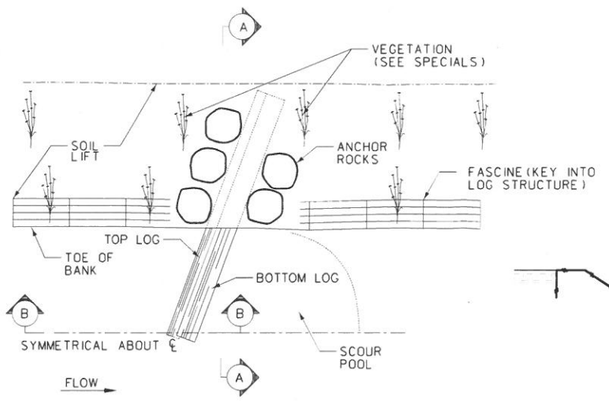
STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH-27(39)	8

MONTANA DEPARTMENT OF TRANSPORTATION

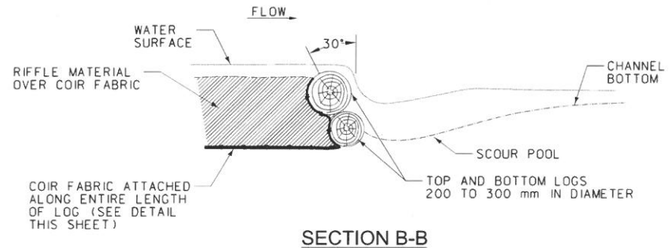
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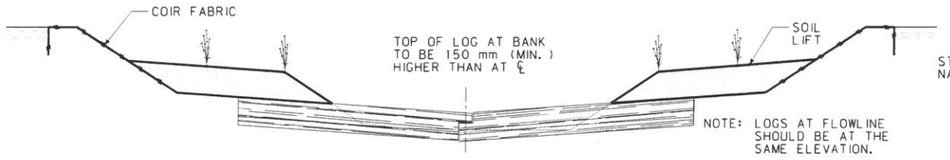
DROP POOL SEQUENCE DETAIL
SEGMENT 2B



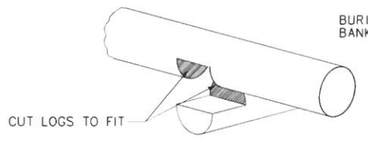
PLAN VIEW



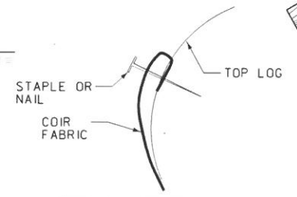
SECTION B-B



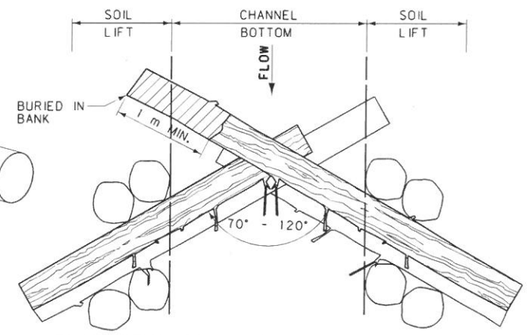
SECTION A-A



DETAIL



ATTACHMENT DETAIL



PLAN VIEW - GRADE CONTROL STRUCTURE

GRADE CONTROL STRUCTURE DETAIL - SEGMENTS 1 & 2B

DROP/POOL SEQUENCE AND GRADE CONTROL STRUCTURE (NOT TO SCALE)

REVISED BY	CHECKED BY	REVIEWED BY	DESIGNED BY	DATE
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				3-20-2014

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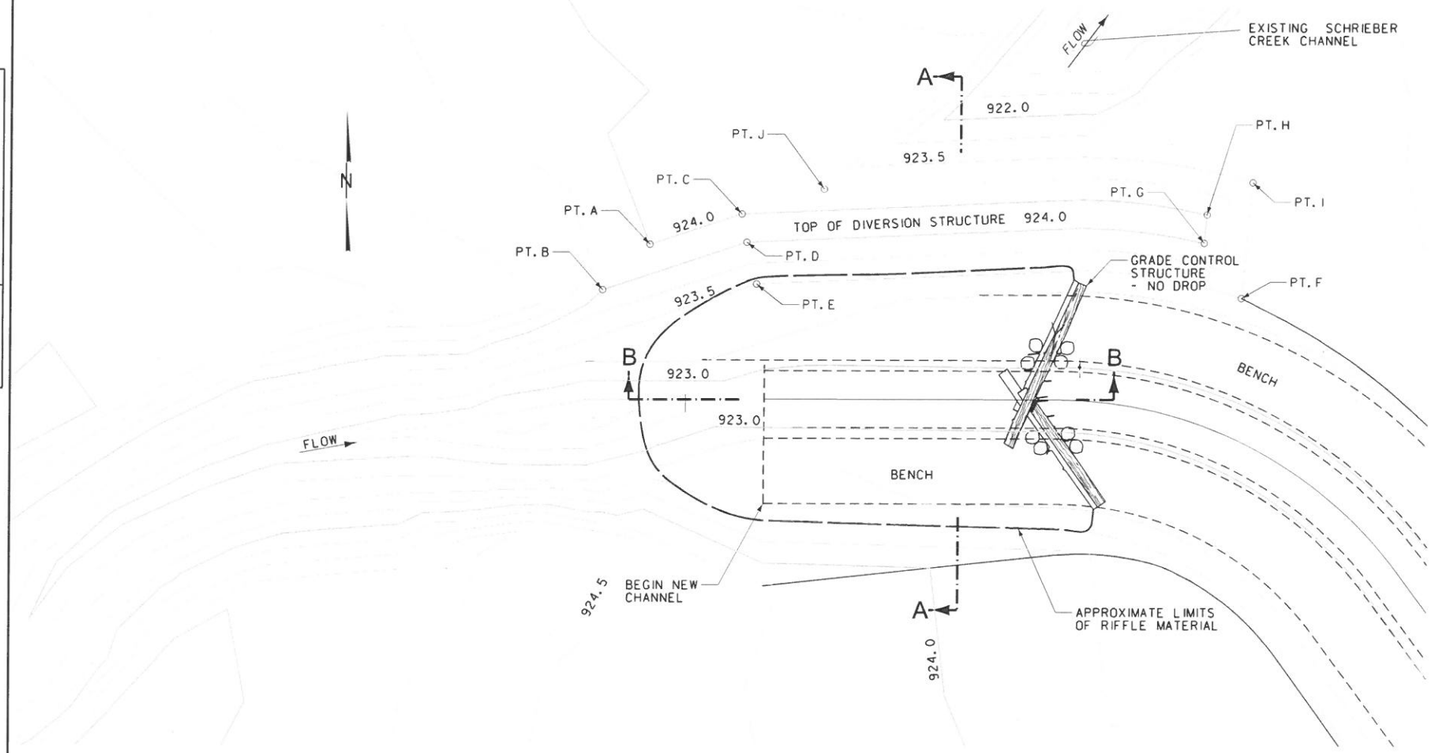
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Highways & Engineering
Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH-27(39)	9

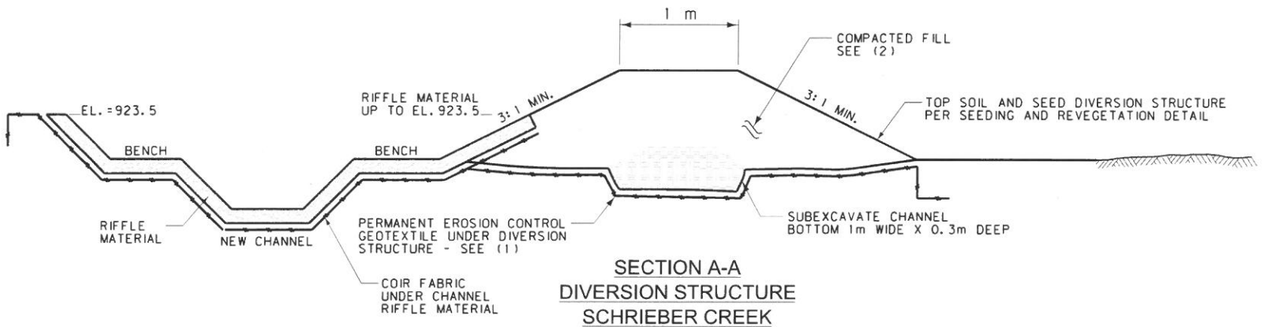
DIVERSION STRUCTURE DETAILS



DIVERSION STRUCTURE - SCHRIEBER CREEK

DIVERSION STRUCTURE COORDINATE POINTS			
POINT	NORTHING (m)	EASTING (m)	ELEVATION (m)
A	445365.871	160092.057	924.0
B	445364.273	160090.408	924.0
C	445366.938	160095.284	924.0
D	445365.945	160095.466	924.0
E	445364.825	160095.272	923.5
F	445363.992	160112.855	923.5
G	445365.923	160111.528	924.0
H	445366.924	160111.620	924.0
I	445368.057	160113.229	923.5
J	445367.812	160098.171	923.8

SECTION B-B
SCHRIEBER CREEK
EXISTING CHANNEL TO
NEW CHANNEL TRANSITION



SECTION A-A
DIVERSION STRUCTURE
SCHRIEBER CREEK

(1) BURY AND ANCHOR PERMANENT EROSION CONTROL GEOTEXTILE SO THAT NO PORTION OF THE FABRIC IS EXPOSED.

(2) PLACE AND COMPACT SUITABLE MATERIALS PER SECTION 203, EARTH EMBANKMENT.

SCHRIEBER CREEK
DIVERSION STRUCTURE DETAIL
(NOT TO SCALE)

MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

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4/8/2014	REVIEWED BY	D. HEDSTROM	3-20-2014
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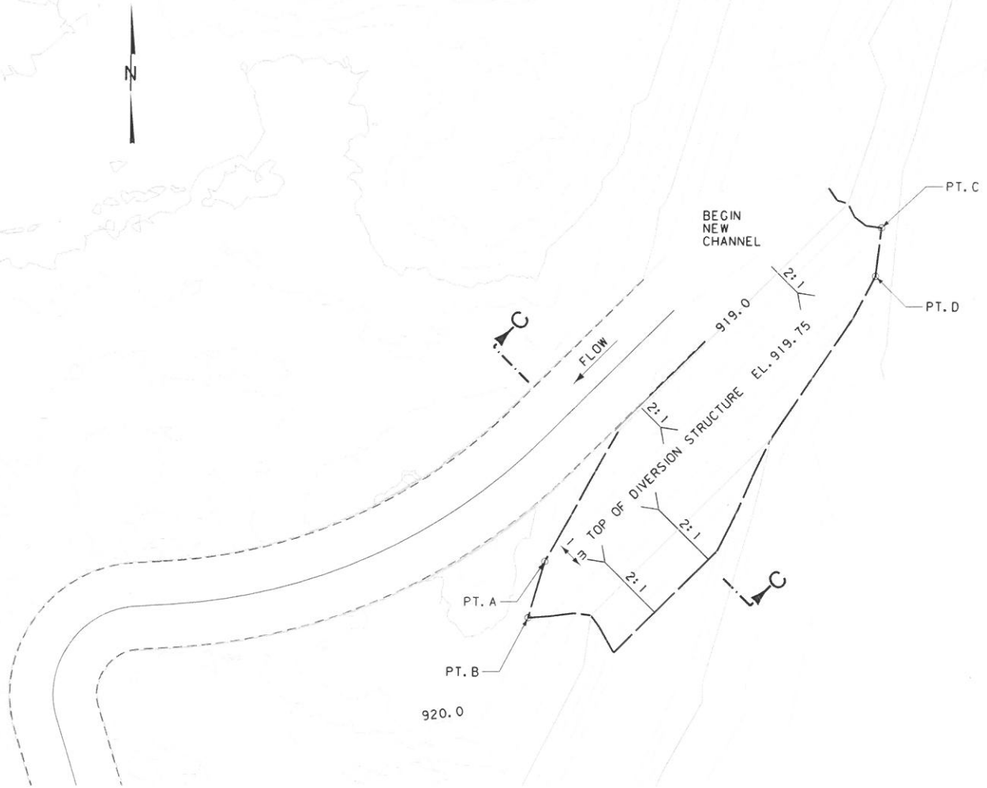
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DIVERSION STRUCTURE DETAILS

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH-27(39)	10

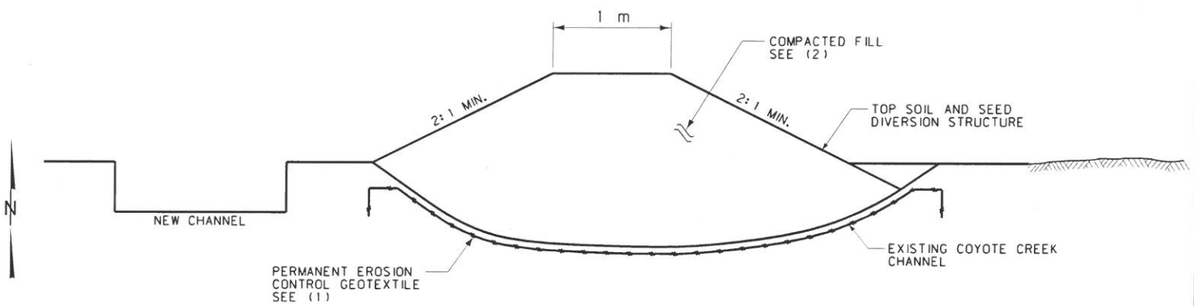
MDT MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD



DIVERSION STRUCTURE - COYOTE CREEK

DIVERSION STRUCTURE COORDINATE POINTS			
POINT	NORTHING (m)	EASTING (m)	ELEVATION (m)
A	445178.084	160452.005	919.75
B	445176.102	160451.433	919.75
C	445189.847	160463.708	919.75
D	445188.147	160463.512	919.75



SECTION C-C
DIVERSION STRUCTURE
COYOTE CREEK

(1) BURY AND ANCHOR PERMANENT EROSION CONTROL FABRIC SO THAT NO PORTION OF THE FABRIC IS EXPOSED.

(2) PLACE AND COMPACT SUITABLE MATERIALS PER SECTION 203, EARTH EMBANKMENT.

COYOTE CREEK
DIVERSION STRUCTURE DETAIL
(NOT TO SCALE)

1	EPS - 11/13	REVISED BY	6-10-2013
2		REVIEWED BY	D. HEDSTROM
		CHECKED BY	D. HEDSTROM
		REVIEWED BY	3-20-2014

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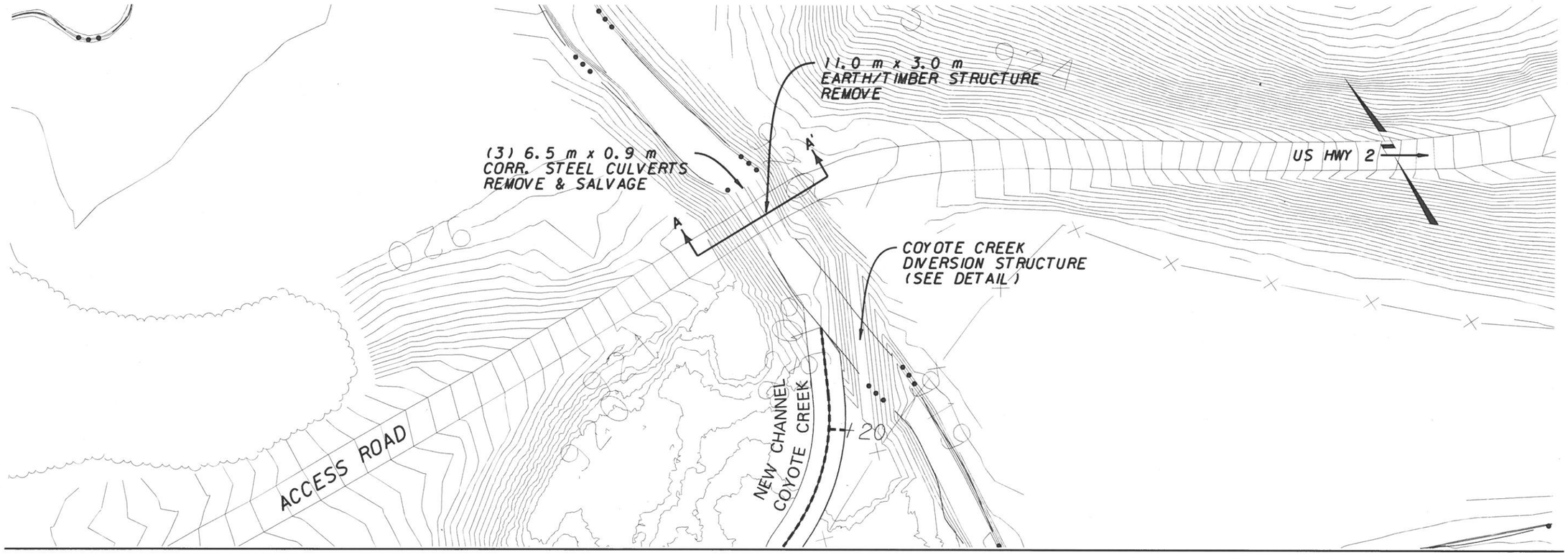
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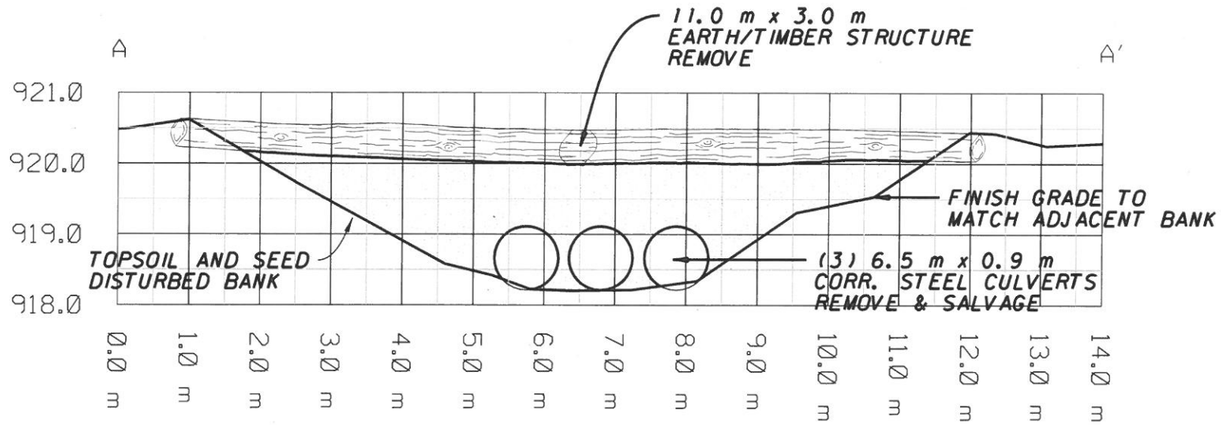
04/08/2014
Highways & Engineering
Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	11

CSF = 0.99943246

MDT MONTANA DEPARTMENT OF TRANSPORTATION
MONTANA CADD





BRIDGE REMOVAL DETAIL

(NO SCALE)

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4/8/2014	REVIEWED BY		2
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04/08/2014
Highways & Engineering Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	12

CSF = 0.99943246

MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD

LEAVE EXISTING FENCE/GATE IN PLACE

SITE ENTRANCE

US HWY 2

EXISTING TIMBER BRIDGE 3 X 0.9 m STEEL CULVERT REMOVE (SEE DETAIL)

STA 0+10.00
BEG. COYOTE CR.

COYOTE CREEK DIVERSION STRUCTURE (SEE DETAIL)

REMOVE FENCE

REMOVE FENCE

WOODEN BARN DO NOT DISTURB

SCHRIEBER CREEK DIVERSION STRUCTURE (SEE DETAIL)

WOODEN FENCE/CORRAL DO NOT DISTURB

STA 1+81.24
BEG. SEG. 2A

STA 3+52.82
BEG. SEG. 2B

STA 3+89.82
BEG. SEG. 3

TRANSITION POOL

STA 3+07.10
END COYOTE CR.

SCHRIEBER LAKE

REMOVE FENCE TO EDGE OF ACCESS ROAD

LEAVE FENCE IN PLACE

REMOVE FENCE ON PROP. BNDRY

SCHRIEBER CR.
STA 0+24.76
BEG. SEG. 1

PIEZOMETER

PROPERTY BOUNDARY

WETLAND CELLS

SCHRIEBER CR.
STA 6+74.25
END SEG. 3

REMOVE FENCE TO EDGE OF CREEK CHANNEL

REMOVE FENCE ON PROP. BNDRY

EXISTING CHANNEL

TALL GRASS

TREE COVER

DELINEATED WETLAND AREAS

(#) = WETLAND CELL

(PZ) = PIEZOMETER (DO NOT DISTURB)

NOTE:
IMPACTS TO DELINEATED WETLANDS CAUSED BY CONSTRUCTION TRAFFIC/ACTIVITIES MUST BE MINIMIZED THROUGH THE USE OF RESPONSIBLE CONSTRUCTION PRACTICES.

DISTRIBUTE BANK HABITAT LOGS/LOG & ROOT WADS THROUGHOUT PROJECT SITE(S) AT LOCATIONS DETERMINED BY THE SRS. SEE SPECIAL PROVISIONS.

CONTOUR INTERVAL = 0.2 m

SITE PLAN

(NO SCALE)

3			
2			
1			

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DESIGNED BY
REVIEWED BY
CHECKED BY

MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	13

NOTE:
ALL STATIONS/ COORDINATES ARE METRIC
STATE PLANE ON CHANNEL CENTERLINE.

CSF = 0.99943246

STREAM ALIGNMENT COORDINATE TABLE

STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
0+10.00	POT	445,186.948	160,456.487	BEGIN COYOTE CREEK
0+16.56	PC	445,182.331	160,451.831	
0+24.11	PI	445,177.016	160,446.471	
0+30.99	PT	445,176.568	160,438.937	
0+32.31	PC	445,176.490	160,437.621	
0+33.79	PI	445,176.401	160,436.139	
0+35.07	PT	445,175.170	160,435.310	
0+35.18	PC	445,175.073	160,435.245	
0+36.60	PI	445,173.897	160,434.454	
0+37.83	PT	445,172.538	160,434.860	
0+40.66	PC	445,169.826	160,435.672	
0+42.30	PI	445,168.258	160,436.142	
0+43.66	PT	445,167.015	160,435.077	
0+44.52	PC	445,166.366	160,434.522	
0+46.41	PI	445,164.925	160,433.289	
0+47.55	PT	445,166.080	160,431.785	
0+49.24	PC	445,167.109	160,430.443	
0+50.59	PI	445,167.932	160,429.371	
0+51.62	PT	445,167.244	160,428.208	
0+53.45	PC	445,166.314	160,426.633	
0+55.60	PI	445,165.220	160,424.783	
0+57.51	PT	445,163.125	160,424.303	
0+57.80	PC	445,162.840	160,424.238	
0+58.78	PI	445,161.888	160,424.020	
0+59.73	PT	445,161.088	160,423.459	
0+60.93	PC	445,160.107	160,422.772	
0+64.17	PI	445,157.448	160,420.909	
0+65.87	PT	445,159.515	160,418.405	
0+68.79	PC	445,161.373	160,416.154	
0+71.14	PI	445,162.866	160,414.345	
0+72.56	PT	445,161.156	160,412.740	
0+73.09	PC	445,160.774	160,412.381	
0+74.06	PI	445,160.067	160,411.717	
0+74.81	PT	445,159.171	160,412.090	
0+75.45	PC	445,158.575	160,412.338	
0+80.67	PI	445,153.762	160,414.341	
0+83.18	PT	445,152.483	160,409.287	
0+83.31	PC	445,152.452	160,409.162	
0+84.82	PI	445,152.082	160,407.703	
0+86.10	PT	445,153.032	160,406.535	
0+90.58	PC	445,155.857	160,403.057	
0+93.07	PI	445,157.427	160,401.125	
0+94.50	PT	445,155.500	160,399.547	
0+96.08	PC	445,154.276	160,398.544	
0+96.72	PI	445,153.783	160,398.140	
0+97.33	PT	445,153.543	160,397.549	
0+98.86	PC	445,152.968	160,396.129	
1+00.76	PI	445,152.259	160,394.379	
1+02.23	PT	445,150.375	160,394.261	
1+07.94	PC	445,144.676	160,393.903	
1+11.56	PI	445,141.069	160,393.677	
1+13.82	PT	445,140.930	160,390.065	
1+14.42	POT	445,140.907	160,389.469	
1+25.45	PC	445,140.482	160,378.443	
1+30.35	PI	445,140.294	160,373.549	
1+33.20	PT	445,135.396	160,373.636	
1+34.83	PC	445,133.769	160,373.666	
1+41.22	PI	445,127.381	160,373.780	
1+43.90	PT	445,128.806	160,367.551	
1+44.04	PC	445,128.838	160,367.411	
1+49.13	PI	445,129.973	160,362.450	
1+51.98	PT	445,124.993	160,361.403	
1+60.40	PC	445,116.760	160,359.671	
1+65.77	PI	445,111.505	160,358.566	
1+68.61	PT	445,112.982	160,353.403	
1+69.06	PC	445,113.105	160,352.971	
1+75.02	PI	445,114.745	160,347.236	
1+77.79	PT	445,108.811	160,346.623	
1+80.47	PC	445,106.143	160,346.348	
1+85.78	PI	445,100.860	160,345.802	
1+88.63	PT	445,101.723	160,340.562	
1+94.46	PC	445,102.672	160,334.802	
1+98.13	PI	445,103.267	160,331.189	
2+00.78	PT	445,100.002	160,329.531	
2+05.46	PC	445,095.832	160,327.413	
2+07.85	PI	445,093.706	160,326.333	
2+09.91	PT	445,093.207	160,324.001	
2+13.48	PC	445,092.462	160,320.517	
2+17.67	PI	445,091.584	160,316.413	
2+20.80	PT	445,087.428	160,315.830	
2+22.58	PC	445,085.661	160,315.582	
2+23.65	PI	445,084.602	160,315.433	
2+24.72	PT	445,083.535	160,315.512	
2+25.98	PC	445,082.278	160,315.605	
2+27.07	PI	445,081.188	160,315.686	
2+27.86	PT	445,080.931	160,316.747	
2+31.22	PC	445,080.140	160,320.004	
2+35.42	PI	445,079.148	160,324.093	
2+37.70	PT	445,075.114	160,322.895	
2+40.07	PC	445,072.842	160,322.220	
2+43.02	PI	445,070.019	160,321.382	
2+43.97	PT	445,070.281	160,324.315	
2+48.13	PC	445,070.650	160,328.461	

STREAM ALIGNMENT COORDINATE TABLE

STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
2+50.10	PI	445,070.825	160,330.424	
2+51.62	PT	445,069.093	160,331.364	
2+52.50	PC	445,068.319	160,331.784	
2+55.12	PI	445,066.015	160,333.034	
2+57.33	PT	445,063.676	160,331.851	
2+60.53	PC	445,060.821	160,330.406	
2+61.15	PI	445,060.265	160,330.125	
2+61.73	PT	445,059.648	160,330.209	
2+63.48	PC	445,057.920	160,330.444	
2+67.69	PI	445,053.752	160,331.010	
2+69.19	PT	445,055.646	160,334.767	
2+73.56	PC	445,057.614	160,338.671	
2+75.26	PI	445,058.380	160,340.190	
2+76.38	PT	445,057.003	160,341.190	
2+78.17	PC	445,055.553	160,342.243	
2+80.29	PI	445,053.838	160,343.488	
2+82.07	PT	445,051.844	160,342.768	
2+83.54	PC	445,050.458	160,342.268	
2+85.20	PI	445,048.898	160,341.705	
2+86.31	PT	445,048.056	160,343.133	
2+86.61	PC	445,047.902	160,343.393	
2+88.22	PI	445,047.088	160,344.774	
2+89.47	PT	445,048.003	160,346.091	
2+93.64	PC	445,050.388	160,349.520	
2+96.55	PI	445,052.049	160,351.908	
2+97.95	PT	445,049.438	160,353.191	
3+00.58	PC	445,047.072	160,354.353	
3+02.10	PI	445,045.712	160,355.022	
3+03.59	PT	445,044.215	160,355.257	
3+07.10	POT	445,040.745	160,355.803	END COYOTE CREEK

STREAM ALIGNMENT COORDINATE TABLE

STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
0+24.76	POT	445,360.438	160,096.114	BEGIN SCHRIEBER CR-SEG 1
0+35.03	PC	445,360.418	160,106.386	
0+42.58	PI	445,360.404	160,113.932	
0+49.01	PT	445,354.337	160,118.418	
0+58.17	PC	445,346.977	160,123.861	
0+66.87	PI	445,339.977	160,129.037	
0+73.94	PT	445,340.999	160,137.682	
0+81.16	PC	445,341.847	160,144.850	
0+90.34	PI	445,342.925	160,153.970	
0+97.64	PT	445,335.293	160,159.077	
1+04.87	PC	445,329.289	160,163.095	
1+13.52	PI	445,322.097	160,167.908	
1+20.56	PT	445,322.664	160,176.544	
1+24.23	PC	445,322.904	160,180.202	
1+35.91	PI	445,323.669	160,191.860	
1+44.08	PT	445,312.554	160,195.456	
1+49.71	PC	445,307.201	160,197.188	
1+54.08	PI	445,303.038	160,198.534	
1+58.22	PT	445,300.252	160,201.909	
1+65.66	PC	445,295.516	160,207.644	
1+72.86	PI	445,290.932	160,213.197	
1+79.09	PT	445,283.732	160,213.092	
1+81.24	POT	445,281.579	160,213.061	END SCHRIEBER CR-SEG 1

STREAM ALIGNMENT COORDINATE TABLE

STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
1+81.24	POT	445,281.579	160,213.061	BEG. SCHRIEBER CR-SEG 2A
1+92.06	PC	445,270.761	160,212.903	
1+98.23	PI	445,264.596	160,212.814	
2+03.11	PT	445,261.747	160,218.282	
2+08.71	PC	445,259.158	160,223.251	
2+15.18	PI	445,256.169	160,228.988	
2-20.20	PT	445,249.711	160,228.614	
2+21.94	PC	445,247.969	160,228.513	
2+27.34	PI	445,242.579	160,228.201	
2+31.84	PT	445,239.361	160,232.536	
2+38.33	PC	445,235.493	160,237.748	
2+43.68	PI	445,232.309	160,242.038	
2+48.15	PT	445,226.972	160,241.776	
2+51.91	PC	445,223.215	160,241.591	
2+58.31	PI	445,216.826	160,241.277	
2+63.29	PT	445,213.863	160,246.946	
2+65.14	PC	445,213.007	160,248.582	
2+73.23	PI	445,209.258	160,255.753	
2+78.74	PT	445,201.463	160,253.582	
2+81.33	PC	445,198.973	160,252.889	
2+85.87	PI	445,194.597	160,251.671	
2+89.86	PT	445,190.800	160,254.165	
2+93.55	PC	445,187.715	160,256.191	
2+99.97	PI	445,182.347	160,259.717	
3+04.96	PT	445,176.908	160,256.302	
3+11.01	PC	445,171.790	160,253.089	

STREAM ALIGNMENT COORDINATE TABLE

STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
3+18.32	PI	445,165.944	160,248.690	
3123.64	PT	445,159.982	160,252.928	
3+27.82	PC	445,156.575	160,255.350	
3+33.76	PI	445,151.730	160,258.795	
3+38.55	PT	445,146.390	160,256.184	
3+44.09	PC	445,141.407	160,253.749	
3+51.47	PI	445,134.778	160,250.509	
3+52.82	POC	445,132.952	160,253.596	END SEG. 2A/BEG SEG. 2B
3+56.81	PT	445,129.727	160,255.886	
3+59.30	PC	445,128.020	160,257.703	
3+63.38	PI	445,125.224	160,260.680	
3+67.05	PT	445,121.144	160,260.848	
3+71.38	PC	445,116.823	160,261.027	
3+73.88	PI	445,114.325	160,261.130	
3+76.28	PT	445,112.170	160,262.396	
3+89.82	PC	445,100.384	160,269.320	END SCHRIEBER CR-SEG 2B

STREAM ALIGNMENT COORDINATE TABLE

STATION	DESCRIPTION	N OR Y COORDINATE	E OR X COORDINATE	REMARKS
3+89.82	POT	445,100.495	160,269.261	BEGIN SCHRIEBER CR-SEG 3
3+95.99	PC	445,095.174	160,272.389	
3+99.64	PI	445,091.880	160,273.945	
4+02.90	PT	445,088.449	160,272.717	
4+22.53	PC	445,070.352	160,265.111	
4+25.75	PI	445,067.334	160,263.992	
4+28.65	PT	445,065.931	160,261.095	
4-34.09	PC	445,063.564	160,256.205	
4+36.62	PI	445,062.459	160,253.923	
4+38.60	PT	445,059.924	160,253.948	
4+44.07	PC	445,054.460	160,254.002	
4+47.61	PI	445,050.920	160,254.038	
4+50.73	PT	445,048.514	160,251.442	
4-55.09	PC	445,045.552	160,248.247	
4+59.03	PI	445,042.872	160,245.356	
4+61.77	PT	445,039.436	160,247.288	
4+65.03	PC	445,036.591	160,248.887	
4+68.41	PI	445,033.641	160,250.545	
4+70.98	PT	445,031.006	160,248.424	
4+76.00	PC	445,027.095	160,245.276	
4-83.09	PI	445,021.570	160,240.829	
4+85.57	PT	445,019.238	160,247.528	
4+89.63	PC	445,017.903	160,251.362	
4-94.79	PI	445,016.205	160,256.241	
4+97.64	PT	445,011.384	160,254.384	
5+04.76	PC	445,004.744	160,251.827	
5+09.84	PI	445,000.000	160,250.000	
5+12.70	PT	444,998.252	160,254.773	
5+17.82	PC	444,996.491	160,259.580	
5+19.97	PI	444,995.750	160,261.601	
5+21.88	PT	444,993.773	160,262.453	
5+27.95	PC	444,988.196	160,264.853	
5-33.29	PI	444,983.296	160,266.962	
5+36.13	PT	444,985.717	160,271.715	
5+36.13	POT	444,985.717	160,271.715	
5-54.89	PC	444,994.230	160,288.428	
5+56.73	PI	444,995.069	160,290.074	
5+58.50	PT	444,994.986	160,291.921	
5+65.77	PC	444,994.658	160,299.183	
5+71.17	PI	444,994.414	160,304.576	
5+73.24	PT	444,989.326	160,302.773	
5+80.38	PC	444,982.592	160,300.386	
5+85.21	PI	444,978.042	160,298.774	
5+86.47	PT	444,978.611	160,303.568	
5+95.67	PC	444,979.694	160,312.702	
6+00.87	PI	444,980.307	160,317.869	
6+02.52	PT	444,975.291	160,316.489	
6+04.50	PC	444,973.381	160,315.964	
6+06.20	PI	444,971.742	160,315.513	
6+07.87	PT	444,970.344	160,314.546	
6+09.63	PC	444,968.891	160,313.542	
6+15.03	PI	444,964.453	160,310.472	
6+17.10	PT	444,962.806	160,315.611	
6+20.61	PC	444,961.733	160,318.959	
6+24.38	PI	444,960.582	160,322.552	
6+26.37	PT	444,957.086	160,321.135	
6+35.01	PC	444,949.077	160,317.890	
6-38.99	PI	444,945.387	160,316.396	
6+40.96	PT	444,944.377	160,320.246	
6147.57	PC	444,942.699	160,326.641	
6+49.31	PI	444,942.258	160,328.323	
6+50.92	PT	444,940.869	160,329.368	
6-58.29	PC	444,934.975	160,333.802	
6+59.30	PI	444,934.167	160,334.410	
6-60.29	PT	444,933.658	160,335.284	
6+74.25	POT	444,926.641	160,347.355	END SCHRIEBER CR-SEG 3

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2	CHECKED BY:
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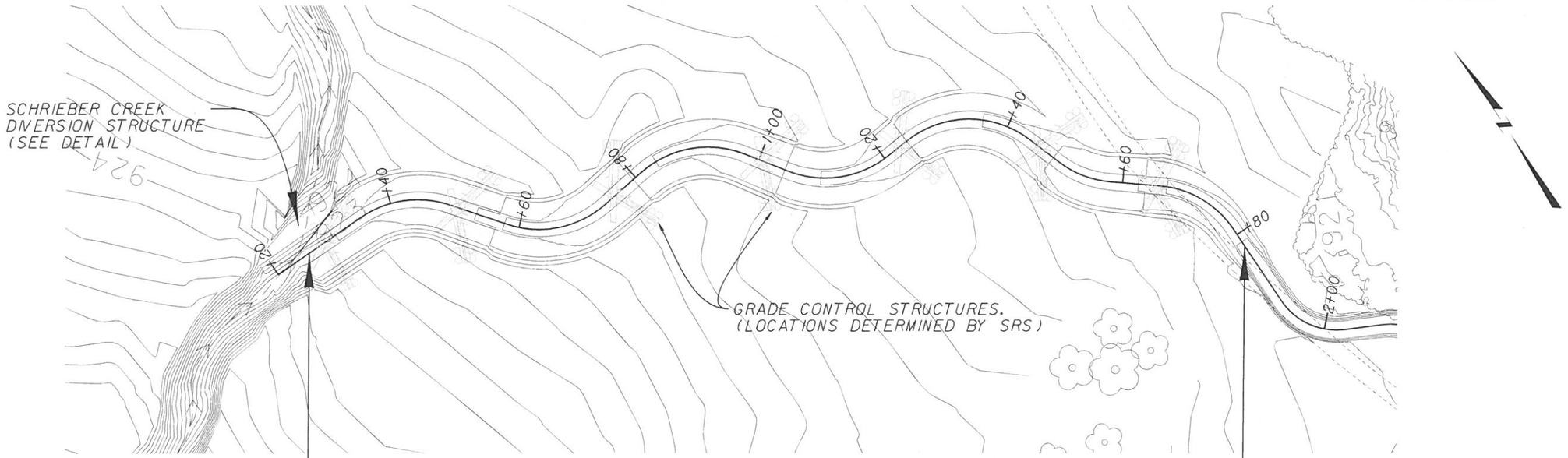
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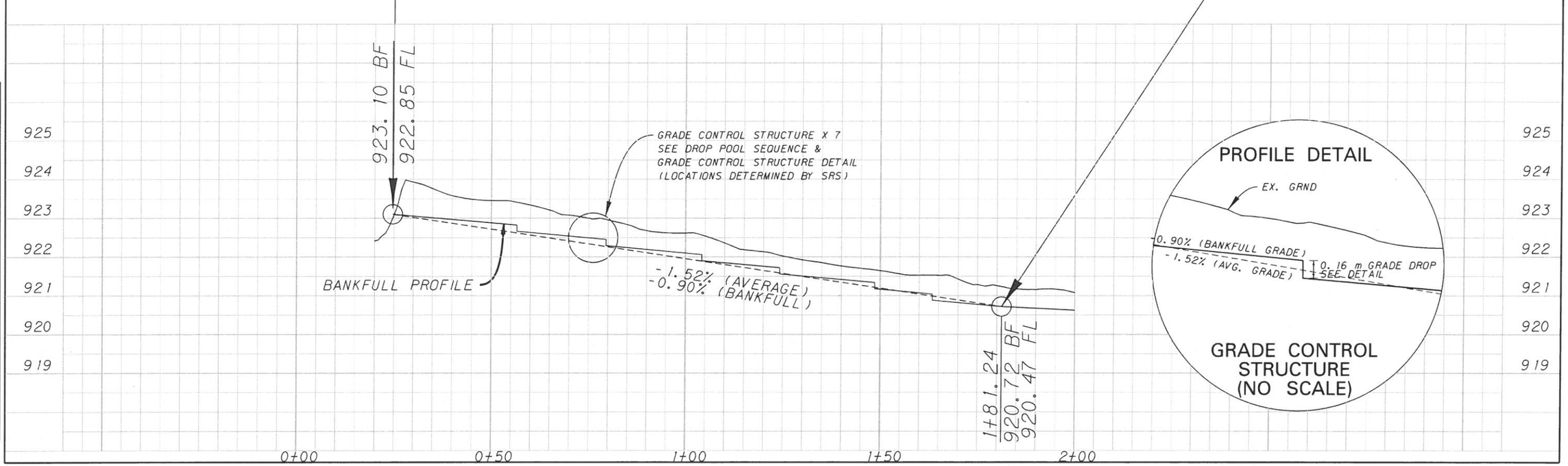
MDT MONTANA DEPARTMENT OF TRANSPORTATION

MONTANA CADD



SCHRIEBER CREEK
STA 0+24.76
BEGIN SEGMENT 1

SCHRIEBER CREEK
STA 1+81.24
END SEGMENT 1



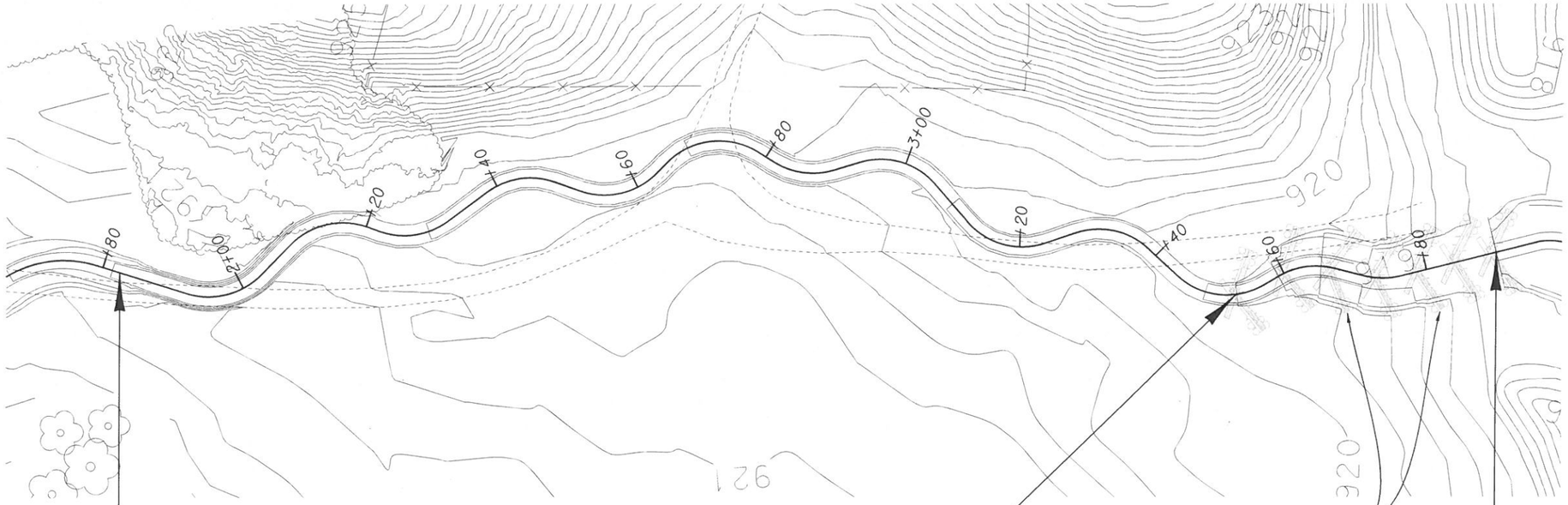
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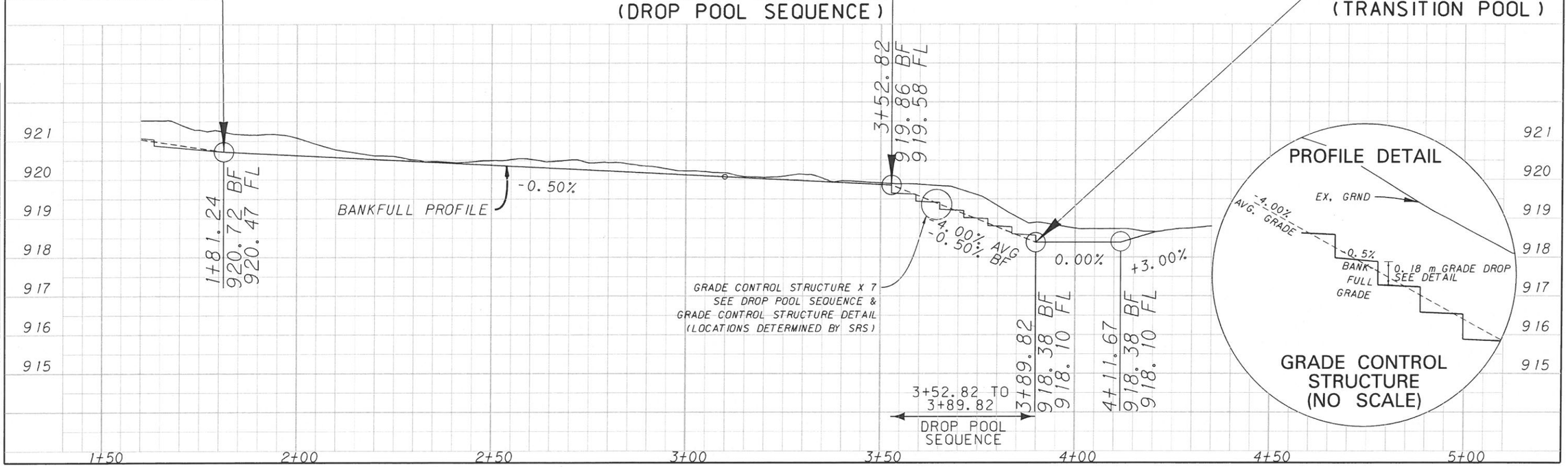


SCHRIEBER CREEK
STA 1+81.24
BEGIN SEGMENT 2A

SCHRIEBER CREEK
STA 3+52.82
BEGIN SEGMENT 2B
(DROP POOL SEQUENCE)

GRADE CONTROL STRUCTURES
(LOCATIONS DETERMINED BY SRS)

SCHRIEBER CREEK
STA 3+89.82
BEGIN SEGMENT 3
(TRANSITION POOL)



MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

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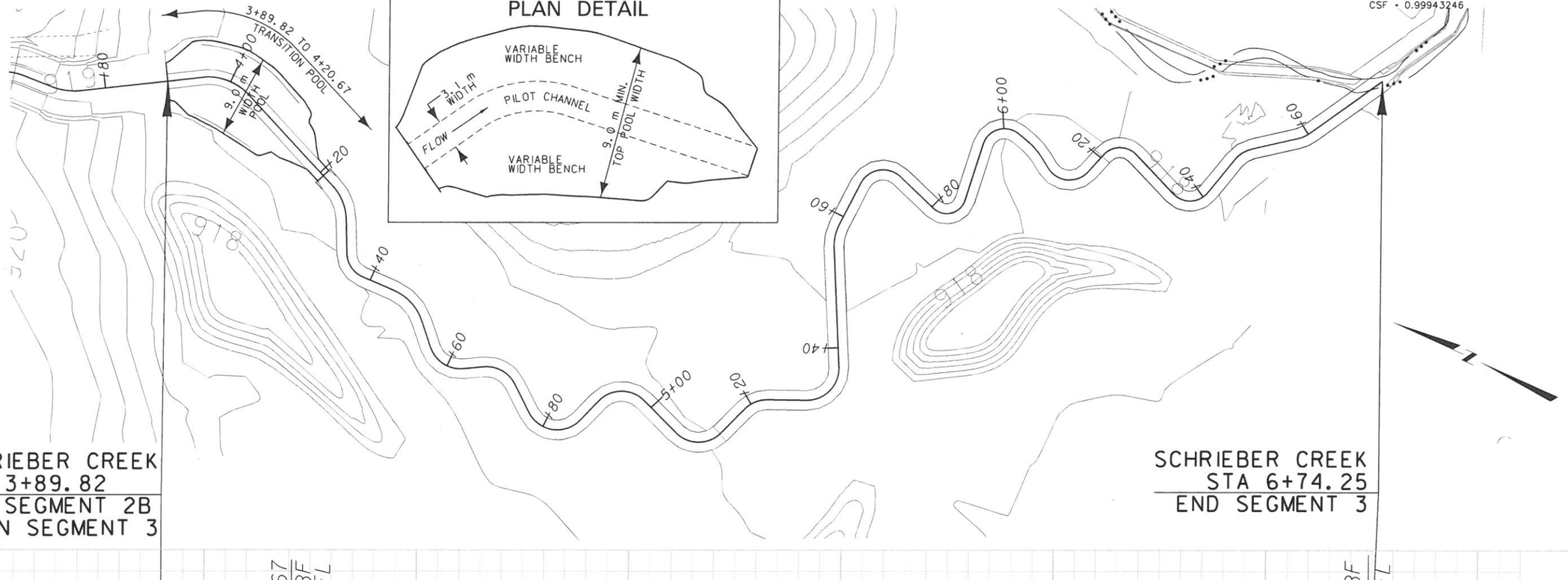
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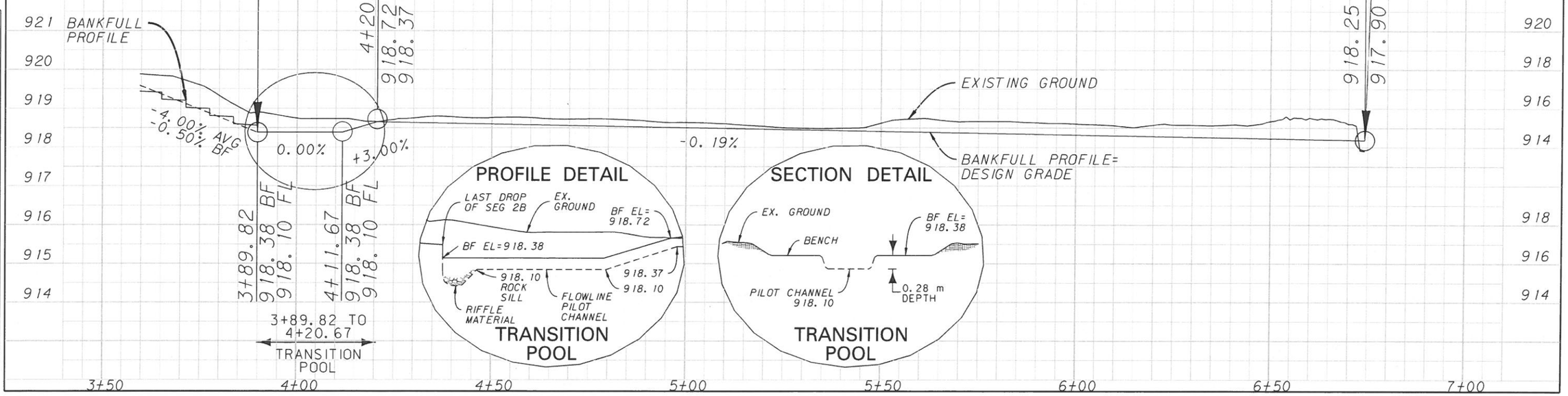
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MONTANA	NH 27(39)	16

CSF = 0.99943246

NOTE: DISTRIBUTE BANK HABITAT LOGS/LOG & ROOT WADS THROUGHOUT PROJECT SITE(S) AT LOCATIONS DETERMINED BY THE SRS. SEE SPECIAL PROVISIONS.

TRANSITION POOL PLAN DETAIL



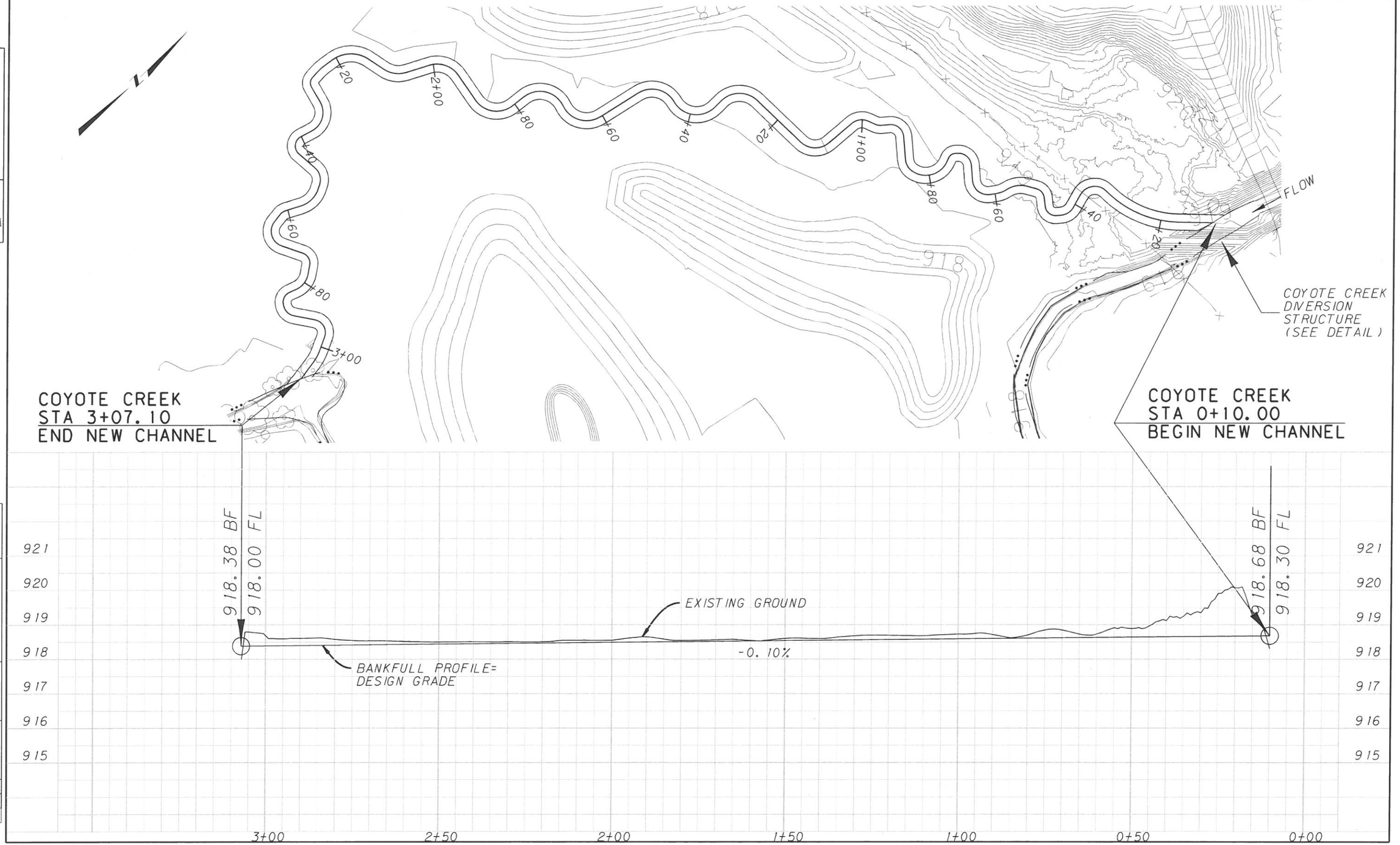


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STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	17

MDT MONTANA DEPARTMENT OF TRANSPORTATION
MONTANA CADD

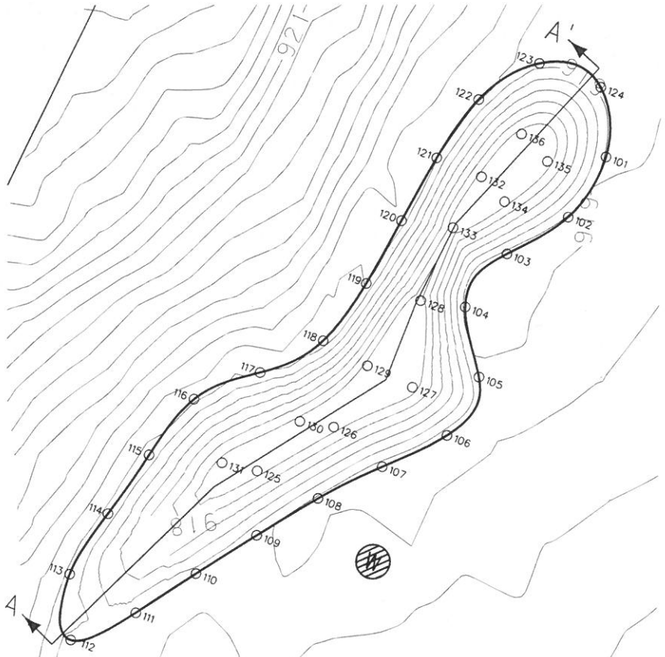


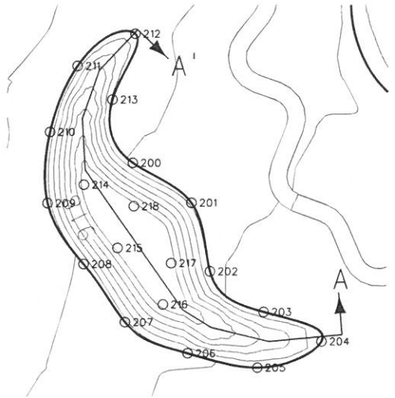
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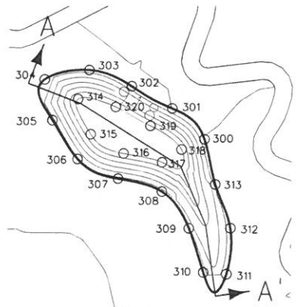
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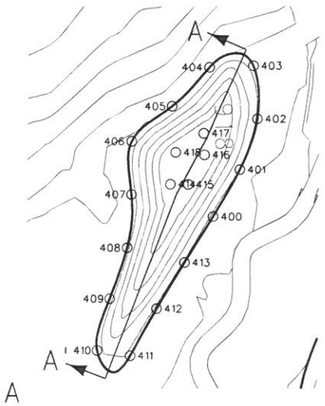
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MONTANA	NH 27(39)	18

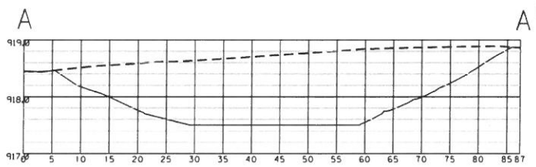
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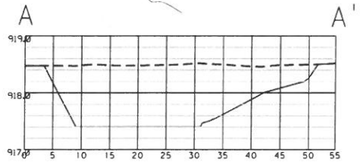


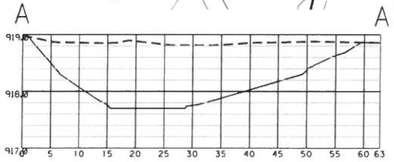


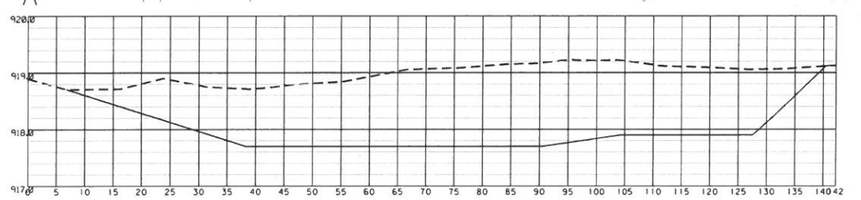












CELL 1 COORDINATES

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	ELEVATION
101	445005.947	160197.095	919.036
102	444993.731	160194.734	919.026
103	444983.860	160186.978	919.086
104	444972.549	160183.523	919.065
105	444961.951	160190.258	918.961
106	444950.385	160188.763	918.925
107	444941.201	160180.168	918.916
108	444931.960	160171.621	918.848
109	444922.053	160163.846	918.760
110	444911.958	160156.315	918.722
111	444901.751	160148.937	918.757
112	444893.238	160140.034	918.713
113	444903.979	160135.663	918.955
114	444916.299	160138.065	918.930
115	444928.525	160141.074	918.957
116	444940.474	160144.872	919.064
117	444948.963	160154.026	919.001
118	444958.148	160162.413	919.151
119	444970.228	160165.839	919.207
120	444982.696	160167.609	919.341
121	444995.170	160169.342	919.219
122	445007.344	160172.469	919.233
123	445017.072	160180.156	919.092
124	445017.021	160191.789	919.100
125	444932.652	160159.822	917.700
126	444944.666	160169.665	917.700
127	444956.108	160180.030	917.700

CELL 1 COORDINATES

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	ELEVATION
128	444970.819	160175.834	917.700
129	444956.818	160171.278	917.700
130	444943.461	160163.693	917.700
131	444931.783	160153.520	917.700
132	444994.860	160177.851	917.900
133	444984.761	160176.454	917.900
134	444992.241	160183.250	917.900
135	445001.530	160187.749	917.900
136	445004.408	160181.742	917.900

CELL 2 COORDINATES

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	ELEVATION
200	445005.342	160225.941	918.796
201	444998.336	160236.314	918.684
202	444986.293	160239.656	918.622
203	444979.153	160249.194	918.545
204	444973.967	160259.475	918.442
205	444969.375	160248.169	918.551
206	444971.891	160235.864	918.609
207	444977.362	160224.788	918.669
208	444987.572	160217.411	918.779
209	444998.271	160210.892	918.906
210	445010.772	160211.329	918.931
211	445022.361	160216.095	918.920
212	445028.019	160226.211	918.864
213	445016.456	160222.269	918.852
214	445001.499	160217.357	917.500
215	444990.395	160223.373	917.500
216	444980.478	160231.423	917.500
217	444987.729	160232.833	917.500
218	444997.737	160226.173	917.500

CELL 3 COORDINATES

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	ELEVATION
300	444967.639	160302.837	918.594
301	444973.049	160297.130	918.602
302	444976.933	160289.959	918.556
303	444979.794	160282.403	918.510
304	444978.138	160274.537	918.478
305	444970.984	160275.953	918.464
306	444964.168	160280.424	918.444
307	444960.711	160287.639	918.463
308	444958.438	160295.431	918.480
309	444951.986	160300.216	918.461
310	444944.240	160302.819	918.483
311	444943.922	160306.847	918.529
312	444952.005	160307.482	918.509
313	444959.704	160304.784	918.480
314	444974.706	160280.460	917.400
315	444968.507	160282.738	917.400
316	444965.138	160288.593	917.400
317	444963.583	160295.403	917.400
318	444966.832	160298.813	917.400
319	444969.988	160293.304	917.400
320	444973.300	160287.138	917.400

CELL 4 COORDINATES

POINT NAME/NUMBER	N OR Y COORDINATE	E OR X COORDINATE	ELEVATION
400	445067.771	160248.965	918.876
401	445076.028	160253.562	918.820
402	445084.947	160256.591	918.836
403	445094.259	160255.795	918.884
404	445093.994	160248.118	919.014
405	445087.151	160241.627	918.996
406	445080.988	160234.583	918.947
407	445071.662	160234.602	918.919
408	445062.288	160233.926	918.874
409	445053.337	160230.908	918.897
410	445044.247	160228.785	918.883
411	445043.308	160234.625	918.850
412	445051.589	160239.184	918.852
413	445059.713	160244.021	918.844
414	445073.449	160241.428	917.700
415	445075.413	160244.551	917.700
416	445078.630	160247.371	917.700
417	445082.403	160247.201	917.700
418	445079.048	160242.311	917.700

NOTE:

ALL COORDINATES ARE METRIC STATE PLANE COORDINATES
HORIZONTAL COORDINATES AND DISTANCES ARE METERS (NAD83–2007)
ELEVATIONS ARE METERS (NADV88)

WETLAND PROFILE & COORDINATES

(NO SCALE)

MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

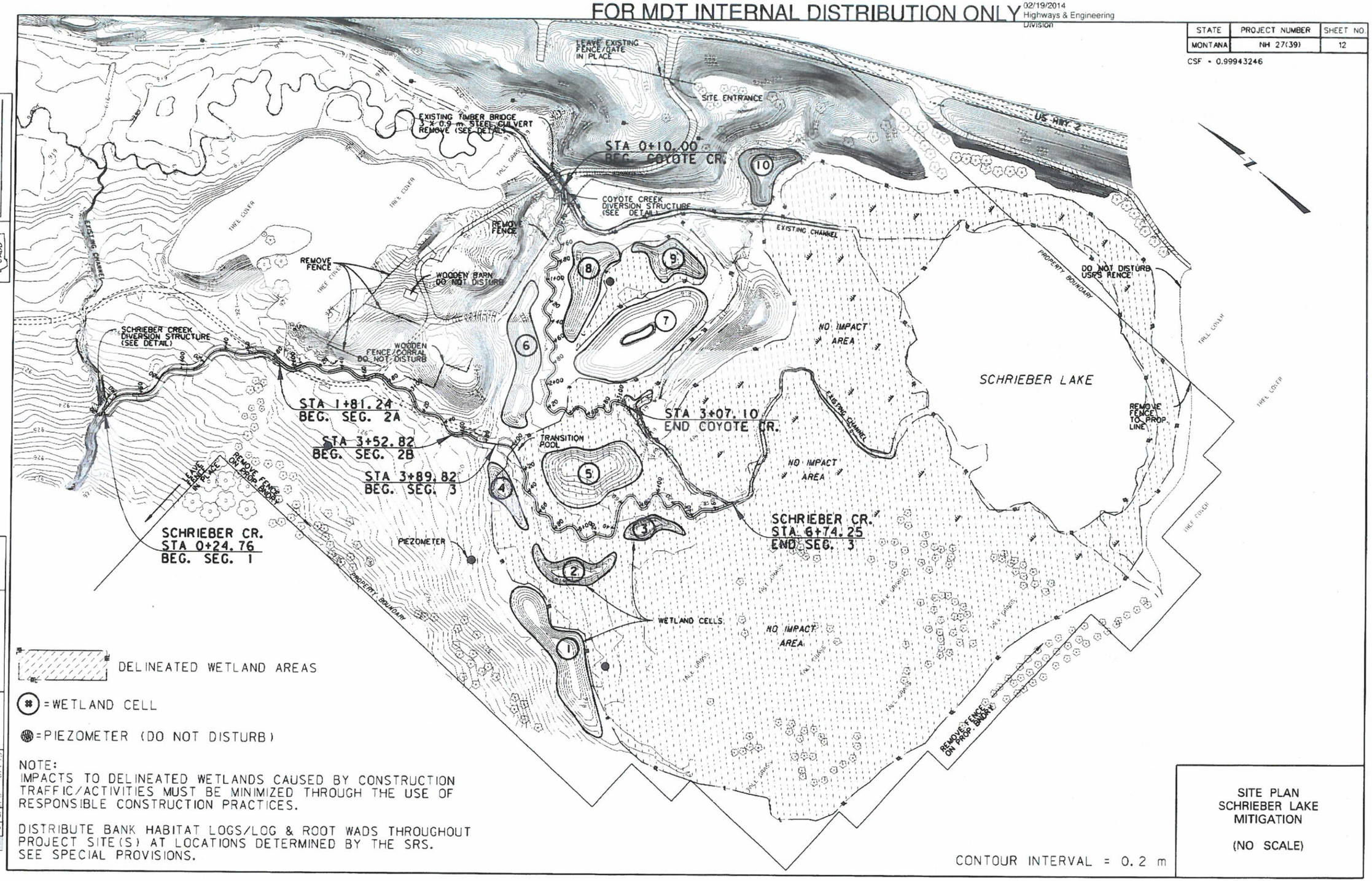
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02/19/2014
Highways & Engineering
Division

STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	12

CSF = 0.99943246



DELINEATED WETLAND AREAS

= WETLAND CELL

= PIEZOMETER (DO NOT DISTURB)

NOTE:
IMPACTS TO DELINEATED WETLANDS CAUSED BY CONSTRUCTION TRAFFIC/ACTIVITIES MUST BE MINIMIZED THROUGH THE USE OF RESPONSIBLE CONSTRUCTION PRACTICES.

DISTRIBUTE BANK HABITAT LOGS/LOG & ROOT WADS THROUGHOUT PROJECT SITE(S) AT LOCATIONS DETERMINED BY THE SRS. SEE SPECIAL PROVISIONS.

CONTOUR INTERVAL = 0.2 m

SITE PLAN
SCHRIEBER LAKE
MITIGATION

(NO SCALE)

MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

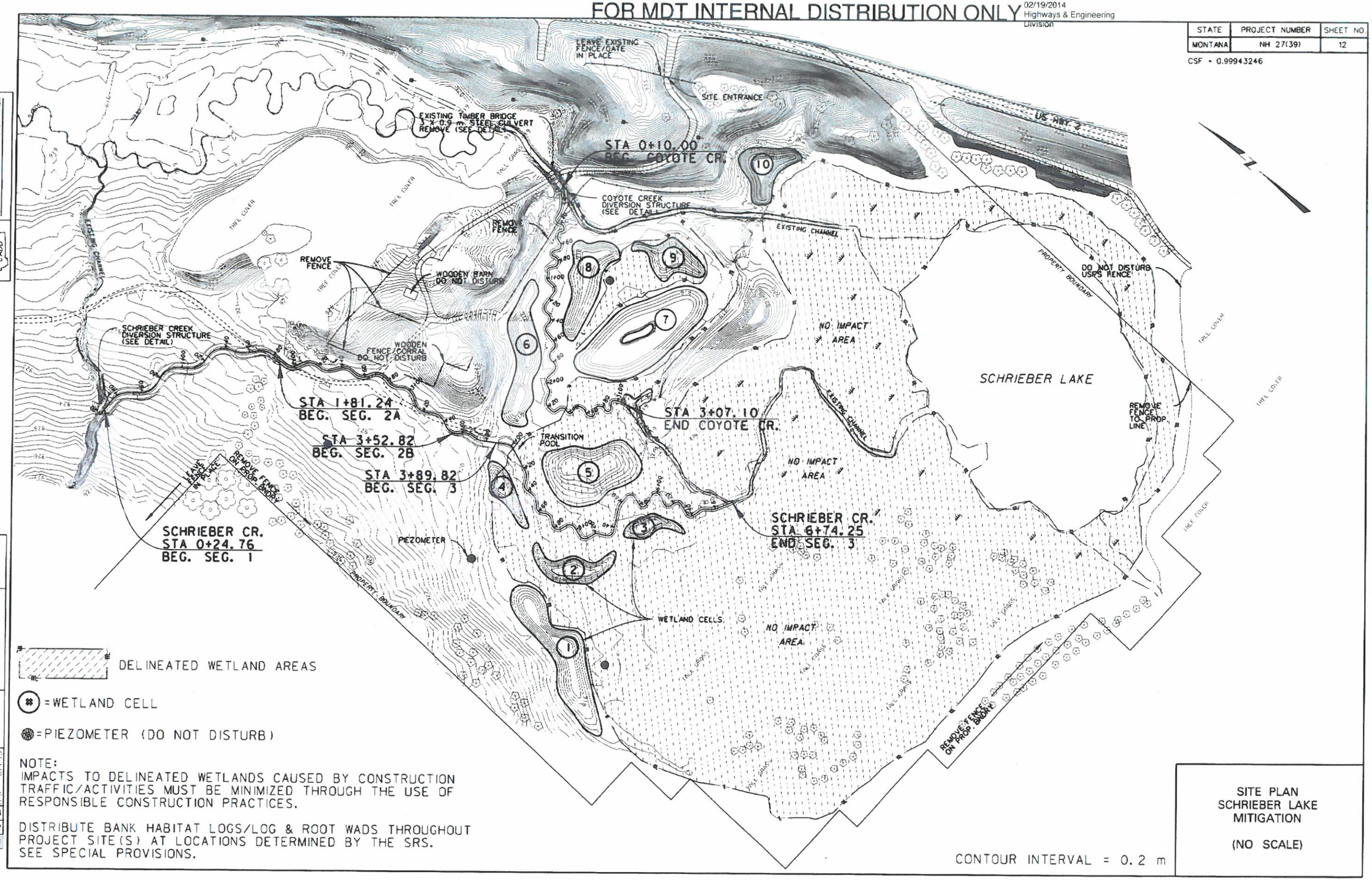
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STATE	PROJECT NUMBER	SHEET NO.
MONTANA	NH 27(39)	12

CSF = 0.99943246



DELINEATED WETLAND AREAS

(*) = WETLAND CELL

(*) = PIEZOMETER (DO NOT DISTURB)

NOTE:
IMPACTS TO DELINEATED WETLANDS CAUSED BY CONSTRUCTION TRAFFIC/ACTIVITIES MUST BE MINIMIZED THROUGH THE USE OF RESPONSIBLE CONSTRUCTION PRACTICES.

DISTRIBUTE BANK HABITAT LOGS/LOG & ROOT WADS THROUGHOUT PROJECT SITE(S) AT LOCATIONS DETERMINED BY THE SRS. SEE SPECIAL PROVISIONS.

CONTOUR INTERVAL = 0.2 m

SITE PLAN
SCHRIEBER LAKE
MITIGATION

(NO SCALE)

MONTANA DEPARTMENT OF TRANSPORTATION
MDT
MONTANA CADD

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SITE PLAN
SCHRIEBER LAKE
MITIGATION
(NO SCALE)
CONTOUR INTERVAL = 0.2 m
NOTE:
IMPACTS TO DELINEATED WETLANDS CAUSED BY CONSTRUCTION TRAFFIC/ACTIVITIES MUST BE MINIMIZED THROUGH THE USE OF RESPONSIBLE CONSTRUCTION PRACTICES.
DISTRIBUTE BANK HABITAT LOGS/LOG & ROOT WADS THROUGHOUT PROJECT SITE(S) AT LOCATIONS DETERMINED BY THE SRS. SEE SPECIAL PROVISIONS.
= PIEZOMETER (DO NOT DISTURB)
= WETLAND CELL
DELINEATED WETLAND AREAS
SCHRIEBER LAKE
SCHRIEBER CR.
STA 0+24.76
BEG. SEC. 1
STA 3+89.82
BEG. SEC. 3
STA 3+52.82
BEG. SEC. 2B
STA 1+81.24
BEG. SEC. 2A
SCHRIEBER CR.
STA 6+74.25
END SEC. 3
END COYOTE CR.
STA 3+07.10
REC. COYOTE CR.
STA 0+10.00
WETLAND CELLS
NO IMPACT AREA
PEZOMETER
TRANSITION POOL
EXISTING CHANNEL
COYOTE CREEK DIVERSION STRUCTURE (SEE DETAIL)
SCHRIEBER CREEK DIVERSION STRUCTURE (SEE DETAIL)
REMOVE FENCE
REMOVE EXISTING FENCE/GATE
LEAVE EXISTING FENCE/GATE IN PLACE
REMOVE FENCE ON PROP. BNDRY
REMOVE FENCE TO PROP LINE
DO NOT DISTURB WOODEN FENCE/CORRAL
DO NOT DISTURB WOODEN BARN
DO NOT DISTURB USFS FENCE
EXISTING TIMBER BRIDGE 3 x 0.9 m STEEL GIRDER
REMOVE (SEE DETAIL)
SITE ENTRANCE
PROPERTY BOUNDARY
TREE LINE
TALL GRASS
US HWY 2
EXISTING HIGHWAY
MONTANA CADD
MDT MONTANA DEPARTMENT OF TRANSPORTATION
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02/19/2014 Highways & Engineering Division
STATE: MONTANA
PROJECT NUMBER: NH 27(39)
SHEET NO: 12
CSF - 0.99943246
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