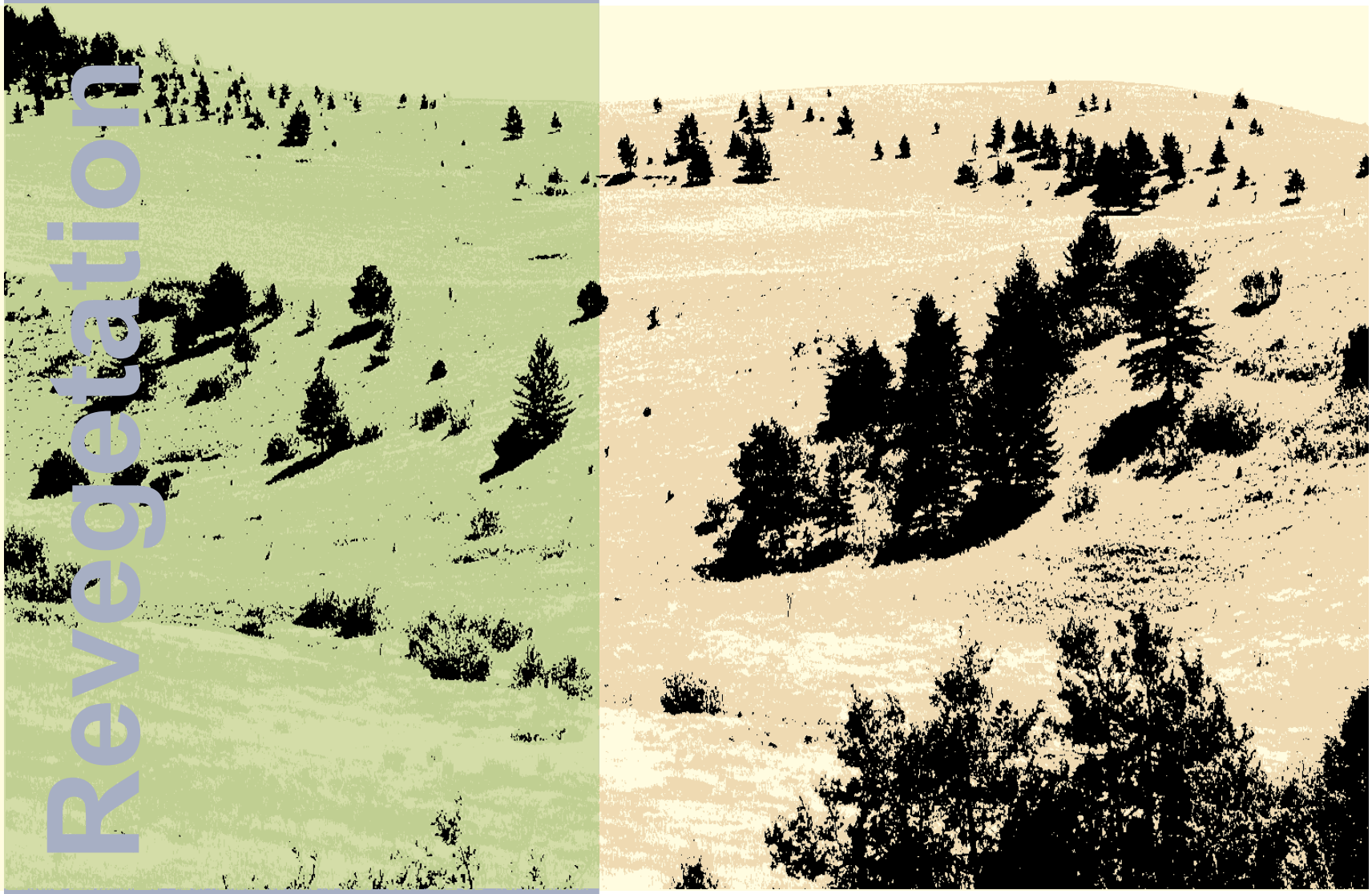
U.S. 93

Revegetation



Project Committee:

Montana Department of Transportation
Federal Highway Administration
The Confederated Salish & Kootenai Tribes of the Flathead Nation

Planting and Revegetation Guidelines

U.S. 93 from Evaro to Polson, Montana

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Prepared by:
Jones & Jones Architects and Landscape Architects, Ltd.

JONES JONES Architects and Landscape Architects, Ltd.

SKILLINGS CONNOLLY PRIME CONSULTANT

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US 93 Planting and Revegetation Guidelines

Introduction

U.S. Highway 93 from Evaro to Polson winds through the hills and valleys of the Flathead Indian Reservation in western Montana, home to the Confederated Salish and Kootenai Tribes. The highway is the main transportation corridor in daily use by tribal members and other residents of the reservation. The number of drivers on U.S. 93 swells on summer weekends as thousands of recreationists and tourists travel between Missoula and Flathead Lake or Glacier National Park. The increasing flow of traffic and increased development has led to increased safety and accessibility concerns on the highway. The Montana Department of Transportation (MDT) has worked closely with the Federal Highway Administration (FHWA) and the Confederated Salish and Kootenai Tribes (CSKT) to plan for the construction of a new, expanded highway that carries larger volumes of traffic safely while respecting the landscape and the people living there.

Purpose

The purpose of this *Planting and Revegetation Guidelines* report is to provide the design teams and consultants with a revegetation plan along U.S. 93 and to provide specific recommendations on how the Design Teams should proceed with design. The revegetation plan includes: plant community descriptions, community species lists, conceptual revegetation plans, soils analysis, propagation specifications, and seeding and planting specifications. This provides the design teams with a sound basis for developing specific planting and revegetation plans and addressing site-specific issues.

The *Planting and Revegetation Guidelines* build upon the design principles and guidelines established in the Memorandum of Agreement (2000). The MOA takes a fundamentally different approach to the design of the highway by placing cultural, ecological, and aesthetic concerns on equal footing with engineering and safety

concerns. The guiding concept in the MOA is that the "road is a visitor." As such, the road should move lightly through the natural and cultural landscape of the Confederated Salish and Kootenai tribal homeland with minimal impact to key social, cultural, and environmental values.

The planting and revegetation concepts help re-establish the continuity and functions of the cultural and natural landscape severed or disrupted by the road. They tie into an overall restoration approach that includes wildlife crossings, wetland mitigation, stormwater treatment, habitat enhancement, and cultural practices. The revegetation plan will help re-establish key functions such as wildlife movement, habitat connectivity, hydrology, and cultural landscape integrity.

Methods

The existing landscape and vegetation patterns provide the organizing framework for establishing a revegetation plan for US 93 and the eight design projects. Plant community types are listed alphabetically and mapped using the same segments as the Design Components Workbook in the Memorandum of Agreement (MOA). This layout establishes a common frame of reference with the MOA and also allowed us to emphasize the continuity of the plant communities, particularly between the different project segments. Our approach is not based strictly on a scientific definition of habitat types, but considers the overall landscape context: cultural concerns, the physical constraints posed by the corridor, and the edge condition created by roadway and clear-zone. It is a difficult challenge to balance the ecological, cultural, engineering, and safety concerns while achieving a restoration design that goes beyond the standard highway revegetation plan. Our method for developing these plant communities and design guidelines attempts to address the aforementioned major issues while providing an approach not limited to a single criteria or approach. For example, if we adhered strictly to an ecological viewpoint or an engineering viewpoint, our restoration plan would not be successful and fail to achieve design history.

In order to develop a sound foundation for the revegetation plan, it was necessary to establish the existing conditions of the vegetation within and adjacent to the roadway. The plant communities and habitat types that the highway moves through were identified, and from that a community description and a species list for each of the target plant communities was developed based on habitat types and descriptions found within the existing scientific literature. The species lists for each of the plant communities were expanded to include both species found in a particular community within the right-of-way (ROW), or as a species of cultural value.

The species in the plant community lists then needed to be evaluated for inclusion into the final revegetation list. There were six criteria developed for evaluation: existing on-site, major component of the plant community, adaptability, availability, pioneer and cultural value. Please refer to the "Criteria for Inclusion" section for complete definitions. These criteria were used to form an aggregate value (from 1–6) for each of the species listed within the plant communities to determine each species' significance as a revegetation component. Based on this value, we will develop a much smaller list of recommended species for the initial revegetation of each of the plant communities. Thus the final revegetation plant list will not represent the full plant community spectrum. The explicit premise is that by providing the proper framework in terms of soils and pioneer species, the site will in time regenerate. Species that are later seral components will theoretically populate the site from either the soil seed bank or adjacent plant communities.

We recognize the fact that the revegetation lists might not include additional species found during upcoming field reviews that may need to be considered for inclusion. The plant community lists provide a much broader selection of species to draw upon if additional species components are required. The goal is to offer the Landscape Architects on the Design Teams some latitude in refining the final revegetation list and to provide enough information to make informed decisions on species they might find within their sections that did not make it on to our revegetation lists.

The target plant communities were then mapped on the corridor based on soils, aspect, elevation, aerial photos and preliminary field observation. The polygons on the Conceptual Planting and Revegetation Plans delineate where the target plant communities would occur within the ROW, absent the direct and indirect impacts of US 93. The mapping exercise showed us that particular plant communities occur in greater frequency along the corridor, while others occur in limited areas. For example, fescue prairie is a prevalent community type, while talus rarely occurs. This mapping exercise not only shows the extents and approximate location of target plant communities; additionally, the measured area of the mapped plant community polygons helps us determine the initial quantities of seed and plant stock needed for revegetation.

These guidelines include recommendations regarding seed collection, propagation, availability, seed blends and planting specifications. Subconsultant Summit Associates has taken soil samples along the corridor and had developed recommendations for soil amendments, seed blends, application methods and weed

control based on their analysis of the samples. These recommendations are included in this report and shall be used in conjunction with the recommended species list and the area quantities to develop the revegetation plans and specifications.

General Comments

Although there are fifteen different plant communities along the corridor and the specific composition of those plant communities changes from one end of the corridor to the other, there are some issues common to the revegetation plan throughout the corridor. Issues such as native plant sourcing, invasive weed control, stormwater management, salvage and demolition plans, construction practices, maintenance, and long-term adaptive management will all influence the success of the revegetation plans. The Memorandum of Agreement addresses many of these design issues; please refer to the Appendix to review the MOA guidelines concerning revegetation.

Native Plant Sourcing

All graded areas along the highway corridor from Evaro to Polson will be replanted with indigenous vegetation adapted to the local conditions. The CSKT Tribal Preservation Office has requested that all plant material and seed stock be sourced from local genetic stock. However exceptions may be allowed. With particular plants such as wetland species that have a broad genetic distribution, local sourcing becomes less critical and material may be commercially sourced. There may also be rare exceptions to using only native species. For example, a species such as Redtop is not native but has excellent reclamation value in highway projects. These exceptions require review and approval by the Design Management Team, Montana Department of Transportation, and the Confederated Salish and Kootenai Tribes before inclusion in the final species list.

Invasive Weed Control

Invasive plants will be a difficult problem to address in the revegetation design to ensure that native plant communities become established. A comprehensive approach to weed control will allow native plant species to compete with invasive plant species that have already colonized much of the corridor. Mary Price, a wetlands ecologist for the CSKT, provided a list of invasive species within the corridor and on the Flathead Reservation in the Site Analysis report:

> Invasive weeds observed along the Highway 93 corridor included Spotted Knapweed (*Centaurea maculosa*), Dalmation Toadflax (*Linaria dalmatica*), and Sulfur Cinquefoil (*Potentilla recta*). Extensive knapweed was observed at Dirty Corner, Agency Creek gravel pit, Arlee through Schall Flats, the Schall Flats material source (west side of

highway), Mission Creek to Red Horn Road, and Polson Hill.

Irrigation canals are major conduits for the distribution of invasive wetland and aquatic species throughout the Flathead Reservation. No aquatic or wetland invasive species were observed however these species do not appear until later in the spring. Invasive wetland and aquatic species of concern on the Flathead Reservation and their areas of occurrence are:

- Purple loosestrife (*Lythrum salicaria*)—Ronan Spring Creek from Ronan to Charlo, Ninepipe Reservoir, numerous pothole wetlands.
- Yellow Iris (*Iris pseudacorus*)—Ronan Spring Creek, Crow Creek, Post Creek and drainages, numerous pothole wetlands, Lower Flathead River.
- Eurasian Watermilfoil (*Myriophyllum spicatum*)—No known occurrences but occurs in the nearby Pend Oreille River.
- Flowering Rush (*Butomus umbellatus*)—shallow bays of Flathead Lake.
- Hydrilla (*Hydrilla verticillata*)—no known occurrence but reported in Flathead County (Kalispell).
- Water (or mosquito) fern (*Azolla pinnata*)—no known occurrence but reported in Ravalli County (south of Missoula).

Mary Price also offered clear recommendations for the control of invasive plant species:

> It is recommended that Montana Department of Transportation begin a pre-construction weed control program for the highway right-of-way, MDT facilities, future material source sites as they are acquired, and the rail road acquisition at Polson Hill. Pre-construction treatment will prevent the addition of new seed to the soil seed bank which is the most likely to germinate.
>
> Some of the wetland invasive species listed do not yet occur on the Reservation but are found near the Reservation borders. Construction contractors likely to work on the Highway 93 project also work in these other areas and could potentially transport invasive species to the Reservation. Construction BMPs (Best Management Practices) to prevent the introduction and spread of invasive species are recommended and should be included in MDT's construction and contract specifications.

It appears that there is no provision for the Design Management Team to prepare a comprehensive invasive plant and weed control

program. It is an area of concern that CSKT has repeatedly raised and it needs to be addressed as soon as possible. The National Park Service provides an excellent model of weed control for us to reference. Responsibility for addressing this issue has to be defined and assigned to the appropriate authority.

Stormwater Management

The MOA also addresses stormwater management for the entire corridor, suggesting biological, surface treatments rather than large engineered structures. Stormwater guidelines have been prepared by Jones & Jones and Herrera Environmental to address general, corridor-wide issues and provide direction for the consultants and Design Teams to develop site-specific designs. The recommendations and BMPs in the stormwater guidelines will direct design in a significant portion of the ROW as shown in the Next Steps section.

Salvage and Demolition Plans

Jones & Jones will provide the Design Firms with information for site demolition (clearing and grubbing) that identify existing vegetation and other features to be removed during the construction process. Protection and preservation of existing natural features, plants, and on-site materials is critical to minimize impact to cultural tribal values. Jones & Jones will develop diagrammatic information showing location of temporary fencing that will be used to protect and preserve existing vegetation and soils during the construction process. These diagrammatic plans will also show areas where live plants, dead and downed logs, duff, large rocks, and natural litter are to be salvaged along the reconstructed corridor. These salvaged materials will be reinstalled to give rehabilitated sites a more natural appearance, encourage reoccupation by wildlife, and accelerate the reestablishment of native plant species. This information will be incorporated into the construction documents developed by the Design Firms.

Short-term and Long-term Management:

Construction practices

Construction practices will also have a significant impact on the success of the revegetation plan. The design of the highway treat the landscape sensitively, but if construction and implementation is not also done in a sensitive way, the construction process could destroy existing vegetation in the right-of-way, scarring the landscape and preventing successful revegetation and restoration efforts.

Best Management Practices (BMPs) must be developed to minimize unnecessary disturbance and spread of noxious weed seeds. Supervision of the job site is essential to ensure that the BMPs are followed and that the final design reflects the spirit of the Memorandum of Agreement. Responsibility for addressing this issue needs to

be defined and assigned to the appropriate authority.

Maintenance

The Tribes express a strong interest in how U.S. 93 is maintained after construction is complete. Maintenance can affect the ultimate success of the revegetation. Standard maintenance practices that involve snow removal; spreading sand and magnesium chloride; maintaining a clear zone through mowing; herbicide application; and woody vegetation removal, are standard practices that can conflict with the ecological and cultural goals of the highway design. Development of a comprehensive post-construction maintenance plan will be the first step to minimizing conflicts.

Long-term adaptive management

Long-term adaptive management of the revegetated landscape must be integrated into the overall US 93 Management Program. There are several design components that depend upon the success of the revegatation plan: wildlife crossings, habitat enhancement, water quality, aesthetics, traffic calming, buffers and mitigation for cultural areas. Adaptive management will help measure the success of the planting plan and allow for necessary improvements. Long-term adaptive management includes the following: monitoring plant community establishment; replacing dead or damaged plants; documenting successional changes; adapting practices, e.g., overseeding. A short-term and long-term monitoring program like the Western Transportation Institute's monitoring study of the wildlife crossings is recommended for evaluating the effectiveness of the plantings and vegetation.

Areas of Greater Emphasis

Jones & Jones and each design team will develop planting plans in greater detail than the general corridor plans for the following sites: streetscapes, wildlife crossings, culturally-sensitive sites, wetland mitigation, reclaimed sites, e.g., gravel mining, and interpretive overlooks. In general, the *Planting and Revegetation Guidelines* may be applied to these areas but they will require more detailed design concepts to address specific conditions.

Next Steps

This document is the foundation for further refinement of revegetation plans by the Design Teams. The next step is to ground-truth the target plant community extents and composition. A field survey with Jones & Jones, Rocking M Design, CSKT Technical staff, and Bitterroot Restoration, Inc., and Herrera Environmental, will insure that the design teams have a clear understanding of the revegetation design guidelines, and offer an opportunity for further refinement. The process of refining the composition of the plant communities, the mapped polygons and the associated area quantities—by

subtracting the area occupied by the paved roadway, clear zone, stormwater treatment bioswales, existing native vegetation and salvaged vegetation— will begin during the field verification phase and will be completed by the Design Teams and reviewed by Jones & Jones.

While the planting plan locates specific plant communities along the U.S. 93 highway right-of-way, the species from the plant communities will not be planted across the entire cross-section of the right-of-way. The Design Teams need to develop planting plans based on a tiered approach that includes a separate designation for the highway roadside areas or high impact areas (see Figure x "Planting Zones"). The roadside designation may divide into four main areas.

Adapting the plant palette to reflect the complexities of the highway corridor will be necessary during further design iterations done by the Design Teams and reviewed by Jones & Jones. The roadside plant list may include natives not found within the native communities currently defined and may include non-natives with excellent reclamation value as well as species on the current list. The use of non-native species requires review and approval by the Design Management Team, Montana Department of Transportation, and the Confederated Salish and Kootenai Tribes before inclusion in the final species list.

Recommended Strategies for US 93 Landscape Restoration

Introduction

During the course of developing planting and revegetation design concepts for US 93, it has become apparent that several significant issues need to be resolved. A sub-group has been formed to study these issues in greater detail and to develop recommendations for review by the Technical Design Committee (TDC). Sub-group members include the following: Joanne Bigcrane and Steve Kloetzel (CSKT Tribal Preservation Office); Tom Parker (Herrera); Jennie Meinershagen and Bill LaCroix (Rocking M Design); Paul Hansen (Bitterroot Restoration Inc.); and Ints Luters and René Senos (Jones & Jones Architects and Landscape Architects). We presented the key issues to the TDC on October 3, 2002, and met the following day to develop the following set of strategies.

Leadership and Oversight

Contract Structure

It is recommended that MDT let a second, separate revegetation contract for construction that includes 'Performance Specifications.' This contract model is the preferred method to insure that the following objectives are achieved: preservation of the existing landscape is maximized; restoration strategies are implemented; and the criterion for successful revegetation are met at the end of the plant establishment period. This contract structure is recommended for many of the same reasons by Washington Department of Transportation (WSDOT) in their Roadside Manual and by California Department of Transportation (Caltrans) in their Project Development Procedures Manual. The objectives of the MOA may be best met through separate road construction and revegetation contracts administered by Montana Department of Transportation (MDT). MDT's stated concern with this approach is the difficult coordination and timing sequence between the separate contracts. Any potential delays to one contractor may cause additional delays and costs to the overall project. The Design Management Team needs to research precedent examples of unique contract models that achieve the project's restoration goals while

addressing MDT's scheduling and budget concerns.

An alternative model suggested by MDT is to use one prime contractor who sub-contracts the revegetation component to a qualified restoration contractor. The biggest concern is whether the revegetation component of the construction contract could be administered as a performance-based contract. For example, the different completion points for construction (when the road is built) and revegetation (when the plants are established) lead to conflicts in quality control and payment issues.

ACTION: The Design Management Team needs to research precedent examples of unique contract models.

Technical Oversight

Technical oversight during all project phases—before, during, and after construction – is essential to insure that the design guidelines established by the MOA are carried forward into the design and are implemented in the final product, the physical landscape. Including members of the restoration or wetland design teams as inspectors is recommended by Washington Department of Transportation (WSDOT) in their Roadside Manual to ensure that the project is built as designed. We recommend a 3-tiered organizational framework to administer technical oversight.

A. Technical Design Committee (TDC)

Existing 3-government group provides technical oversight throughout project construction and during the plant establishment period.

B. Restoration Team

Sub-group of the TDC provides technical support to on-site Quality Control Team during construction administration to insure successful restoration. Restoration is based on project components such as wildlife crossings, revegetation, and stormwater. The Restoration Team consists of consultants and representatives of the three governments with restoration expertise. The team reports to the TDC on a regular basis. Proposed members of the subgroup might include: Design Management team members (Jones & Jones, Skillings-Connolly, Herrera), CSKT Tribal Preservation staff Joanne Bigcrane and Steve Kloetzel, CSKT Wetlands biologist Mary Price, MDT's Phil Johnson, and a FHA representative.

C. On-site Quality Control Team

On-site team comprised of CSKT technical staff trained in restoration and funded by FHA provides quality control during construction. This group provides quality control for the restoration component of the overall project. This team may need to monitor the establishment of the vegetation to insure that the contractors meet the requirements of their performance-based contract. FHA and MDT will need to determine the process to create and fund multiple full-time

positions for the duration of the construction and establishment period. We anticipate that the construction observer position will require more that one person considering the potential to have four segments under construction concurrently.

ACTION: Form the Restoration Team

ACTION: Hire personnel for the On-Site Quality Control Team

Seed and Plant Sourcing

The acceptable geographic limit for seed and plant sources will vary by species. We identified four levels of regional scale that will be referenced to make that determination: 1.) Site-specific 2.) Flathead Indian Reservation 3.) Western Montana, and 4.) Intermountain Northwest or the area comprised by Montana, Northern Idaho, and Eastern Washington. Seed and plant sourcing from within the watershed is recommended for genetic diversity, adaptability and survival by Washington Department of Transportation (WSDOT) in their Roadside Manual. The CSKT Tribal Preservation Office will review the plant species lists to distinguish the appropriate local or regional source for each species. The TPO will also determine the protocol for revegetating sites with cultural plants. It is anticipated that the grasses will mostly be commercially-sourced seed, with seed origin specified as close to western Montana as possible. Trees, shrubs, and forbs will mostly be sourced from the Flathead Indian Reservation, with possible exceptions being restricted to western Montana or the Intermontaine Northwest for large trees and shrubs needed for streetscapes. Large potted or balled and burlaped plants take up to ten years to produce.

ACTION: CSKT Tribal Preservation Office will review the plant species lists to distinguish the appropriate local or regional source for each species.

Seed Collection and Propagation

To ensure that adequate plant material is available at the time of installation, seed collection and propagation need to occur well in advance of construction. Seed collection and propagation is recommended to support the regional sourcing recommendation by Washington Department of Transportation (WSDOT) in their Roadside Manual.

Jones & Jones Architects and Landscape Architects and Bitterroot Restoration, Inc., in conjunction with CSKT Tribal Preservation Office, will develop estimates of needed seed quantities, cuttings,

tubelings, and container stock for the overall corridor. Herrera's estimated seed and plant quantities for the wetland mitigation sites will be added to the overall quantities.

It is recommended that MDT establish a separate seed collection and propagation contract that is performance-based, and requires the contractor to meet qualifications. The contractor will need to partner with CSKT as well as meet TERO obligations. The recent Highway 93 PSA collection contract agreed to by MDT and CSKT provides a template that could be referenced for drafting additional US 93 seed collection contracts. It is recommended that a signed contract be put in place by March 1, 2003 in order to capture the beginning of the next seed and cutting production period. It is further advised that seed and plant propagation be combined into one contract for ease in administration and plant stock production.

We recommend one or more contracts for establishing a "plant bank" for the entire corridor. This plant bank would grow and hold all the plants for the corridor; the contractor(s) would need to overgrow by 30% each year to accommodate changing construction schedule. The excess stock would already meet specifications and would be reserved for use during the maintenance and establishment period. Alternatively, excess stock might be grown into larger material to include in new construction projects or to use as enhancement plantings on already-constructed sites where plant material of sufficient size was not available at time of construction.

ACTION: develop estimates of needed seed quantities, cuttings, tubelings, and container stock for the overall corridor.

ACTION: MDT establishes a separate seed collection and propagation contract.

ACTION: one or more contracts for establishing a "plant bank"

Preservation and Salvage

The primary goal is preservation, or not disturbing existing landscape integrity. Preservation of existing native vegetation and landscape elements such as rocks, soils, sod, and downed logs is essential to protect the tribal cultural values and to maintain ecological integrity. Furthermore, preserving these elements reduces replacement costs that would otherwise be incurred. Every square foot of soil we preserve, we don't have to revegetate. In conjunction with preservation, we recommend salvaging existing plants and landscape elements. Salvaging some landscape elements such as logs and rocks will be fairly straightforward, however, salvaging and segregating

topsoil will require a more sophisticated strategy. Limiting stockpiling to a period of one year or less and covered piles no taller than 1.3 meters (4 feet) is recommended by Washington Department of Transportation (WSDOT) in their Roadside Manual. Plant salvage will consist of three primary operations: 1-salvaging viable plant material for transplanting; 2-salvaging rare plant species; 3-and salvaging cultural species. An effective salvage program will help support ecological and cultural values while reducing restoration costs.

Jones & Jones will conduct field surveys with tribal preservation staff to designate plants and materials to be protected, and those plants and materials to be salvaged. We recommend clearly identifying preservation and salvage areas on construction documents and in the field with fencing. Critically, the preservation and salvage plan must be adhered to by anyone working in the right-of-way prior to or during construction, including utility companies, contractors, and managing government agencies. The on-site Quality Control Team can monitor contractors' compliance with the preservation plan during construction. Meaningful monetary penalties are recommended (i.e., $1000 per damaged 10 foot tree, $1,500 per 15 foot tree…) to provide strong incentive for contractors to avoid impacting delineated preservation areas. Specifications for preserving plant materials in place that are impacted by construction will be developed, for example; fill over root zones of large trees to preserve and modified clearing and grubbing to promote regrowth from the root zone and protection of plant material under fill for temporary roadways.

We recommend combining the salvage contract with the plant propagation contract. This approach is most efficient in that the same qualified contractor(s) who are gathering and growing plant material for propagation would collect and maintain salvaged plants. The salvaged plants become part of the "plant bank," providing a reliable source for site-adapted material. As a component of the plant propagation contract, salvage operations will be performance-based. The NPS per unit indefinite quantities approach is the preferred model, whereby separate per unit payments are allotted for distinct activities: digging, holding, and delivering.

It may be necessary to identify temporary plant holding facilities in the corridor in order to minimize costs of transporting salvaged material. MDT maintenance yards, borrow sites, or large wetland mitigation parcels may be appropriate for this purpose.

ACTION: Research model contracts

ACTION: Jones & Jones will conduct field surveys with tribal preservation staff to designate plants and materials

to be protected, and those plants and materials to be salvaged

ACTION: Identify preservation and salvage areas on construction documents and in the field with fencing

ACTION: Meaningful monetary penalties

ACTION: Develop preservation outline specification.

ACTION: Identify temporary plant holding facilities

Planting and Installation

Successful planting and installation will be insured under a performance-based revegetation contract with a two year establishment period. It is in the contractors' best interest to properly handle, install, and maintain vegetation through the establishment phase. The Design Management team and consultants will have to develop clear criterion defining parameters for successful restoration.

Jones & Jones and sub-consultants (Bitterroot Restoration, Rocking M Design) will develop recommendations for seeding and planting methods to be incorporated in the Planting and Revegetation Guidelines.

The consultant team and TPO will review the planting plans to ensure that the appropriate plant materials and planting techniques are specified along the corridor. Different areas of the corridor will have a different level or intensity of planting. While a low-intensity planting approach will be appropriate for portions of the corridor, other areas such as wildlife crossings, gravel sites or borrow pits, wetland mitigation sites, cultural areas, and streetscapes require a more developed planting approach. For example, wildlife crossings need immediate vegetative cover to facilitate wildlife use during the monitoring period. This might require larger plant stock than typically used in the remainder of the corridor.

Availability of larger stock may pose a challenge. Some options worth pursuing include the following: 1.) salvage trees and shrubs from immediate site; 2.) require salvage contractor(s) to collect a specified number of appropriately-sized species; 3.) work with the CSKT to identify "donor tribal lands" from which larger stock can be acquired. All of these options entail that the stock be identified and root-pruned at least one season in advance of transplanting. It is recommended sites planted with large shrubs and trees be inter-planted with plants of varying sizes and ages.

ACTION: Develop criteria for performance-method for on-site personnel to evaluate acceptability of revegetation.

ACTION: Work with the CSKT to identify "donor tribal lands" from which larger stock can be acquired.

Native Plants

As discussed in the Memorandum of Agreement, native plants are integral to maintaining cultural and natural integrity of the Reservation landscape. Thus the Planting and Revegetation Guidelines specify the use of native plant species throughout the corridor. Immediately adjacent to the road, MDT has identified a 15' wide zone that is typically planted with very hardy, low-growing, rhizomatous grasses. We will work with MDT to develop a seeding mix that includes predominantly native species. Extending beyond this 15' band, but still within the clear zone, we recommend selecting low-growing species from the identified native plant community. Outside of the clear zone the identified native plant community will be re-established.

Weed Control

"Competitive exclusion" is the primary recommended strategy for reducing noxious or invasive weeds. Pre-construction treatment is important to minimize weed seed and to allow native plants to quickly colonize a site. This needs to be addressed specifically and in accordance or consultation with the county weed board. Methodology for appropriate weed control requires research, and an approach that incorporates knowledgeable and appropriate responses needs to be developed. Coordination with CSKT, MDT and the Counties is necessary to address this topic. The discussion began at the 10/3/02 TDC meeting about changes in funding mechanisms that would alter the method of weed control funding. CSKT may be interested in pursuing management of the weeds in the highway corridor. Invasive and noxious weed control during construction as well as post-construction is crucial. See discussion under Construction regarding Best Management Practices. See discussion under Short-term Management and Long-term Management regarding inter-agency coordination.

Construction

The restoration process begins before construction, continues through construction, and continues beyond construction into the establishment phase. Control of pre-construction activities by utility company relocations and r.o.w. maintenance by various agencies is essential to avoid impacting cultural and natural resources. Utility relocation may damage cultural plant populations; these areas must be delineated on the ground prior to any operations, and operations then appropriately modified to protect the resource. Careful coordination of road construction with the restoration process is essential. The organization of contracts, and whether revegetation is broken out as a separate contract, is particularly a

critical issue for the construction phase. Technical oversight as described earlier is also crucial at this stage.

Contractors need to prepare for mitigating road construction impacts well in advance of construction. Materials used to reduce erosion, stabilize slopes, and prevent sediment discharge need to be ordered well ahead of construction schedule to avoid delays. Some of these materials, like rice straw waddles, need to be obtained early as demand can exceed availability. Last minute substitutions of inferior products will not be acceptable.

A major concern is how to minimize impacts from road construction to the existing landscape. Best management practices (BMP's) are typically established for stormwater, erosion control, and noxious weed management during construction. The Restoration Team will review MDT's BMP's to determine whether they fully address the goals of the MOA, and will recommend improvements where appropriate. Other BMP models such as the National Park Service standards or Herrera's wetland mitigation BMP's may suggest ways to strengthen BMP's applied to the US 93 project.

The requirement to maintain two lanes of continuous travel during construction will create significant temporary impacts. There are numerous issues related to the construction impacts of temporary roads. Emphasis must be placed on preserving existing vegetation; devising strategies for minimizing disturbance to wetlands and plant habitats; and applying BMP's & Special Provisions to temporary construction.

ACTION: On-the-ground staking and fencing to protect plant resources.

ACTION: Pre-construction meetings to clarify importance and intent of preservation and revegetation and penalties.

ACTION: MDT training video for all operators and managers.

ACTION: Specifications to address methods for plant preservation, salvage, equipment types and cleaning, clearing and grubbing modifications, temporary roads and erosion control and stormwater management.

ACTION: The Design Consultants and CSKT staff will review MDT's BMP's to determine whether they fully address all necessary practices, and most likely we will recommend that a higher standard be applied.

Short-Term Management

Once the seed is broadcast and the plants are put in the ground, the new vegetation will require care and maintenance during a 24-month period in order to become successfully established. Temporary irrigation, weed control, plant replacement, and browse control are some of the initial

practices that will facilitate plant establishment. A performance-based revegetation contract addresses these plant maintenance needs. Contractor bonds may be another approach.

We recommend a "Cooperative Maintenance Agreement" between the various managing agencies that have overlapping maintenance practices within the right-of-way along the US 93 corridor. These agencies include: MDT, MRL, Missoula and Lake Counties, CSKT, Mission Valley Power, and independent utility companies. These managing agencies all have different and sometimes conflicting maintenance practices that may run counter to this project's restoration goals. Cooperative maintenance agreements are recommended by California Department of Transportation (Caltrans) in their Project Development Procedures Manual. This cooperative agreement would establish a more efficient and consistent approach to managing the corridor. For example, if there is no coordination regarding weed control, varying practices may create conditions that either promote weed introduction or reduce native plant production. The Montana Weed Management Plan, January 2001 addresses cooperative agreements for weed control and this document should be referenced.

ACTION: Write a "Cooperative Maintenance Agreement" between the various managing agencies that have overlapping maintenance practices within the right-of-way along the US 93 corridor.

Long-Term Management

We recommend adaptive management and monitoring of the restoration project for a 3 to 7 year period. Monitoring and adaptive management provide the mechanism to evaluate the progress of the revegetation, effectiveness of erosion control, water quality and weed invasion and to adjust management and maintenance practices accordingly. Monitoring is recommended by Washington Department of Transportation (WSDOT) in their Roadside Manual and by California Department of Transportation (Caltrans) in their Project Development Procedures Manual. An adaptive management plan establishes the optimal conditions for success over the long term, in keeping with CSKT's "seven generations" perspective. Also, longer monitoring for wetland mitigation is a way to allow for less intrusive initial construction and more emphasis on natural recovery processes. This can result in lower up-front costs due to lower planting densities, smaller plant materials, and less dramatic approaches to weed control.

Similar to the wildlife monitoring conducted by WTI, monitoring the

restoration outcome will provide MDT with useful information for future highway projects. The functioning of several restoration components, such as the wildlife crossings, is predicated on successful revegetation. Wildlife habitat and connectivity are provided by the restored vegetation; without it, the effectiveness of the wildlife crossings is greatly diminished. Criteria such as habitat cover is a useful and measurable way to evaluate the success of the project.

Because so many individual design components such as wildlife crossings, hydrology, and wetland mitigation hinge upon the vitality of one another, we recommend the formation of an "integrated monitoring program" that includes vegetation, to tie these elements together into an overall restoration approach.

ACTION: establish an "Integrated Monitoring Program."

Revegetation Area Calculations

	Plant Community	Sym	Area (m)	Linear Road Variable					Road Area	Estimated Planted Area (meters sq.)	(acres sq.)
				1 lane	2 Lanes	3 Lanes	4 Lanes	6 Lanes			
				10.5	21	31.5	42	63			
Segment 1	Douglas Fir Forest	DFF	619722	1365	6440		730		180232.5	**439489.5**	**108.6**
	Bluebunch Wheatgrass Prairie	BWP	44385	0	610				12810	**31575**	**7.8**
	Wet Meadow	*WM*	*4167*	*170*	*0*				*1785*	*2382*	*0.6*
	Bluejoint Reedgrass	WM-BR	4167	170					1785	**2382**	**0.6**
	Shrub Riparian	*SR*	*44050*		*720*				*15120*	*28930*	*7.1*
	Bebb Willow	SR-BW	23081		320				6720	**16361**	**4**
	Yellow Willow	SR-YW	20969		400				8400	**12569**	**3.1**
	Fescue Prairie	FP	53601	390	30	500	230		30135	**23466**	**5.8**
	Mixed Conifer & Broadleaf	MCBR	10690		130				2730	**7960**	**2**
	Aspen Grove	AG	23562		620				13020	**10542**	**2.6**
	Black Cottonwood Riparian Forest	BCRF	9172		118				2478	**6694**	**1.6**
Segment 2	*Wet Meadow*	*WM*	*13449*						*0*	*13449*	*3.3*
	Beaked Sedge	WM-BS	13449						*0*	**13449**	**3.3**
	Bluebunch Wheatgrass Prairie	BWP	103741	80	840				18480	**85261**	**21**
	Ponderosa Pine Forest	PPF	286272				3730		156660	**129612**	**32**
	Shrub Riparian	*SR*	*126281*	*80*	*2620*				*55860*	*70421*	*17.4*
	Sandbar Willow	SR-SW	57869	80					840	**57029**	**14.1**
	Bebb Willow	SR-BW	68412		2620				55020	**13392**	**3.3**
	Fescue Prairie	FP	108056		900		400	240	50820	**57236**	**14.1**
	Black Cottonwood Riparian Forest	BCRF	10642						0	**10642**	**2.6**
Segment 3	Ponderosa Pine Forest	PPF	67697		100		760		34020	**33677**	**8.3**
	Bluebunch Wheatgrass Prairie	BWP	67767		1160				24360	**43407**	**10.7**
	Mixed Conifer & Broadleaf	MCBR	82313		100		150	430	35490	**46823**	**11.6**

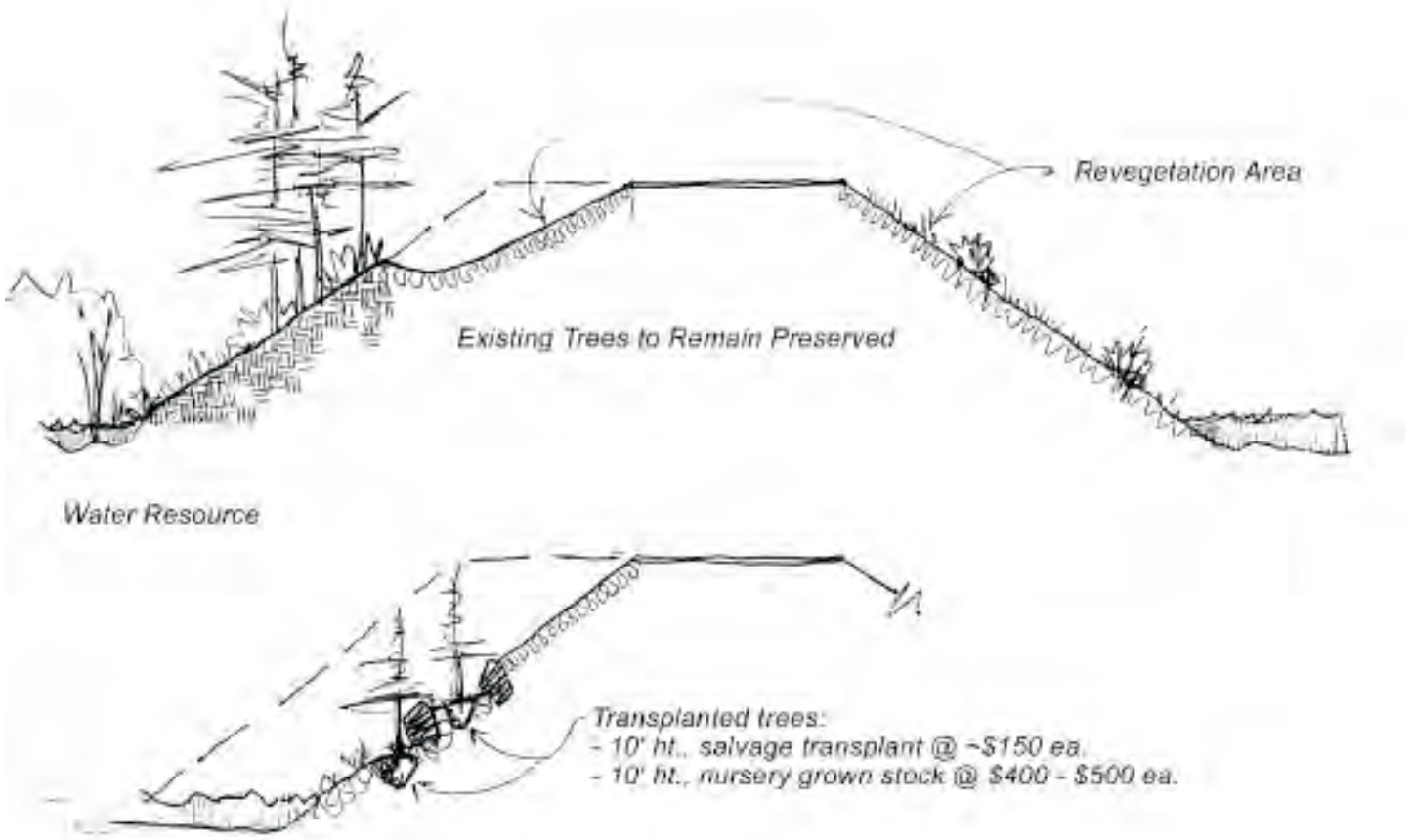
	Plant Community	Sym	Area (m)	Linear Road Variable					Road Area	Estimated Planted Area	
				1 lane	*2 Lanes*	*3 Lanes*	*4 Lanes*	*6 Lanes*		*(meters sq.)*	*(acres sq.)*
Segment 4	Douglas Fir Forest	DFF	8094	270					2835	5259	1.3
	Bluebunch Wheatgrass Prairie	BWP	36799	1040					10920	25879	6.4
	Ponderosa Pine Forest	PPF	99251	2830					29715	69536	17.2
	Shrub Riparian	SR	99124	3970	570				53655	45469	11.2
	Bebb Willow	SR-BW	89785	4230	310				50925	38860	9.6
	Yellow Willow	SR-YW	9339	260					2730	6609	1.6
	Fescue Prairie	FP	195525	2540	3040				90510	105015	26
	Mixed Conifer & Broadleaf	MCBR	45724	890					9345	36379	9
	Wet Meadow	WM	74913	1820	220				23730	51183	12.6
	Beaked Sedge	WM-BS	12060		220				4620	7440	1.8
	Bluejoint Reedgrass	WM-BR	62853	1820					19110	43743	10.8
	Talus	TAL	18159	580					6090	12069	3
Segment 5	Fescue Prairie	FP	117476	490	1230				30975	86501	21.4
	Bluebunch Wheatgrass Prairie	BWP	82088		1030				21630	60458	14.9
	Ponderosa Pine Forest	PPF	418139	1980	1850		750	500	122640	295499	73
	Shrub Riparian	SR	14275		150				3150	11125	2.7
	Bebb Willow	SR-BW	14275		150				3150	11125	2.7
	Mixed Conifer & Broadleaf	MCBR	92587	1080					11340	81247	20
	Talus	TAL	11169		370				7770	3399	0.8
	Upland Shrub	US	14318		170				3570	10748	2.6
Segment 6	Fescue Prairie	FP	567558		6890			400	169890	397668	98.3
	Black Cottonwood Riparian Forest	BCRF	25408		300				6300	19108	4.7
	Shrub Riparian	SR	76062		980				20580	55482	13.7
	Yellow Willow	SR-YW	76062		980				20580	55482	13.7
	Mixed Conifer & Broadleaf	MCBR	29502		410				8610	20892	5.2

Revegetation Area Calculations

	Plant Community	Sym	Area (m)	Linear Road Variable					Road Area	Estimated Planted Area	
				1 lane	*2 Lanes*	*3 Lanes*	*4 Lanes*	*6 Lanes*		*(meters sq.)*	*(acres sq.)*
Segment 7	Fescue Prairie	FP	282099	300	1390		1950		114240	167859	41.5
	Ponerosa Pine Forest	PPF	594243		470		4580	2900	384930	209313	51.7
	Wet Meadow	WM	21846	120			190		9240	12606	3.1
	Beaked Sedge	WM-BS	5164	120					1260	3904	1
	Hardstem Bulrush	WM-HB	16682				190		7980	8702	2.1
	Shrub Riparian	SR	43688	420	60		250		16170	27518	6.8
	Yellow Willow	SR-YW	43688	420	60		250		16170	27518	6.8
	Black Cottonwood Riparian Forest	BCRF	43591				230		31500	12091	2.9
							**260-8ln PPF				
Segment 8	Aspen Grove	AG	16093		137				2877	13216	3.3
	Fescue Prairie	FP	280893		80		2950		125580	155313	38.4
	Ponderosa Pine Forest	PPF	281257		80		2140		91560	189697	46.9
	Upland Shrub	US	11810		137				2877	8933	2.2
								Total Road Surface Area:	**2245519.5**		

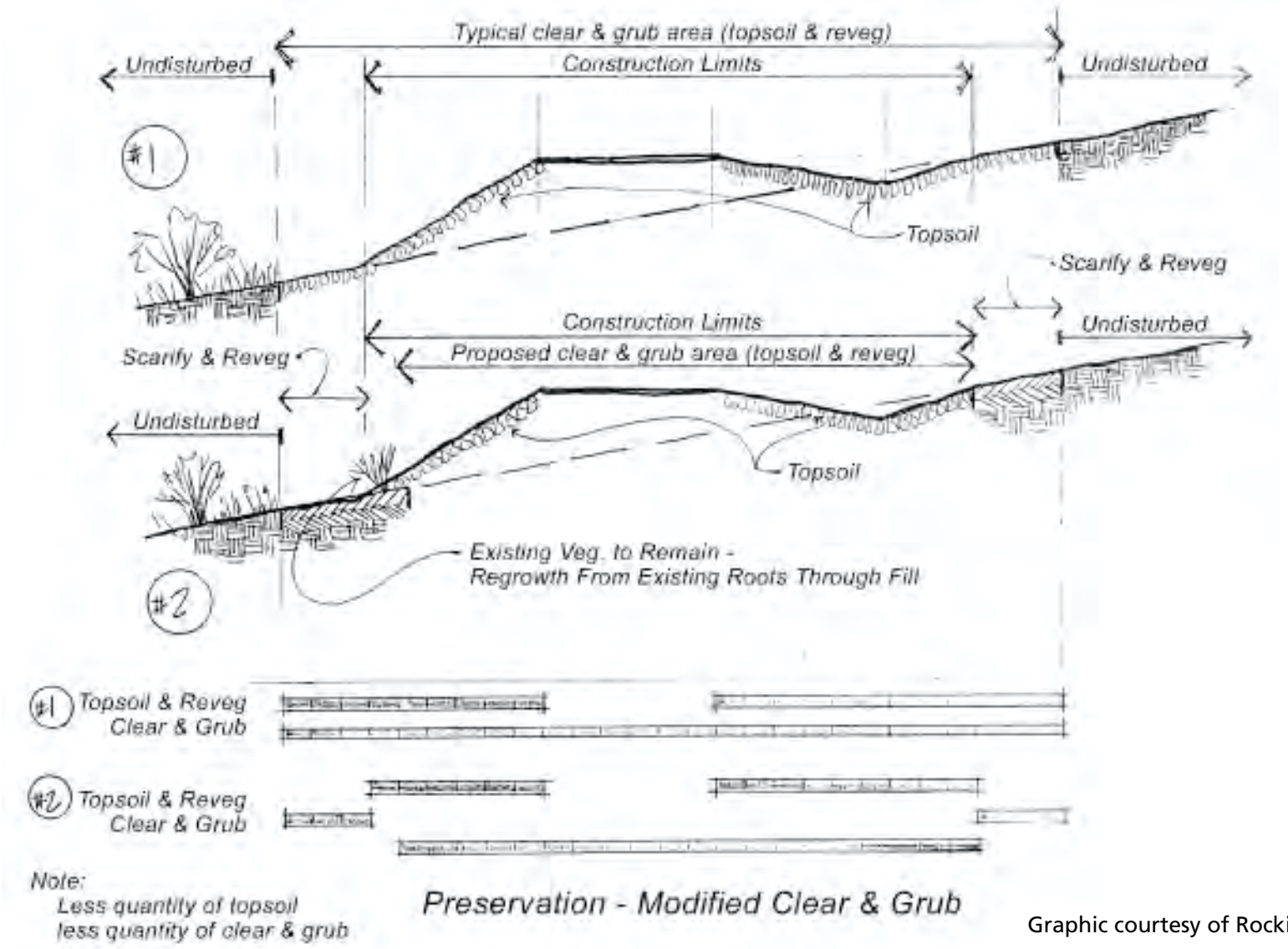
Total Quantity Estimates: (sq. acres)			
Douglas Fir Forest	109.9	Wet Meadow	19.6
Ponderosa Pine Forest	229.1	Beaked Sedge	6.1
Mixed Conifer Broadleaf Rip.	47.8	Bluejoint Reedgrass	11.4
Bluebunch Wheatgrass Prairie	60.8	Hardstem Bulrush	2.1
Black Cottonwood Rip. Forest	11.8	Shrub Riparian	58.9
Upland Shrub	4.8	Bebbs Willow	19.6
Aspen Grove	5.9	Yellow Willow	25.2
Fescue Prairie	245.5	Sandbar Willow	14.1
Talus	3.8		
		Paved Area	554.9

Salvage & Preservation Strategies



Screening Vegetation at Wildlife Crossing

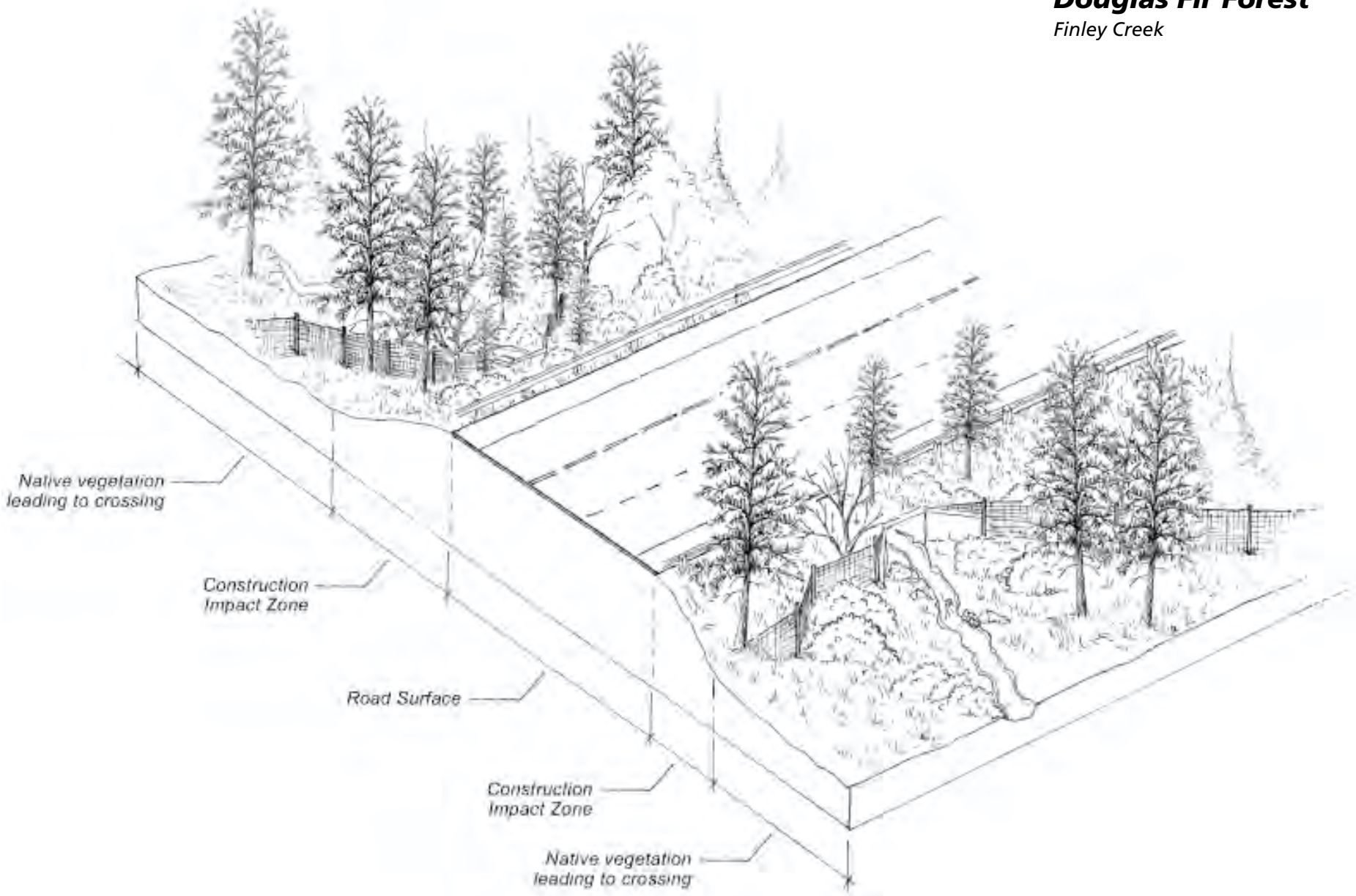
Graphic courtesy of Rocking M Design



Graphic courtesy of Rocking M Design

Douglas Fir Forest

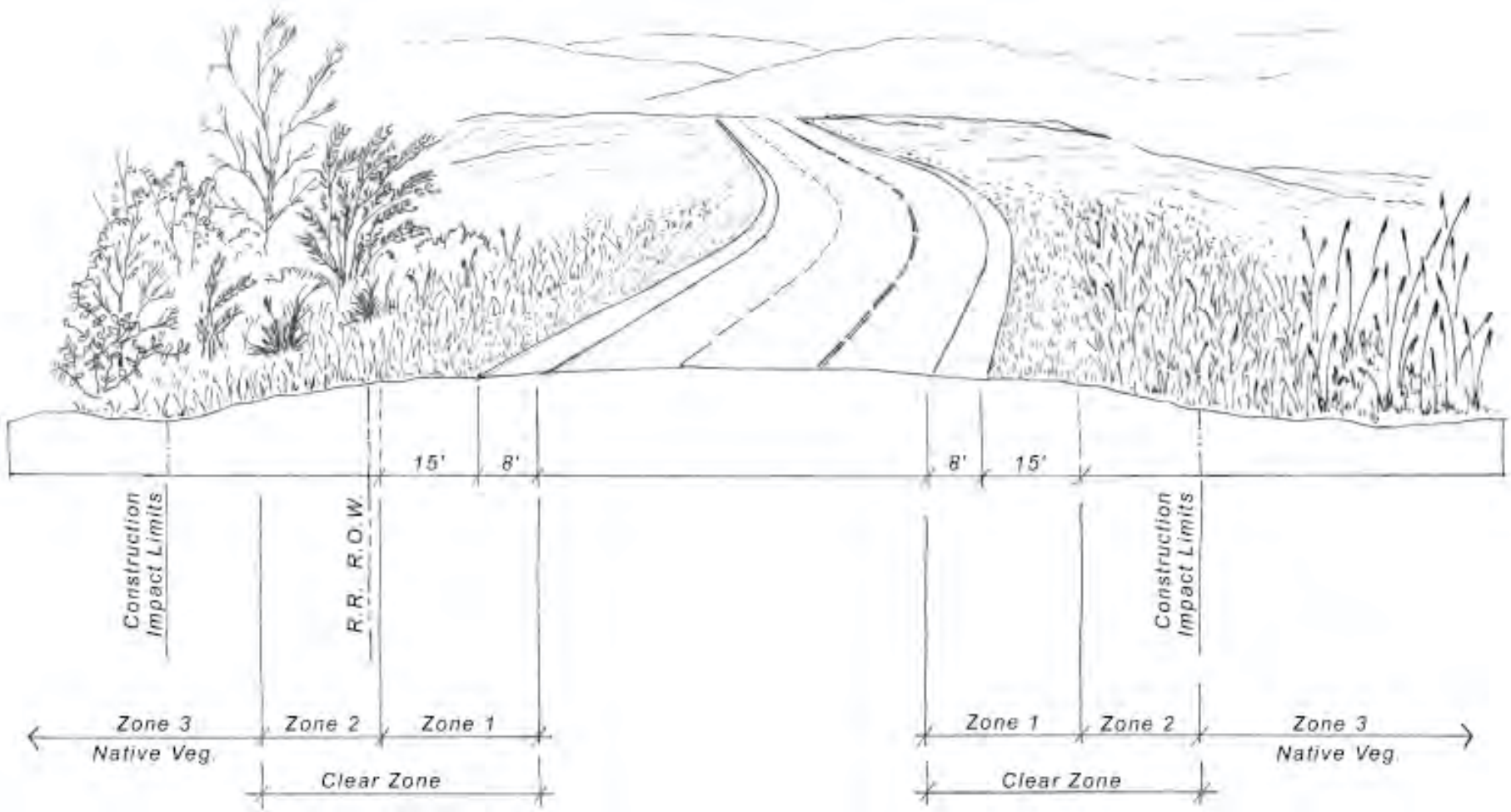
Finley Creek



Block Diagram based on Proposed Contours

Revegetation Concepts

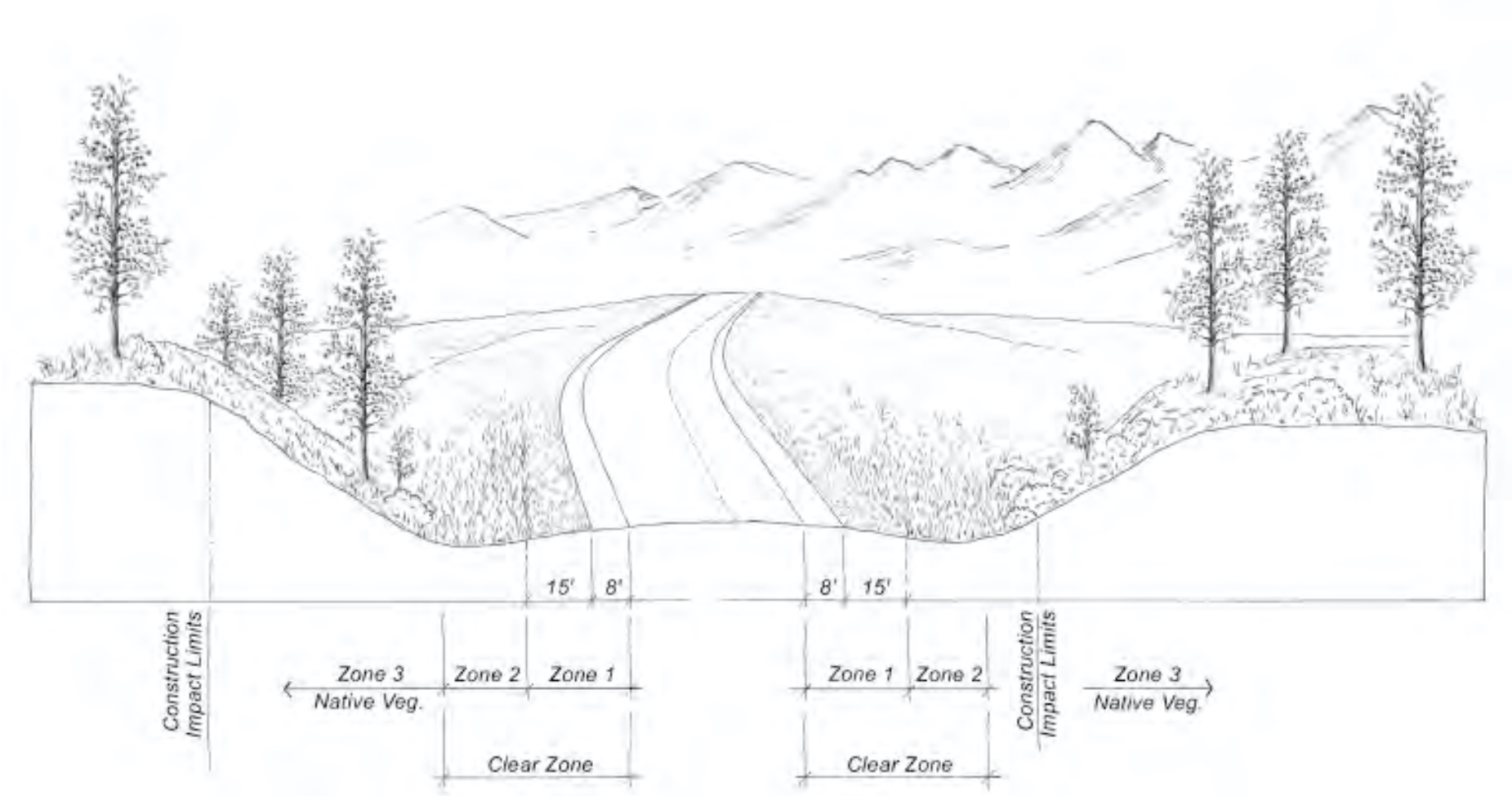
Shrub Riparian
Schall Flats



Block Diagram based on Proposed Contours

Ponderosa Pine Forest - Open Savanna

Cut Slope north of Pistol Creek

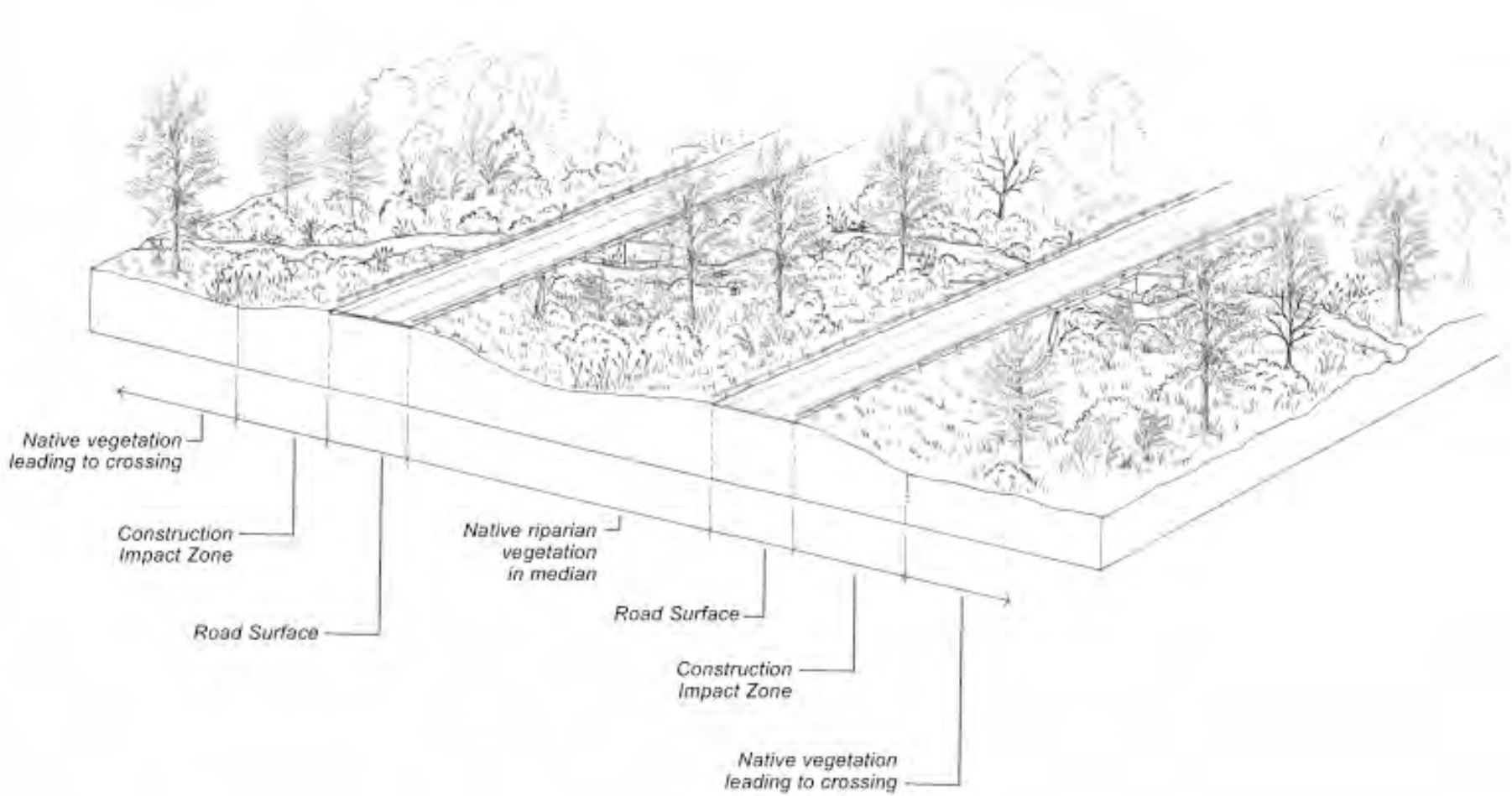


Block Diagram based on Proposed Contours

Revegetation Concepts

Black Cottonwood Riparian Forest

Mudd Creek



Block Diagram based on Proposed Contours

Roadside Planting Zones

The area between the edge of paved shoulder and right-of-way limit is divided into 4 zones. Each of these zones require a particular revegetation strategy based on a variety of factors described below.

Zone A

Zone A is the inslope area that extends 15' beyond the edge of paved shoulder. It is a zone of continuous severe disturbance that also falls within the clear zone requirements for operational safety as specified by MDT. Clear zone limits vary depending upon multiple factors, including road geometry and travel speeds. A robust seed mix of 6-8 native graminoids is specified for this zone.

Zone B

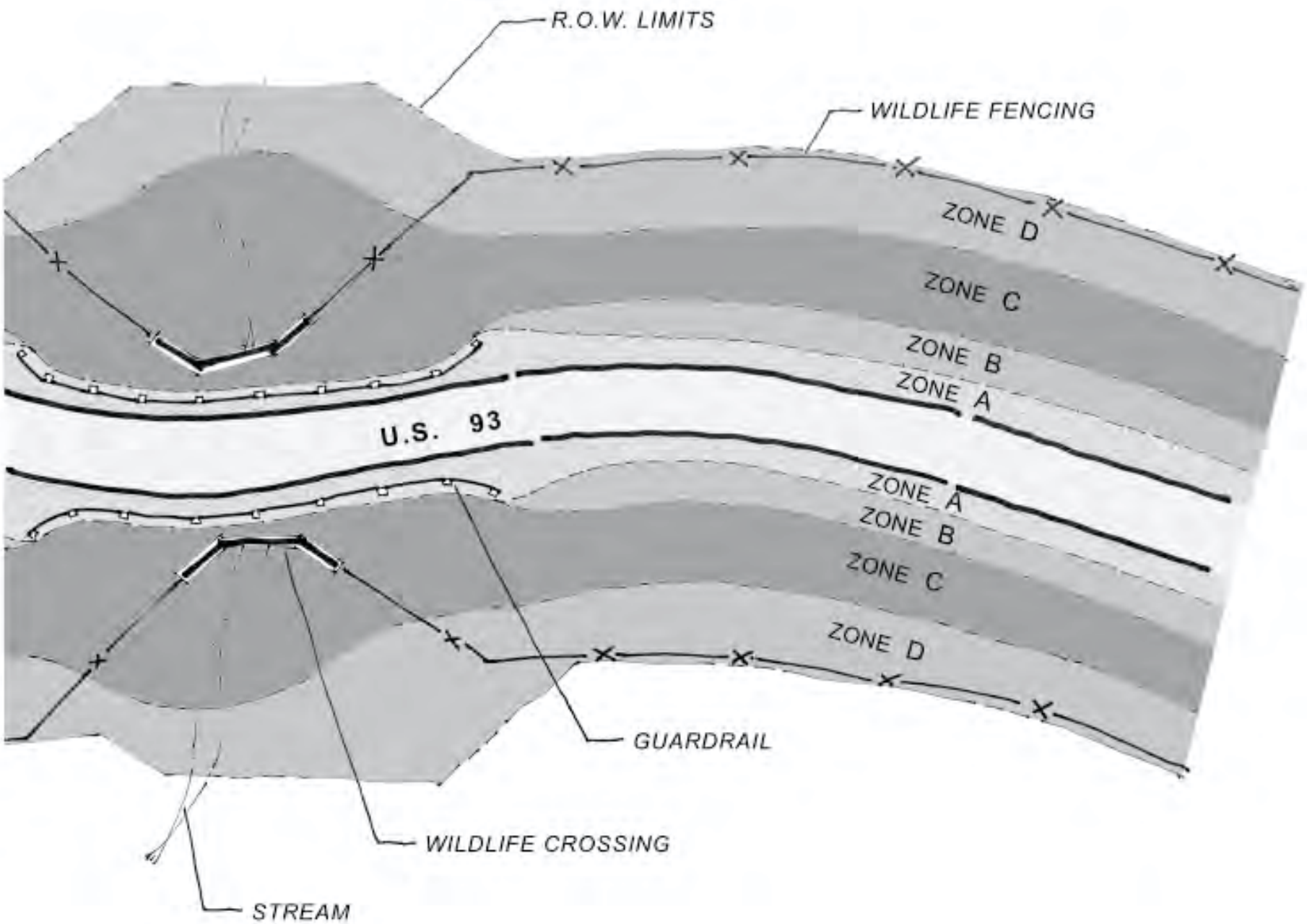
Zone B is the clear zone area that extends beyond Zone A. It is a zone of moderate disturbance that falls within the clear zone requirements for operational safety as specified by MDT. Clear zone limits vary depending upon multiple factors, including road geometry and travel speeds, thus Zone B limits will vary accordingly. Safety barriers and guardrails typically reduce the width of clear zone areas; thus shrubs and trees can be planted closer to the roadway behind such barriers. Revegetation in Zone B is limited to the seed mix and the shrubs from the target plant community that meets clear-zone requirements.

Zone C

Zone C extends from Zone B to the construction impact limits. Plant the full target plant community within this zone.

Zone D

Zone D extends from Zone C to the right-of-way limits. Zone D is the preservation and rehabilitation zone. Preserve existing native vegetation identified in the Preservation & Salvage Plan or by the design teams. Revegetate disturbed areas, such as weedy, grazed, barren, or eroded areas, with the full target plant community.


R.O.W. LIMITS
WILDLIFE FENCING
ZONE D
ZONE C
ZONE B
ZONE A
U.S. 93
ZONE A
ZONE B
ZONE C
ZONE D
GUARDRAIL
WILDLIFE CROSSING
STREAM

Aspen Grove Riparian Forest

Limits of Range: Found in pockets throughout region

Reference Site: Jocko River Campground or north of camas prairie at Evaro

Description: This plant community is based upon the Quaking Aspen/Red-Osier Dogwood (*Populus tremuloides/Cornus stolonifera*) Habitat Type found in *Classification and Management of Montana's Riparian and Wetland Sites*, by Hansen and others (1995). Only, but not all, species with a representation greater than one percent were selected from the species list of the habitat type. In addition to the species selected from the habitat type in Hansen and others (1995), blue camas (*Camassia quamash*), large-leaved avens (*Geum macrophyllum*) and sweetgrass (*Hierochloe odorata*) were added because they are either currently a component of this community within the right-of-way or as a species of cultural value.

The Quaking Aspen/Red-Osier Dogwood (*Populus tremuloides/ Cornus stolonifera*) Habitat Type is a minor plant community found on alluvial terraces adjacent to streams and rivers, or near springs and seeps. Quaking aspen (*Populus tremuloides*) grove communities appear in relatively small clumps or series of clumps at the bases of ravines at points of junction between grasslands and lower extensions of the Douglas fir (*Pseudotsuga menziesii*) communities. This type is characterized by an overstory of quaking aspen (*Populus tremuloides*) dominating a dense undergrowth of red-osier dogwood (*Cornus stolonifera*), mountain alder (*Alnus incana*), Woods rose (*Rosa woodsii*), and thimbleberry (*Rubus parviflorus*), as well as several herbaceous species.

Quaking aspen (*Populus tremuloides*) can be found on drier sites with shorter shrub or herbaceous understories. A habitat type for aspen dominated upland sites at lower elevations (2,000 ft to 4,000 ft) in west central Montana has not been described thus far, but would typically have a snowberry (*Symphoricarpos species*), rose (*Rosa species*), currant/ gooseberries (*Ribes species*), of common chokecherry (*Prunus virginiana*), western serviceberry (*Amelanchier alnifolia*) understory with various mesic site grasses and forbs.

Soils are typically Mollisols with soil textures ranging from silt loam to sand. Sites adjacent to streams are often Fluvents overlying river cobbles. Water tables average 12 inches below the surface in mid-summer but water depths many stands can be greater than one meter. Although occurring in limited areas, this habitat type has high wildlife value as cover and feeding areas. Beaver, elk, moose, and numerous bird species may make heavy use of this habitat.

ASPEN GROVE RIPARIAN FOREST

Acreage estimate: 5.90 acres

Tree Spacing Target: 12 foot spacing = 303 plants/acre

Shrub Spacing Target: 6 foot spacing = 1210 plants/acre

Seeding Target: 120 PLS/Square Foot 1513 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
TREES						
Pinus ponderosa	Ponderosa Pine	1		20%	61	357
Populus tremuloides	Quaking Aspen	1	60	80%	242	1,428
SHRUBS				**100%**		
Alnus incana	Mountain Alder	2	10	7%	85	500
Amelanchier alnifolia	Western Serviceberry	1	3	8%	97	571
Berberis repens	Oregon Grape	2	2	5%	61	357
Cornus stolonifera	Red-Osier Dogwood	1	40	5%	61	357
Prunus virginiana	Common Chokecherry	1	3	13%	157	928
Ribes spp	Wild Currant	2	1	2%	24	143
Rosa woodsii	Wood's Rose	1	3	15%	182	1,071
Rubus idaeus	Red Raspberry	2	2	8%	97	571
Salix bebbiana	Bebb willow	1	10	12%	145	857
Shepherdia canadensis	Canada Buffaloberry		2	4%	48	286
Spiraea betulifolia	White Spiraea	2	1	6%	73	428
Symphoricarpos spp	Snowberry	1	5	15%	182	1,071
OTHER				**100%**		
Hierochloe odorata	Sweetgrass	2	1		CSKT	
Camassia quamash	Blue Camas	2	1		CSKT	
					1513	8,924
	1513	**X**	**5.90**	**ACRES**	**=**	**8,924** **Total Seedlings**

Aspen Grove Riparian Forest

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	1.00	2,270,000	52.1	2,270,000	30.4%
Elymus glaucus	Blue Wildrye	1	1.00	110,000	2.5	110,000	1.5%
Glyceria striata	Fowl Mannagrass	2	1.00	160,000	3.7	160,000	2.1%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	4.00	140,000	12.9	560,000	7.5%
FORBS							0.0%
Achillea millefolium	Common Yarrow	3	0.30	2,770,000	19.1	831,000	11.1%
Anaphalis margaritacea	Pearly Everlasting	2	0.20	8,200,000	37.6	1,640,000	22.0%
Artemisia ludovisciana	Prairie Sage	2	0.10	4,500,000	10.3	450,000	6.0%
Aster laevis	Smooth Aster	2	1.00	200,000	4.6	200,000	2.7%
Epilobium angustifolium	Fireweed	3	0.10	8,500,000	19.5	850,000	11.4%
Clematis ligusticifolia	Western Virgins-bower	2	0.50	315,000	3.6	157,500	2.1%
Geum macrophyllum	Large-leaved Avens	2	0.50	400,000	4.6	200,000	2.7%
Senecio triangularis	Arrowleaf Groundsel	2	0.00	500,000	0.0	0	0.0%
Vicia americana	American Vetch	1	1.00	33,000	0.8	33,000	0.4%
			10.70		**171**	**7,461,500**	**100.0%**

10.70 **Total PLS pounds per acre** **63.13** **PLS pounds for community**

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Aspen Grove Notes:

Vary the intensity of plantings; e.g., plant masses of trees and shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

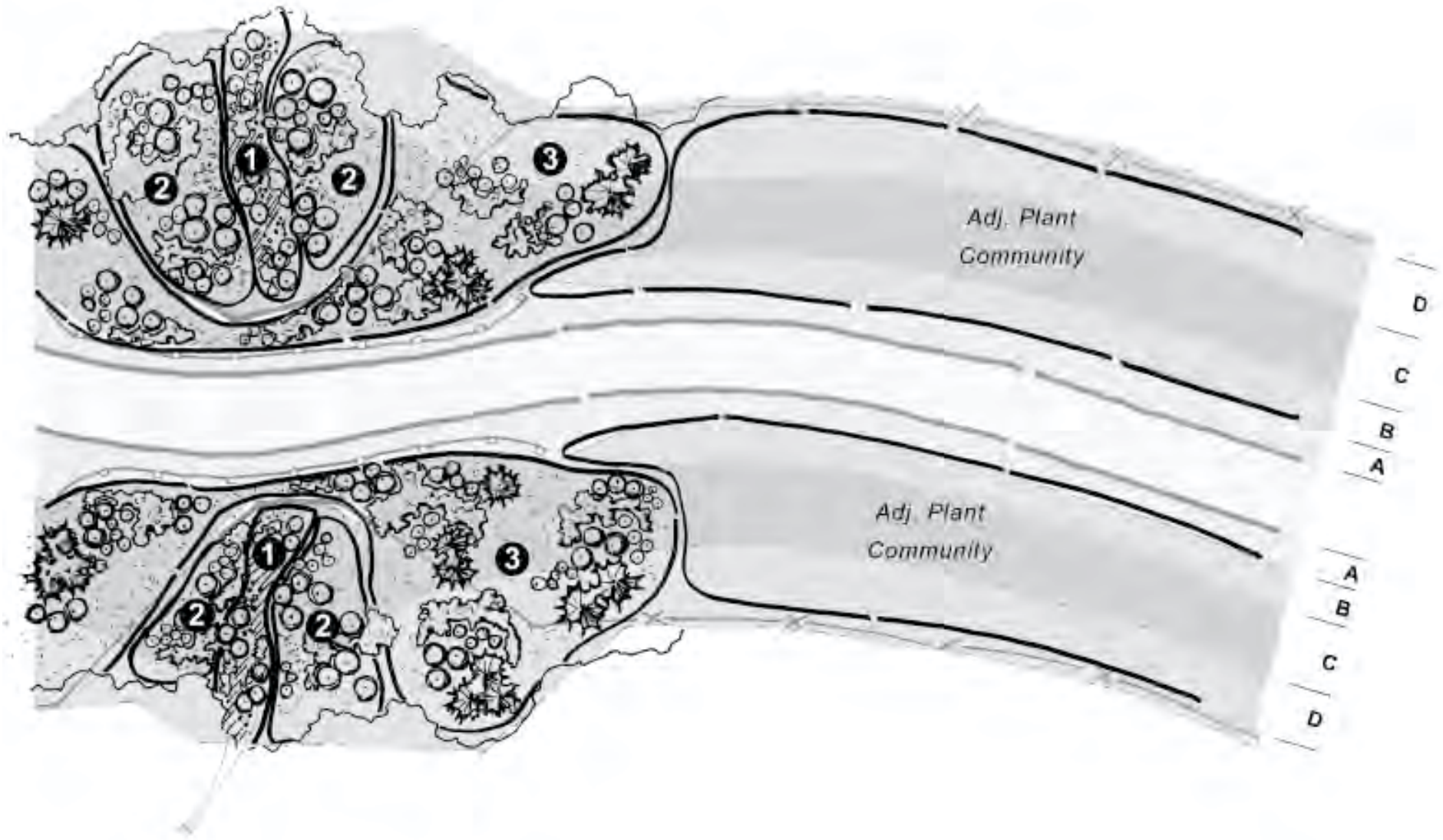
Undulate planting lines to create a variable forest edge

Emulate the natural distribution of species across the soil moisture gradient from the wet, instream area (ZONE 1) through the transitional area (ZONE 2) and into the drier upland area (ZONE 3). For example; include Ponderosa pine (Pinus ponderosa) only in well drained areas in zones 3; concentrate Quaking aspen (Populus tremuloides), Mountain alder (Alnus incana) and Bebb's willow (Salix bebbiana) in zone 1 with a lesser distribution in zone 2.

Plant Quaking aspen ((Populus tremuloides) in clumps due to its rhizomatous nature

Include Sweetgrass (Hierochloe odorata), and Blue Camas (Camassia quamash) only on moist microsites under approval of CSKT Tribal Preservation Office

Aspen Grove Riparian Forest



Black Cottonwood Riparian Forest

Limits of Range: Dominant riparian habitat on large floodplain areas throughout the region

Reference Site: Mission Creek near St. Ignatius; Jocko River north of Arlee

Description: This plant community is based upon the Black Cottonwood/Red-osier Dogwood (*Populus trichocarpa/Cornus stolonifera*) Community Type found in *Classification and Management of Montana's Riparian and Wetland Sites*, by Paul L. Hansen and others (1995). Only the species with a representation greater than 1% were selected from the species list of the Habitat Type.

The Black Cottonwood/Red-Osier Dogwood (*Populus trichocarpa/Cornus stolonifera*) riparian forest is a major community type at low to mid elevations (2,000 ft to 6,600 ft) that occurs on alluvial terraces of major streams and rivers and around lakes and ponds. Stands may be broad and extensive or may be distributed in narrow fingers. Cottonwoods are a pioneering species that requires moist, freshly-deposited alluvial soils exposed to full sunlight; floodplain soils are typically Fluvents up to 1 meter deep overlying river gravel and/or cobbles, and soil texture varies from loam to coarse sand. Inceptisol and Mollisol soils may be found on older sites. Water tables typically drop below one meter but surface horizons may stay moist. This type is characterized by an overstory of black cottonwood (*Populus trichocarpa*) with an understory of a dense, diverse mix of shrubs and herbaceous plants. Red-osier dogwood (*Cornus stolonifera*) is the primary component, accompanied by willows (*Salix species*), western serviceberry (*Amelanchier alnifolia*), common chokecherry (*Prunus virginiana*), currants and gooseberries (*Ribes species*), and rose (*Rosa species*).

BLACK COTTONWOOD RIPARIAN FOREST

Acreage estimate: 11.80 acres

Tree Spacing Target: 12 foot spacing = 303 plants/acre

Shrub Spacing Target: 6 foot spacing = 1210 plants/acre

Seeding Target: 120 PLS/Square Foot 1513 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species	
TREES							
Pinus ponderosa	Ponderosa Pine	1		10%	30	357	
Populus trichocarpa	Black Cottonwood	1	60	90%	272	3,213	
SHRUBS				**100%**			
Alnus incana	Mountain Alder	1	5	7%	85	999	
Amelanchier alnifolia	Western Serviceberry	1	10	10%	121	1,428	
Betula occidentalis	Water Birch	2	3	6%	73	857	
Cornus stolonifera	Red-Osier Dogwood	1	40	5%	61	714	
Crataegus douglasii	Black Hawthorn	3	1	5%	61	714	
Philadelphus lewisii	Mockorange	1	3	5%	61	714	
Prunus americana	American Plum	1	3	5%	61	714	
Prunus virginiana	Common Chokecherry	1	5	6%	73	857	
Ribes spp.	Wild Currant	1	2	3%	36	428	
Rosa woodsii	Wood's Rose	1	3	10%	121	1,428	
Rubus idaeus	Red Raspberry	2	2	5%	61	714	
Salix bebbiana	Bebb willow	2	5	5%	61	714	
Salix exigua	Sandbar willow	1	5	10%	121	1,428	
Salix drummondiana	Drummond willow	1	3	5%	61	714	
Sambucus cerulea	Blue Elderberry	1	1	3%	36	428	
Symphoricarpos spp	Snowberry	2	2	10%	121	1,428	
OTHER				**100%**			
Hierochloe odorata	Sweetgrass	2	1		CSKT		
Lysichitum americanum	Skunk Cabbage	2	2		CSKT		
					1513	17,848	
	1513	**X**	**11.80**	**ACRES**	**=**	**17,848**	**Total Seedlings**

Black Cottonwood Riparian Forest

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	1.00	2,270,000	52.1	2,270,000	38.0%
Elymus glaucus	Blue Wildrye	1	1.00	110,000	2.5	110,000	1.8%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	4.00	140,000	12.9	560,000	9.4%
FORBS							
Achillea millefolium	Common Yarrow	3	0.20	2,770,000	12.7	554,000	9.3%
Anaphalis margaritacea	Pearly Everlasting	2	0.05	8,200,000	9.4	410,000	6.9%
Artemisia ludovisciana	Prairie Sage	2	0.10	4,500,000	10.3	450,000	7.5%
Aster laevis	Smooth Aster	2	1.00	200,000	4.6	200,000	3.3%
Clematis ligusticifolia	Western Virgins-bower	2	0.50	315,000	3.6	157,500	2.6%
Epilobium angustifolium	Fireweed	3	0.10	8,500,000	19.5	850,000	14.2%
Solidago canadensis	Canada goldenrod	1	0.50	700,000	8.0	350,000	5.9%
Vicia americana	American Vetch	1	2.00	33,000	1.5	66,000	1.1%
							0.0%
			10.45		**137**	**5,977,500**	**100%**

10.45	**Total PLS pounds per acre**	**123.3**	**PLS pounds for community**

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15’ roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Black Cottonwood Notes:

Vary the intensity of plantings; e.g., plant masses of trees and shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

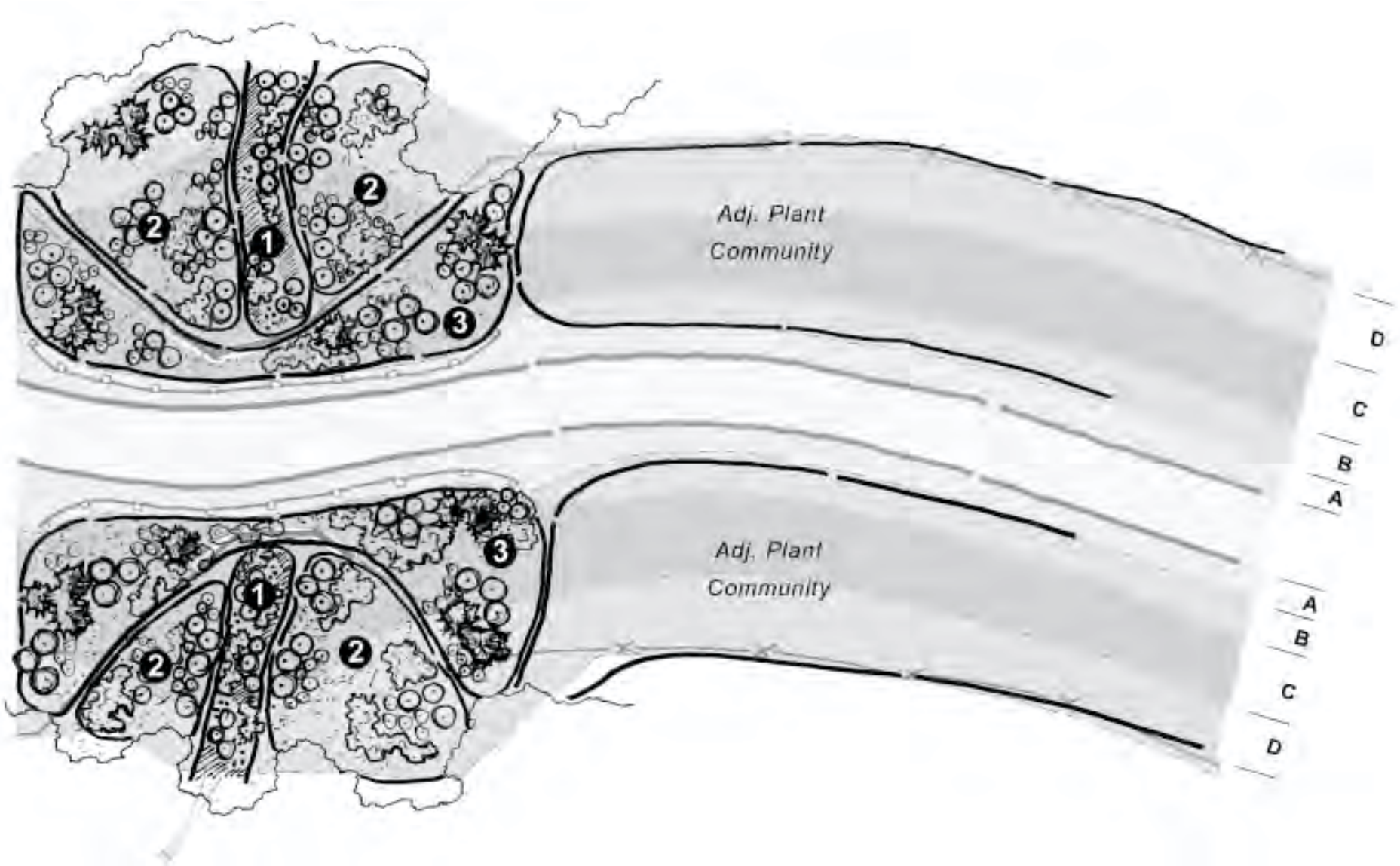
Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Undulate planting lines to create a variable forest edge

Emulate the natural distribution of species across the soil moisture gradient from the wet, instream area (ZONE 1) through the transitional area (ZONE 2) and into the drier upland area (ZONE 3). For example; include Ponderosa pine (Pinus ponderosa) only in well drained areas in zones 3; concentrate Black cottonwood (Populus trichocarpa), Mountain alder (Alnus incana) and Sandbar willow (Salix exigua) in zone 1 with a lesser distribution in zone 2.

Include Sweetgrass (Hierochloe odorata), and Skunk cabbage (Lysichitum americanum) only on moist microsites under approval of CSKT Tribal Preservation Office

Black Cottonwood Riparian Forest



Bluebunch Wheatgrass Prairie

Limits of Range: Occurs from Evaro to Ravalli Hills

Reference Site: Cutbank at Station 385-386, Ninepipe Wildlife Refuge

Description: The Bluebunch Wheatgrass Prairie is based upon the Bluebunch Wheatgrass/Sandberg's Bluegrass (*Agropyron spicatum/Poa secunda*) Habitat Type (Mueggler and Stewart 1980). Only the species with a representation greater than one percent were selected from the species list of the Habitat Type. In addition to the species selected from the habitat type in Mueggler, tall annual willowherb (*Epilobium brachycarpum*), bitterroot (*Lewisia rediviva*), pineapple weed (*Matricaria matricarioides*), prickly pear cactus (*Opuntia fragilis*), slender phlox (*Phlox gracilis*), wooly plantain (*Plantago patagonica*), yucca (*Yucca glauca*), great basin wildrye (*Elymus cinereus*), bitterbrush (*Purshia tridentata*), oakleaf sumac (*Rhus trilobata*), Wood's rose (*Rosa woodsii*), common snowberry (*Symphoricarpus albus*) and Rocky Mountain juniper (*Juniperus scopulorum*) were added either because they are currently a component of this community within the right-of-way, or as a species of cultural value.

Bluebunch Wheatgrass habitat is a xeric grassland that occurs on dry soils on varying terrain from steep slopes to rolling hills, along hot dry slopes to warm dry forest fringe. These bunchgrass wheatgrass (*Agropyron spicatum*) dominated types are to be expected on moderately arid sites with loamy, well-drained or sandy soils, such as occur on much of the area within the northern portion of this project. These types are very similar in site requirements and vegetative composition. Each will fit the conditions found on the driest sites to be encountered on the project, other than perhaps the severe talus slope sites.

The habitat type generally occurs on valley bottoms and on west and south exposures at elevations ranging between 2,800 and 7,000 feet.

Bluebunch wheatgrass (*Agropyron spicatum*) is the dominant grass, accompanied by rough fescue (*Festuca scabrella*), fringed sage (*Artemisia frigida*), arrowleaf balsamroot (*Balsamorhiza sagittata*), common yarrow (*Achillea millefolium*), and other forbs.

Bluebunch Wheatgrass Prairie

BLUEBUNCH WHEATGRASS PRAIRIE

Acreage estimate: 81.90 acres

Tree Spacing Target: 0 foot spacing = 0 plants/acre

Forb Spacing Target: ? foot spacing = ? plants/acre

eeding Target: 140 PLS/Square Foot ? = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
Lewisia rediviva	Bitterroot	1				

SEED MIX

Species Name	Common Name	Inclusion Priority	PLS #/acre	Seeds per PLS lb.	Seeds per Square foot	Seeds per Acre	Percent of Mix
GRAMINOIDS							
Festuca idahoensis	Idaho Fescue	2	2.00	450,000	20.7	900,000	13.4%
Festuca scabrella	Rough Fescue	1	3.00	300,000	20.7	900,000	13.4%
Koeleria cristata	Prairie Junegrass	1	0.25	2,300,000	13.2	575,000	8.6%
Oryzopsis hymenoides	Indian Ricegrass	2	2.00	141,000	6.5	282,000	4.2%
Poa secunda	Pine Sandberg Bluegrass	1	0.40	925,000	8.5	370,000	5.5%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	10.00	139,000	31.9	1,390,000	20.7%
Stipa comata	Needle and Thread	2	1.50	115,000	4.0	172,500	2.6%
FORBS							
Achillea millefolium	Common Yarrow	3	0.20	2,770,000	12.7	554,000	8.2%
Antennaria microphylla	Rosy Pussytoes	1	0.05	8,000,000	9.2	400,000	6.0%
Artemisia frigida	Fringed Sage	2	0.10	4,000,000	9.2	400,000	6.0%
Balsamorhiza sagittata	Arrowleaf Balsamroot	1	0.50	55,000	0.6	27,500	0.4%
Castilleja spp	Paintbrush	2	0.10	4,900,000	11.2	490,000	7.3%
Lupinus sericeus	Silky Lupine	1	2.00	13,000	0.6	26,000	0.4%
SHRUBS							
Chrysothamnus nauseosus	Rubber Rabbitbrush	1	0.30	782,000	5.4	234,600	3.5%
		22.40		**154**		**6,721,600**	**100%**

22.40 Total PLS pounds per acre **1834.6 PLS pounds for community**

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

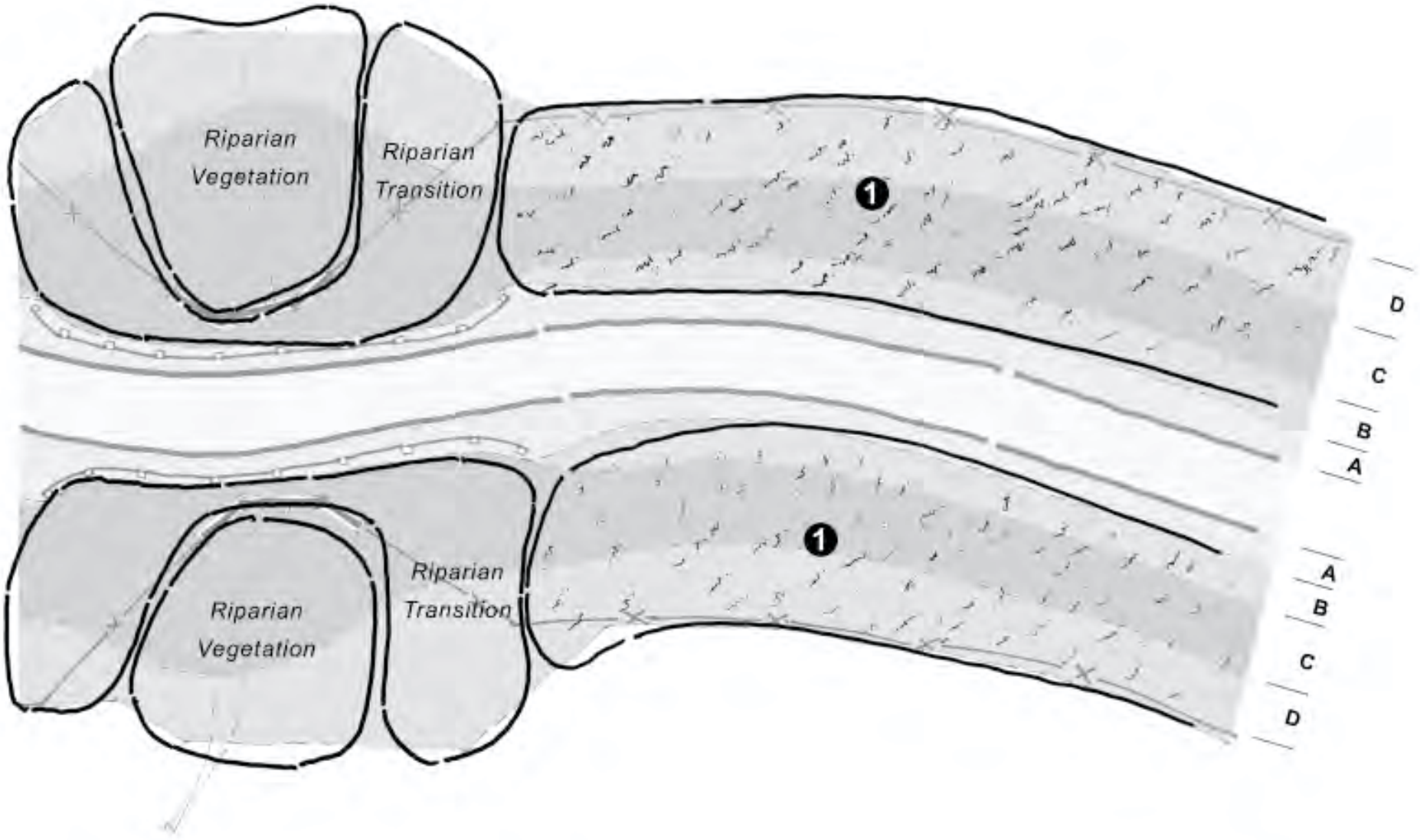
Bluebunch Wheatgrass Prairie Notes

Plant Bluebunch Wheatgrass Prairie Community species in Plant Zone 1

Both prairie communities are entirely seeded (no tubelings or containers) in Zones B, C, and D

There may be inclusions of other plant communities, e.g., wet meadows or ponderosa pine communities, within the prairie community

Bluebunch Wheatgrass Prairie



Douglas Fir Forest

Limits of Range: Continuous forest primarily from Evaro to Schley Creek with some intermittent forest stands on the hillsides south of Ravalli

Reference Site: North of Evaro; Finley Creek Tributaries

Description: This plant community is based upon the Douglas Fir/Ninebark (*Pseudotsuga menziesii/Physocarpus malvaceus*) Habitat Type, Pinegrass (*Calamagrostis rubescens*) phase (Pfister, and others 1977). This phase represents the majority of forested sites south of St. Ignatius. Only the species with a representation greater than one percent were selected from the species list of the Habitat Type. In addition to the species selected from the habitat type in Pfister, Kinnikinnick (*Arctostaphylos uva-ursi*) was added either because it is currently a component of this community within the right-of-way, or as a species of cultural value.

Douglas fir (*Pseudotsuga menziesii*) communities are well-developed forest habitats on meso-xeric, upland habitats between 3,500 and 5,000-foot elevation. Douglas fir (*Pseudotsuga menziesii*) is the dominant overstory tree on northern and eastern exposures with Ponderosa pine (*Pinus ponderosa*) as a minor seral component. Douglas fir (*Pseudotsuga menziesii*) forests also occur on southern and western exposures with Ponderosa pine (*Pinus ponderosa*) as a major seral component. Western larch *Larix occidentalis* becomes more prevalent on the cooler, northern exposures as a seral element of the Douglas fir (*Pseudotsuga menziesii*) community.

DOUGLAS FIR FOREST

Acreage estimate: 109.90 acres	**Acres to Seedlings:** 65%		
Tree Spacing Target:	12 foot spacing	=	303 plants/acre
Shrub Spacing Target:	8 foot spacing	=	681 plants/acre
Seeding Target:	130 PLS/Square Foot	983	= TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species	
TREES							
Larix occidentalis	Western Larch	2	2	20%	61	6,649	
Picea engelmannii	Engelmann Spruce	3	1	5%	15	1,662	
Pinus ponderosa	Ponderosa Pine	1	20	35%	106	11,636	
Pseudotsuga menziesii	Douglas Fir	1	50	40%	121	13,298	
SHRUBS				**100%**			
Acer glabrum	Rocky Mt. Maple	2	3	5%	34	3,740	
Amelanchier alnifolia	Western Serviceberry	1	5	10%	68	7,480	
Arctostaphylos uva-ursi	Kinnikinnick	1	5	12%	82	8,976	
Berberis repens	Oregon Grape	1	2	9%	61	6,732	
Holodiscus discolor	Ocean Spray	2	2	6%	41	4,488	
Physocarpus malvaceus	Ninebark	1	30	15%	102	11,220	
Prunus virginiana	Common Chokecherry	1	3	13%	88	9,724	
Shepherdia canadensis	Canada Buffaloberry	2	2	10%	68	7,480	
Spiraea betulifolia	White Spiraea	1	3	10%	68	7,480	
Symphoricarpos spp	Snowberry	1	5	10%	68	7,480	
OTHER				**100%**			
					983	**108,045**	
	983	**X**	**71.44** (65%)	**ACRES**	**=**	**70,230**	**TotalSeedlings**

Douglas Fir Forest

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis rubescens	Pinegrass	1	0.10	4,480,000	10.3	448,000	8.2%
Carex geyeri	Elk Sedge	1	1.50	91,400	3.1	137,100	2.5%
Festuca idahoensis	Idaho Fescue	2	2.00	450,000	20.7	900,000	16.5%
Festuca scabrella	Rough Fescue	1	1.00	300,000	6.9	300,000	5.5%
Koeleria cristata	Prairie Junegrass	1	0.20	2,300,000	10.6	460,000	8.4%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	2	10.00	139,000	31.9	1,390,000	25.5%
Stipa comata	Needle and Thread	2	1.00	115,000	2.6	115,000	2.1%
FORBS							
Achillea millefolium	Common Yarrow	3	0.10	2,770,000	6.4	277,000	5.1%
Anaphalis margaritacea	Pearly Everlasting	2	0.05	8,200,000	9.4	410,000	7.5%
Antennaria microphylla	Rosy Pussytoes	1	0.05	8,000,000	9.2	400,000	7.3%
Arnica cordifolia	Heartleaf Arnica	2	0.50	220,000	2.5	110,000	2.0%
Balsamorhiza sagittata	Arrowleaf Balsamroot	2	1.50	55,000	1.9	82,500	1.5%
Epilobium angustifolium	Fireweed	3	0.05	8,500,000	9.8	425,000	7.8%
			18.05		**125**	**5,454,600**	**100%**
	18.05 Total PLS pounds per acre			**1983.7**	**PLS pounds for community**		

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Douglas Fir Forest Notes:

Plant Douglas Fir community species in Plant Zone 1

Vary the intensity of plantings; e.g., plant masses of trees and shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

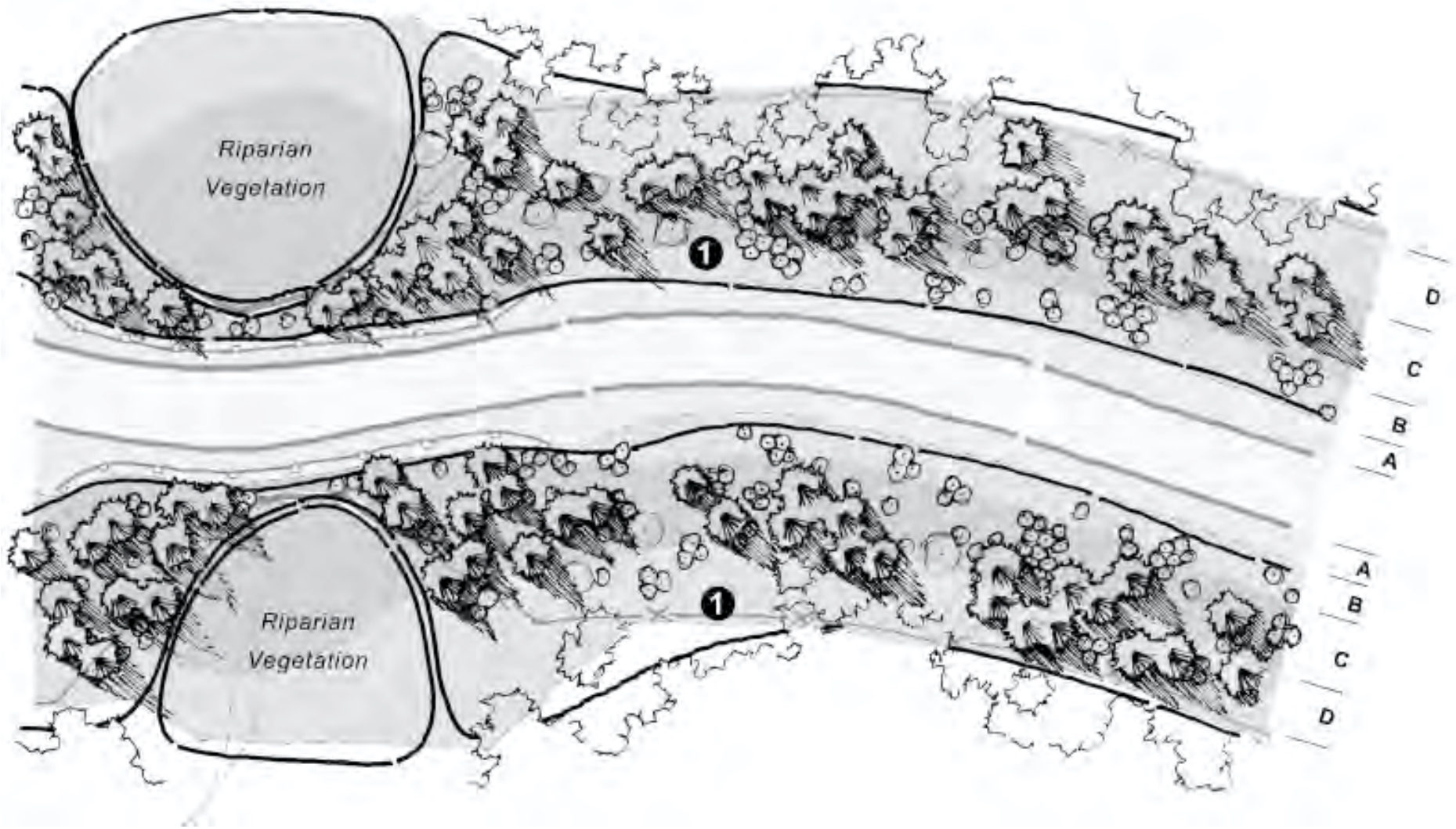
Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Undulate planting lines to create a variable forest edge

Include Western larch (Larix occidentalis) only on cooler, north facing slopes

Include Engelmann spruce (Picea engelmanii) in moist microsites with boggy soils

Douglas Fir Forest



Fescue Prairie

Limits of Range: Occurs from Ravalli hills north to Polson

Reference Site: Top of Polson Hill; possibly Ninepipe complex; south of Missoula

Description: This plant community is based upon the Rough Fescue/Bluebunch Wheatgrass (*Festuca scabrella/ Agropyron spicatum*) Habitat Type (Mueggler and Stewart 1980). These bunchgrass dominated types are to be expected on moderately arid sites with loamy, well drained or sandy soils, such as occur on much of the area within the northern portion of this project. These types are very similar in site requirements and vegetative composition. Each will fit the conditions found on the driest sites to be encountered on the project, other than perhaps the severe talus slope sites.

Only the species with a representation greater than 1% were selected from the species list of the Habitat Type. In addition to the species selected from the habitat type in Mueggler, Nuttall's Rockcress (*Arabis nutallii*), Buckwheat (*Eriogonum heracloides*), Bitterroot (*Lewisia rediviva*), Prairie Star (*Lithophragma parviflora*), Bigseed Biscuitroot (*Lomatium macrocarpum*), and Wood's Rose (*Rosa woodsi*) were added either because they are currently a component of this community within the right-of-way, or as a species of cultural value.

Fescue Prairie habitat is a mesic grassland that generally it occurs on valley bottoms and on west and south exposures at elevations ranging between 2,800 and 7,000 feet. Annual moisture is often less than 15 inches on these sites. Grasslands do occur on north facing exposures, often as islands surrounded by forest species. The development and maintenance of fescue grasslands on these more mesic exposures is probably related to past fire disturbances. Community composition is significantly altered by livestock grazing throughout western Montana.

Fescue Prairie

FESCUE PRAIRIE

Acreage estimate: 224.30 acres								
Tree Spacing Target:	0 foot spacing	= 0 plants/acre						
Forb Spacing Target:	? foot spacing	= ? plants/acre						
Seeding Target:	140 PLS/Square Foot	?	= TOTAL PLANTS/ACRE					

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
Lomatium triternatum	Nine-leaf Desert-parsley	2	1		Salvage	
Lomatium macrocarpum	Bigseed Biscuitroot	2	1		Salvage	
Lewisia rediviva	Bitterroot	2	1		CSKT	

SEED MIX

Species Name	Common Name	Inclusion Priority	PLS #/acre	Seeds per PLS lb.	Seeds per Square foot	Seeds per Acre	Percent of Mix
GRAMINOIDS							
Festuca idahoensis	Idaho Fescue	1	2.00	450,000	20.7	900,000	13.5%
Festuca scabrella	Rough Fescue	1	9.00	300,000	62.0	2,700,000	40.4%
Koeleria cristata	Prairie Junegrass	1	0.20	2,300,000	10.6	460,000	6.9%
Poa secunda	Pine Sandberg Bluegrass	2	0.50	925,000	10.6	462,500	6.9%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	2.00	139,000	6.4	278,000	4.2%
Stipa comata	Needle and Thread	2	1.00	115,000	2.6	115,000	1.7%
FORBS							
Achillea millefolium	Common Yarrow	3	0.10	2,770,000	6.4	277,000	4.1%
Antennaria microphylla	Rosy Pussytoes	1	0.05	8,000,000	9.2	400,000	6.0%
Artemisia frigida	Fringed Sage	2	0.10	4,000,000	9.2	400,000	6.0%
Artemisia ludoviciana	Prairie Sage	2	0.10	4,000,000	9.2	400,000	6.0%
Balsamorhiza sagittata	Arrowleaf Balsamroot	1	1.00	55,000	1.3	55,000	0.8%
Eriogonum spp	Buckwheat	2	0.10	210,000	0.5	21,000	0.3%
Gaillardia aristata	Blanket Flower	2	0.30	50,000	0.3	15,000	0.2%
Geranium viscosissimum	Sticky Geranium	1	0.30	52,000	0.4	15,600	0.2%
Geum triflorum	Prairiesmoke	2	0.10	696,000	1.6	69,600	1.0%
Lithospermum ruderale	Western Gromwell	3	0.20	230,000	1.1	46,000	0.7%
Lupinus sericeus	Silky Lupine	1	5.00	13,000	1.5	65,000	1.0%
			22.05		**153**	**6,679,700**	**100%**

22.05	**Total PLS pounds per acre**		**4945.8**	**PLS pounds for community**

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

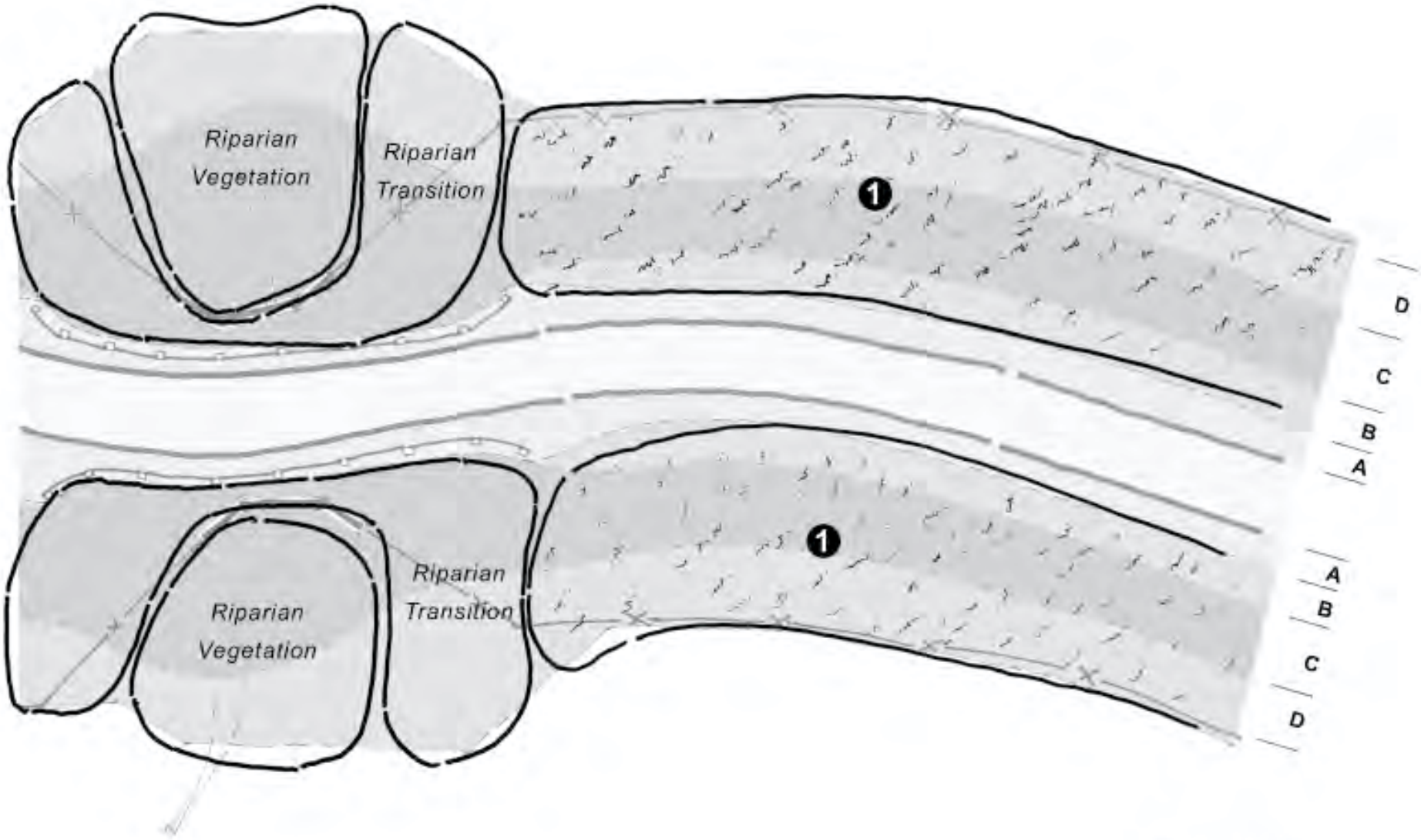
Fescue Prairie Notes:

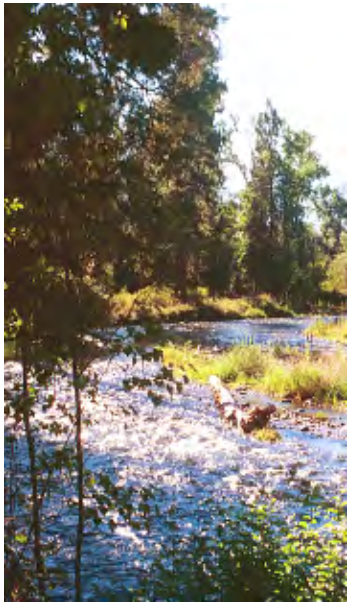
Plant Fescue Prairie community species in Plant Zone 1

Both prairie communities are entirely seeded (no tubelings or containers) in Zones B, C, and D

There may be inclusions of other plant communities, e.g., wet meadows or ponderosa pine communities, within the prairie community

Fescue Prairie





Mixed Conifer and Broadleaf Riparian

Limits of Range: found in riparian areas throughout region

Reference Site: Jocko River north of Arlee and Jocko side channel

Description: This plant community is based upon the Douglas Fir/Red-osier Dogwood (*Pseudotsuga menziesii/Cornus stolonifera*) Habitat Type found in *Classification and Management of Montana's Riparian and Wetland Sites*, by Paul L. Hansen and others (1995). The Douglas Fir/Red-osier Dogwood (*Pseudotsuga menziesii/Cornus stolonifera*) Habitat Type represents more moist riparian sites with potential for conifer trees. Only, but not all species with a representation greater than one percent were selected from the species list of the Habitat Type. In addition to the species selected from the habitat type in Hansen, sweetscented bedstraw (*Galium triflorum*), skunk cabbage (*Lysichiton americanum*), black hawthorn (*Crateagus douglasii*), gray alder (*Alnus incana*), water birch (*Betula occidentalis*), Englemann spruce (*Picea enlgemannii*) were added because they are either currently a component of this community within the right-of-way or as a species of cultural value.

The Douglas fir/red-osier dogwood woodland is a mixed conifer and broadleaf riparian community that occurs at low to mid elevations (3,600 to 6,360 feet) on well-drained alluvial benches or terraces of major streams and rivers as well as along smaller streams and creeks, typically on an east aspect. Soils are usually Mollisols or Entisols, typically Fluvents, and soil textures vary from loam to coarse sand. Water tables typically drop below 1 meter but surface horizons may stay moist. This habitat type is characterized primarily by an overstory of black cottonwood (*Populus trichocarpa*), Douglas fir (*Pseudotsuga menziesii*), and a scattering of ponderosa pine (*Pinus ponderosa*), and quaking aspen (*Populus tremuloides*); and an understory shrub layer of Wood's rose (*Rosa woodsii*), red-osier dogwood (*Cornus stolonifera*), and common chokecherry (Prunus virginiana), as well as several herbaceous species. Species particularly suited for revegetating disturbed sites include: red-osier dogwood (Cornus stolonifera), western serviceberry (Amelanchier alnifolia), common chokecherry (Prunus virginiana), and various willow species (Salix sp.). This habitat type provides valuable cover and shade for a variety of wildlife species, including birds and big game.

MIXED CONIFER AND BROADLEAF RIPARIAN FOREST

Acreage estimate: 47.80 acres

Tree Spacing Target: 12 foot spacing = 303 plants/acre

Shrub Spacing Target: 6 foot spacing = 1210 plants/acre

Seeding Target: 120 PLS/Square Foot 1513 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
TREES						
Pinus ponderosa	Ponderosa Pine	1	5	15%	45	2169
Picea engelmannii	Engelmann Spruce	3	1	5%	15	723
Pseudotsuga menziesii	Douglas Fir	1	40	20%	61	2892
Populus tremuloides	Quaking Aspen	1	10	20%	61	2892
Populus trichocarpa	Black Cottonwood	1	20	40%	121	5784
SHRUBS				**100%**		
Acer glabrum	Rocky Mt. Maple	2	3	4%	48	2314
Alnus incana	Mountain Alder	3	2	5%	61	2892
Amelanchier alnifolia	Western Serviceberry	1	5	6%	73	3470
Berberis repens	Oregon Grape	2	1	3%	36	1735
Betula occidentalis	Water Birch	2	5	5%	61	2892
Cornus stolonifera	Red-Osier Dogwood	1	10	5%	61	2892
Philadelphus lewisii	Mockorange; Syringa	1	3	4%	48	2314
Prunus americana	American Plum	1	3	5%	61	2892
Prunus virginiana	Common Chokecherry	1	5	10%	121	5784
Ribes spp.	Wild Currant	1	2	2%	24	1,157
Rosa woodsii	Wood's Rose	1	3	11%	133	6,362
Rubus idaeus	Red Raspberry	2	2	5%	61	2,892
Rubus parviflorus	Thimbleberry	2	1	2%	24	1157
Salix bebbiana	Bebb willow	2	5	7%	85	4,049
Sambucus cerulea	Blue Elderberry	1	1	3%	36	1,735
Symphoricarpos spp	Snowberry	2	2	11%	133	6,362
Shepherdia canadensis	Canada Buffaloberry	2	1	4%	48	2314
Spiraea betulifolia	Shiny-leaf Spiraea	1	2	8%	97	4627
				100%	**1513**	**72,298**
		1513	**X**	**47.80**	**ACRES =**	**72,298** **Total Seedlings**

Mixed Conifer and Broadleaf Riparian

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	0.50	2,270,000	26.1	1,135,000	20.0%
Elymus glaucus	Blue Wildrye	1	5.00	110,000	12.6	550,000	9.7%
Festuca idahoensis	Idaho Fescue	2	1.00	450,000	10.3	450,000	7.9%
Festuca scabrella	Rough Fescue	1	1.00	300,000	6.9	300,000	5.3%
Koeleria cristata	Prairie Junegrass	1	0.20	2,300,000	10.6	460,000	8.1%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	2	10.00	139,000	31.9	1,390,000	24.5%
Stipa comata	Needle and Thread	2	2.00	115,000	5.3	230,000	4.1%
FORBS							
Achillea millefolium	Common Yarrow	3	0.10	2,770,000	6.4	277,000	4.9%
Anaphalis margaritacea	Pearly Everlasting	2	0.05	8,200,000	9.4	410,000	7.2%
Antennaria microphylla	Rosy Pussytoes	1	0.05	8,000,000	9.2	400,000	7.0%
Arnica cordifolia	Heartleaf Arnica	2	0.50	220,000	2.5	110,000	1.9%
Artemisia ludovisciana	Prairie Sage	2	0.10	4,500,000	10.3	450,000	7.9%
Aster laevis	Smooth Aster	2	1.00	200,000	4.6	200,000	3.5%
Clematis ligusticifolia	Western Virgins-bower	2	0.50	315,000	3.6	157,500	2.8%
Epilobium angustifolium	Fireweed	3	0.05	8,500,000	9.8	425,000	7.5%
Solidago canadensis	Canada goldenrod	1	0.50	700,000	8.0	350,000	6.2%
Vicia americana	American Vetch	1	2.00	33,000	1.5	66,000	1.2%
			19.05		**130**	**5,675,500**	**100%**
	19.05	**Total PLS pounds per acre**		**910.6**	**PLS pounds for community**		

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Mixed Conifer and Broadleaved Riparian Forest Notes:

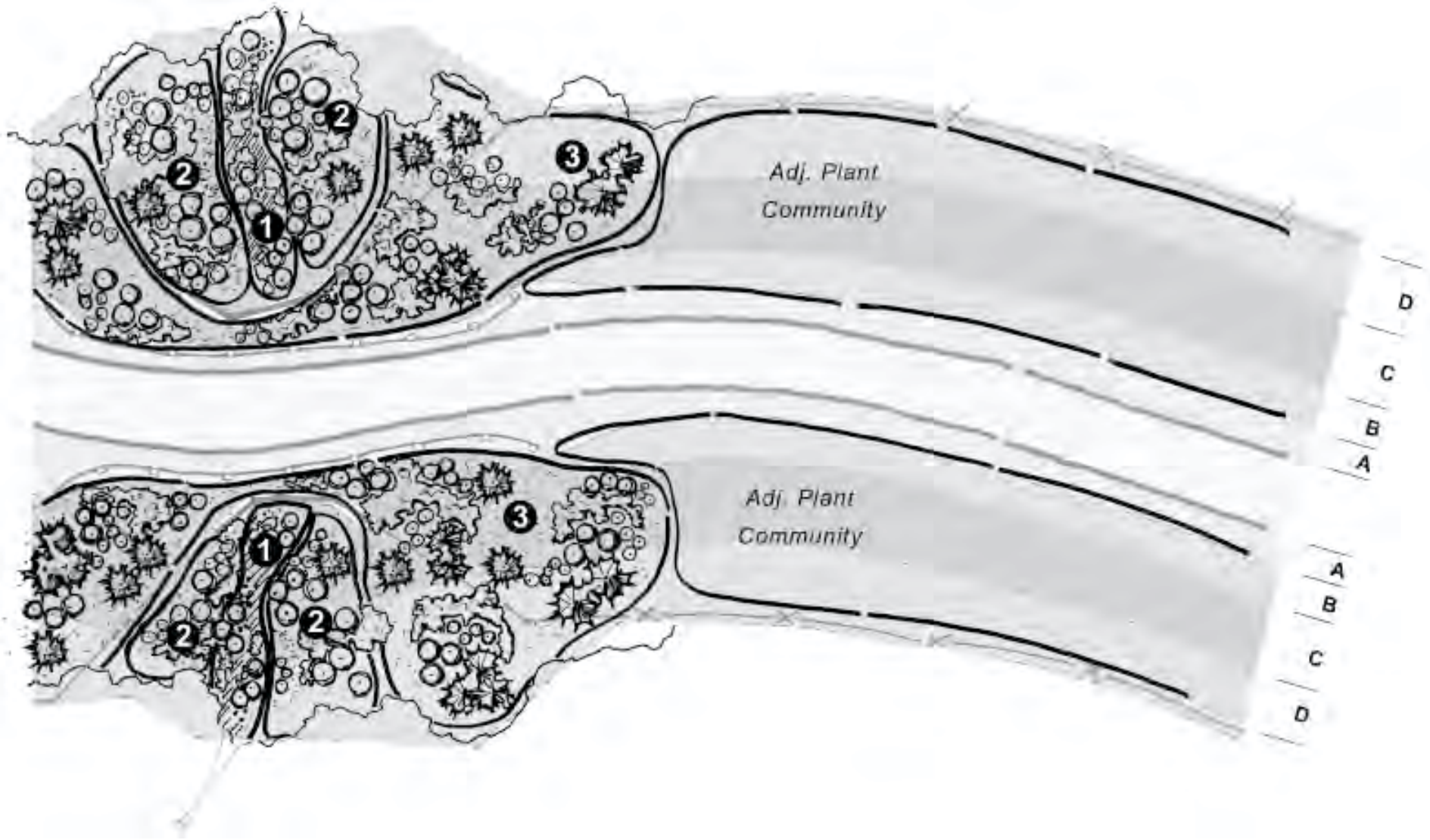
Vary the intensity of plantings; e.g., plant masses of trees and shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Undulate planting lines to create a variable forest edge

Emulate the natural distribution of species across the soil moisture gradient from the wet, instream area (ZONE 1) through the transitional area (ZONE 2) and into the drier upland area (ZONE 3). For example; include Ponderosa pine (Pinus ponderosa) only in well drained areas in zones 3; concentrate Quaking aspen (Populus tremuloides), Black cottonwood (Populus trichocarpa), and Mountain alder (Alnus incana) in zone 1 with a lesser distribution in zone 2.

Mixed Conifer and Broadleaf Riparian



Ponderosa Pine Forest

Limits of Range: Located along corridor from Schley Creek north to Polson

Reference Site: Pablo; Schley home sites north to Dirty Corner; Polson

Description: This plant community is based upon the Ponderosa Pine/Bluebunch Wheatgrass (Pinus ponderosa/Agropyron spicatum) Habitat Type found in Forest Habitat Types of Montana, by Pfister and others (1977). Only, but not all species with a representation greater than one percent were selected from the species list of the Habitat Type. In addition to the species selected from the habitat type in Pfister, buckwheat (Eriogonum heracleoides), prairie junegrass (Koeleria cristata), Scribner's panic grass (Panicum scribnerium), sand dropseed (Sporobolus cryptandrus), needle-and-thread (Stipa comata), kinnikinnick (Arctostaphylos uva-ursi), and Rocky Mountain juniper (Juniperus scopulorum) were added either because they are currently a component of this community within the right-of-way, or as a species of cultural value.

Ponderosa pine (*Pinus ponderosa*) forests can be very distinct, lying between grassland and Douglas fir (*Pseudotsuga menziesii*) zones, with ecotones of varying width interconnecting the three zones. Soils and parent material can be variable in the Ponderosa pine (*Pinus ponderosa*) series, but generally this habitat type predominates on deep clay deposits. Ponderosa pine (*Pinus ponderosa*) communities are the driest forest type, and moisture availability determines whether this species develops as open savannas or closed forests underplanted with grassland and forest species. Exposure shifts the community composition; Ponderosa pine (*Pinus ponderosa*) eventually becomes dominant in warmer south and west exposures. North of Ravalli at wildlife crossing #24 Ponderosa pine savanna occurs upslope on the east side of the highway while at Pablo, moisture allows the development of a denser canopy of a Ponderosa pine forest.

Ponderosa pine (*Pinus ponderosa*) is the dominant overstory species with scattered Douglas fir (*Pseudotsuga menziesii*); associated shrubs include Rocky Mountain juniper (*Juniperus scopularum*) and western serviceberry (*Amelanchier alnifolia*). Bluebunch wheatgrass (*Agropyron spicatum*), Idaho fescue (*Festuca idahoensis*), and Geyer's sedge (*Carex geyeri*) comprise the majority of the predominantly herbaceous understory. Big game winter demand for this habitat may be high, e.g., elk.

PONDEROSA PINE FOREST

Acreage estimate: 229.10 acres		**% Acres to Seedlings*:**	50%	
Tree Spacing Target:	12 foot spacing	=	303 plants/acre	*assumes that only x% of the acreage would be planted with seedlings
Shrub Spacing Target:	8 foot spacing	=	681 plants/acre	
Seeding Target:	130 PLS/Square Foot	983	= TOTAL PLANTS/ACRE	

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
TREES						
Juniperus scopulorum	Rocky Mountain Juniper	1	3	10%	30	3,465
Pinus ponderosa	Ponderosa Pine	1	60	90%	272	31,186
SHRUBS				100%		
Amelanchier alnifolia	Western Serviceberry	1	3	25%	170	19,491
Arctostaphylos uva-ursi	Kinnikinnick	1	2	15%	102	11,695
Berberis repens	Oregon Grape	1	2	10%	68	7,797
Holodiscus discolor	Ocean Spray	2		5%	34	3,898
Physocarpus malvaceus	Ninebark	1		5%	34	3,898
Prunus virginiana	Common Chokecherry	1	2	15%	102	11,695
Rosa woodsii	Wood's Rose	1		10%	68	7,797
Shepherdia canadensis	Canada Buffaloberry	2		2%	14	1,559
Spiraea betulifolia	White Spiraea	1	1	3%	20	2,339
Symphoricarpos spp	Snowberry	1	2	10%	68	7,797
				100%	**983**	**112,617**

	983	**X**	**114.55**	**ACRES**	**=**	**112,617**	**Total Seedlings**

Ponderosa Pine Forest

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis rubescens	Pinegrass	1	0.10	4,480,000	10.3	448,000	7.9%
Carex geyeri	Elk Sedge	1	1.50	91,400	3.1	137,100	2.4%
Festuca idahoensis	Idaho Fescue	2	2.00	450,000	20.7	900,000	15.8%
Festuca scabrella	Rough Fescue	1	2.00	300,000	13.8	600,000	10.5%
Koeleria cristata	Prairie Junegrass	1	0.20	2,300,000	10.6	460,000	8.1%
Poa secunda	Pine Sandberg Bluegrass	2	0.50	925,000	10.6	462,500	8.1%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	2	6.50	139,000	20.7	903,500	15.9%
Stipa comata	Needle and Thread	2	1.50	115,000	4.0	172,500	3.0%
FORBS							
Achillea millefolium	Common Yarrow	3	0.10	2,770,000	6.4	277,000	4.9%
Anaphalis margaritacea	Pearly Everlasting	2	0.05	8,200,000	9.4	410,000	7.2%
Antennaria microphylla	Rosy Pussytoes	1	0.05	8,000,000	9.2	400,000	7.0%
Arnica cordifolia	Heartleaf Arnica	2	1.00	220,000	5.1	220,000	3.9%
Artemisia ludovisciana	Prairie Sage	2	0.05	4,500,000	5.2	225,000	3.9%
Balsamorhiza sagittata	Arrowleaf Balsamroot	2	1.50	55,000	1.9	82,500	1.4%
			17.05		**131**	**5,698,100**	**100%**

	17.05	**Total PLS pounds per acre**		**3906.2**	**PLS pounds for community**

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Ponderosa Pine – Closed Forest Notes:

Plant Ponderosa Pine community species in Plant Zone 1

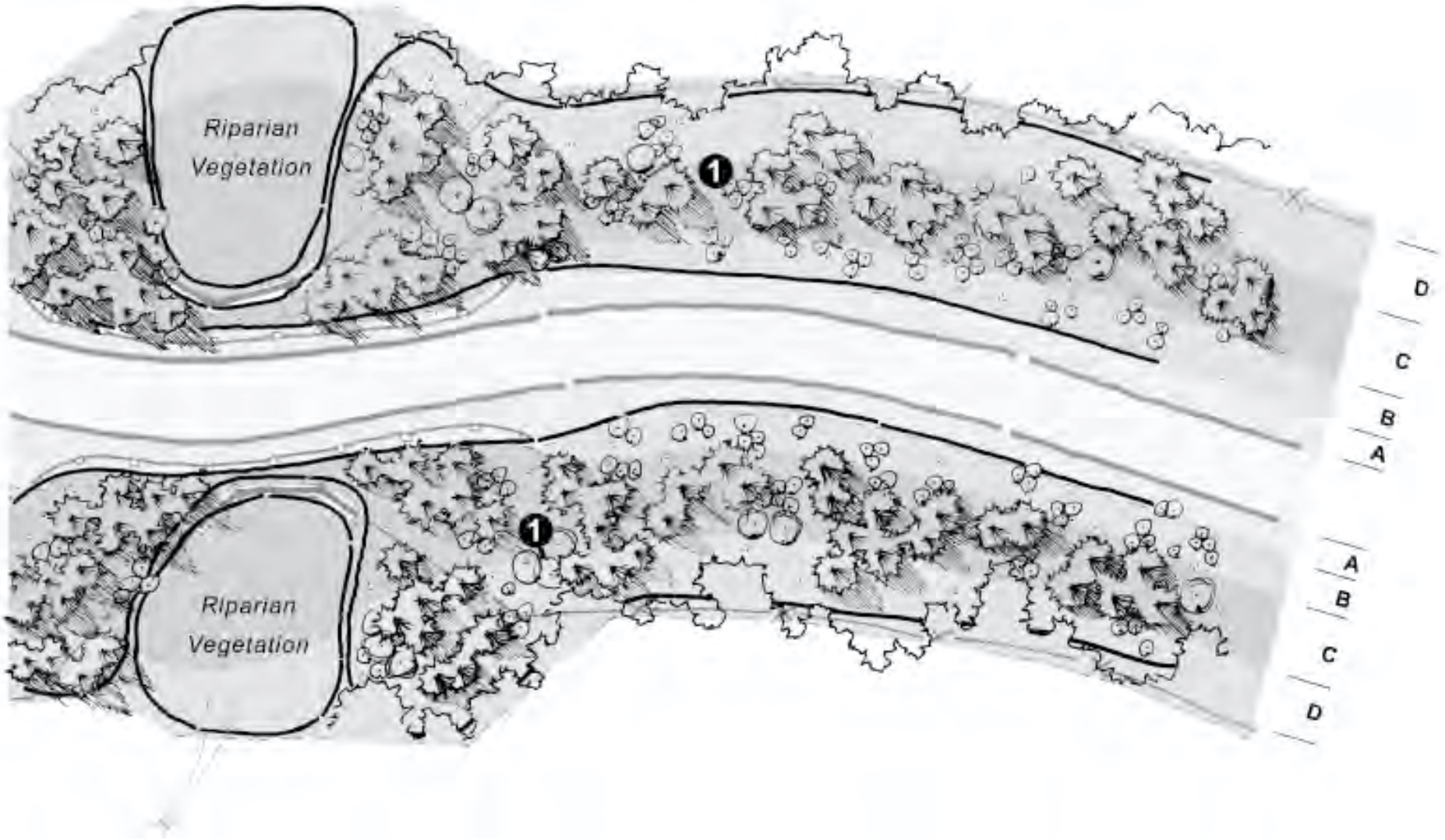
Vary the intensity of plantings; e.g., plant masses of trees and shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Locate and size the tree and shrub inclusions to match the character of the surrounding landscape; e.g., ponderosa pine forests are predomininantly comprised of ponderosa pine trees underplanted with grassland understory

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Undulate planting lines to create a variable forest edge

Ponderosa Pine Forest - Closed Forest



General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15’ roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

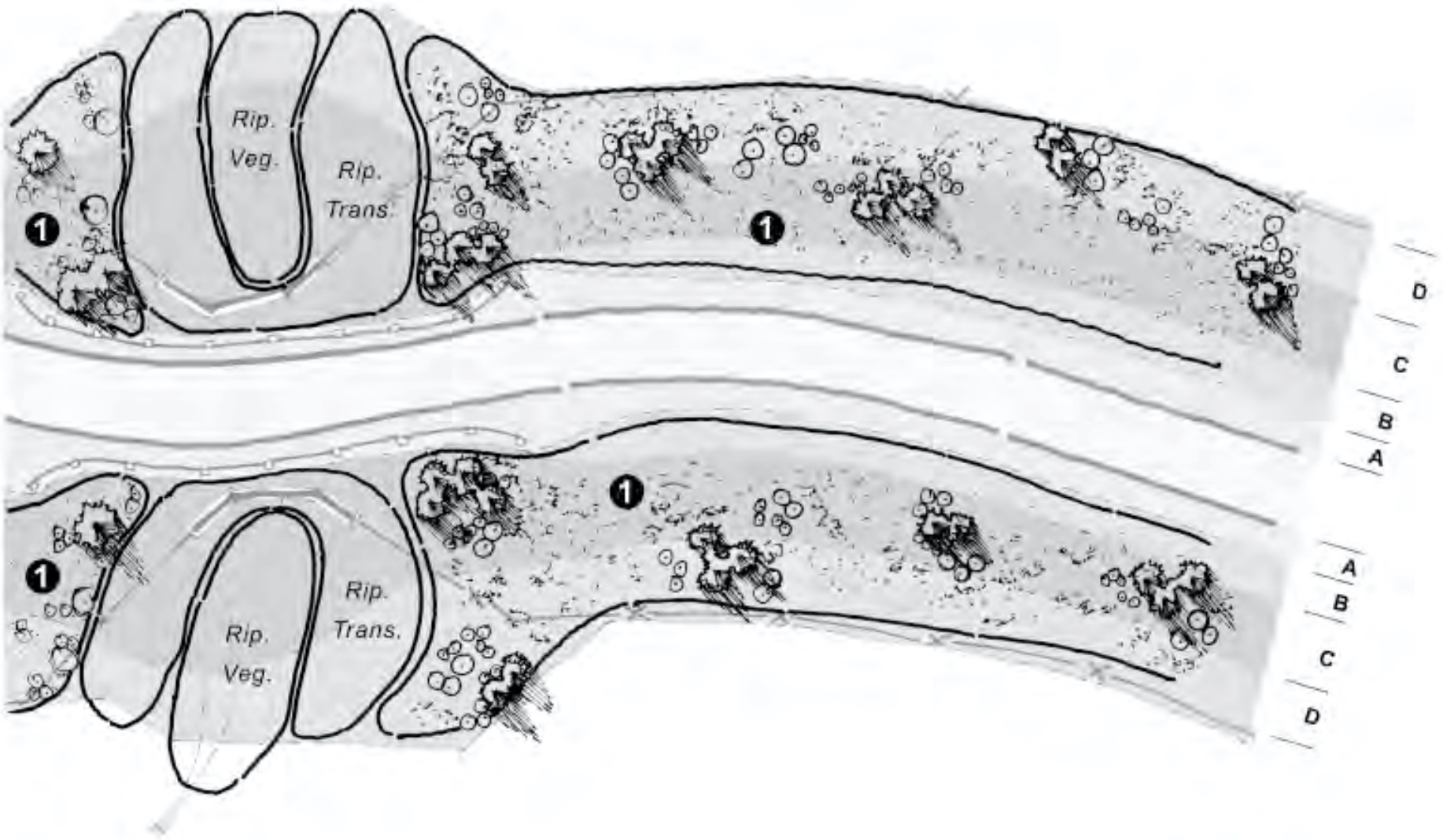
Ponderosa Pine – Open Savanna Notes:

Plant Ponderosa Pine community species in Plant Zone 1

Open savanna areas will be revegetated primarily through seeding with inclusions of shrubs and trees planted from container stock or salvage

Locate and size the tree and shrub inclusions to match the character of the surrounding landscape; e.g., ponderosa pine savannas are predomininantly grasslands with a scattering of ponderosa pine trees

Ponderosa Pine Forest - Open Savanna



Shrub Riparian Communities

Limits of Range: Found in riparian areas throughout region

Reference Site: MRL railroad borrow pits and streambank riparian sites

Description: Shrub Riparian plant communities are a major type found at mid to moderately high elevations (2,320 to 7,800 feet) and occur next to lakes, marshes, beaver ponds, seeps and springs, and on alluvial terraces adjacent to rivers and streams. Soils are widely variable, including Entisols, Histosols, and Mollisols; floodlplain soils contain high percentages of gravel and cobbles. Water tables range from surface levels to greater than 1 meter below the soil surface during summer. Big game use of the willow thickets may be heavy, and this is excellent habitat for waterfowl and fish.

Only the species with a representation greater than one percent were selected from the species list of the Habitat Type.

Sandbar Willow (Salix exigua) Community Type (Hansen, and others 1995)

The Sandbar Willow (*Salix exigua*) Community Type is an early seral pioneer community that is normally found on moist to very moist alluvial deposits along streams and on periodically exposed shorelines of lakes and ponds. These communities may occur as mono specific pure stands of willow, or as a mixture of other pioneer species of graminoids and forbs. This community provides rapid and excellent stabilization of exposed soils on moist sites.

Bebb Willow (Salix bebbiana) Community Type (Hansen, and others 1995)

The Bebb Willow (*Salix bebbiana*) Community Type is another excellent stabilizer of disturbed moist sites, but takes longer to develop. This community is typically more structurally complex and diverse than the Sandbar Willow (*Salix exigua*) Community Type and has greater values as wildlife habitat. Frequently associated important shrub species are red-osier dogwood (*Cornus stolonifera*), mountain alder (*Alnus incana*), water birch (*Betula occidentalis*) and rose (*Rosa sp.*).

Yellow Willow/Beaked Sedge (Salix lutea/Carex rostrata) Habitat Type (Hansen, and others 1995)

The Yellow Willow/Beaked Sedge (*Salix lutea/Carex rostrata*) Habitat Type is typically found on fluvial (lotic) systems along stream floodplains. This type is not greatly represented within the project area, but both yellow willow (Salix lutea) and beaked sedge (*Carex rostrata*) are present. Understory and associated species are very similar to those for the Bebb Willow Community Type.

SHRUB RIPARIAN - BEBBS WILLOW

Acreage estimate: 19.60 acres			
Shrub Spacing Target:	6 foot spacing	=	1,210 plants/acre
Gram. Spacing Target:	2 foot spacing	=	10,890 plants/acre
Seeding Target:	130 PLS/Square Foot	12,100	= TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
SHRUBS						
Alnus incana	Mountain Alder	1	5	5%	61	1186
Amelanchier alnifolia	Western Serviceberry	1	3	10%	121	2372
Betula occidentalis	Water Birch	2	3	5%	61	1186
Cornus stolonifera	Red-Osier Dogwood	1	5	10%	121	2372
Crataegus douglasii	Black Hawthorn	2	5	15%	182	3557
Crataegus succulenta	Succulent Hawthorn	3	1	3%	36	711
Prunus americanum	American Plum	2		3%	36	711
Prunus virginiana	Common Chokecherry	1	50	15%	182	3557
Rosa woodsii	Wood's Rose	1	3	10%	121	2372
Salix bebbiana	Bebb willow	1	50	10%	121	2372
Salix exigua	Sandbar Willow	1	5	7%	85	1660
Symphoricarpos spp	Snowberry	2	2	7%	85	1660
GRAMINOIDS				**100%**		
Carex aquatilis	Water Sedge	1	3	30%	3267	64033
Carex utriculata	Beaked Sedge	1	3	30%	3267	64033
Carex vesicaria	Inflated Sedge	1	1	10%	1089	21344
Juncus balticus	Baltic Rush	2	1	20%	2178	42689
Juncus ensifolius	Dagger-leaf Rush	2	1	10%	1089	21344
				100%	**12,100**	**237,160**
	12100	**X**	**19.60**	**ACRES**	**=**	**237,160** **Total Seedlings**

Shrub Riparian - Bebb's Willow

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	0.50	2,270,000	26.1	1,135,000	19.6%
Deschampsia cespitosa	Tufted Hairgrass	1	0.50	2,500,000	28.7	1,250,000	21.6%
Elymus glaucus	Blue Wildrye	1	6.00	110,000	15.2	660,000	11.4%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	6.00	156,000	21.5	936,000	16.2%
FORBS							
Achillea millefolium	Common Yarrow	3	0.10	2,770,000	6.4	277,000	4.8%
Antennaria microphylla	Rosy Pussytoes	3	0.05	8,000,000	9.2	400,000	6.9%
Apocynum cannabinum	Hemp Dogbane	1	0.10	500,000	1.1	50,000	0.9%
Aster spp	Aster	2	0.10	200,000	0.5	20,000	0.3%
Epilobium ciliatum	Common Willow-herb	1	0.10	3,000,000	6.9	300,000	5.2%
Heracleum lanatum	Cow-parsnip	3	1.00	75,000	1.7	75,000	1.3%
Galium boreale	Northern Bedstraw	3	0.10	500,000	1.1	50,000	0.9%
Geum macrophyllum	Large-leaved Avens	1	0.50	400,000	4.6	200,000	3.5%
Solidago canadensis	Canada Goldenrod	1	0.30	700,000	4.8	210,000	3.6%
Vicia americana	American Vetch	1	3.00	75,000	5.2	225,000	3.9%
			18.35		**133**	**5,788,000**	**100%**

	18.35	**Total PLS pounds per acre**	**359.7**	**PLS pounds for community**	

SHRUB RIPARIAN - SANDBAR WILLOW

Acreage estimate: 14.10 acres

Shrub Spacing Target: 6 foot spacing = 1,210 plants/acre

Gram. Spacing Target: 2 foot spacing = 10,890 plants/acre

Seeding Target: 130 PLS/Square Foot 12,100 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
SHRUBS						
Cornus stolonifera	Red-Osier Dogwood	1	5	15%	182	2559
Salix bebbiana	Bebb willow	1	3	15%	182	2559
Salix exigua	Sandbar Willow	1	60	60%	726	10237
Salix lutea	Yellow Willow	2	3	5%	61	853
Sambucus cerulea	Blue Elderberry	1	1	5%	61	853
GRAMINOIDS				100%		
Carex aquatilis	Water Sedge	1	3	30%	3267	46065
Carex utriculata	Beaked Sedge	1	3	20%	2178	30710
Carex vesicaria	Inflated Sedge	1	1	10%	1089	15355
Eleocharis palustris	Common Spikesedge	1	2	15%	1634	23032
Juncus balticus	Baltic Rush	2	1	15%	1634	23032
Juncus ensifolius	Dagger-leaf Rush	2	1	10%	1089	15355
				100%	**12,100**	**170,610**
	12100	**X**	**14.10**	**ACRES**	**=**	**170,610 Total Seedlings**

Shrub Riparian - Sandbar Willow

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	0.50	2,270,000	26.1	1,135,000	20.0%
Deschampsia cespitosa	Tufted Hairgrass	1	0.50	2,500,000	28.7	1,250,000	22.1%
Elymus glaucus	Blue Wildrye	1	6.00	110,000	15.2	660,000	11.7%
Hordeum jubatum	Foxtail Barley	3	5.00	30,000	3.4	150,000	2.6%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	4.00	156,000	14.3	624,000	11.0%
FORBS							
Achillea millefolium	Common Yarrow	3	0.05	2,770,000	3.2	138,500	2.4%
Antennaria microphylla	Rosy Pussytoes	3	0.05	8,000,000	9.2	400,000	7.1%
Apocynum cannabinum	Hemp Dogbane	1	0.30	500,000	3.4	150,000	2.6%
Aster spp	Aster	2	0.10	200,000	0.5	20,000	0.4%
Epilobium ciliatum	Common Willow-herb	1	0.10	3,000,000	6.9	300,000	5.3%
Heracleum lanatum	Cow-parsnip	3	2.00	75,000	3.4	150,000	2.6%
Geum macrophyllum	Large-leaved Avens	1	0.50	400,000	4.6	200,000	3.5%
Glycyrrhiza lepidota	American Licorice	3	1.00	52,700	1.2	52,700	0.9%
Solidago canadensis	Canada Goldenrod	1	0.30	700,000	4.8	210,000	3.7%
Vicia americana	American Vetch	1	3.00	75,000	5.2	225,000	4.0%
			23.40		**130**	**5,665,200**	**100%**
		23.40	**Total PLS pounds per acre**		**329.9**	**PLS pounds for community**	

SHRUB RIPARIAN - YELLOW WILLOW/BEAKED SEDGE

Acreage estimate: 25.20 acres

Shrub Spacing Target: 6 foot spacing = 1,210 plants/acre

Gram. Spacing Target: 2 foot spacing = 10,890 plants/acre

Seeding Target: 130 PLS/Square Foot 12,100 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
SHRUBS						
Alnus incana	Mountain Alder	3	3	5%	61	1525
Betula occidentalis	Water Birch	1	3	5%	61	1525
Cornus stolonifera	Red-Osier Dogwood	1	3	10%	121	3049
Salix bebbiana	Bebb willow	2	3	10%	121	3049
Salix exigua	Sandbar Willow	1	5	10%	121	3049
Salix lutea	Yellow Willow	1	40	45%	545	13721
Sambucus cerulea	Blue Elderberry	1	2	5%	61	1525
Rosa woodsii	Wood's Rose	2	2	5%	61	1525
Symphoricarpos spp	Snowberry	2	1	5%	61	1525
GRAMINOIDS				**100%**		
Carex aquatilis	Water Sedge	1	10	10%	1089	27443
Carex utriculata	Beaked Sedge	1	20	50%	5445	137214
Carex vesicaria	Inflated Sedge	1	1	10%	1089	27443
Eleocharis palustris	Common Spikesedge	1		10%	1089	27443
Juncus balticus	Baltic Rush	2	1	10%	1089	27443
Juncus ensifolius	Dagger-leaf Rush	2	1	10%	1089	27443
				100%	**12,100**	**304,920**
	12100	**X**	**25.20**	**ACRES**	**=**	**304,920** **Total Seedlings**

Shrub Riparian - Yellow Willow

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	0.50	2,270,000	26.1	1,135,000	20.5%
Deschampsia cespitosa	Tufted Hairgrass	2	0.50	2,500,000	28.7	1,250,000	22.6%
Elymus glaucus	Blue Wildrye	1	6.00	110,000	15.2	660,000	11.9%
Hordeum jubatum	Foxtail Barley		5.00	30,000	3.4	150,000	2.7%
Pascopyrum smithii	Western Wheatgrass	3	1.00	110,000	2.5	110,000	2.0%
Pseudoroegnaria spicata	Bluebunch Wheatgrass		4.00	156,000	14.3	624,000	11.3%
FORBS							
Achillea millefolium	Common Yarrow		0.05	2,770,000	3.2	138,500	2.5%
Apocynum cannabinum	Hemp Dogbane		0.30	500,000	3.4	150,000	2.7%
Aster spp	Aster	2	0.10	200,000	0.5	20,000	0.4%
Clematis ligusticifolia	Western Virgins-bower	2	0.50	315,000	3.6	157,500	2.8%
Epilobium ciliatum	Common Willow-herb	1	0.10	3,000,000	6.9	300,000	5.4%
Heracleum lanatum	Cow-parsnip	2	2.00	75,000	3.4	150,000	2.7%
Geum macrophyllum	Large-leaved Avens	2	0.50	400,000	4.6	200,000	3.6%
Glycyrrhiza lepidota	American Licorice		1.00	52,700	1.2	52,700	1.0%
Solidago canadensis	Canada Goldenrod	2	0.30	700,000	4.8	210,000	3.8%
Vicia americana	American Vetch	1	3.00	75,000	5.2	225,000	4.1%
			24.85		**127**	**5,532,700**	**100%**

	24.85	**Total PLS pounds per acre**	**626.2**	**PLS pounds for community**	

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

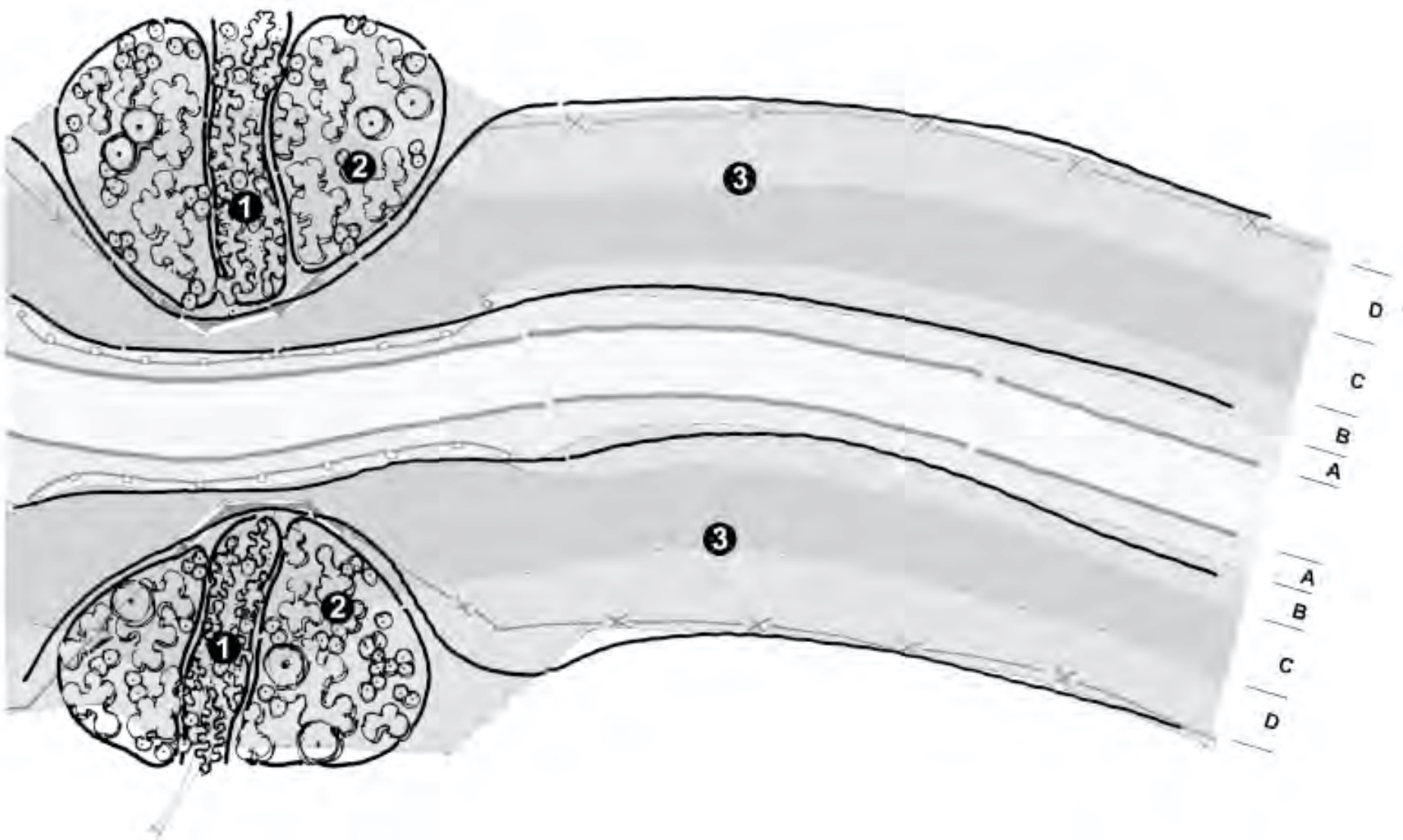
Shrub Riparian – Bebb's Willow Notes:

Vary the intensity of plantings; e.g., plant masses of shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Emulate the natural distribution of species across the soil moisture gradient from the wet, instream area (ZONE 1) through the drier, transitional area (ZONE 2).

Shrub Riparian - Bebb's Willow



General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

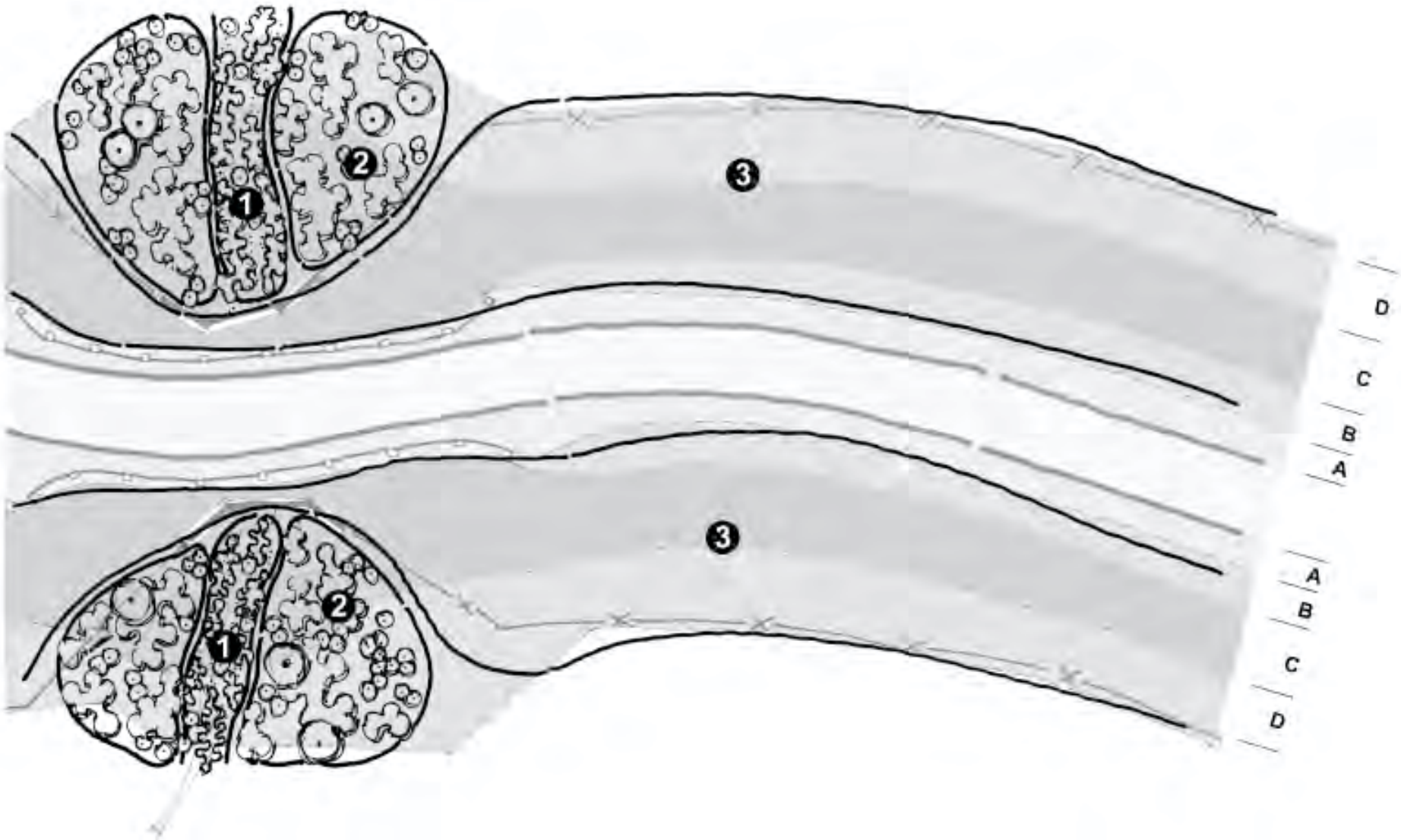
Shrub Riparian – Sandbar Willow Notes:

Vary the intensity of plantings; e.g., plant masses of shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Emulate the natural distribution of species across the soil moisture gradient from the wet, instream area (ZONE 1) through the drier, transitional area (ZONE 2).

Shrub Riparian - Sandbar Willow



General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

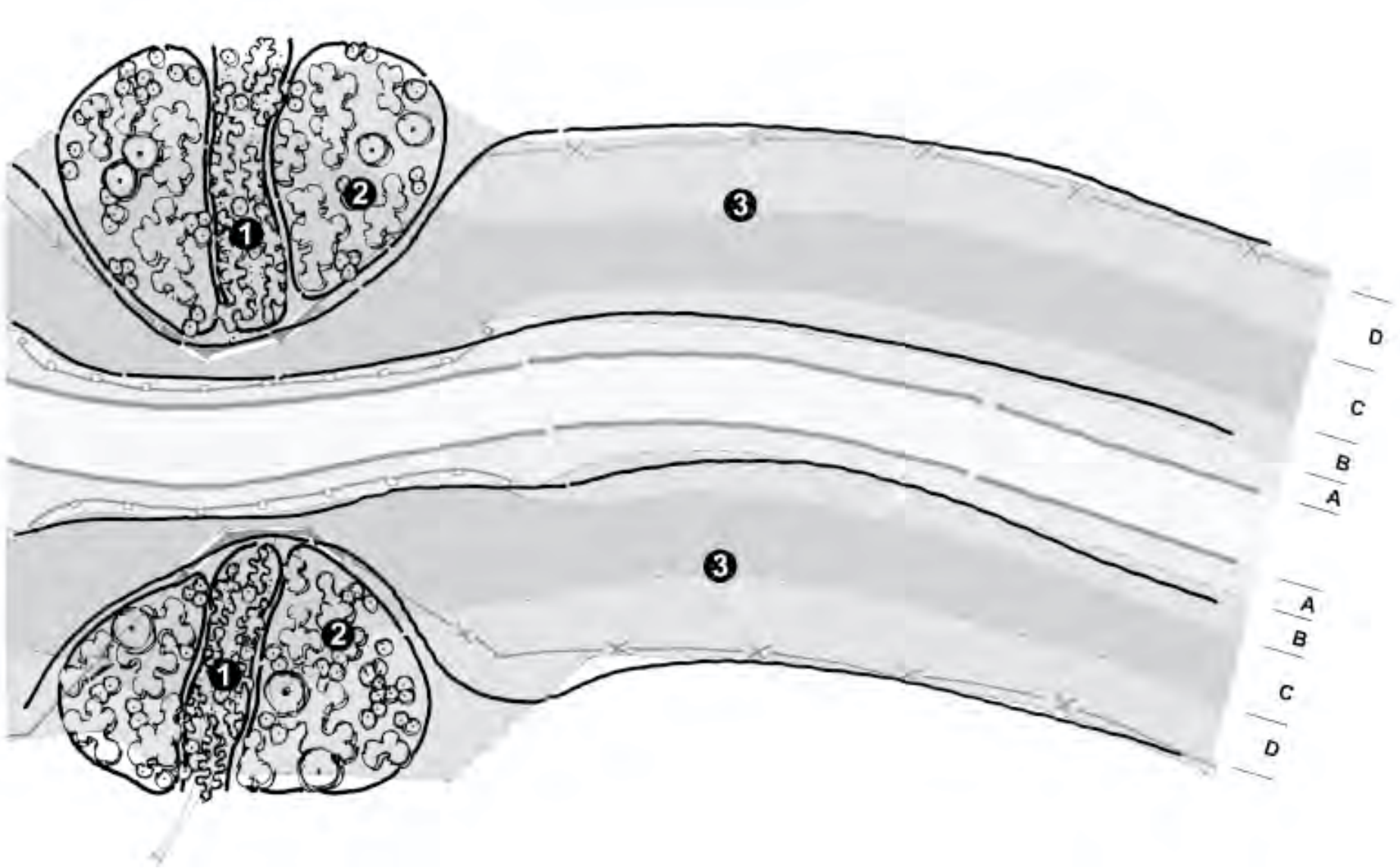
Shrub Riparian – Yellow Willow Notes:

Vary the intensity of plantings; e.g., plant masses of shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Emulate the natural distribution of species across the soil moisture gradient from the wet, instream area (ZONE 1) through the drier transitional area (ZONE 2). For example; include Blue elderberry (Sambucus cerulea) only in well drained areas in zone 2; concentrate Water birch (Betula occidentalis) or Mountain alder (Alnus incana), Yellow willow (Salix lutea) and Sandbar willow (Salix exigua) in zone 1.

Shrub Riparian - Yellow Willow



Talus Slopes

Limits of Range: Occurs at a few sites on steep, exposed scree slopes

Reference Site: Ravalli Canyon

Description: This plant community is based upon the; Talus Slope Habitat Type in *The Vegetation of Northwestern Montana* by Habeck and the description of scree habitat in F*orest Habitat Types of Montana*, by Pfister and others (1977). Only the species with a representation greater than one percent were selected from the species list of the habitat type. In addition to the species selected from the habitat types in Habeck and Pfister, roundleaf alumroot (*Heuchera cylindrica*) and penstemon (*Penstemon procerus*) were added either because they are currently a component of this community within the right-of-way, or as a species of cultural value.

Talus or scree habitats are composed of coarse rock material developed as result of an accumulation of broken and eroded material originating from steep mountain faces above the talus. The initial plant species are lichens and mosses, and on northern exposures, shrub species occur such as western serviceberry (*Amelanchier alnifolia*), mock orange or syringa (*Philadelphus lewisii*), ninebark (*Physocarpus malvaceus*), and western snowberry (*Symphoricarpos occidentalis*), and various currants and gooseberries (*Ribes species*). Where adequate moisture is available, Ponderosa Pine (*Pinus ponderosa*) may occur, and possibly Douglas fir (*Pseudotsuga menziesii*) on these soil-limited sites.

Talus Slopes

TALUS

Acreage estimate: 3.80 acres

Tree Spacing Target: 20 foot spacing = 109 plants/acre

Shrub Spacing Target: 8 foot spacing = 681 plants/acre

Seeding Target: 40 PLS/Square Foot 790 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
TREES						
Juniperus scopulorum	Rocky Mountain Juniper	2	3	20%	22	83
Pinus ponderosa	Ponderosa Pine	1	10	50%	54	207
Pseudotsuga menziesii	Douglas Fir	1	20	30%	33	124
SHRUBS				**100%**		
Amelanchier alnifolia	Western Serviceberry	1	5	15%	102	388
Prunus virginiana	Common Chokecherry	1	10	20%	136	517
Juniperus communis	Common Juniper	2	3	10%	68	259
Rubus idaeus	Red Raspberry	2	2	10%	68	259
Rhus glabra	Smooth Sumac	2	3	5%	34	129
Rosa woodsii	Wood's Rose	1	5	15%	102	388
Spiraea betulifolia	White Spiraea	2	2	5%	34	129
Symphoricarpos spp	Snowberry	3	2	15%	102	388
FORBS						
Heuchera cylindrica	Roundleaf Alumroot	2	1	5%	34	129
				100%	**790**	**3000**
	790	**X**	**3.80**	**ACRES**	**=**	**3,000**

SEED MIX

Species Name	Common Name	Inclusion Priority	PLS #/acre	Seeds per PLS lb.	Seeds per Square foot	Seeds per Acre	Percent of Mix
GRAMINOIDS							
Agropyron spicatum	Bluebunch Wheatgrass	1	10.00	139,000	31.9	1,390,000	92.7%
Balsamorhiza sagittata	Arrowleaf Balsamroot	1	2.00	55,000	2.5	110,000	7.3%
			12.00		**34.4**	**1,500,000**	**100.0%**
	12.00	**Total PLS pounds per acre**		**120.0**	**PLS pounds for community**		

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Talus Slope Notes:

Talus areas (Plant Zone 1) consist of barren rock with shrubs and trees typically distributed around the base or in pockets of available soil

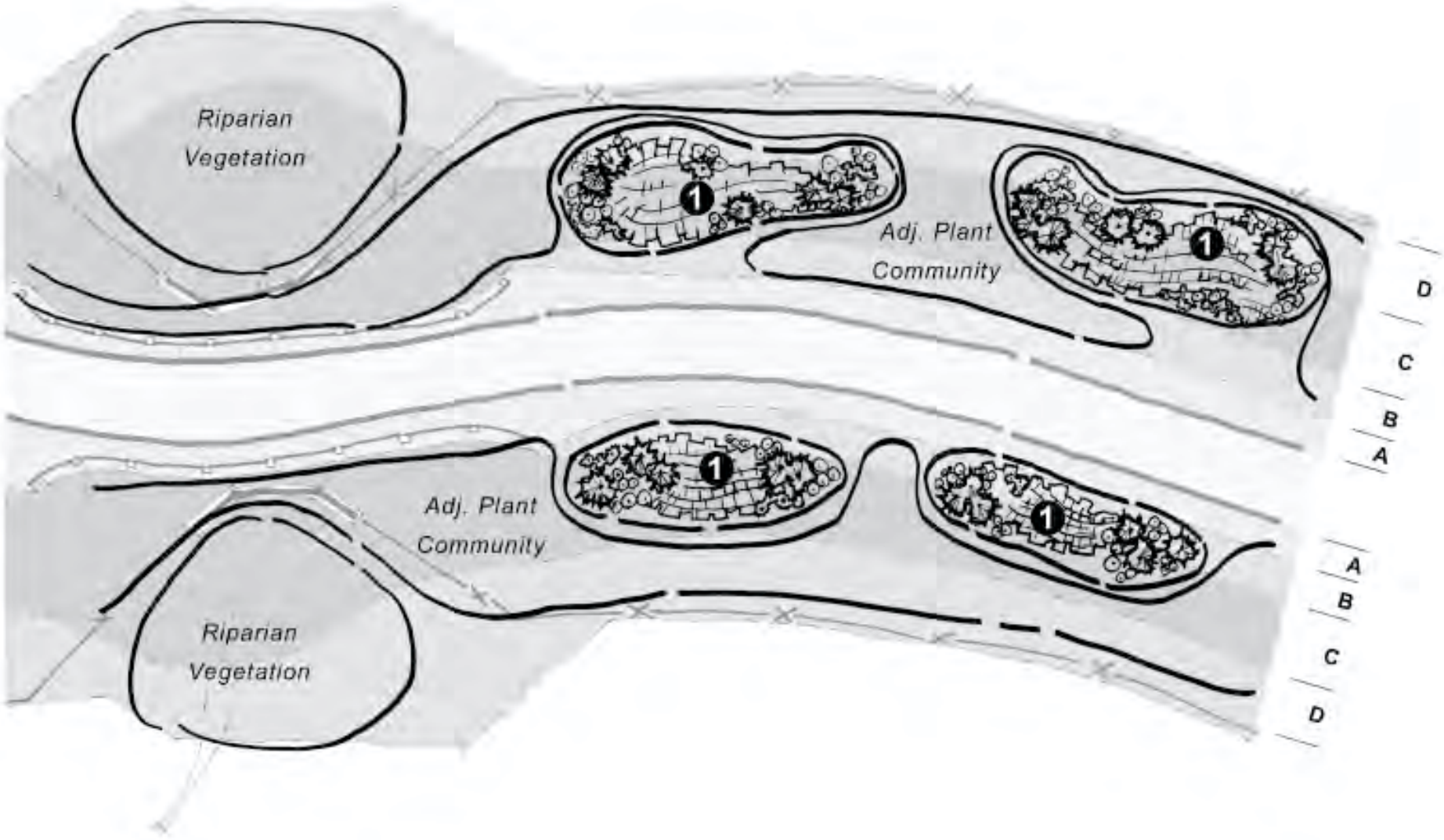
Talus areas shall be revegetated primarily through seeding with inclusions of shrubs and trees planted from container stock or salvage

Locate and size the tree and shrub inclusions to match the character of the adjacent talus slope areas

Vary the intensity of plantings; e.g., plant masses of trees and shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source.

Talus Slopes



Mesic Shrub

Limits of Range: Found in upland areas and side slopes adjacent to riparian areas

Reference Site: Northwest side of Pistol Creek Wildlife Crossing No.1

Description: This plant community is based upon the Common Chokecherry (*Prunus virginiana*) Community Type found in *Classification and Management of Montana's Riparian and Wetland Sites*, by Paul L. Hansen and others (1995). The Common Chokecherry (*Prunus virginiana*) Community Type is an incidental type at low to mid elevations that occurs as small, dense thickets, narrow bands or irregular patches. Only, but not all species with a representation greater than one percent were selected from the species list of the Habitat Type. In addition to the species selected from the habitat type in Hansen, western serviceberry (*Amelanchier alnifolia*), Wood's rose (*Rosa woodsii*) and common snowberry (*Symphoricarpus albus*) were added because they are either currently a component of this community within the right-of-way or as a species of cultural value.

MESIC SHRUB

Acreage estimate: 4.80 acres			
Tree Spacing Target:	0 foot spacing	= 0 plants/acre	
Shrub Spacing Target:	6 foot spacing	= 1210 plants/acre	
Seeding Target:	130 PLS/Square Foot	1210 = TOTAL PLANTS/ACRE	

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
SHRUBS						
Amelanchier alnifolia	Western Serviceberry	1	30	22%	266	1278
Crataegus douglasii	Black Hawthorn	2	5	6%	73	348
Crataegus succulenta	Succulent Hawthorn	3	1	5%	61	290
Prunus virginiana	Common Chokecherry	1	50	22%	266	1278
Rosa woodsii	Wood's Rose	1	10	20%	242	1162
Rubus idaeus	Red Raspberry	3	2	5%	61	290
Symphoricarpos spp.	Snowberry	1	5	20%	242	1162
				100%	1210	5808

	1210	**X**	**4.80**	**ACRES**	**=**	**5,808**	**Total Seedlings**

Mesic Shrub

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	1	0.40	2,270,000	20.8	908,000	13.5%
Elymus glaucus	Blue Wildrye	1	2.00	110,000	5.1	220,000	3.3%
Festuca idahoensis	Idaho Fescue	2	1.50	450,000	15.5	675,000	10.1%
Festuca scabrella	Rough Fescue	2	2.00	300,000	13.8	600,000	8.9%
Koeleria cristata	Prairie Junegrass	1	0.25	2,300,000	13.2	575,000	8.6%
Oryzopsis hymenoides	Indian Ricegrass	2	2.00	141,000	6.5	282,000	4.2%
Poa secunda	Pine Sandberg Bluegrass	1	0.40	925,000	8.5	370,000	5.5%
Pseudoroegnaria spicata	Bluebunch Wheatgrass	1	6.00	139,000	19.1	834,000	12.4%
Stipa comata	Needle and Thread	2	2.00	115,000	5.3	230,000	3.4%
FORBS							
Achillea millefolium	Common Yarrow	3	0.10	2,770,000	6.4	277,000	4.1%
Anaphalis margaritacea	Pearly Everlasting	2	0.05	8,200,000	9.4	410,000	6.1%
Antennaria microphylla	Rosy Pussytoes	1	0.05	8,000,000	9.2	400,000	6.0%
Epilobium angustifolium	Fireweed	3	0.05	8,500,000	9.8	425,000	6.3%
Solidago canadensis	Canada Goldenrod	1	0.50	700,000	8.0	350,000	5.2%
Clematis ligusticifolia	Western Virgins-bower	2	0.50	315,000	3.6	157,500	2.3%
			17.80		**154**	**6,713,500**	**100%**
			17.80	**Total PLS pounds per acre**	**85.4**	**PLS pounds for community**	

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

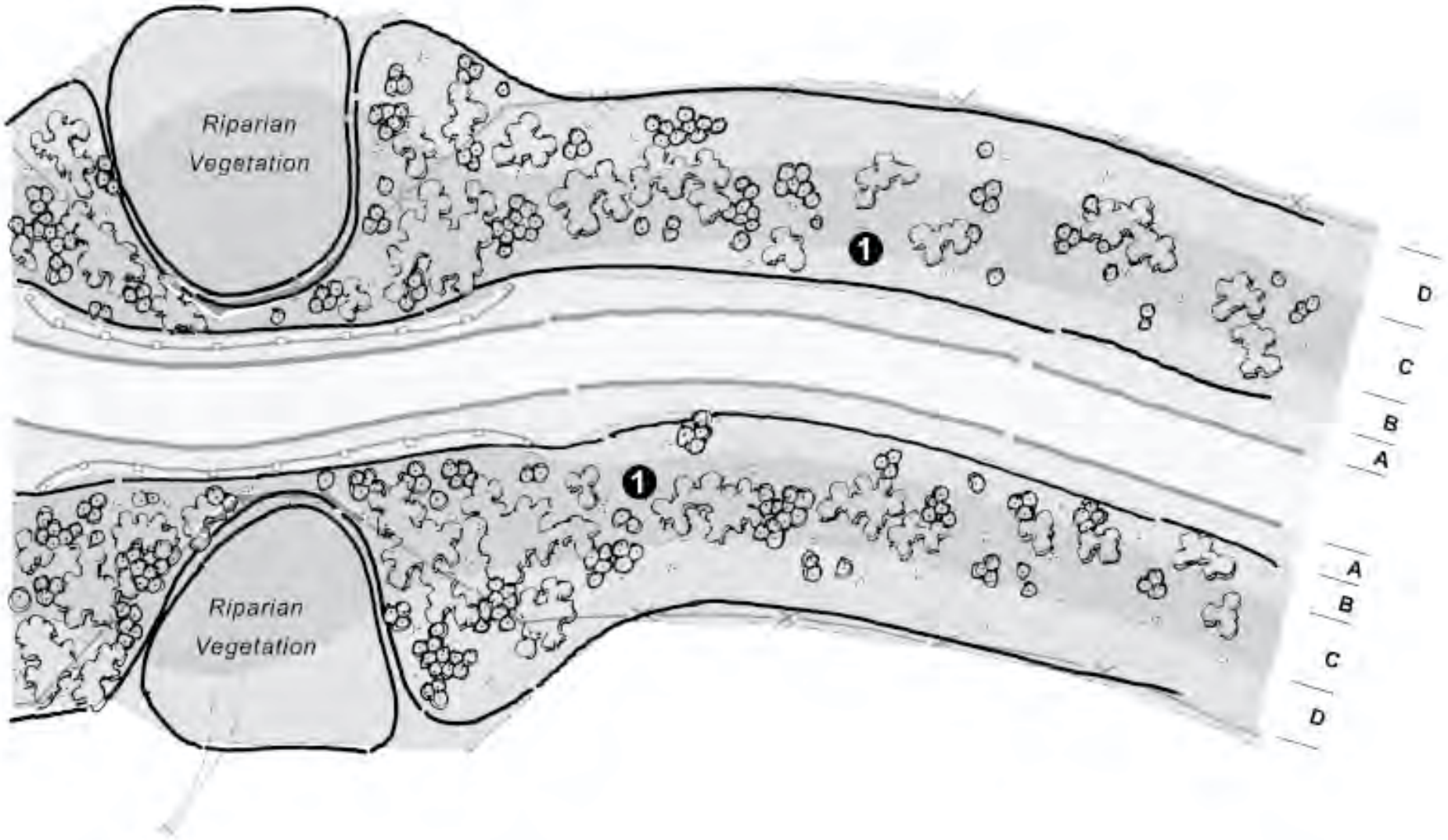
Mesic Shrub Notes:

Plant Mesic Shrub Community species in Plant Zone 1

Vary the intensity of plantings; e.g., plant masses of shrubs in clusters interspersed with seeded areas, to maximize visual impacts of revegetation, provide wildlife cover, stabilize slopes, and aesthetically fit the character of the landscape.

Reduce the intensity of plantings in locations where the adjacent native plant community provides a good seed source

Mesic Shrub



Wet Meadow Communities

Limits of Range: Occurs in limited areas supported by appropriate hydrologic conditions, such as pothole depressions, seep areas, and wet sites adjacent to streams

Reference Site: North of Evaro's camas prairie; Bouchard property; Ninepipe

Description: The Wet Meadow habitat types occur in wet meadows, basins, forest openings, and on alluvial terraces or benches of low gradient streams at an elevation range of 3,500 to 7,630 feet. Spring flooding may be a common event. Soils are typically Entisols (Aquents and Fluvents) or Inceptisols (Aquepts), and rarely Histosols. Parent materials are usually coarse textured alluvium along low-gradient streams. Soil texture is finer clay loam to sand on sites next to wet meadows. Available water is moderate to high, and soils stay moist throughout the growing season. Elk may use this habitat type in summer, and wet meadows help fisheries by providing bank stability for sites adjacent to streams.

Wet Meadow species with representation greater than 1 percent were selected from the species list of the habitat type. In addition to the species selected from the habitat type in Hansen and others (1995), blue camas (Camassia quamash), littleleaf pussytoes (Antennaria microphylla), showy milkweed (Asclepias speciosa), and sweetgrass (Hierochloe odorata) were added because they are either currently a component of this community within the right-of-way or as a species of cultural value.they are either currently a component of this community within the right-of-way or as a species of cultural value.

Wet Meadow Communities (cont.)

*Beaked Sedge (*Carex rostrata*) Habitat Type (Hansen, and others 1995)*

The Beaked Sedge (*Carex rostrata*) Habitat Type is common on suitably moist sites with saturated fine-textured soils. The communities may be nearly mono specific pure stands of beaked sedge, if undisturbed. Physical disturbance, such as grazing, or fluctuating water levels will result in a diverse mix with other facultative and obligate wetland species. Commonly, the community will include water sedge (*Carex aquatilis*), small-fruited bulrush (*Scirpus microcarpa*), rushes (*Juncus species*), and various wet site forbs.

*Hardstem Bulrush (*Scirpus acutus*) Habitat Type (Hansen, and others 1995)*

The Hardstem Bulrush (*Scirpus acutus*) Habitat Type and the Common Cattail (*Typha latifolia*) Habitat Type are the types adapted to deepest water of any vascular plants that occur in the region. These typically occur as mono specific stands, unless disturbed during periods of low water level. We understand that the CSKT may prefer to delete the Cattail type from consideration for the project; however we would suggest that it is an appropriate choice for certain site conditions. However, it is likely that the species will naturally colonize suitable sites on its own without assistance.

*Bluejoint Reedgrass (*Calamagrostis canadensis*) Habitat Type (Hansen, and others 1995)*

The Bluejoint Reedgrass (*Calamagrostis canadensis*) Habitat Type is the driest of the wet meadow types, occupying sites that do not remain inundated or saturated as long into the growing season as the types mentioned above, but are dominated by facultative and/or obligate wetland species. Bluejoint reedgrass (*Calamagrostis canadensis*) and narrow-spiked reedgrass (Calamagrostis stricta) are the key species of this habitat type, accompanied by various sedges (*Carex species*), and forbs (Solidago, Aster, Angelica, Licorice-root, Potentilla, Groundsel, etc.),

WET MEADOW / BEAKED SEDGE

Acreage estimate: 6.10 acres

Shrub Spacing Target: 0 foot spacing = 0 plants/acre

Gram. Spacing Target: 2 foot spacing = 10,890 plants/acre

Seeding Target: 130 PLS/Square Foot 10,890 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
GRAMINOIDS						
Carex aquatilis	Water Sedge	1	20	5%	545	3321
Carex utriculata	Beaked Sedge	1	70	65%	7079	43179
Carex vesicaria	Inflated Sedge	1	5	5%	545	3321
Carex languinosa	Wooly Sedge	2		5%	545	3321
Scirpus microcarpus	Small-fruited Bulrush	2	2	5%	545	3321
Eleocharis palustris	Common Spikesedge	2	2	5%	545	3321
Juncus balticus	Baltic Rush			5%	545	3321
Juncus effusus	Soft Rush			5%	545	3321
				100%	**10,890**	**66,429**
	10890	**X**	**6.10**	**ACRES**	**=**	**66,429** **Total Seedlings**

Wet Meadow

SEED MIX							
Species Name	**Common Name**	**Inclusion Priority**	**PLS #/acre**	**Seeds per PLS lb.**	**Seeds per Square foot**	**Seeds per Acre**	**Percent of Mix**
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass	2	0.50	2,270,000	26.1	1,135,000	19.5%
Calamagrostis stricta	Narrowspiked Reedgrass	2	0.50	2,270,000	26.1	1,135,000	19.5%
Deschampsia cespitosa	Tufted Hairgrass	1	0.50	2,500,000	28.7	1,250,000	21.5%
Elymus glaucus	Blue Wildrye		5.00	110,000	12.6	550,000	9.5%
Hordeum jubatum	Foxtail Barley		5.00	30,000	3.4	150,000	2.6%
Pascopyrum smithii	Western Wheatgrass		1.00	110,000	2.5	110,000	1.9%
Pseudoroegnaria spicata	Bluebunch Wheatgrass		3.00	156,000	10.7	468,000	8.0%
FORBS							
Achillea millefolium	Common Yarrow		0.05	2,770,000	3.2	138,500	2.4%
Aster spp	Aster		0.10	200,000	0.5	20,000	0.3%
Epilobium ciliatum	Common Willow-herb	1	0.10	3,000,000	6.9	300,000	5.2%
Heracleum lanatum	Cow-parsnip		2.00	75,000	3.4	150,000	2.6%
Geum macrophyllum	Large-leaved Avens	1	0.50	400,000	4.6	200,000	3.4%
Solidago canadensis	Canada Goldenrod		0.30	700,000	4.8	210,000	3.6%
			18.55		**134**	**5,816,500**	**100%**

18.55 **Total PLS pounds per acre** **113.2** **PLS pounds for community**

WET MEADOW / BLUEJOINT REEDGRASS

Acreage estimate: 11.40 acres

Shrub Spacing Target: 0 foot spacing = 0 plants/acre

Gram. Spacing Target: 2 foot spacing = 10,890 plants/acre

Seeding Target: 150 PLS/Square Foot 10,890 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
GRAMINOIDS/FORBS						
Camassia quamash	Blue Camas			5%	545	6207
Carex aquatilis	Water Sedge	1	5	40%	4356	49658
Carex utriculata	Beaked Sedge	1	3	25%	2723	31037
Carex microptera	Small-winged Sedge	2	2	10%	1089	12415
Carex vesicaria	Inflated Sedge	2	1	5%	545	6207
Scirpus microcarpus	Small-fruited Bulrush			5%	545	6207
Eleocharis palustris	Common Spikesedge			5%	545	6207
Juncus balticus	Baltic Rush			5%	545	6207
				100%	**10,890**	**124,146**
	10890	**X**	**11.40**	**ACRES**	**=**	**124,146** **Total Seedlings**

Wet Meadow

WET MEADOW / HARDSTEM BULRUSH

Acreage estimate: 2.10 acres

Shrub Spacing Target: 0 foot spacing = 0 plants/acre

Gram. Spacing Target: 1.5 foot spacing = 19,360 plants/acre

Seeding Target: 100 PLS/Square Foot 19,360 = TOTAL PLANTS/ACRE

SEEDLINGS

Species Name	Common Name	Inclusion Priority	Canopy Cover (%)	Percent of Mix	Plants per acre	Total Plants by species
GRAMINOIDS/FORBS						
Carex aquatilis	Water Sedge			10%	1936	4066
Carex utriculata	Beaked Sedge			5%	968	2033
Scirpus acutus	Hardstem Bulrush	1	90	55%	10648	22361
Scirpus microcarpus	Small-fruited Bulrush			5%	968	2033
Eleocharis palustris	Common Spikesedge	2	2	10%	1936	4066
Juncus ensifolius	Dagger-leaf Rush			10%	1936	4066
Juncus balticus	Baltic Rush			5%	968	2033
				100%	**19,360**	**40,656**

	19360	**X**	**2.10**	**ACRES**	**=**	**40,656**

SEED MIX

Species Name	Common Name	Inclusion Priority	PLS #/acre	Seeds per PLS lb.	Seeds per Square foot	Seeds per Acre	Percent of Mix
GRAMINOIDS							
Calamagrostis canadensis	Bluejoint Reedgrass		1.00	2,270,000	52.1	2,270,000	49.7%
Deschampsia cespitosa	Tufted Hairgrass		0.50	2,500,000	28.7	1,250,000	27.4%
Elymus glaucus	Blue Wildrye		5.00	110,000	12.6	550,000	12.0%
FORBS							
Epilobium ciliatum	Common Willow-herb	2	0.10	3,000,000	6.9	300,000	6.6%
Geum macrophyllum	Large-leaved Avens	3	0.50	400,000	4.6	200,000	4.4%
			7.10		**105**	**4,570,000**	**100%**

7.10	**Total PLS pounds per acre**	**14.9**	**PLS pounds for community**	

General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Wet Meadow – Beaked Sedge Notes:

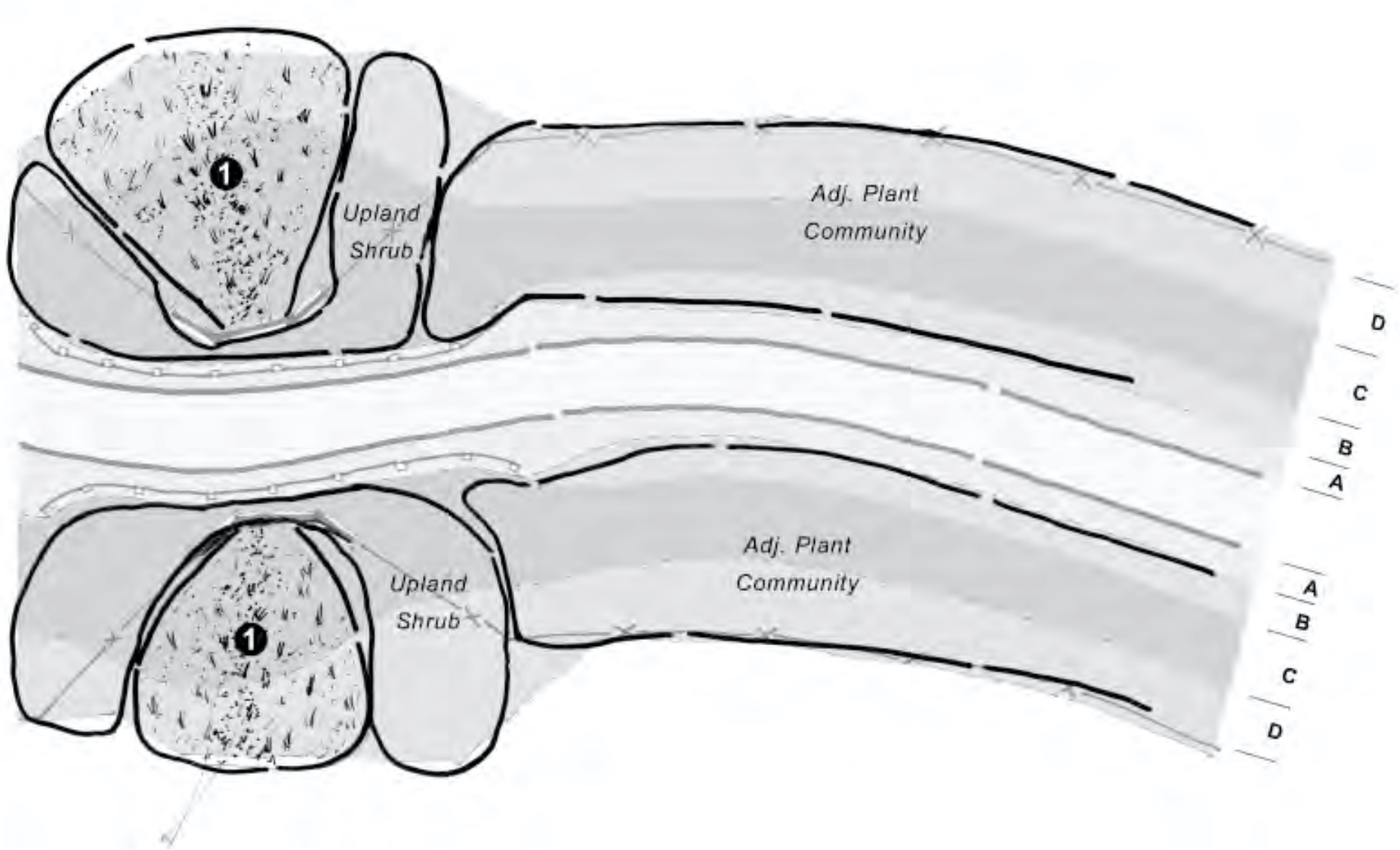
Plant Beaked Sedge Wet Meadow Community species in Plant Zone 1

Refer to the planting notes in Herrera's conceptual wetland mitigation plans for distribution information of wet meadow species

Emulate the natural distribution of species across the soil moisture gradient from wet, instream area to drier upland area

Plant Mesic shrub community in the upland areas adjacent to the wet meadow community to augment water quality, wildlife habitat, and provide screening

Wet Meadow - Beaked Sedge



General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Wet Meadow – Bluejoint Reedgrass Notes:

Plant Bluejoint Reedgrass Wet Meadow Community species in Plant Zone 1

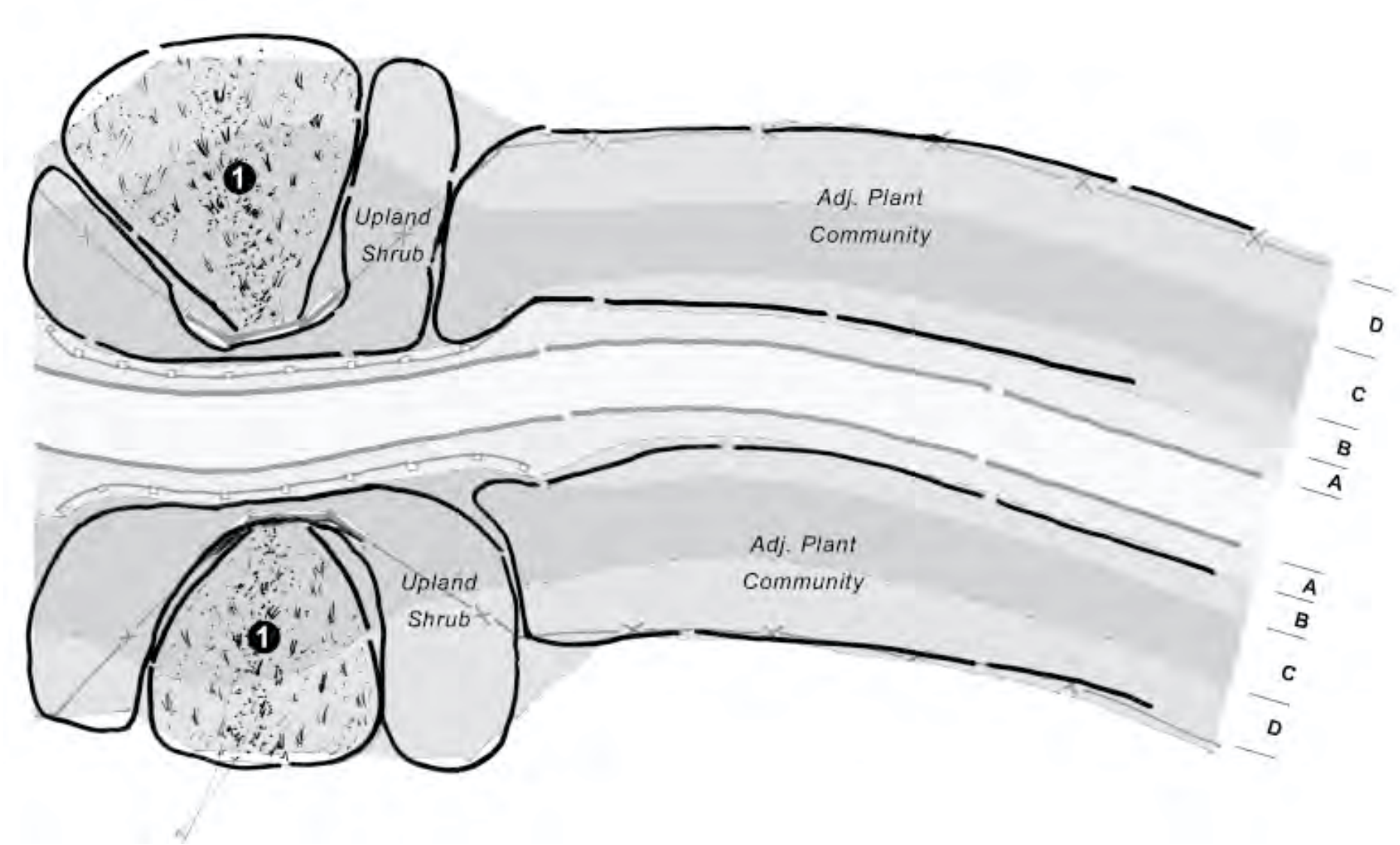
Refer to the planting notes in Herrera's conceptual wetland mitigation plans for distribution information of wet meadow species

Emulate the natural distribution of species across the soil moisture gradient from wet, instream area to drier upland area

Plant Mesic shrub community in the upland areas adjacent to the wet meadow community to augment water quality, wildlife habitat, and provide screening

Include Blue Camas (Camassia quamash) only on the drier areas of the wet meadow community under approval of CSKT Tribal Preservation Office

Wet Meadow - Bluejoint Reedgrass



General Notes:

Preserve existing native vegetation as identified by Preservation & Salvage Plan or by Design Teams (ZONE D)

Revegetate disturbed areas (weedy, grazed, barren) outside of construction impacts but within the right-of-way limit (ZONE D)

Use the specified seed mix for the 15' roadside/in-slope area (ZONE A)

Use the seed mix (graminoids and forbs) and low-growing shrubs from the target native plant community within the clear-zone area (ZONE B)

Use the full target plant community list for the area outside of clear-zone area within the right-of-way limit (ZONE C and D)

All planting locations are conceptual and approximate

Apply seeding and planting rates and methods as specified in Plant Community lists

Slopes 3:1 or flatter shall be drill-seeded while slopes greater than 3:1 will be broadcast seeded

Increase the density of plantings in forest and shrub communities around sensitive areas such as wildlife crossings and cultural areas.

Wet Meadow – Hardstem Bulrush Notes:

Plant Hardstem Bulrush Wet Meadow Community species in Plant Zone 1

Refer to the planting notes in Herrera's conceptual wetland mitigation plans for distribution information of wet meadow species

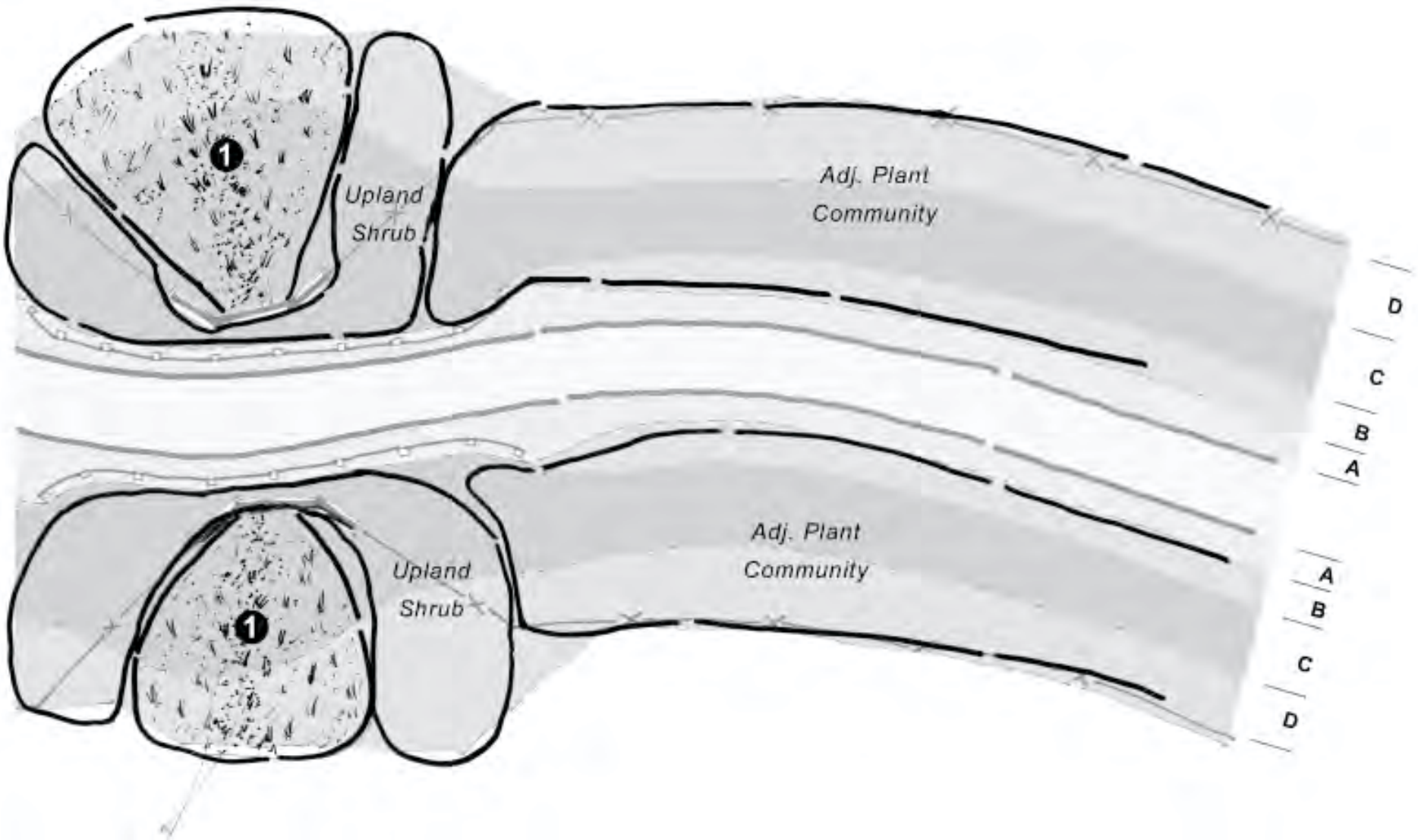
Hardstem bulrush community occurs only in standing water and is monotypic, consisting of 90% bulrush (Scirpus acutus)

Emulate the natural distribution of species across the soil moisture gradient from wet, instream area to drier upland area

Apply seed mix to soil surfaces only, not to standing water areas

Plant Mesic shrub community in the upland areas adjacent to the wet meadow community to augment water quality, wildlife habitat, and provide screening

Wet Meadow - Hardstemmed Bulrush



Criteria for Inclusion

We used six criteria to evaluate the species found in each of the plant communities for inclusion into the final revegetation list. They are:

Existing On-site—Is the species currently existing within the right-of-way? We can infer from this that the species in question can withstand the harsh conditions adjacent to the highway.

Major Component of the Plant Community—Is the species a significant component of the particular community?

Adaptability—Is the species found across a broad range of different conditions and cover types within the overall community? This suggests that the species in question is adaptable and will do well within the ROW.

Availability—Is the species easily propagated from localized seed or cuttings? Is it commercially available?

Early Seral—Is the species a native species that readily establishes on disturbed sites and/or outcompetes invasive species?

Cultural Value—Is the species one that has a cultural value to the Tribes?

These criteria were used to form an aggregate value for each of the species listed within the plant communities. Based on this value, we developed a much smaller list of recommended species for the initial revegetation of each of the plant communities.

Station 110+00–129+00

Segment 1—Evaro to vicinity of McClure Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
3. All refinements and revisions to be reviewed by Jones & Jones.
4. Plant communities as mapped represent target community types that will be refined to reflect the specific conditions created by the highway profile as it moves through the existing landscape.
5. Jones & Jones and each design team will develop planting plans in greater detail than the general corridor plans for the following sites:
   - Streetscapes
   - Wildlife crossings
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   - Wetland mitigation
   - Reclaimed sites, e.g. gravel mining
   - Interpretive overlooks
6. Summit Associates will develop soil amendment and seeding recommendations that will be incorporated in final design decisions.
7. Bitterroot Restoration, Inc. will develop propagation and planting specifications that will be incorporated into seeding and planting plans.
8. A salvage plan that preserves existing boulders, native sod and vegetation will be developed by each design team and reviewed by Jones & Jones.
9. Noxious weed control requirements must comply with section 107.11.5 of the mdt standard specifications for road and bridge construction.
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

Station 129+00–153+00

Segment 1—Evaro to vicinity of McClure Road

General notes:

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Station 153+00–179+00

Segment 1—Evaro to vicinity of McClure Road

General notes:

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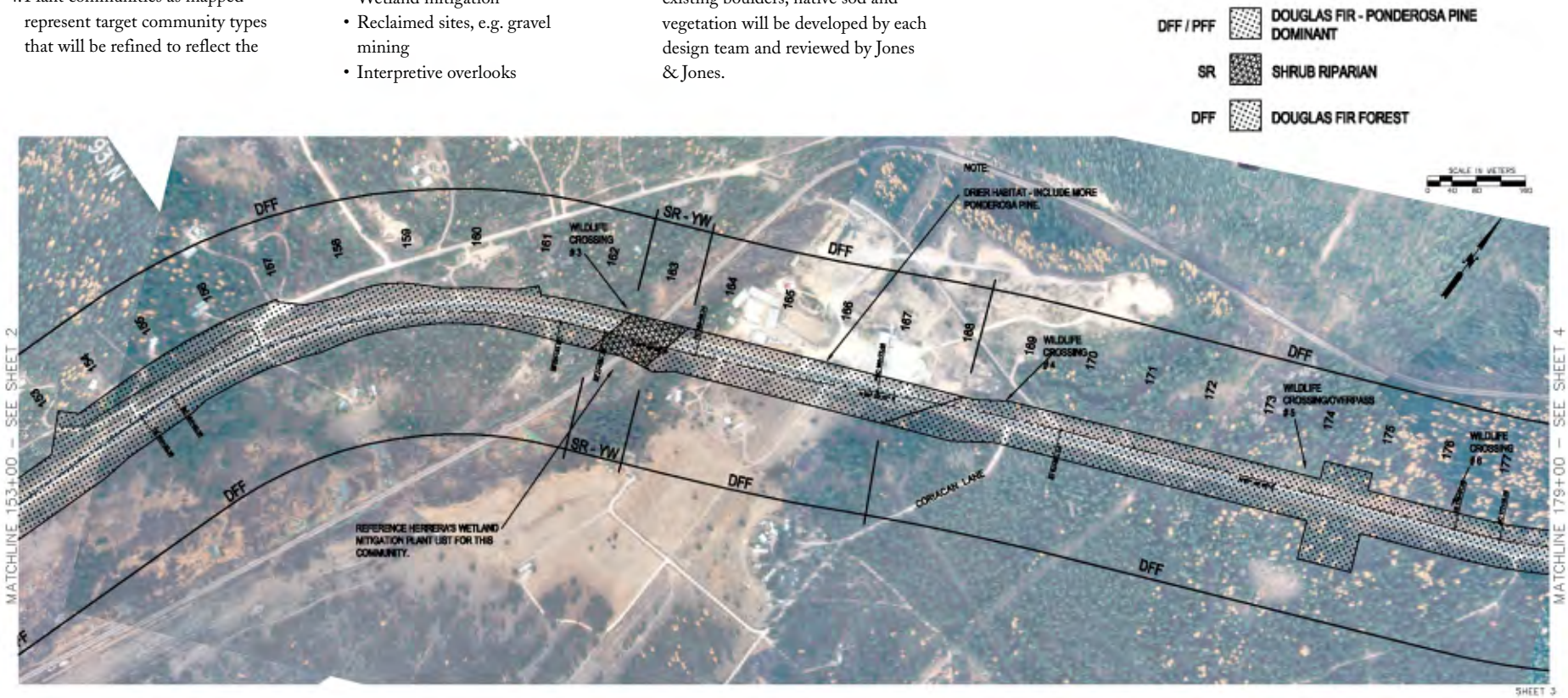

Station 179+00–205+00

Segment 1—Evaro to vicinity of McClure Road

General notes:

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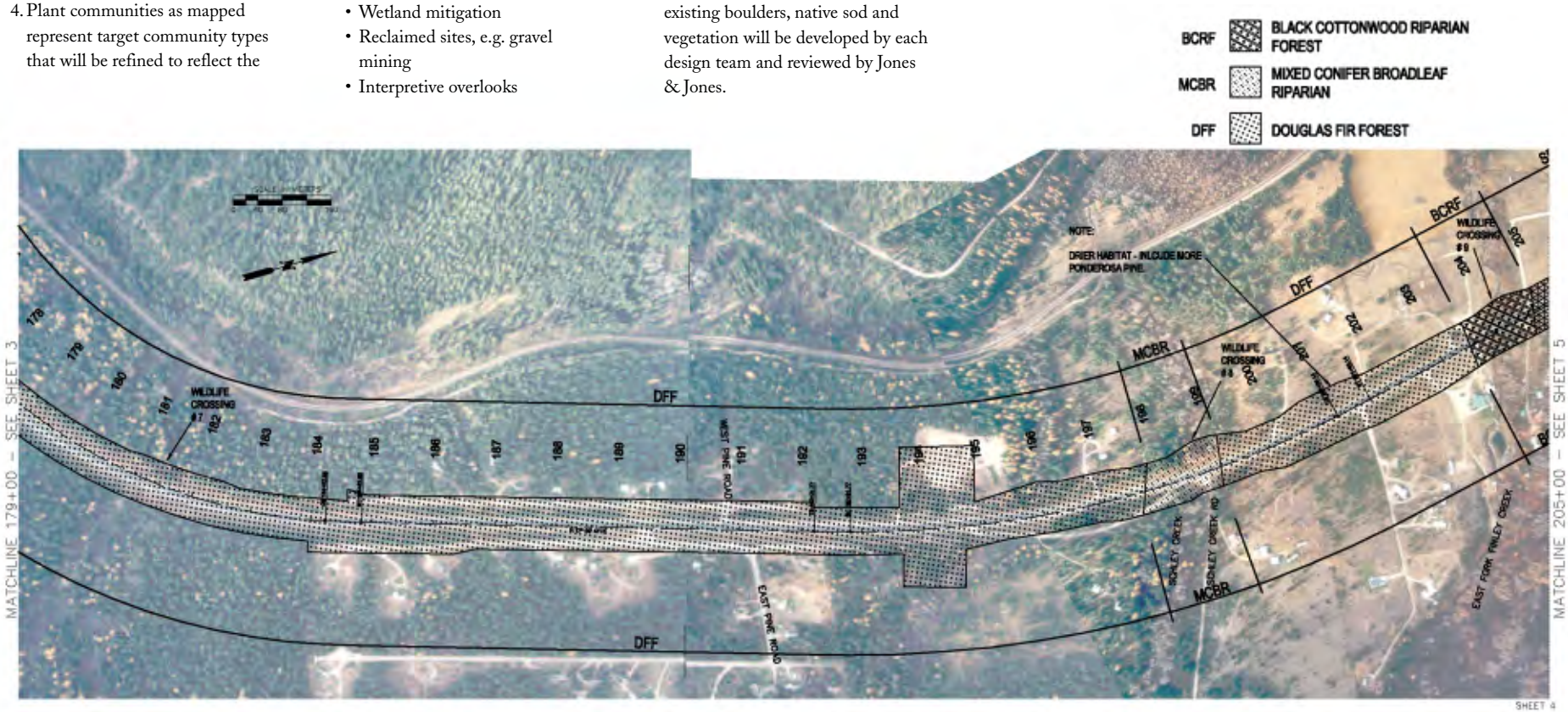

Station 205+00–229+40

Segment 1—Evaro to vicinity of McClure Road through Segment 2—To North end of Arlee Couplet

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN

BWP BLUEBUNCH WHEATGRASS PRAIRIE

Station 229+40–249+50

Segment 2—To North end of Arlee Couplet

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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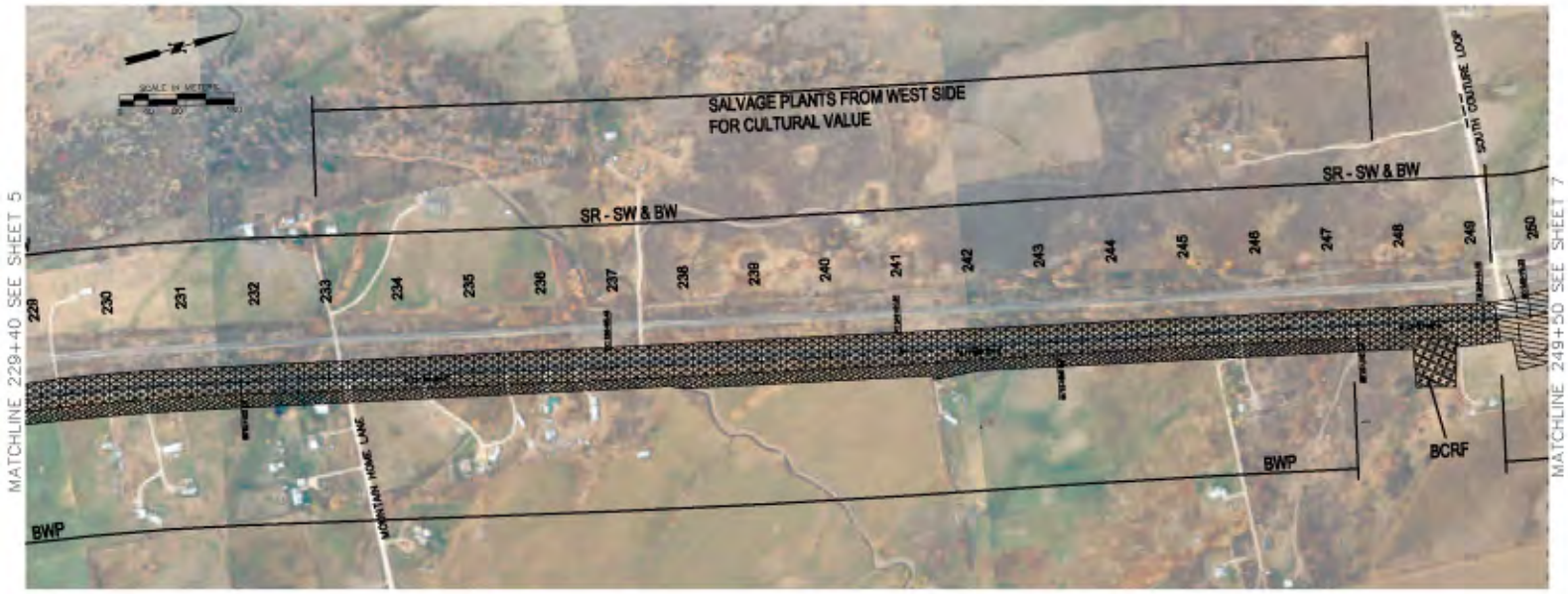
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

BCRF BLACK COTTONWOOD RIPARIAN FOREST

SR SHRUB RIPARIAN

BWP BLUEBUNCH WHEATGRASS PRAIRIE



SHEET 6

Station 249+50–275+00

Segment 2—To North end of Arlee Couplet

General notes:

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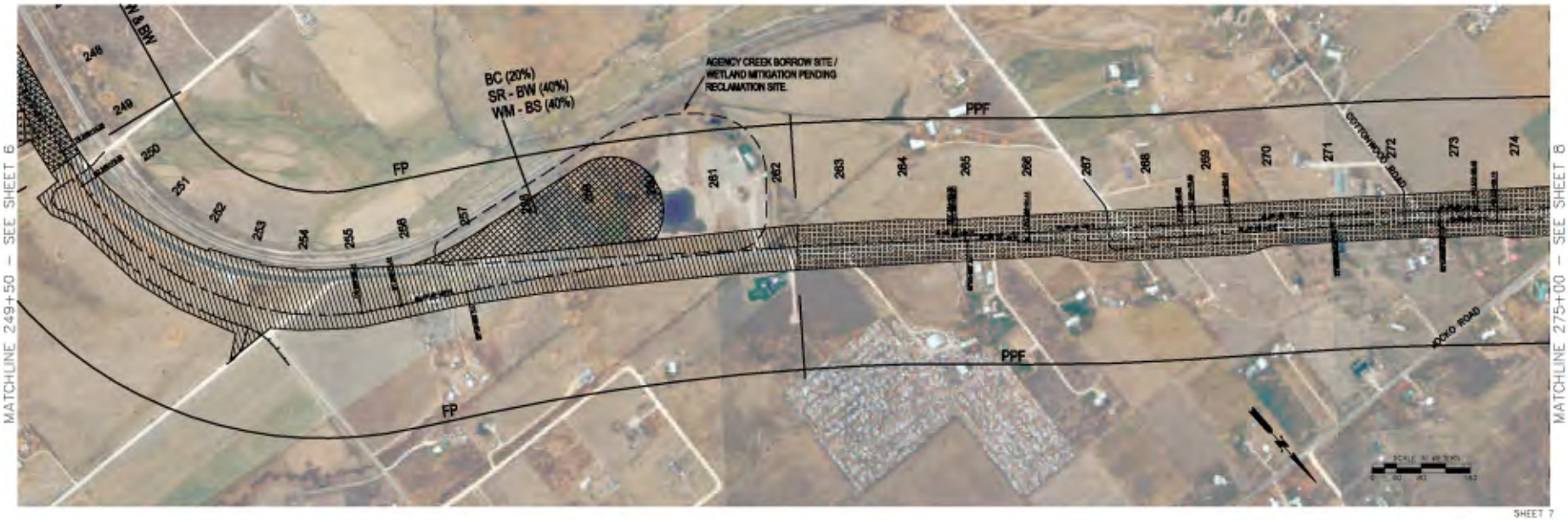
SR SHRUB RIPARIAN
PPF PONDEROSA PINE FOREST
FP FESCUE PRAIRIE
WM WETLAND MEADOW



Station 275+00–300+00

Segment 2—To North end of Arlee Couplet

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9. Noxious weed control requirements must comply with section 107.11.5 of the mdt standard specifications for road and bridge construction.
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

Station 300+00–326+00

Segment 2—To North end of Arlee Couplet through Segment 3—To vicinity of White Coyote Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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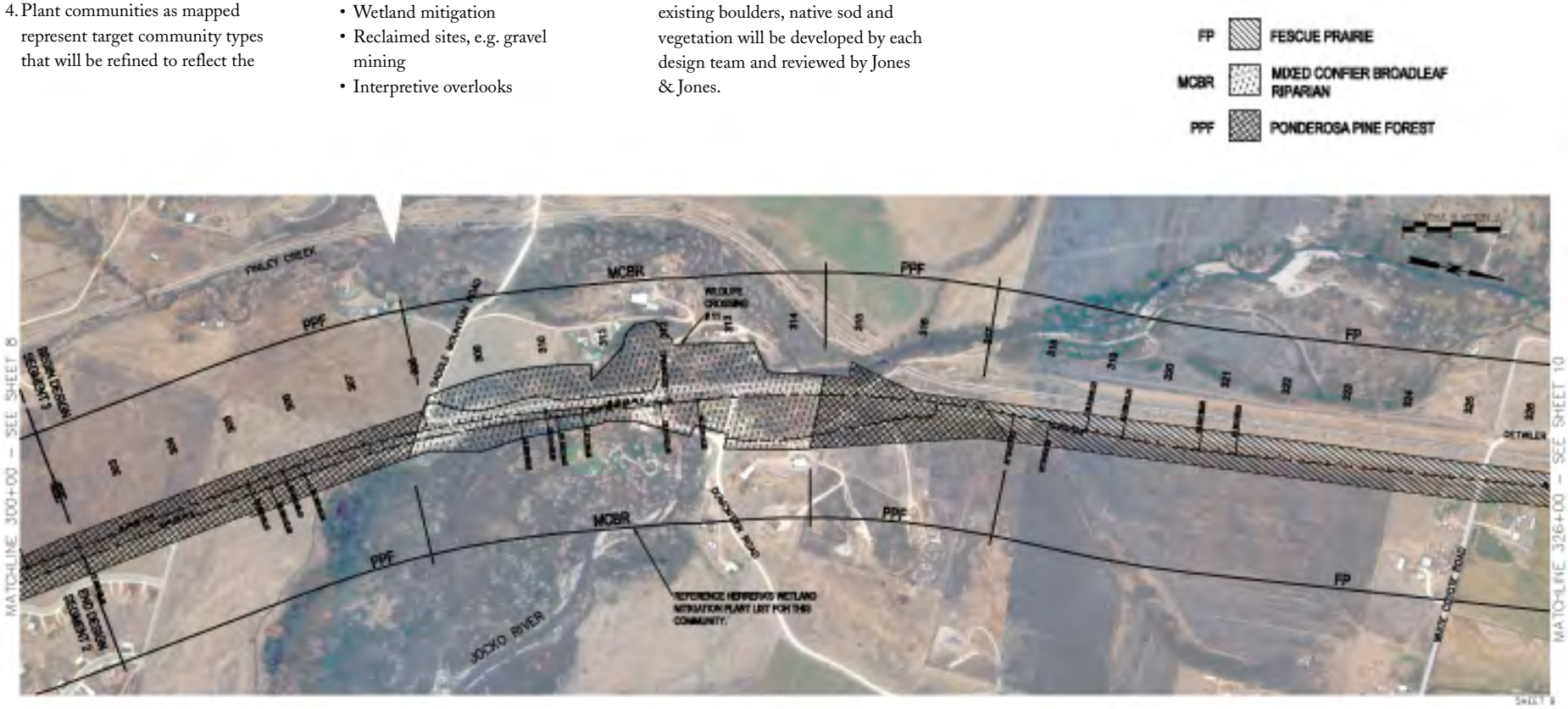

Station 326+00–352+00

Segment 3—To vicinity of White Coyote Road through Segment 4—To South end of Ravalli

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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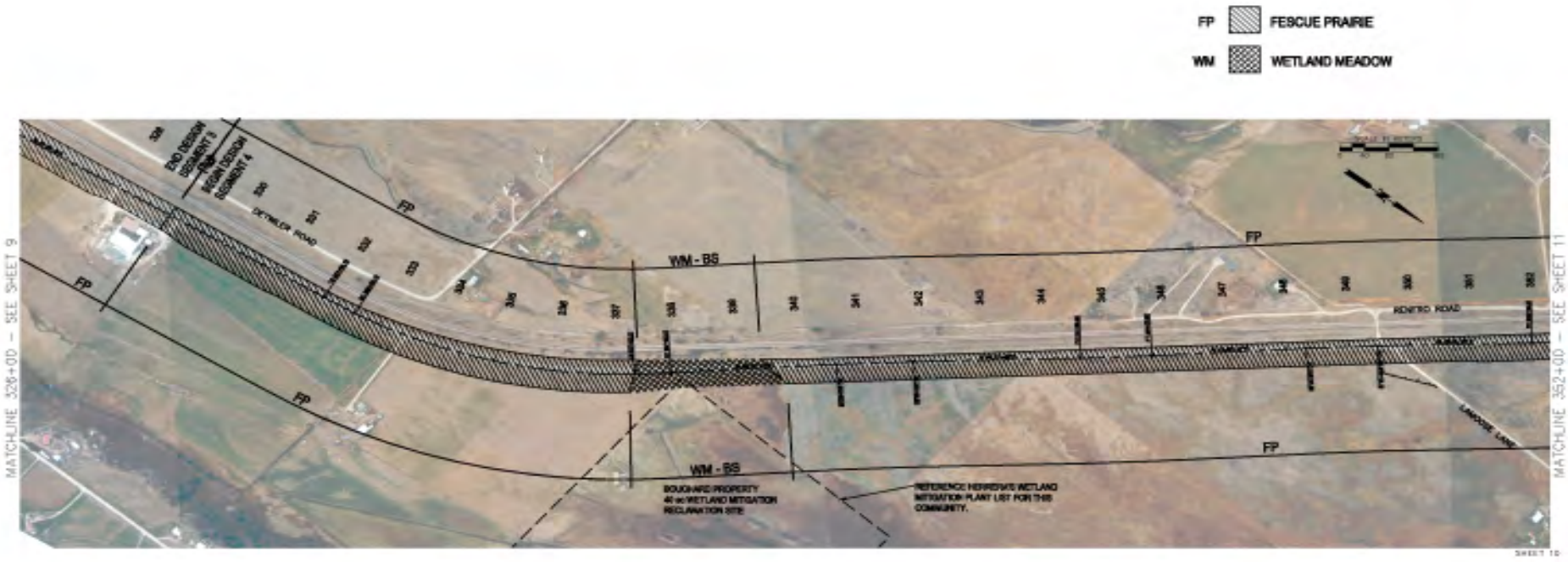

Station 352+00–377+10

Segment 4—To South end of Ravalli

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN
FP FESCUE PRAIRIE
WM WETLAND MEADOW

Station 377+10–402+10

Segment 4—To South end of Ravalli

General notes:

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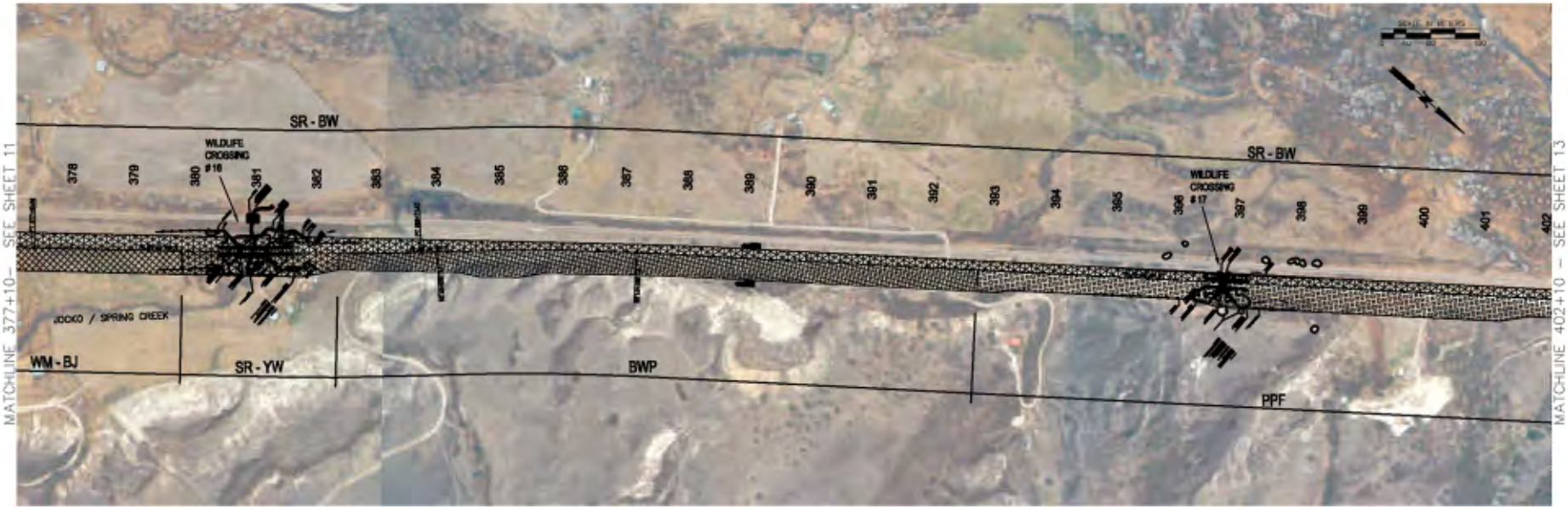
PPF PONDEROSA PINE FOREST
BWP BLUEBUNCH WHEATGRASS PRAIRIE
SR SHRUB RIPARIAN
WM WETLAND MEADOW



Station 402+10–431+00

Segment 4—To South end of Ravalli

General notes:

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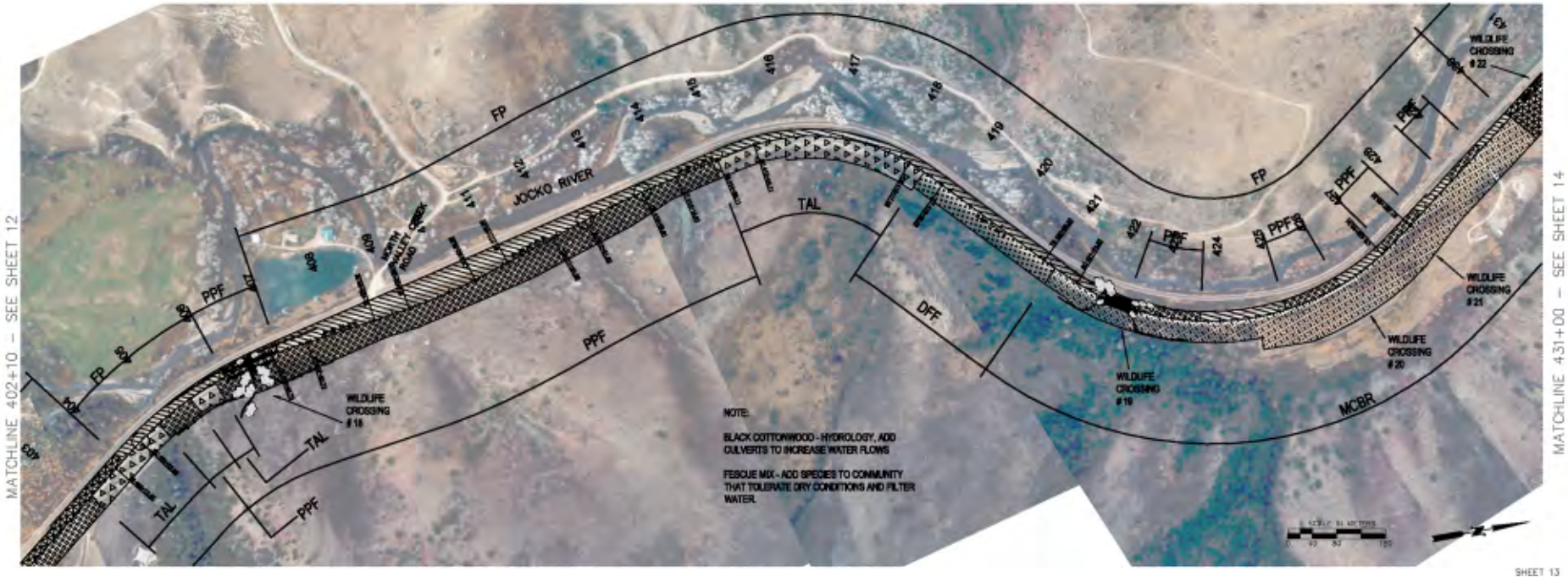
MCBR	MIXED CONIFER BROADLEAF RIPARIAN
DFF	DOUGLAS FIR FOREST
TAL	TALUS
PPF	PONDEROSA PINE FOREST
FP	FESCUE PRAIRIE



Station 431+00–450+00

Segment 4—To South end of Ravalli through Segment 5—To South St. Ignatius

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
3. All refinements and revisions to be reviewed by Jones & Jones.
4. Plant communities as mapped represent target community types that will be refined to reflect the specific conditions created by the highway profile as it moves through the existing landscape.
5. Jones & Jones and each design team will develop planting plans in greater detail than the general corridor plans for the following sites:
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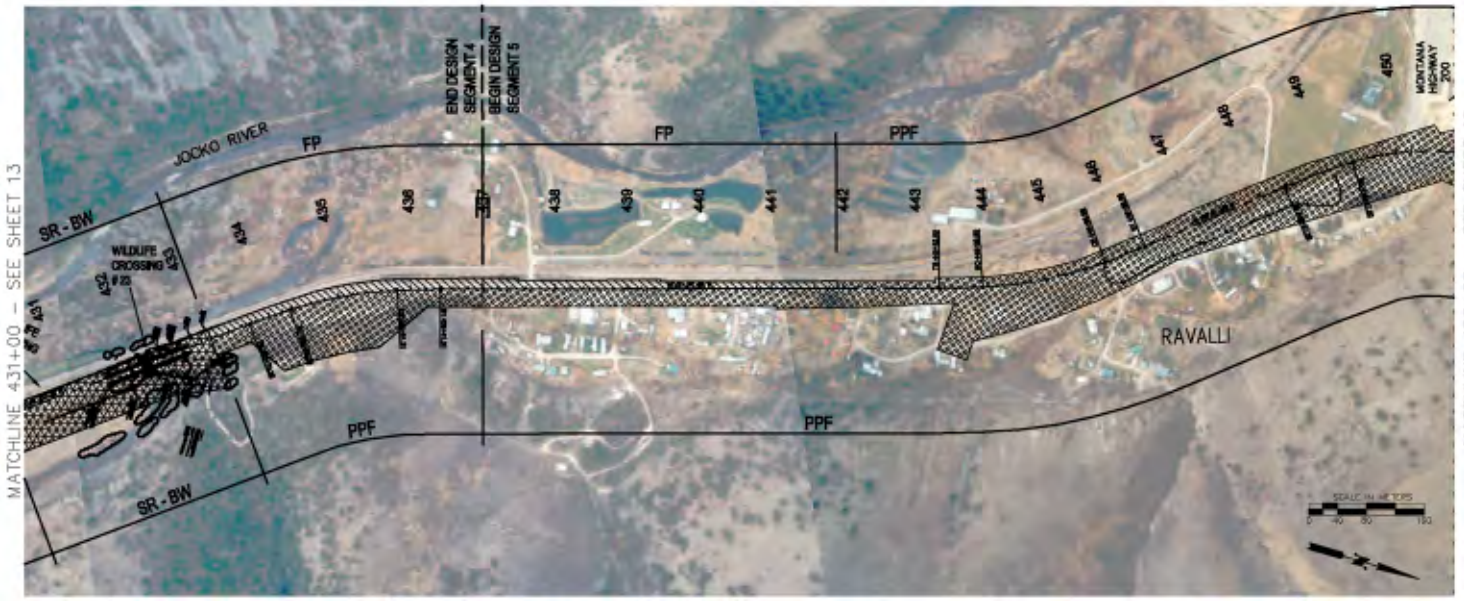
   - Wildlife crossings
   - Culturally sensitive sites
   - Wetland mitigation
   - Reclaimed sites, e.g. gravel mining
   - Interpretive overlooks
6. Summit Associates will develop soil amendment and seeding recommendations that will be incorporated in final design decisions.
7. Bitterroot Restoration, Inc. will develop propagation and planting specifications that will be incorporated into seeding and planting plans.
8. A salvage plan that preserves existing boulders, native sod and vegetation will be developed by each design team and reviewed by Jones & Jones.
9. Noxious weed control requirements must comply with section 107.11.5 of the mdt standard specifications for road and bridge construction.
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN
PPF PONDEROSA PINE FOREST
FP FESCUE PRAIRIE



Station 450+00–477+80

Segment 5—To South St. Ignatius

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
3. All refinements and revisions to be reviewed by Jones & Jones.
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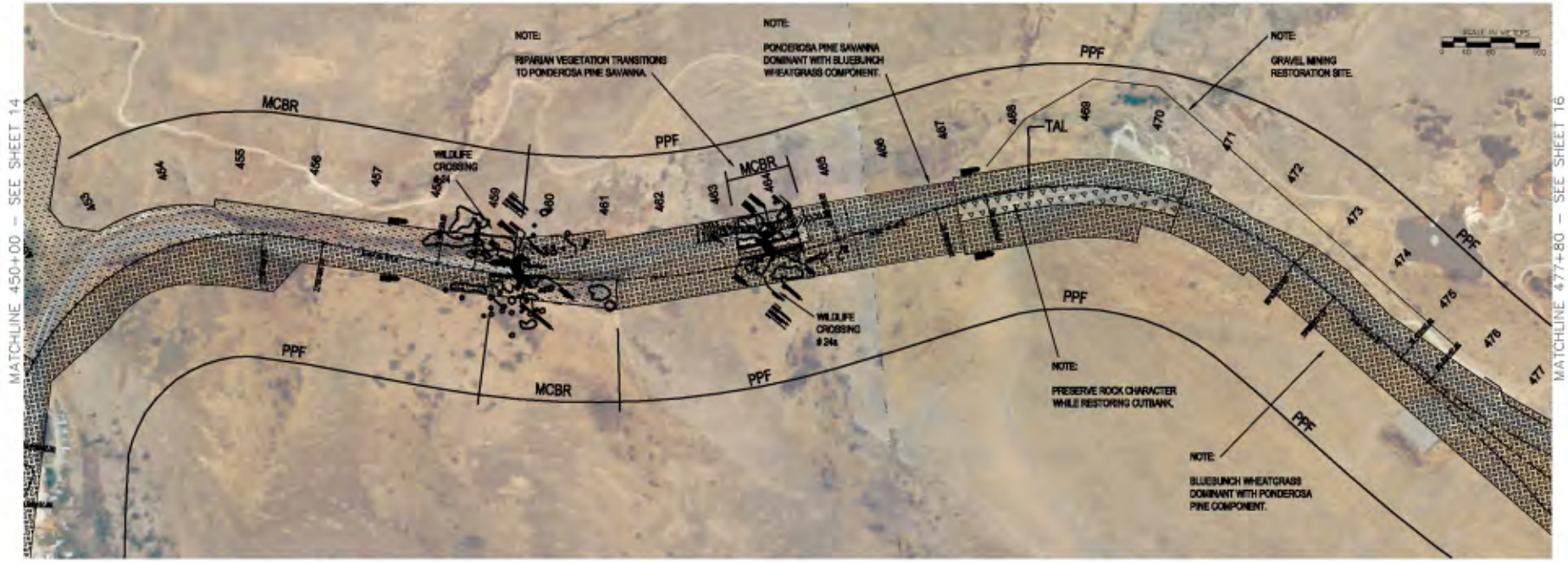
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

MCBR		MIXED CONIFER BROADLEAF RIPARIAN
TAL		TALUS
BWP		BLUEBUNCH WHEATGRASS PRAIRIE
PPF		PONDEROSA PINE FOREST



Station 477+80–503+10

Segment 5—To South St. Ignatius

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
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   - Culturally sensitive sites
   - Wetland mitigation
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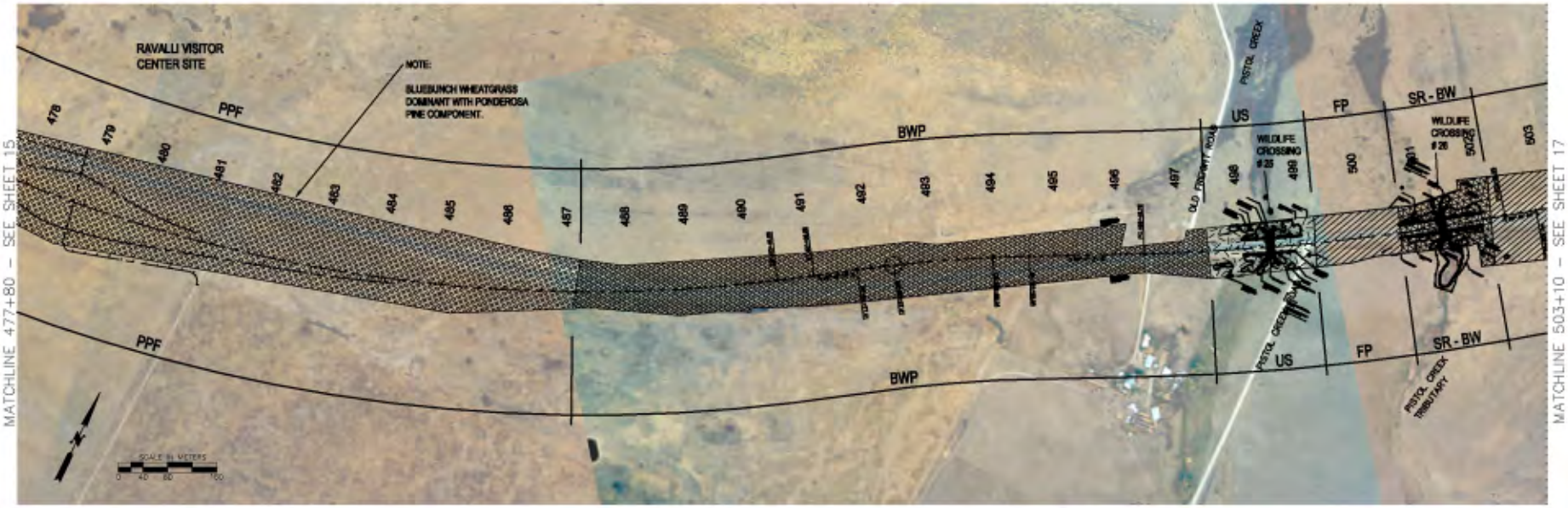
9. Noxious weed control requirements must comply with section 107.11.5 of the mdt standard specifications for road and bridge construction.
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN
BWP BLUEBUNCH WHEATGRASS PRAIRIE
FP FESCUE PRAIRIE



Station 503+10–528+00

Segment 5—To South St. Ignatius through Segment 6—To vicinity of Red Horn Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
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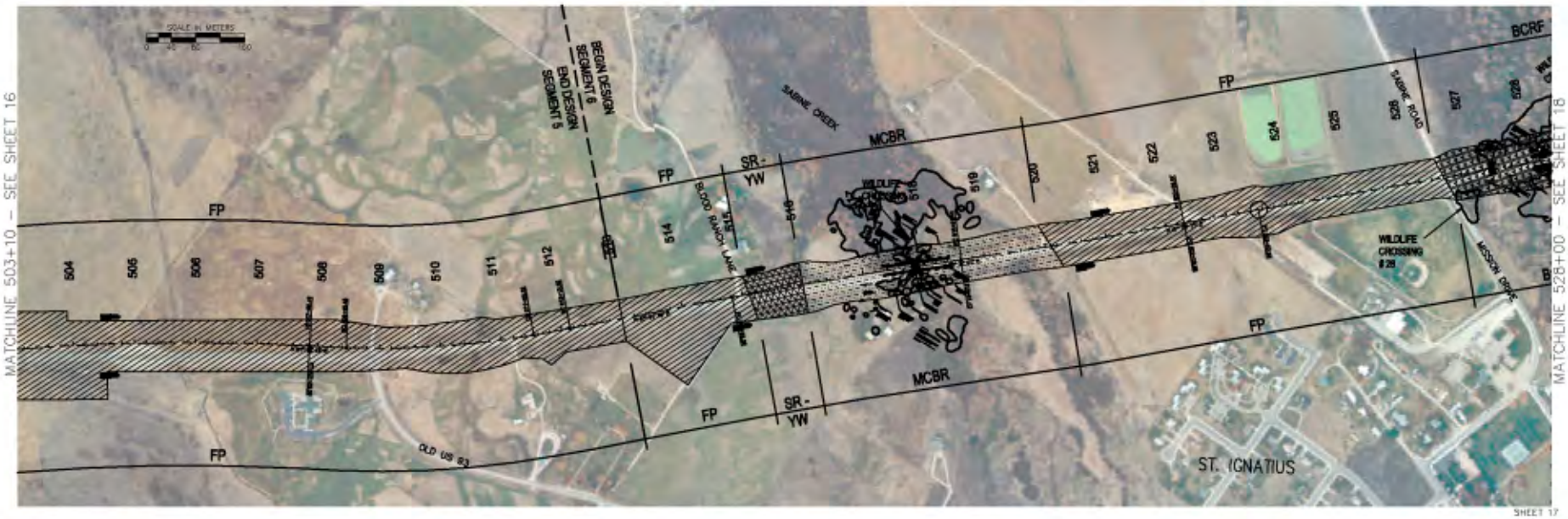
9. Noxious weed control requirements must comply with section 107.11.5 of the mdt standard specifications for road and bridge construction.
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

BCRF — BLACK COTTONWOOD RIPARIAN FOREST
MCBR — MIXED CONIFER BROADLEAF RIPARIAN
SR — SHRUB RIPARIAN
FP — FESCUE PRAIRIE



Station 528+00–554+40

Segment 6—To vicinity of Red Horn Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
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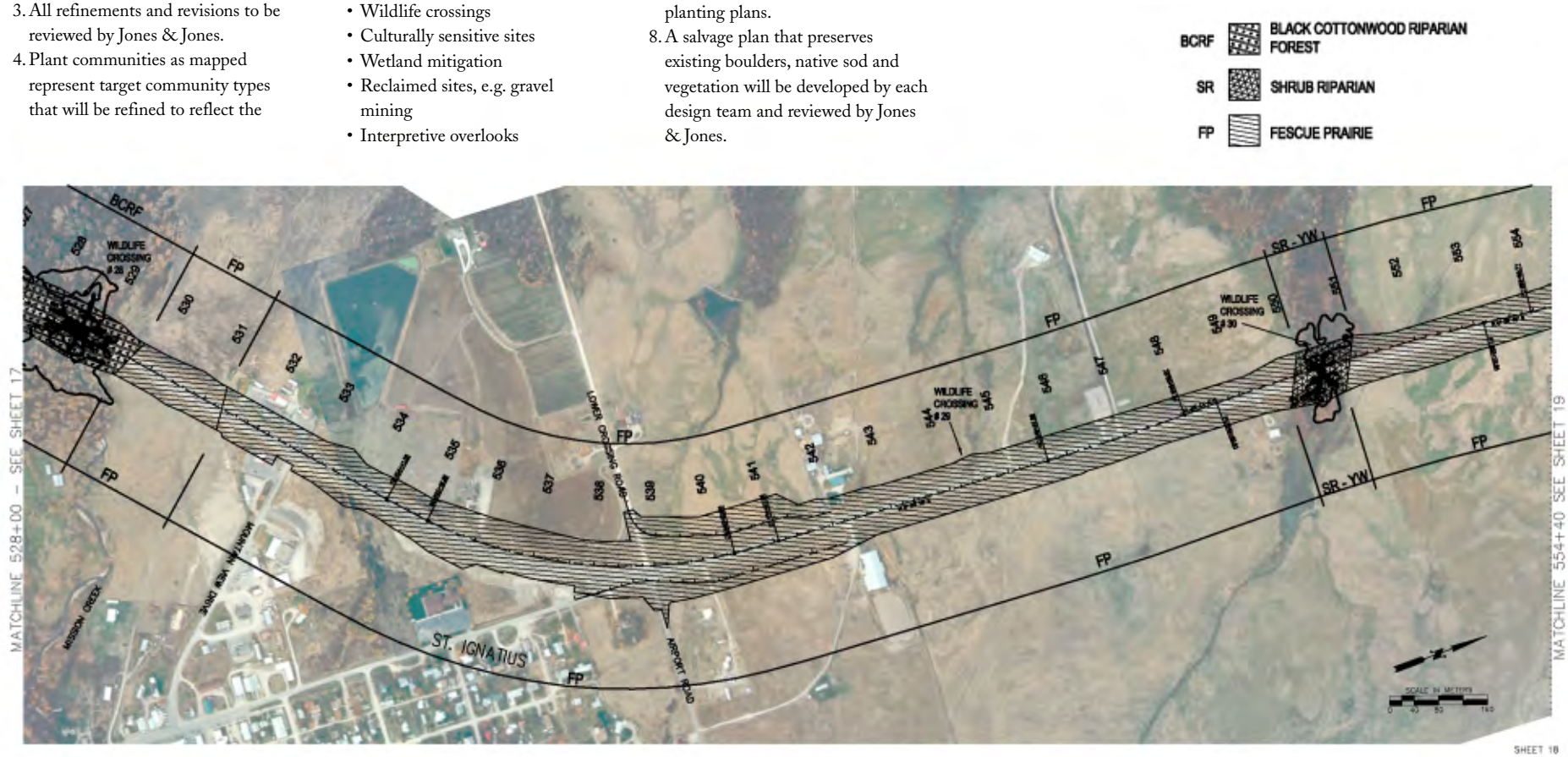

Station 554+40–571+00

Segment 6—To vicinity of Red Horn Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
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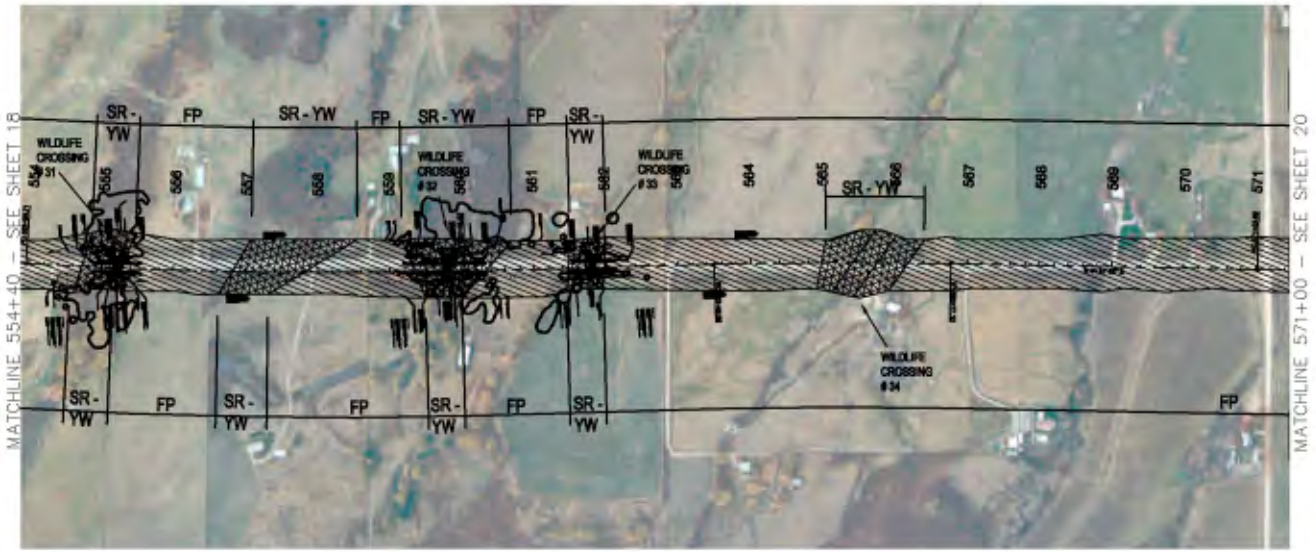
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN

FP FESCUE PRAIRIE



SHEET 19

Station 571+00–596+00

Segment 6—To vicinity of Red Horn Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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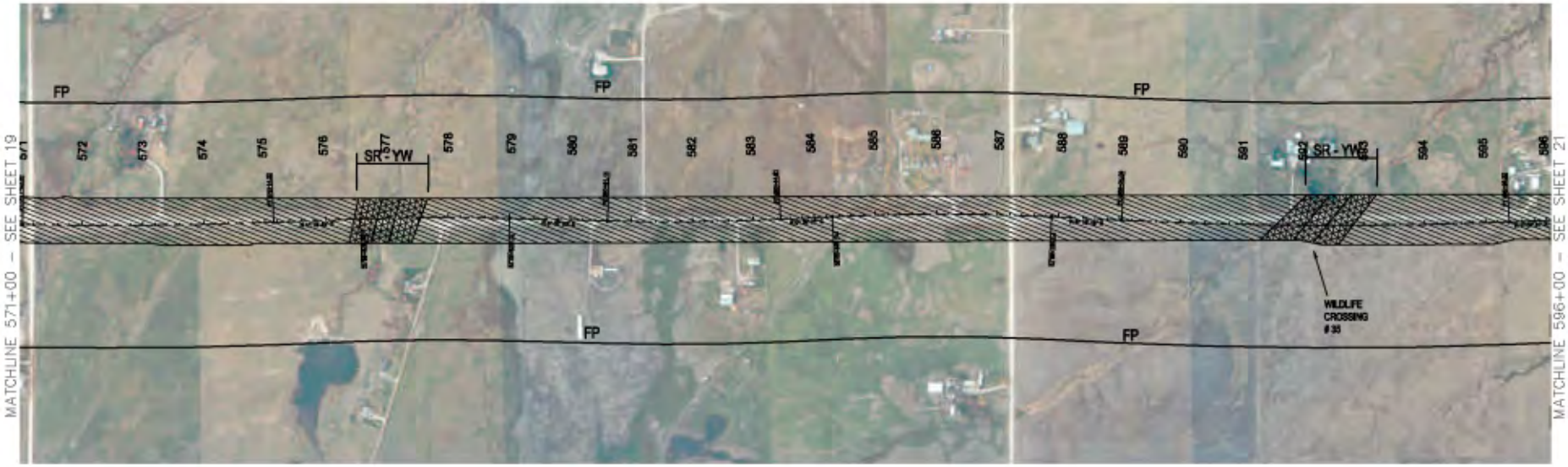
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN

FP FESCUE PRAIRIE



Station 596+00–603+00

Segment 6—To vicinity of Red Horn Road

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

SR SHRUB RIPARIAN

FP FESCUE PRAIRIE

NINEPIPE AND RONAN AREA - BEGIN SEIS STUDY

SHEET 21

Station 768+00–778+20

Segment 7—Spring Creek Road to Minesinger Trail

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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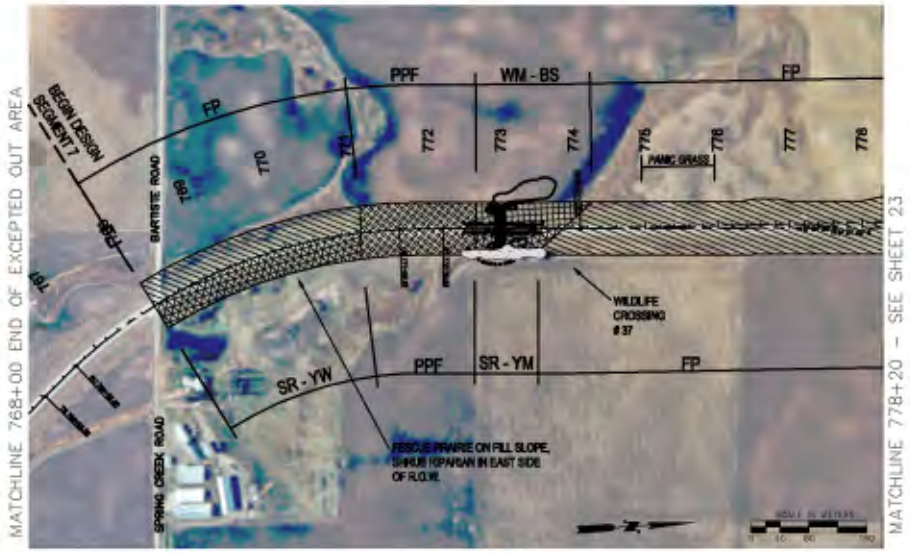
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

PPF PONDEROSA PINE FOREST
WM WET MEADOW
SR SHRUB RIPARIAN
FP FESCUE PRAIRIE

NINEPIPE AND RONAN AREA - END OF SEIS STUDY



Station 778+20–803+00

Segment 7—Spring Creek Road to Minesinger Trail

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

WM — WET MEADOW
PPF — PONDEROSA PINE FOREST
FP — FESCUE PRAIRIE

Station 803+00–828+00

Segment 7—Spring Creek Road to Minesinger Trail

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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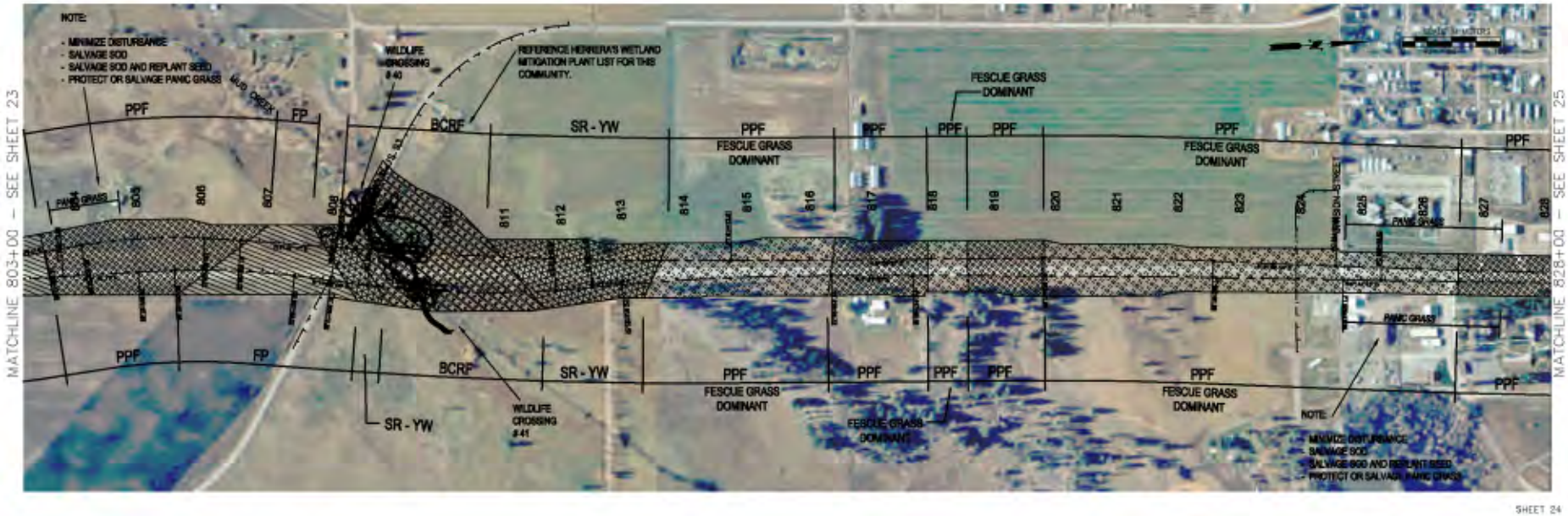
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

BCRF	BLACK COTTONWOOD RIPARIAN FOREST
SR	SHRUB RIPARIAN
MCBR	MIXED CONIFER BROADLEAF RIPARIAN
PPF	PONDEROSA PINE FOREST
PPF	PONDEROSA PINE FOREST - FESCUE GRASS DOMINANT
FP	FESCUE PRAIRIE



Station 828+00–853+00

Segment 7—Spring Creek Road to Minesinger Trail

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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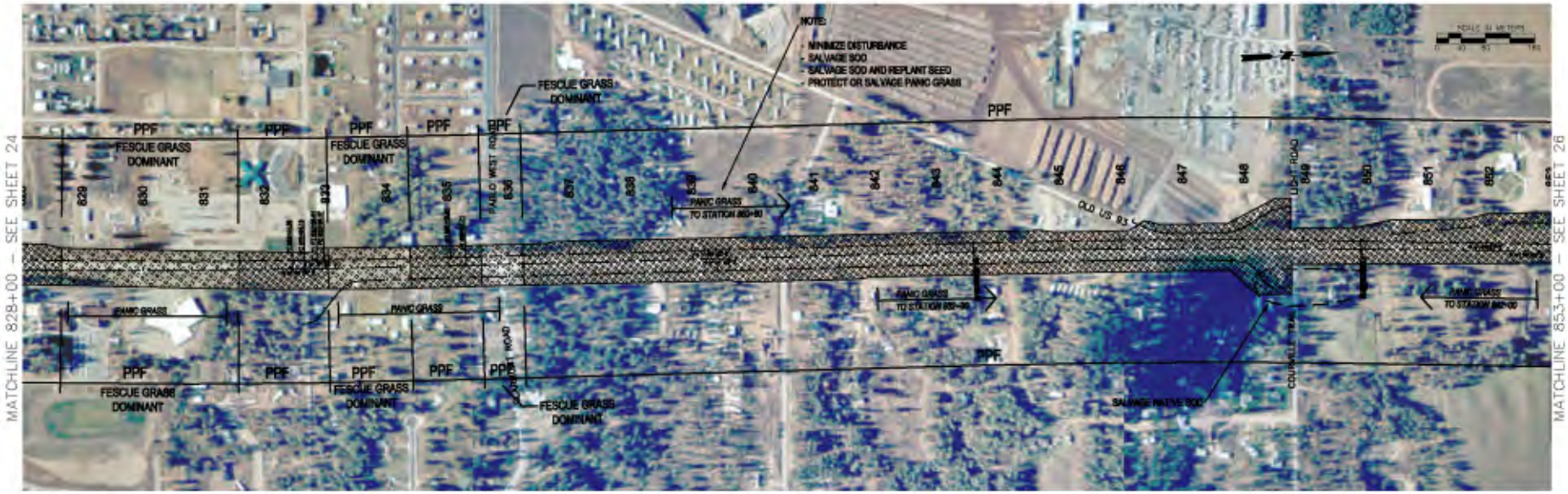
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

PPF PONDEROSA PINE FOREST

PPF PONDEROSA PINE FOREST - FESCUE GRASS DOMINANT



Station 853+00–878+00

Segment 7—Spring Creek Road to Minesinger Trail

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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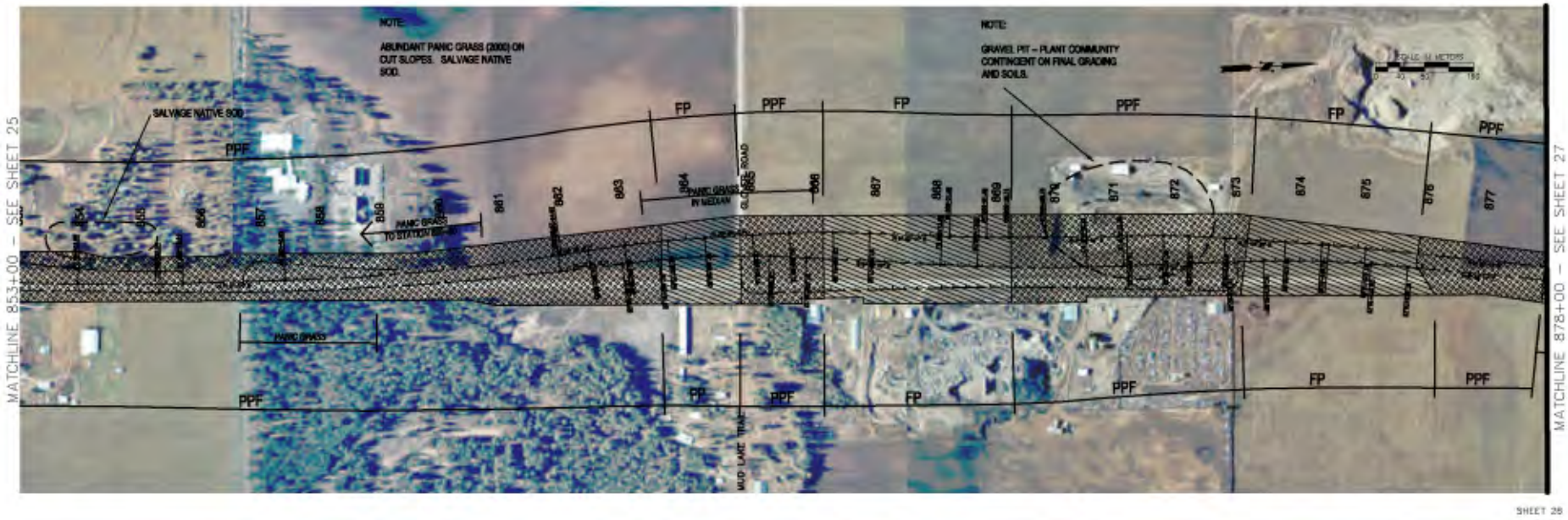
PPF PONDEROSA PINE FOREST

FP FESCUE PRAIRIE



Station 878+00–903+80

Segment 8—To Mt. 35, Polson

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
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9. Noxious weed control requirements must comply with section 107.11.5 of the mdt standard specifications for road and bridge construction.
10. Final revegetation plans will preserve and enhance wetlands per project mitigation guidelines.

PPF PONDEROSA PINE FOREST

FP FESCUE PRAIRIE

Station 903+80–931+40

Segment 8—To Mt. 35, Polson

General notes:

1. Final extent of revegetation plans to be determined after road alignment, right-of-way, and construction easements are finalized.
2. Extent and composition of target plant communities to be field verified by Jones & Jones and the design team, and then developed in greater detail by the design team.
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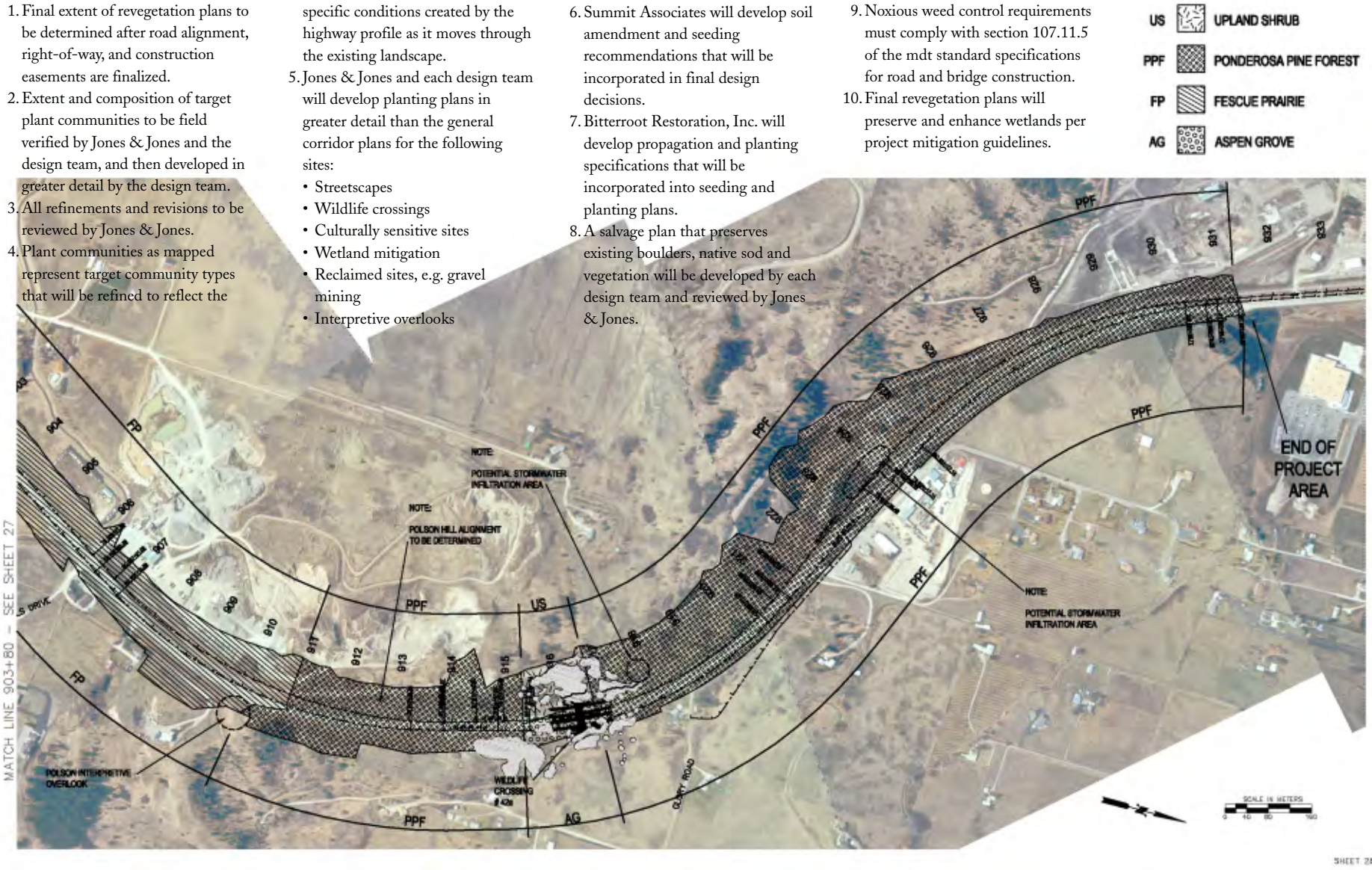
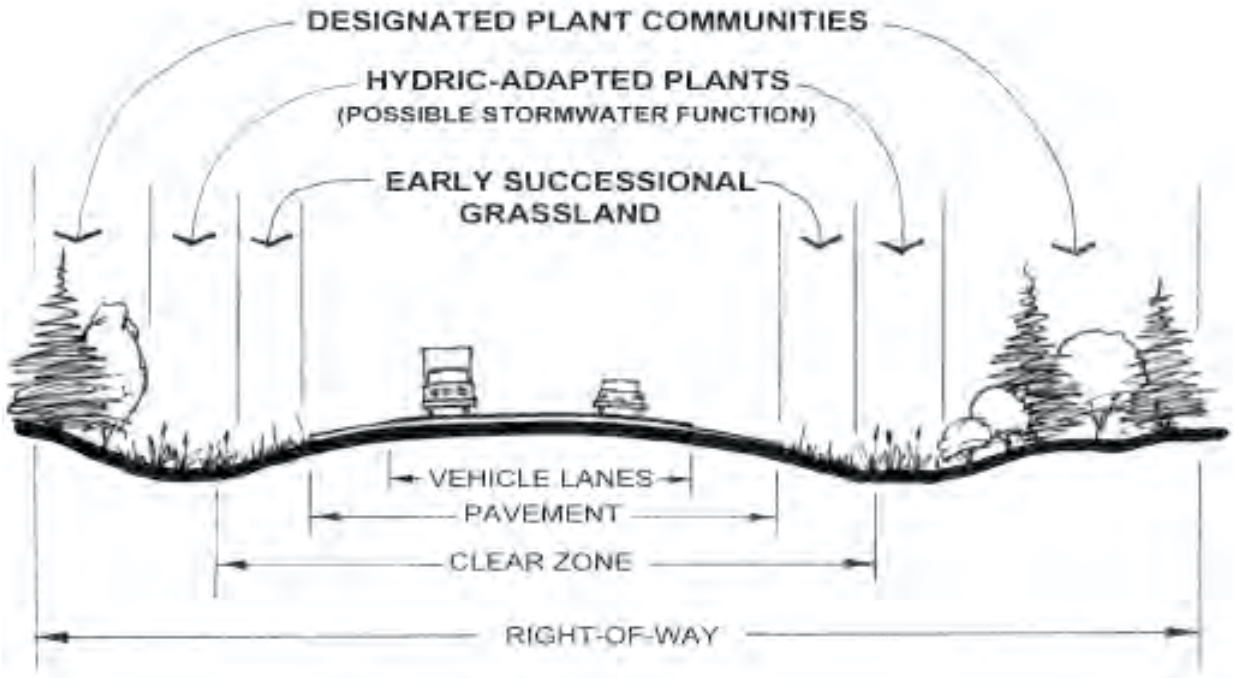


Typical U.S. 93 cross-section illustrating three planting zones



References

US 93 Planting and Revegetation Guidelines

Publications

Barrett, Stephen and Arno, Stephen. 1999. "Indian Fires in the Northern Rockies," in *Indians, Fire and the Land in the Pacific Northwest*, edited by Robert Boyd. Corvallis, Oregon: Oregon State University Press.

Hansen, Paul, R. Pfister, K. Boggs, B. Cook, J. Joy, and D. Hinckley. February 1995. *Classification and Management of Riparian and Wetland Sites in Montana*. Montana Riparian and Wetland Association, Montana Forest and Conservation Experiment Station, and UM School of Forestry. Missoula, Montana: University of Montana.

Hart, Jeff. 1976, reprinted 1996. *Montana Native Plants and Early Peoples*. Helena, Montana: Montana Historical Society Press.

Hitchcock, C. Leo, and Cronquist, Arthur. 1973, reprinted 1987. *Flora of the Pacific Northwest*. Seattle and London: University of Washington Press.

Kershaw, Linda, A. MacKinnon, and J. Pojar. 1998. *Plants of the Rocky Mountains*. Canada: Lone Pine Publishing.

Moerman, Daniel E. 1998, reprinted 2000. *Native American Ethnobotany*. Portland, Oregon: Timber Press, Inc.

Reports

Habeck, James R. 1967. *The Vegetation of Northwest Montana, a preliminary r*eport. Department of Botany. Missoula, Montana: University of Montana.

Hart, Jeff. 1974. *Plant Taxonomy of the Salish and Kootenai Indians of Western Montana*. Masters thesis, University of Montana.

Lackschewitz, Klaus. November 1986. *Plants of West-Central Montana – Identification and Ecology: Annotated Checklist*. USDA Forest Service General Technical Report INT-217. Intermountain Research Station. Ogden, Utah: U.S. Forest Service, U.S. Department of Agriculture.

Mueggler, W.F. and W.P Handl. 1974. *Mountain Grassland and Shrubland Habitat Types of Western Montana*. Intermountain Forest and Range Experiment Station and Region One. USDA Forest Service.

Pfister, Robert, B. Kovalchik, S. Arno, and R. Presby. May 1977, reprinted 1997. *Forest Habitat Types of Montana*. USDA Forest Service General Technical Report INT-34. Intermountain Forest and Range Experiment Station. Ogden, Utah: U.S. Forest Service, U.S. Department of Agriculture.

Pierce, John. November 2001. *Rare Plant Survey: US 93 Evaro to Polson, Draft Biological Assessment*. Prepared for Herrera Environmental Consultants, Inc. Missoula, Montana: John Pierce & Ecosystem Research Group.

Stubbs, Ron D. 1966. *An Investigation of the Edible and Medicinal Plants Used by the Flathead Indians*. Masters thesis, University of Montana.

USDA Soil Conservation Service. April 1982. *Montana Technical Range Site Descriptions*. Montana.

USDA Natural Resources Conservation Service. 1997, reprinted 1998. *Soil Survey of Lake County Area, Montana.*

USDA Natural Resources Conservation Service and Forest Service. 1995. *Soil Survey of Missoula County Area, Montana.*

Websites

Caltrans Project Development Procedures Manual.

http://www.dot.ca.gov/hq/oppd/pdpm/pdpm.htm

Montana Natural Heritage Program. http://nhp.nris.state.mt.us/plants/

Montana NHP 2002 List of Ecological Communities for Montana. http://www.nhp.nris.state.mt.us

Native Plants Network. http://nativeplants.for.uidaho.edu/

U.S.D.A. Natural Resources Conservation Service. Plants database. http://plants.usda.gov/

WADOT Roadside Manual. http://www.wsdot.wa.gov/eesc/design/roadside/

Interviews and Personal Communications

Tom Parker, Wetlands Botanist, Herrera Environmental, Inc. 5/2002 - present. Several personal communications with Jones & Jones staff to discuss wetland mitigation and revegetation concepts.

Steven Kloetzel, Habitat Restoration Botanist, CSKT Tribal Preservation Department. 6/21/2002. Faxed comments on Jones & Jones draft plant list for US 93. 5/2002 – present, several personal communications with Jones & Jones staff to discuss revegetation concepts.

Joanne Bigcrane, Ethnobotanist, CSKT Tribal Preservation Department. 8/13/2002. Meeting with Jones & Jones staff to review plant community and plant species lists.

Mary Price, Wetlands Biologist, CSKT Wildlife Program. 8/13/2002. Personal communication with Jones & Jones staff to discuss reference plant communities.

Jennie Meinershagen, Landscape Architect, Rocking M Design. 7/30-8/1/2002. Design charrette at Jones & Jones office, Seattle to develop planting and revegetation design concepts, and map target plant communities along the US 93 corridor.

John Steinbacher, Soil Scientist. 8/14/2002. On-site meeting with Jones & Jones staff to collect soil samples and discuss restoration strategies.

Tony Clevenger, Wildlife Biologist, Banff National Park. 8/16/02. Personal communication to discuss wildlife browsing behavior on new plantings.

Appendix A—Master List of Plant Species

Species Name	Common Name	Form	Plant Communities	Notes
Juniperus scopulorum	Rocky Mountain Juniper	tree	PPF, T	
Larix occidentalis	Western Larch	tree	PPF	
Picea engelmannii	Engelmann Spruce	tree	PPF, MCBR	at wildlife xings, wetter sites, use in Finley Creek Tributaries
Pinus ponderosa	Ponderosa Pine	tree	AG, BCRF,DFF, MCBR, PPF,T	This should be the primary conifer throughout the corridor.
Populus tremuloides	Quaking Aspen	tree	AG, MCBR	plant as "Tallone" one gallons
Populus trichocarpa	Black Cottonwood	tree	BCRF, MCBR	plant as tallone 1 gallon plants
Pseudotsuga menziesii	Douglas Fir	tree	DFF, MCBR, T	
Acer glabrum	Rocky Mt. Maple	shrub	DFF, MCBR	
Alnus incana	Mountain Alder	shrub	AG, BCRF, MCBR, SRBW, SRYW	Streamside or moist microsites. Should be a seedling component throughout the Entranco section.
Amelanchier alnifolia	Western Serviceberry	shrub	AG, BCRF, DFF, MS, MCBR, PPF, SRBW, T	General distribution. Should be a major component of all plant communities in the corridor for restoration.
Arctostaphylos uva-ursi	Kinnikinnick	shrub	DFF, PPF	
Berberis repens	Oregon Grape	shrub	AG, DFF, MCBR, PPF	General distribution
Betula occidentalis	Water Birch	shrub	BCRF, MCBR, SRBW, SRYW	
Chrysothamnus nauseosus	Rubber Rabbitbrush	shrub	BBWP	local collection
Cornus stolonifera	Red-Osier Dogwood	shrub	AG, BCRF, MCBR, SRBW, SRSW, SRYW	Moist sites, microsites, consistent riparian species, good stream stabilizer
Crataegus douglasii	Black Hawthorn	shrub	MCBR, MS, SRBW	
Crataegus succulenta	Succulent Hawthorn	shrub	MS, SRBW	
Holodiscus discolor	Ocean Spray	shrub	DFF, PPF	
Juniperus communis	Common Juniper	shrub	T	
Philadelphus lewisii	Mockorange	shrub	BCRF, MCBR	
Physocarpus malvaceus	Ninebark	shrub	DFF, PPF	
Prunus americana	American Plum	shrub	BCRF, MCBR, SRBW	Needs partial sun/shade
Prunus virginiana	Common Chokecherry	shrub	AG, BCRF, DFF, MS, MCBR, PPF, SRBW, T	General distribution. Should be a main restoration species throughout corridor.
Rhus glabra	Smooth Sumac	shrub	T	
Ribes spp	Wild Currant	shrub	AG, BCRF, MCBR	R. inerme or lacustre suggested, depends on collections

Appendix A—Master List of Plant Species

Rosa woodsii	Wood's Rose	shrub	AG, BCRF, MS, MCBR, PPF, SRBW, SRYW, T	General distribution
Rubus idaeus	Red Raspberry	shrub	AG, BCRF, MS, MCBR, T	General distribution
Rubus parviflorus	Thimbleberry	shrub	MCBR	#1 restoration value.
Salix bebbiana	Bebb willow	shrub	AG, BCRF, MCBR, SRBW, SRSW, SRYW	Streamside or moist microsites,not at polson. #1 restoration value.
Salix drummondiana	Drummond willow	shrub	BCRF	
Salix exigua	Sandbar willow	shrub	BCRF, SRBW, SRSW, SRYW	
Salix lutea	Yellow Willow	shrub	SRSW, SRYW	
Sambucus cerulea	Blue Elderberry	shrub	BCRF, MCBR, SRSW, SRYW	
Shepherdia canadensis	Canada Buffaloberry	shrub	AG, DFF, MCBR, PPF	General distribution
Spiraea betulifolia	White Spiraea	shrub	AG, DFF, MCBR, PPF, T	General distribution
Symphoricarpos spp	Snowberry	shrub	AG, BCRF, DFF, MCBR, PPF, SRBW, SRYW, T, MS	General distribution. Should be a major component of almost all of the plant communities throughout the corridor, excellent value, stabilizer & erosion control
Achillea millefolium	Common Yarrow	forb	ALL EXCEPT; T, WMHB	comm avail. Good pioneer species. Good soil stabilization; should be a major seed component.
Anaphalis margaritacea	Pearly Everlasting	forb	AG, BCRF, DFF, MS, MCBR, PPF	comm avail
Antennaria microphylla	Rosy Pussytoes	forb	BBWP, DFF, FP, MS, MCBR, PPF, SRBW, SRSW	
Apocynum cannabinum	Hemp Dogbane	forb	SRBW, SRSW, SRYW	opp only, hand seed
Arnica cordifolia	Heartleaf Arnica	forb	DFF, MCBR, PPF	local coll
Artemisia frigida	Fringed Sage	forb	BBWP, FP	Forb or 1/2 shrub, seeds easily into disturbed areas; this should be a major pioneer forb mixed in grasslands and roadside mix. Reproduces readily from seed, tolerates grazing and mowing.
Artemisia ludoviciana	Prairie Sage	forb	FP, AG, MCBR, PPF	Seeds easily into disturbed areas. Possibly propagate in Tribal nursery and disperse throughout corridor. Could add into grass seed mix to hedge your bets in desirable locations.
Aster laevis	Smooth Aster	forb	AG, BCRF, MCBR	local collect
Aster spp	Aster	forb	SRBW, SRSW, SRYW, WMBS, WMBR	opp only
Balsamorhiza sagittata	Arrowleaf Balsamroot	forb	BBWP, DFF, FP, PPF	local coll, CSKT TPO to review use.
Brodiaea douglasii	Wild Hyacinth	forb	WMBR	opportunistic collection only, check on seeds/#!!
Camassia quamash	Blue Camas	forb	AG, WMBR	Moist sites, in Aspen Grove near Frog Creek/Evaro only. CSKT TPO to review use.

Castilleja spp	Paintbrush	forb	BBWP	check on commercial seed source or local collect
Clematis ligusticifolia	Western Virgins-bower	forb	AG, BCRF, MS, MCBR, SRYW	local collect, will be useful for screening wildlife crossing structures, vining/trailing plant.
Epilobium angustifolium	Fireweed	forb	AG, BCRF, DFF, MS, MCBR	local collect
Epilobium ciliatum	Common Willow-herb	forb	SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	
Eriogonum spp	Buckwheat	forb	FP	opportunistic collecting only, will come from seed
Gaillardia aristata	Blanket Flower	forb	FP	opportunistic collecting only
Galium boreale	Northern Bedstraw	forb	SRBW	opportunistic collecting only
Geranium viscosissimum	Sticky Geranium	forb	FP	Present on John Pierce's Rare plant inventory
Geum macrophyllum	Large-leaved Avens	forb	AG, SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	local collection, might come in on its own?
Geum triflorum	Prairiesmoke	forb	FP	opportunistic collection only, present on John Pierce's Rare plant inventory
Glycyrrhiza lepidota	American Licorice	forb	SRSW, SRYW	opportunistic collecting only, hand seed
Heracleum lanatum	Cow-parsnip	forb	SRBW, SRSW, SRYW, WMBS, WMBR	opportunistic collecting only, hand seed, probably not available/practical
Heuchera cylindrica	Roundleaf Alumroot	forb	T	
Lewisia rediviva	Bitterroot	forb	BBWP	Use, placement and spacing to be determined by CSKT-TPD, Sites for Bitterroot seeding or transplants should be carefully chosen for lack of competition, exposure, etc.
Lithospermum ruderale	Western Gromwell	forb	FP	opportunistic collecting only
Lupinus sericeus	Silky Lupine	forb	BBWP, FP	Small mammal cover, good soil stabilizing properties, best on sandy to clay loam soils, grassland-open forest, drill seed 1 inch deep or plants.
Lysichitum americanum	Skunk Cabbage	forb	BCRF	This species requires very moist, shaded microsite conditions
Senecio triangularis	Arrowleaf Groundsel	forb	AG	include as opportunistic collection only, species is adapted for moist riparian sites
Solidago canadensis	Canada goldenrod	forb	BCRF, MS, MCBR, SRBW, SRSW, SRYW, WMBS	
Vicia americana	American Vetch	forb	AG, BCRF, MCBR, SRBW, SRSW, SRYW	local collect or comm avail, check seeds/pls#@33k
Agropyron spicatum	Bluebunch Wheatgrass	graminoid	T	hand seed only, major component BBWhP. Effort should be made to collect native seed. This is a long-lived bunchgrass.

Appendix A—Master List of Plant Species

Balsamorhiza sagittata	Arrowleaf Balsamroot	graminoid	T	hand seed only
Calamagrostis canadensis	Bluejoint Reedgrass	graminoid	AG, BCRF, MS, MCBR, SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	comm avail., broadcast only, rarely sets seed - acquire in burn areas
Calamagrostis rubescens	Pinegrass	graminoid	DFF, PPF	local coll, plants produce seed only after a disturbance/fire. Native seed might be hard to come by, but would be worth a try. Just don't count on it. Plugs?
Calamagrostis stricta	Narrowspiked Reedgrass	graminoid	WMBS	
Carex aquatilis	Water Sedge	graminoid	SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	
Carex geyeri	Elk Sedge	graminoid	DFF, PPF	local collecting only
Carex languinosa	Wooly Sedge	graminoid	WMBS	CARVES or CARLAN, not necc both…
Carex microptera	Small-winged Sedge	graminoid	WMBR	
Carex utriculata	Beaked Sedge	graminoid	SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	This will be a main restoration component in WM.
Carex vesicaria	Inflated Sedge	graminoid	SRBW, SRSW, SRYW, WMBS, WMBR	this is common in the corridor
Deschampsia cespitosa	Tufted Hairgrass	graminoid	SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	
Eleocharis palustris	Common Spikesedge	graminoid	SRBW, SRSW, SRYW, WMBR, WMHB	
Elymus glaucus	Blue Wildrye	graminoid	AG, BCRF, MS, MCBR, SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	comm avail
Festuca idahoensis	Idaho Fescue	graminoid	BBWP, DFF, FP, MS, MCBR, PPF	Major component BBWhP. Effort should be made to collect native seed. Good pioneer.
Festuca scabrella	Rough Fescue	graminoid	BBWP, DFF, FP, MS, MCBR, PPF	Major component BBWhP. Effort should be made to collect native seed. May be slow to establish from seed, not real competitive at establishment, does not tolerate grazing/mowing/disturbance, consider tubelings in Polson Hill area, long lived bunchgrass.
Glyceria striata	Fowl Mannagrass	graminoid	AG	
Hierochloe odorata	Sweetgrass	graminoid	AG, BCRF	Moist & sunny sites, TPO to review use. Plugs would be most immediately successful.
Hordeum jubatum	Foxtail Barley	graminoid	SRSW, SRYW, WMBS	opportunistic collection only
Juncus balticus	Baltic Rush	graminoid	SRBW, SRSW, SRYW, WMBS, WMBR, WMHB	
Juncus effusus	Soft Rush	graminoid	WMBS	
Juncus ensifolius	Dagger-leaf Rush	graminoid	SRBW, SRSW, SRYW, WMHB	
Koeleria cristata	Prairie Junegrass	graminoid	BBWP, DFF, FP, MS, MCBR, PPF	Major component BBWhP. Effort should be made to collect native seed. Increases with disturbance, good pioneer.
Oryzopsis hymenoides	Indian Ricegrass	graminoid	BBWP, MS	
Pascopyrum smithii	Western Wheatgrass	graminoid	SRYW, WMBS, WMBR	to occupy dry spots

Poa secunda	Pine Sandberg Bluegrass	graminoid	BBWP, FP, MS, PPF	
Pseudoroegnaria spicata	Bluebunch Wheatgrass	graminoid	ALL EXCEPT; T, WMHB	Major component BBWhP. Effort should be made to collect native seed. This is a long-lived bunchgrass.
Scirpus acutus	Hardstem Bulrush	graminoid	WMHB	
Scirpus microcarpus	Small-fruited Bulrush	graminoid	WMBS, WMBR, WMHB	
Stipa comata	Needle and Thread	graminoid	BBWP, DFF, FP, MS, MCBR, PPF	Competitive from seed. Commonly occurs as a major portion of composition.

Appendix B—Plant Inventory List

Recorded by John Pierce, Botanist, MOA aerial line maps, July 2001

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
ACEGLA	*Acer glabrum*	Rocky Mt. Maple	9,14,15
ACHMIL	*Achillea millefoilum*	Yarrow	1,2,3,4,5,6,9,11,13, 15,16,17,19,20,21,30, 31, 32,34
AGRSMI	*Agropyron smithii*	Western Wheatgrass	13,15
AGRSPI	*Agropyron spicatum*	Bluebunch Wheatgrass	7,8,9,10,12,13,15,34
ALIPLA	*Alisma plantago*	American Water Plantain	2
ALLCER	*Allium textile*	Nodding Onion	1,3,4,12
ALNINC	*Alnus Incana*	Gray Alder	3,9,13,18,30
AMEALN	*Amelanchier alnifolia*	Serviceberry	2,3,4,5,6,9,15,17,34
ANAMAR	*Anaphalis margaritacea*	Pearly Everlasting	30,34
ANGARG	*Angelica arguta*	Sharptooth Angelica	4
ANTMIC	*Antennaria microphylla*	Rosy Pussytoes	1,2,3,4,12,15,16,17,28, 29,31,32
ANTNEG	*Antennaria neglecta*	Field Pussytoes	2,3,4
ANTPAR	*Antennaria parvifolia*	Nuttall's Pussytoes	30,31,33,34
APOAND	*Apocynum androsaemifolium*	Creeping Dogbane	2,3,4
ARCUVA	*Arctostaphylos uva-ursi*	Kinnikinnick	1,2,3,4,31,32
AREHOE*	*Areneria hookeri*		12
ARILON	*Aristida longiseta*	Red Three-awn	12,13,15,16,30,32
ARNCOR	*Arnica cordifolia*	Heartleaf Arnica	3
ARTDRA*	*Artemisia dracunculus*	Wild Tarragon	14,15
ARTFRI	*Artemisia frigida*	Fringed Sage	12,15,29
ARTLUDA	*Artemisia ludoviciana*	Gray Sagewort	2,5,7,29,30,31,32
ASCSPE	*Asclepias speciosa*	Showy Milkweed	4,6,7,10,11,14,15,16,34
AST		Aster spp	1,2,4,5,6,7,9,12,13,14, 15,16,17,19,31,33,34
ASTCON	*Aster conspicuous*	Showy Aster	3,4
ASTFAL	*Astragalus falcatus*		12,16,17,18

**Italic* not clear from notes

Appendix B—Plant Inventory List

Recorded by John Pierce, Botanist, MOA aerial line maps, July 2001

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
ASTMIS*	*Astragalus miser*	Weedy Milkvetch	2
ATHFIL	*Athyrium filix-femina*	Common Lady Fern	3,9,
BALSAG	*Balsamorhiza sagittata*	Arrowleaf Balsamroot	2,34
BECSCH*			2
BERREP	*Berberis repens*	Oregongrape	2,3,4,12
BESRUB	*Besseya rubra*	Tall Kittentails	31,32,33,34
BETGLA	*Betula glandulosa*	Bog Birch	30
BETOCC	*Betula occidentalis*	Water Birch	9,13
BEUMAC*			3
BRODOU	*Brodiaea douglasii*	Wild Hyacinth	16,33
CALRUB	*Calamagrostis rubescens*	Pinegrass	3,4
CAMQUA	*Camassia quamash*	Camas	1
CAMROT	*Campanula rotundifolia*	Scotch Harebell	2,3,4,34
CARBEB	*Carex bebbii*	Bebb's Sedge	1,29,30
CARBRE	*Carex brevior*	Short-beaked Sedge	17,18,19,20,21
CARBUX	*Carex buxbaumii*	Buxbaum's Sedge	30
CARCON	*Carex concinnoides*	Northwest Sedge	2,4
CARCUS	*Carex cusickii*	Cusick's Sedge	19
CARDIA	*Carex diandra*	Lesser Panicled Sedge	2,5
CARGEY	*Carex geyeri*	Elk Sedge	2,3,4
CARHYS*			20,21
CARINT	*Carex interior*	Inland Sedge	30
CARLAN	*Carex langinosa*	Woolly Sedge	19,20
CARLAS	*Carex lasiocarpa*	Slender Sedge	30
CARMIC	*Carex lasiocarpa*	Slender Sedge	4,21
CARNEB	*Carex nebrascensis*	Nebraska Sedge	1,2,3,4,5,12,17,18,19,20,28,29,30
CARSTI	*Carex stipata*	Sawbeak Sedge	1,2,3,5,17,18,19,20,21
CARTEN	*Carex tenera*	Slender Sedge	2,5
CARUTR	*Carex utriculata*	Beaked Sedge	1,4,5,6,10,12,13,17,20, 28,29,30

**Italic* not clear from notes

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
CARVIR	*Carex viridula*	Green Sedge	2,3,5
CASMIN	*Castilleja miniata*	Common Red Paintbrush	3,
CHRNAU	*Chrysothamnus nauseosus*	Rubber Rabbit Brush	12,14,15
CHRVIL	*Chrysopsis villosa*	Hairy Golden Aster	12,15,16,31
CHRVIS	*Chrysothamnus viscidiflorus*	Green Rabbit-brush	12
CICDOU	*Cicuta douglasii*	Water Hemlock	1,6,9,13
CIRUND	*Cirsium undulatum*	Wavy-leaf Thistle	13,15
CLELIG	*Clematis ligusticifolia*	White Clematis	8,9,13,14,15
COLLIN	*Collomia linearis*	Narrow-leaf Collomia	1,2,3,7,8,9,10,12,16, 30,31,32,33
COMUMB	*Comandra umbellata*	Pale Bastard Toadflax	12,15
CORSTO	*Cornus stolonifera*	Redosier Dogwood	3,4,9,13,14,17,19,30
CRACOL	*Crataegus columbiana*	Columbia Hawthorn	16,17,18,19
CRADOU	*Crataegus douglasii*	Douglas Hawthorn	1,2,3,4,5,6,8,17,30,34
CREMOD	*Crepis modocensis*	Low Hawksbeard	34
DESCES	*Deschampsia caespitosa*	Tufted Hairgrass	1,2,3
DOD	*Dodecatheon spp*	Shooting Star	34
ELEPAL	*Eleocharis palustris*	Common Spike Rush	1,2,3,5,9,17
ELOCAN	*Elodea nuttallii*	Nuttall's Waterweed	9
ELYCIN	*Elymus cinereus*	Basin Wildrye	11,12,14,15,17
EPIANG	*Epilobium angustifolium*	Fireweed	2,3,5
EPIGLA	*Epilobium glaberrimum*	Smooth Willow-weed	3
EQUARV	*Equisetum ravens*	Common Horestail	2,3,4,5,6,9,13,17,18,19, 28,29
EQUHYE	*Equisetum hyemale*	Common Scouring Rush	3,4,9,13
EQULAE	*Equisetum laevigatum*	Smooth Scouring Brush	1,10,11,12,15,17,18,19, 28,29,30,31,32,33
ERICEA*	*Erigeron caespitosus*	Tufted Daisy	15
ERIHER	*Erioginum heracleoides*		31,32,34
ERISPE	*Erigeron speciosus*	Showy Fleabane	31, 32, 34
ERYGRA	*Erythronium grandiflorum*	Glacier Lily	2
FESIDA	*Festuca Idahoensis*	Idaho Fescue	3,13,31,32,34

**Italic* not clear from notes

Appendix B—Plant Inventory List

Recorded by John Pierce, Botanist, MOA aerial line maps, July 2001

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
FESSCA	*Festuca scabrella*	Rough Fescue	12,13,31,32,34
FRAVIR	*Fragaria Virginiana*	Virginia Strawberry	1,2,3,4,5,6,10,13,30, 31, 32
FRIPUD	*Fritillaria pudica*	Yellowbell	12,15,30,32,34
GALARI	*Gaillardia aristata*	Blanketflower	34
GALBOR	*Galium boreale*	Northern Bedstraw	2,3,13,34
GAUCOC	*Gaura coccinea*	Scarlet Butterlfy-weed	13,15
GERVIS	*Geranium viscosissimum*	Sticky Geranium	2,4,12,13,15,33,34
GEUMAC	*Geum macrophyllum*	Largle-leaved Avens	1,4,7,9,12,13,17,18,20, 21,30
GEUTRI	*Geum triflorum*	Prairie Smoke	15,19
GLYGRA	*Glyceria grandis*	American Mannagrass	9,14,17,19
GLYLEP	*Glycyrrhiza lepidota*	Licorice root	15
GRISQU	*Grindelia squarrosa*	Gumweed	4,5,6
HABDIL	*Habenaria dilatata*	White Bog Orchid	3,4,5
HELANU	*Helianthus annuus*	Common Sunflower	17
HERCLY*			13
HERLAN	*Heracleum lanatum*	Cow Parsnip	3,9,13,14
HOLDIS	*Holodiscus discolor*	Oceanspray	4
HORJUB	*Hordeum jubatum*	Foxtail Barley	1,16,21
HUECLY	*Heuchera cylindrica*	Roundleaf Alumroot	34
HYDLIN*			31,32
ILLRIV	*Iliamna rivularis*	Mountain Hollyhock	14
JUNBAL	*Juncus balticus*	Baltic Rush	1,2,3,5,6,10,11,12,18,19,28,30
JUNCOM	*Juniperus communus*	Common Juniper	3,4
JUNENS	*Juncus ensifolius*	Daggerleaf Rush	1,2,4,5,30
JUNTEN	*Juncus tenuis*	Slender Rush	2,5
JUSSCO	*Juniperus scopulorum*	Rocky Mt. Juniper	3,9,12,13,14,16,18
KOECRI	*Koeleria cristata*	Junegrass	12,13,15,31,32
LEMMIN	*Lemna Minor*	Common Duckweed	21,28
LEPGLY*			16

**Italic* not clear from notes

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
LITRUD	*Lithospermum ruderale*	Pucoon	12,13,15,16,17,29,34
LOMDIS	*Lomatium dissectum*	Fern-leaved Lomatium	14,15
LOMTRI	*Lomatium triternatum*	Nine-leaf Lomatium	19,20
LONCIL	*Lonicera ciliosa*	Trumpet Honeysuckle	2
LUP	*Lupinus*		1,5,8,12,16,29,30,31, 32, 34
LYSCIL	*Lysimachia ciliata*	Fringed Loosestrife	12
MAHREP	*Mahonia repens*	Oregongrape	13
MENARV	*Mentha arvensis*	Field Mint	1,2
MICGRA	*Microsteris gracilis*	Pink Microsteris	3,8
MIMGLA	*Mimilus glabratus*		19
MIMGUT	*Mimulus guttatus*	Yellow Monkyflower	1,2,3,4,5,6,12,30
MIMMOS	*Mimilus moschatus*	Musk Monkeyflower	3
MITGRA*			2
MONFIS	*Monarda fistulosa*	Horsemint	7,34
NASROR*			15
OENRYD*		(Primrose)	4
OPUFRA	*Opuntia fragilis*	Prickly Pear	12
PANSCR	*Panicum scribnerianum*	Scribner's Panic Grass	31,32
PENALB	*Penstemon albertinus*	Albert's Penstemon	3
PENPRO	*Penstemon procerus*	Little Penstemon	1,24,13,29
PETAND*			2
PHAHAS	*Phacelia hastate*	Silverleaf Phacelia	1,15
PHALIN	*Phacelia linearis*	Sand Phacelia	9,30
PHILEW	*Philadelphus lewesii*	Mockorange	3,4,15
PHLLON	*Phlox longifolia*	Long-leaf Phlox	12
PHYMAL	*Physocarpus malvaceus*	Ninebark	3,13
PICENG	*Picea engelmannii*	Engelman's Spruce	3
PINPON	*Pinus ponderosa*	Ponderosa Pine	1,2,3,4,45,6,9,13,14,15,30,31,32,34
PLAPAT	*Plantago patagonica*	Indian Wheat	30,31,32

**Italic* not clear from notes

Appendix B—Plant Inventory List

Recorded by John Pierce, Botanist, MOA aerial line maps, July 2001

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
PLEMAC	*Plectritis macrocera*	White Plectritis	( )
PLEMAC	*Plectritis macrocera*		34
POASAN	*Poa sandbergii*	Sandberg's Bluegrass	12,15
POLAMP	*Polygonum amphibium*	Water Smartweed	28,30
POLOCC	*Polemonium occidentale*	Western Polemonium	3
POPTRE	*Populus tremuloides*	Quaking Aspen	2,4,7,8,9,13,15,17,19,30,34
POPTRI	*Populus trichocarpa*	Black Cottonwood	2,3,4,5,6,7,8,9,13,15,16,18,20,28
POTGRA	*Potentilla gracilis*	Soft Cinquefoil	1,2
POTPEC	*Potamogeton pectinatus*	Fennel-leaved Pondweed	12
PRUVIR	*Prunus virginiana*	Chokecherry	1,4,5,6,8,9,12,13,14, 15,16,17,34
PSEMEN	*Pseudotsuga menziesii*	Dougals Fir	1,2,3,4,6,13,15
PYRASA*			3
RANAQU	*Ranunculus aquatilis*	Water Buttercup	9
RIB		Ribes	13
RIBHUD	*Ribes hudsonianum*	Western Black Currant	3,9
RORNAS	*Rorippa nasturtium*	Watercress	30
ROS	*Rosa*	Rose	1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,17,18, 19,20, 21,29,30,31, 32,33,34
RUBIDA	*Rubus idaeus*	Red Raspberry	1,2,3,4,9,10,12,13,15,17,19,30
RUBPAR	*Rubus parviflorus*	Thimbleberry	3
SALBEB	*Salix bebbiana*	Bebb's Willow	1,2,3,3,4,6,9,12,13,17,18,30
SALEXI	*Salix exigua*	Riverbank Willow	2,6,13,15
SALLUT	*Salix lutea*		9
SALSCO	*Salix scouleriana*	Scouler's Willow	3
SAMCER	*Sambucus cerulea*	Blue Elderberry	2,4,9,13,17,18
SCIACU	*Scirpus acutus*	Hardstem Bulrush	28
SCIMIC	*Scirpus microcarpus*	Small-fruited Bulrush	1,2,4,5,6,9,17,18,19, 21,28,30
SCRLAN	*Scrophularia lanceolata*	Lance-leaved Figwort	11
SENCAN	*Senecio canus*	Silvery Groundel	9
SENINT	*Senecio integerrimus*	Lambstoungue Groundsel	11

**Italic* not clear from notes

Alpha Code	Species Name	Common Name	MOA Aerial Sheet Number
SENPSE	*Senecio pseudaureus*	Streambank Groundsel	3
SENSER	*Senecio serra*	Tall Butterweed	4
SENTRI	*Senecio triangularis*	Arrowleaf Groundsel	33
SHECAN	*Sheperdia canadensis*	Russet Buffaloberry	2,3,10
SILMEN	*Silene menziesii*	Menzies' Catchfly	13
SMISTE	*Smilacina stellata*	Starry False Solomon's Seal	4,9,12,13,29
SOLMIS	*Soldago missouriensis*	Missouri Goldenrod	1,7,9,30
SOLOCC	*Soldago occidentalis*	Western Goldenrod	3,4
SPHCOC	*Sphaeralcea coccinea*	Red Globe-mallow	12
SPIBET	*Spiraea betulifolia*	White Spiraea	2,4
SPIROM	*Spiranthes romanzoffiana*	Ladie's Tresses	33
SPOCRY	*Sporobolus cryptandrus*	Sand Dropseed	31,32
STICOM	*Stipa Comata*	Needle and Thread	8,9,10,11,12,15,30,31,32
STIOCC	*Stipa occidentalis*	Western Needlegrass	11,13,14,16,17
SYMALB	*Symphorocarpus albus*	Common Snowberry	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,16,17,18,28
SYMOCC	*Symphorocarpus occidentalis*	Western Snowberry	1,11,12,14,16,17,19,29,30,34
TYPLAT	*Typa latifolia*	Common Cattail	1,2,3,4,5,6,9,10,12, 13,15,18,19,20,21,28, 29,30
URTDIO	*Urtica dioica*	Stinging Nettle	3,9,12,13,15
VERBRA	*Verbena bracteata*	Bracted Vervain	15,31
VERVER	*Veronica verna*	Vernal Veronica	3
VIOADU	*Viola adunca*	Western Violet	2,30
VIOLA		Violet ssp	5,30
ZANPAL	*Zannichellia palustris*	Horned Pondweed	12

**Italic* not clear from notes

Appendix C—Soil Amendments

REVEGETATION AND EROSION CONTROL SPECIFICATIONS

U.S. 93 from Evaro to Polson Montana

Prepare by
Summit Associates LC
529 E. Sunnyridge Court
Boise Idaho 83702
Telephone 208-338-5400

August 2002

OVERVIEW

The following specifications and recommendations have been prepared in a site-specific manner after careful site review, and soil analysis data from samples taken from said site. All efforts have been made to insure that the soil amendments used will not encourage weed growth at the site. These soil amendments specified have a proven record of being successful at highly disturbed sites where native plant species are being reestablished. Seed species selected were chosen based on specific knowledge of local plant communities in that particular region. It is of critical importance that the procedures outlined below be followed *exactly* as written to obtain success in the revegetation effort. Deviation from these procedures or substitution for products is an invitation for disappointing results.

GENERAL: The plant and revegetation portion of this project will consist of excavation of topsoil to be stockpiled for later reapplication, hydro-application of seed and soil amendments with soil binder, and planting wetland areas willow cutting planting including sealing and rooting hormone treatment. Appropriate weeding will be conducted across time, as supervised by the landscape architect.

SITE PREPARATION: Consultants will identify and flag native grassland and shrub areas not to be disturbed when topsoil salvage operation is undertaken.

TOPSOIL: The topsoil will be salvaged and stockpiled prior to site excavation. Stockpile should be no higher than 4' and should be treated with Atlas SoilLok at 65 gal/acre to prevent erosion and help keep weed free. Typically, no unnecessary disturbance of the site should occur, no ripping or tilling is necessary or desired. Soil types native to this area vegetate better if left in a more undisturbed state. If soil has been compacted, tilling may be necessary however; the Landscape Architect shall approve locations and depth of tilling. Following reapplication of the topsoil to the site, said topsoil should be track-walked with a small dozer-tractor to insure it is not eroded away by wind or rain. This is especially important on slope areas. The grouser tracks from the dozer cleats create a small microclimate area that affords an added measure of opportunity for moisture collection, improving the potential for success of the revegetation effort.

REVEGETATION TREATMENTS: All areas impacted during excavation shall be revegetated following the specifications provided by the landscape architect. No substitutions of soil amendment products, seed, stabilization materials or procedures will be permitted.

Riparian Areas: Willow cuttings prepared as per specification will be planted at approximately five foot on center along the lower 3' of the banks. Willow holes to be bored as deep as the low water line of the channel. Willows may be used in combination with sedge and rush seeding and or container stock.

Upland Slope Areas: Protect native shrub communities as directed by landscape architect. Reapply salvaged topsoil at the maximum depth permitted by the material available in the stockpile, then track-walk. Hydroseed using specified soil amendments, soil stabilizers and seed, being sure to pre-wet the site as per manufacturers recommendations for Atlas SoilLok.

Lower terraces: Protect grass community as directed by Landscape Architect. Hydroseed using specified soil amendments, soil stabilizers and specified seed only.

Rock Rip-Rap: Broadcasts seed and soil amendments over rock rip rap areas. It is especially important to hand broadcast the soil amendments over the seed to better enable seed that gains soil contact to have any opportunity for growth.

Temporary Erosion Control (winterization): Those areas not revegetated as per above specifications in application window of September 15 to October 15 shall receive

Appendix C—Soil Amendments

temporary erosion control, consisting of hydraulic application of 65 gal/acre of Atlas SoilLok and 18 lb/acre PLS of slender wheatgrass *Elymus trachycaulus, pryor*

*All planting materials will be subject to inspection by the landscape architect for approval prior to application, including cuttings, seed, soil amendments, soil stabilizers and dye.

*It is recommended that the hydroseed application be completed using a Finn type hydroseeder. Other types of hydroseeder may be used, provided they use a Demming type centrifugal pump, and that they have recirculation plumbing and mechanical baffles. Mechanical agitator paddles with variable speed control extending the full length of the hydroseeder tank are a must.

*All hydroseed revegetation must follow the field supervision checklist supplied at the end of this document.

REVEGETATION MATERIALS

WILLOWS & REEDS

- Willow cuttings shall be harvested from within the vicinity of the project area, as approved by the landscape architect.
- Willow cuttings shall be harvested in a dormant state, in the autumn after the leaves have dropped from the branches. Do not cut willow stock with green leaves. Wait until the subject willows have gone dormant.
- Willow cuttings shall be approximately 18 inches in length or greater, and be first year growth averaging .40 to, 75 inches in diameter.
- Cuttings shall be free of scars, scrapes, disease or irregularities.
- Cuttings should be made with clevis type pruning shears or lopping shears.
- The bottoms of cutting should be cut at 45-degree angles, the tops 90-degree angles.
- Cutting should be made the day they are planted; temporary storage of cutting while awaiting planting should be covered with a damp burlap bag. Do not place cuttings in a bucket of water to store, as this rapidly depletes valuable carbohydrate reserves.
- The top of all cuttings should be sealed with TreeKote or similar tree seal asphalt compound, preferably one including fungicide to protect cuttings from pathogens. TreeKote should be permitted to dry before cuttings are planted, about 30+ minutes.
- The bottom of all cuttings shall be treated with a rooting hormone compound containing Iodale 3-bulric acid at .01% concentration, common to superior rooting compounds used for willows, roses or tree stock. Hormodin-3 is the common brand name product used by many large commercial growers of willow species and is a recommended rooting hormone for this use. The rooting hormone is a dry powder, and the bottom cut may have to be wet with water to make the hormone stick to the 45 degree angle bottom cut. The rooting hormone should be permitted to dry on the cut stub prior to inserting the cutting into the planting hole. The rooting hormone normally dries in less than 10 minutes.
- The planting hole should be dug by hand or bored using a power auger to width of no less than 4 inches, to a depth of at least 24 inches.
- The planting holes should be placed at the water line of the

channel, with the bottom of the holes no higher than the low water line such that soil is wet. This will insure adequate moisture supply for the willow to grow.

- The cuttings should be planted using a blend of topsoil mixed with approximately one gallon of Fertile-Fibers Nutra-mulch blended with the same soil amendments specified for the hydroseed application in that area. Do not plant with a pure mixture of Fertile-Fiber & soil amendments, as the soil blended with these soil amendments products is an important component of the revegetation effort.
- No more than six inches of the willow cutting should protrude above the backfilled hole, generally with about two growth nodes present along the six-inch length of the cutting. Cutting not having growth nodes along the top six inches should be discarded, as they will not grow. Inspection for these growth nodes on the top six inches following planting is important.
- Planting holes with the willow cuttings should be backfilled with the soil-mulch combination and gently packed into place. Excess soil should be ringed around the cutting hole to better enable capture of rainfall.
- Final inspection of all willow cuttings should be conducted to insure that all are planted as per specifiction, that growth nodes exist on the exposed portion of the cutting, and that the TreeKote was appropriately applied. If any scrapes are evidenced, cover with TreeKote or replace the willow cutting.
- Place appropriate signage on the periphery of the site such that neighbors do not disturb the willow revegetation zone, cautioning them to keep pets from digging or disturbing the willow cutting planting area.

Alternative to willows

Given the varying nature of the water levels in several wetland areas along the highway 93 corridor, the success of willow planting may be in question. Successful revegetation using herbaceous wetland plant materials would be a functional alternative, should the landscape architect so determine. Baltic Rush *Juncus balticus* _____ *(and other species as determined by the landscape architect)* could be successfully planted at the existing water line using seeding techniques similar to those identified in the Revegetation section identified below. Soil amendments and stabilizers would remain the same in each designated area. Container stock plantings may also be considered, though experience indicates seeding is more economical and quite effective.

Another functional alternative would be to plant (to be defined by landscape architect) sedge and or rush plants or seed along the margins of the present water flow. These plants are stout, cool season, rhizomatous, native, sod-forming grass-like perennials. Live plants of these species are to be found through out the valley, and can be successfully transplanted at almost any time of year, though dormant transplanting generally works better. Clumps of live plants can be broken into smaller groups, approximately the diameter of a soccer ball, and replanted in the wet soil of the existing waterway. If seed is to be used, it is again wise to

Appendix C—Soil Amendments

obtain this seed from an area with similar elevation and soil types. Use the below listed soil amendments in seeding efforts.

MO- 1a REVEGETATION SEED BLEND – Woody Mix

Botanical name
Common name PLS lb/acre

To be determined

Total

lbs/acre

MO-2a REVEGETATION SEED BLEND – Grasses Mix

Botanical name
Common name PLS lb/acre

To be determined

Total

lbs/acre

*All seed shall conform to state and federal regulations pertaining purity, shipping and inspection. Weed seed and inert matter content shall be the minimum permitted by law. Viability (TZ) tests shall be no more than six months old. Seed shall be shipped in unmixed bags to the landscape architects field office for approval and testing at least 30 days prior to application. No substitutions will be permitted. After testing and approval by the landscape architect, the seed may be blended and placed in one-acre bags for use by the hydroseed contractor. The landscape architect or designated field supervisor shall maintain control over the seed at all times prior to actual placement into the hydroseed tank.

SOIL AMENDMENTS as per site designation code

SITE 1-1

15 lb/acre Magnesium
15 lb/acre elemental Sulfur
1 lb/acre Boron (liquid form)
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 1-2

15 lbs/acre Magnesium
15 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 1-3

25 lb/acre Phosphorous
25 lb/acre Potassium
15 lbs/acre Magnesium
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 1-4

1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 2-1
20 lbs/acre Phosphorous
5 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 3-1

20 lb/acre Phosphorous
25 lb/acre Potassium
10 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Kiwi Power

SITE 3-2

20 lb/acre Phosphorous
10 lbs/acre elemental Sulfur
15 lbs/acre Magnesium
1 lb/acre Zinc (chelated liquid form)
2 ton/acre Quattro Fertile-Fibers
5 gal/acre Kiwi Power

SITE 3-3

20 lbs/acre Phosphorous
60 lbs/acre Potassium
15 lbs/acre Magnesium
20 lbs/acre elemental Sulfur
1 lb/acre Boron (liquid form)
2 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 4-1

20 lbs/acre Phosphorous
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 4-2

20 lb/acre Phosphorous
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 4-3

20 lbs/acre Phosphorous
50 lbs/acre Potassium
15 lbs/acre Magnesium
1.5 lbs/acre Zinc (chelated liquid form)
1 lb/acre Boron (liquid form)
2 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 4-4

15 lbs/acre Magnesium
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 4-5

20 lbs/acre Phosphorous
15 lbs/acre Magnesium
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 5-1

25 lbs/acre Phosphorous
15 lbs/acre Magnesium
5 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 5-2

25 lbs/acre Phosphorous
5 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 5-3

20 lbs/acre Phosphorous
25 lbs/acre Potassium
15 lbs/acre Magnesium
10 lbs/acre elemental Sulfur
2 tons/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 6-1

15 lbs/acre Magnesium
5 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 6-2

1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 6-3

1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 6-4
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 7-1

25 lbs/acre Phosphorous
30 lbs/acre Potassium
15 lbs/acre Magnesium
10 lbs/acre elemental Sulfur
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 7-2

25 lbs/acre Phosphorous
60 lbs/acre Potassium
15 lbs/acre Magnesium
1 lb/acre Boron (liquid form)
2 tons/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 7-3

20 lbs/acre Phosphorous
25 lbs/acre Potassium
15 lbs/acre Magnesium
10 lbs/acre elemental Sulfur
1 lb/acre Boron (liquid form)
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

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SITE 8-1

80 lbs/acre agricultural Lime
15 lbs/acre Magnesium
10 lbs/acre elemental Sulfur
1 lb/acre Boron (liquid form)
1 ton/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SITE 8-2

25 lbs/acre Phosphorous
75 lbs/acre Potassium
15 lbs/acre Magnesium
20 lbs/acre elemental Sulfur
1.5 lbs/acre Zinc (chelated liquid form)
1 lb/acre Boron (liquid form)
2 tons/acre Quattro Fertile-Fibers
5 gal/acre Quattro Kiwi Power

SOIL BINDERS AND STABILIZERS

- On slopes of 4:1 or flatter apply 150 lbs/acre of Cliffhanger tackifier.

- On slopes steeper than 4:1 apply Atlas SoilLok at a rate of 65 gal/acre. When applying Atlas SoilLok it is imperative that the **site be pre-wet** to a depth of at least .50 inch before application. Under no circumstances should this product be applied to dry ground. Furthermore, it is critical that sites treated with Atlas SoilLok remain rain-free for at least 48 hours, note that 72 hours of rain-free curing time is required at lower temperatures (nighttime temperatures below 40 degrees). This product requires time to cure in order to obtain its holding power. The duration of the rain-free cure time is imperative to insure the integrity and holding power of the specified Atlas SoilLok.

- Tackifibers are added to both the Cliffhanger and Atlas SoilLok to increase structural integrity and holding power and help the seed and mulch remain in place.

- Signage will be placed on the periphery of the seeded areas informing the local public to stay off the seeded areas. It is suggested that the areas immediately adjacent residential neighborhoods be staked and roped off to better inform the public of the boundaries of the revegetation area. Metal stakes commonly used with electric cattle fencing are inexpensive and effective for this application. The unobtrusive and inexpensive b right yellow nylon rope, .25-inch diameter, as commonly used on golf courses to identify areas under repair works well for this use with the metal stakes.

HYDROSEED APPLICATION

The revegetation contractor *must* inform Landscape Architect of intent to proceed at least 24 hours in advance with hydroseeding. A check of the weather forecast should insure the requisite rain-free cure time for the Atlas SoilLok. Client representative and/or Landscape Architect shall supervise this hydroseeding process to insure that the products are installed in the hydroseed tank and applied correctly. These procedures may be an unfamiliar to most contractors and this supervision will help ensure a successful outcome. The following procedures should be strictly followed with absolutely no modification in sequence.

- The hydroseeder should be thoroughly flushed and cleaned before any water or amendment is added to the tank. The landscape architect should be present to insure that all residual matter from previous uses is cleaned from the tank, lines and hoses. It is common for reside from

previous projects to be present in the hydroseeder tank and lines, which must be eliminated to insure best results.

- The hydroseeder should be filled only half full with clean water.
- The Fertile-Fibers may be added first.
- Dry soil amendments not blended with the Fertile-Fibers may then be added to the hydroseeder tank.
- The Kiwi Power may then be added to the tank, being sure th o have shaken the container to get all materials into suspension, followed other liquid soil amendments.
- The Cliffhanger tackifier, or Atlas SoilLok may then be added to the hydroseeder tank.
- The Tracer-Pacer dye is then added.
- Tackifibers are then put into the tank.
- If necessary the tank may be topped off with clean water to make a full load.
- The hydroseed truck is then driven to the site with the agitator running, and only then, after reaching the seeding site is the seed inserted into the tank at the very last minute. The less agitation of the seed in the tank the better. Extended periods of agitation may damage some seeds. Time is of the essence. Do not let the hydroseeder sit with the agitator running. Once the seed is inserted into the tank, smooth orderly application should proceed.
- Two light passes are always better than one heavy spraying from the hydroseeder. The two pass approach with a fine mist nozzle on the hydroseeder works much better. Remember, when using Atlas SoilLok the site must be pre-wet to insure the products integration with the soil.
- When seeding ensure that the hydroseeder engine is running at top speed to insure even blending of the seed, mulch, tackifibers and soil amendments. Operating the hydroseeder at low speeds while seeding will lead to clumping of the fibers and overall poor application, which will adversely impact the entire revegetation effort. This higher engine speed of operation is quite important for both blending and proper pumping.

***CAUTION TO CONTRACTORS- Hydroseed applicators have forgotten to put the seed into the tank.** Even seasoned applicators will forget, as the above sequence is atypical from mixing that is typically done for most wood-fiber lawn seeding. The contractor shall give landscape architect 24 hr. prior to initiating hydroseeding to insure he/she may observe that seed goes into the hydroseed tank.

MAINTENANCE.

Maintain for one year following treatment should be contracted for, this to insure there is no evidence of erosion, such as rills or gullies. This may require re-application of seed, soil amendments, mulches, stabilizers and or tackifiers.

Weeding shall be consistent with all existing State, Federal, and County regulations and plans. Herbicide used for abatement shall be a glyphosate @ 3lb# a.e./A(3.33 kg a.e./ha.) labeled for use next to water either Rodeo pro/A or product equal, as approved by the landscape architect. Following an early season mowing and/or disk in, apply herbicide to shoots that have resprouted.

The Contractor shall continually survey the site during the warranty period for occurrence of these plants and immediately notify the landscape architect if suspect species are present. Removal and abatement, at minimum, shall consist of mechanical treatment (e.g. mowing, pruning and removal of vegetation and dead material) in combination

Appendix C—Soil Amendments

with herbicide applications.

PERFORMANCE STANDARD AND ACCEPTANCE.

Revegetated areas will be inspected at completion of installation and accepted, subject to compliance with specified materials and installation requirements. If adequate coverage was not achieved, the Contractor will be required to re-seed, re-soil amend, and/or re-tackify.

The landscape architect, upon Contractor's request, will make final inspection and acceptance at the conclusion of the maintenance period, one full year following completion of seeding. Provide notification of at least ten (10) working days before requested inspection date.

Soil Test Plots

DESIGN SEGMENT		SAMPLE NO.	LOCATION
SEGMENT 1	1-1	**Camas prairie area north of Evaro**	
	1-2	Highway fill at Evaro	
	1-3	Wildlife Over-crossing	
	1-4	East fork of Finley Creek	
SEGMENT 2	2-1	Dirty Corner or S. of Arlee	Both samples had identical results
SEGMENT 3	3-1	Jocko River	Wetland area
	3-2	"	Upland area
	3-3	"	Cut slope with shale
SEGMENT 4	4-1	Schall Flats	
	4-2	Jocko Spring Creek	
	4-3	Ravalli Curves	
	4-4	Jocko side channel (meadow)	
	4-5	Jocko side channel (channel)	
SEGMENT 5	5-1	Bison Range	
	5-2	Pistol Creek	
	5-3	Interpretive pull-out on east road side	
SEGMENT 6	6-1	Mission Creek	
	6-2	Highway fill	
	6-3	Post Creek tributary drainage	
	6-4	Post Creek drainage (upland)	
SEGMENT 7	7-1	Ronan Canal	
	7-2	Pablo dunes area	
	7-3	Median at Lutheran Church at end of segment	
SEGMENT 8	8-1	Cut slope at Glory Road	
	8-2	Polson fill material	