

9 IMPLEMENTATION

9.1 INTRODUCTION

A successful revegetation project requires not only good planning, but effective implementation of the plan. The Initiation Phase of this report (Chapters 2 and 3) described the organizations, decision processes, and technical concepts involved in beginning a roadside revegetation project. The Planning Phase (Chapters 4 through 7) culminated in the Revegetation Plan, combining strategies for mitigating limiting factors, utilizing site resources, and revegetating the site. Now, in the Implementation Phase, the plan will unfold in the field.

The shift from the Planning Phase to the Implementation Phase involves a change in approach. The planning process tends to be orderly and systematic, with the planner able to take an idealized bird's eye perspective of how the project might best proceed. In contrast, implementation is approached from the ground up, and requires flexibility and adaptability in order to fulfill the objectives of the plan while working with the unpredictable realities of the field.

While the plan guides the project, few projects are implemented exactly as planned. Each project is unique, with its own set of issues and challenges. Schedules and supplies change, unforeseen circumstances intrude, and new opportunities emerge. Teamwork, cooperation, and effective communication with project managers and inspectors will enable the revegetation specialist to utilize all available resources to make the revegetation plan successful. Good planning and a systematic approach to implementation lay the groundwork to acquire necessary materials to revegetate the site, including services, seeds, topsoil, and nursery-grown plants. In the Implementation Phase, flexibility, adaptability, and creativity in obtaining and installing these materials will be important. For example, seed mixes, application rates, and installation methods might have to be modified due to new information or unforeseen circumstances. Lessons learned can lead to new and innovative approaches to revegetation.

The tasks for successfully implementing a revegetation plan are to:

- 1) Review plans with construction engineer,
- 2) Review revegetation treatment details and timelines,
- 3) Develop contracts,
- 4) Install treatments,
- 5) Keep good records,
- 6) Carry out quality control, and
- 7) Implement early maintenance and monitoring.

This chapter is a general overview of the implementation process. Following this chapter, Implementation Guides provide details on the key factors to consider, including soil and site treatments, obtaining plant materials, and installing and caring for plants.

9.2 REVIEW PLANS WITH CONSTRUCTION ENGINEER

The Initiation Phase highlighted the key working relationships for the revegetation specialist to develop during the revegetation process. For some projects, the same engineer will be the contact from project inception through its completion. For more complex projects, the design engineer may hand off the road plans for the construction engineer to implement. Regardless, the engineer who will be on-site during road construction is an essential relationship for implementing a successful revegetation plan. A relationship with both staffs is essential. The design engineer will assure that revegetation plans are designed into the construction plans, schedules, materials lists, and so on. The construction engineer, who will be on site during all phases of road construction, will interpret and implement designs with the input and interpretation of the revegetation specialist. Complex designs, such as soil-faced gabion walls, planting pockets, plantable rockeries, and so on, require more involvement from all participants.

The construction engineer can greatly facilitate all aspects of revegetation by providing construction timelines by road segment, modifications, updates, site specific information,

and treatments by segment. The construction engineer can also help with techniques, experience, and equipment, and assure that any special contract requirements are upheld and implemented correctly. Remember that the Implementation Phase for revegetation begins prior to road construction and continues after construction is complete, so if there are two separate engineers, activities must be coordinated with both.

Before construction begins, a meeting should be scheduled with the construction engineer to discuss the Revegetation Plan. This meeting will cover the objectives for revegetation and the tasks that need to be coordinated with road construction activities. The revegetation plan should be taken to the project site and issues that might be associated with the various revegetation tasks should be discussed. The construction engineer needs to be aware of all details of the revegetation treatments and how they are to be implemented. Plan on-site project reviews early to discuss plans and allow ample time to overcome difficulties in integrating construction and revegetation design. Identify and assess potential areas of conflict between road construction activities and revegetation objectives. Review these potential conflicts one-by-one, and discuss ways to resolve them. Special contract requirements (discussed in Chapter 2) should also be reviewed. These may cover topics such as topsoil salvage, slope treatments, or other key practices. The construction engineers will also have ideas that can help translate revegetation plans to construction contractors.

Of course, it is best to minimize site disturbances in the first place. During the Planning Phase, collaboration with the design engineer is essential in potentially reducing the size of the construction footprint of the project. The construction engineer can often identify opportunities for reducing potential problems, in some cases, making changes that can modify or even eliminate certain construction or revegetation treatments.

During these meetings, it is critical to respect and learn from the experience and insights of the construction engineer. They may have worked with revegetation treatments on other road projects and could have ideas on installation methods on the current project. There are many ways to achieve revegetation objectives; collaboration between the construction engineer and the revegetation specialist will always create the best results. With your combined expertise, new and innovative approaches can also be created.

After the development of treatment details and timelines, another meeting should be scheduled to get the construction engineer's input and to double-check quantities, areas, supplies, and equipment for revegetation treatments. As road construction proceeds, periodic meetings should be scheduled to discuss conflicts and refine revegetation plans.

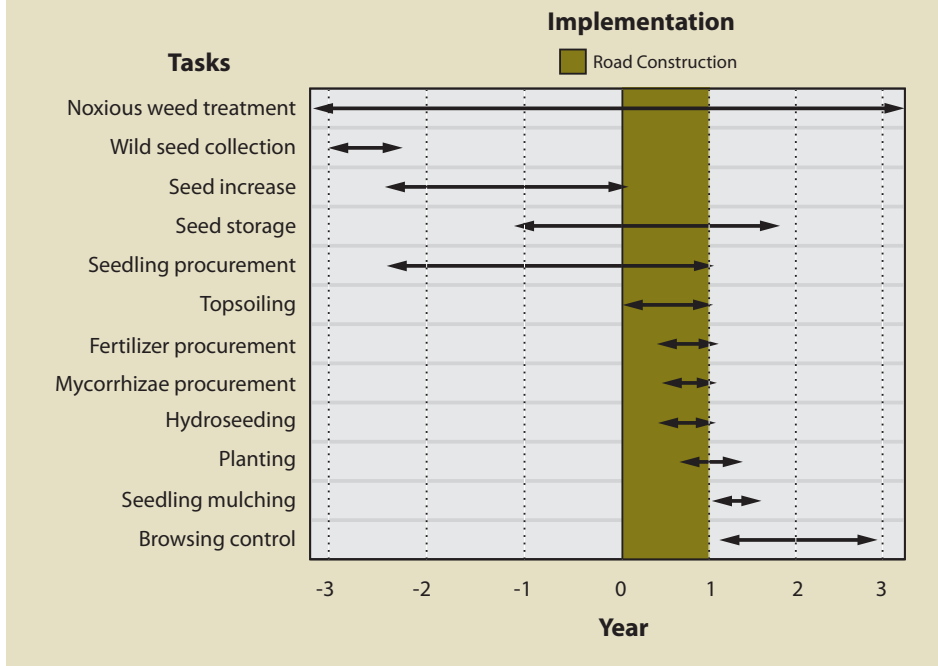
Before road construction begins, roles and responsibilities on the job site need to be clearly defined. Refer to procedural manuals for the agencies involved and make sure you follow their chain of authority. The revegetation specialist must coordinate directly with the construction engineer. The construction engineer will be directing all phases of road construction, and you must always ask permission to communicate directly with any of the contractors. Remember, your role as a revegetation specialist is not to direct the construction contractors, but to play an advisory role so that all contract requirements can be carried out effectively and on schedule.

The more that you are on site during all phases of construction, the stronger your relationships with the construction engineer and construction contractors will be. These strong working relationships will ensure that all revegetation plans will be implemented successfully. Sometimes, spur-of-the-moment meetings must be called to address immediate problems or to adapt to shifting tactics. You must understand that all road projects will not go exactly as planned, so be as responsive as possible.

9.3 REVIEW TREATMENT DETAILS AND TIMELINES

The Revegetation Plan will outline all of the treatment details, quantities, and schedules for the project. However, details often need to be revised or defined more specifically. Accurate and reasonable calculations and schedules will help the revegetation specialist collaborate more effectively with contractors and agency suppliers. At this stage of the process, you should refine calculations and timelines in sufficient detail to begin the contracting process. Calculating and rechecking areas to be treated, needed equipment and supplies, and schedules and budgets will ensure that contracted items are accurately identified and defined.

Figure 9.1 – Example implementation timeline. Implementing the revegetation plan often requires separate schedules and different contractors, so coordination is essential.



In general, four types of implementation activities take place in revegetation, and the Implementation Guides following this chapter give specific details and follow the same general organization:

- 1) Implementing Site and Soil Treatments: fertilizers, tillage, mulches, topsoil, organic matter amendments, lime amendments, beneficial soil microorganisms, and topographic enhancements.
- 2) Obtaining Plants: collecting wild seeds, collecting wild cuttings, collecting wild plants, nursery seed production, nursery cutting production, and nursery plant production.
- 3) Installing Plants: seeding, hydroseeding, installing cuttings, installing plants.
- 4) Caring for Plants: post installation care.

Advanced planning is essential. Many implementation tasks begin up to three years before road construction. Proper planning will ensure that all materials will be ready at the appropriate time during the construction phase. (Planting can occur as early as year one in a multi-year construction project.) Be aware that procuring plant materials and implementing mitigating treatments will involve separate schedules with different contractors. Therefore, developing an implementation timeline is essential in order to keep all scheduling details straight. An example of an implementation timeline is shown in Figure 9.1.

Most timelines have interdependent and time-linked tasks. In Figure 9.1, for instance, the hydroseeding contract is dependent on the success of the seed increase contract. Before that, the seed increase contract depends on the wildland seeds collected by agency personnel or contractors. The success of the hydroseeding contract rests on the successful execution of two tasks that must begin years before hydroseeding implementation. Detailed schedules and timelines are necessary to coordinate these activities. The Implementation Guides provide more detailed information on how to organize and schedule the various tasks.

When creating timelines for tasks, be sure to incorporate the advance time needed to issue contracts. This is especially crucial when ordering plant materials, which will require several years before needed species and quantities can be grown. However, even for routine procurement of equipment or supplies, nine to twelve months of advance notice will result in better prices, since suppliers will have more time to plan their orders. Reputable contractors have plenty of

Figure 9.2 – How to calculate areas being treated.

Station	Slope Length (m)	Distance between stations (m)	Area (m ²)
20 + 1000	3	20	60
20 + 1020	4	20	80
20 + 1040	6	20	120
20 + 1060	7	20	140
20 + 1080	6	20	120
20 + 1100	4	20	80
20 + 1120	2	20	40

Total (m²): 640

Acres: 0.16

work and may not be available on short notice. Implementation Guides provide more detail on scheduling and contracting timelines for individual tasks.

Renting equipment and calculating quantities of materials is an essential part of implementation. In many cases, the construction engineer can provide you with information regarding cubic volumes, surface areas, and haul distances as they refer to plans and specifications. Accurate calculations are essential to develop contracts for various tasks. Figure 9.2 shows example calculations to determine areas being treated. Further details on developing quantity specifications for the various tasks of implementation can be found in the Implementation Guides following this chapter.

Once treatment details and timelines have been developed, meet with the construction engineer and review quantities, timing, materials, and equipment, as well as overall strategies. If areas are only estimates at this stage due to possible changes while the road is constructed, express them as ranges (e.g., 40 to 50 acres) when issuing contracts. After the site has been prepared, you can narrow these ranges down to exact numbers. Be sure to allow for contingencies, especially when ordering seeds. Once you feel confident about the details and timing, develop contracts to carry out the work.

9.4 DEVELOP CONTRACTS

A contract functions as a detailed plan for each task or set of tasks, communicating the desired outcome for the work. Contracts are essential tools for implementing revegetation treatments. Even if the work is to be carried out by personnel within the agency, approaching the tasks as if they were private contracts will facilitate clear communications and a high-quality job. (Check agency procedural manuals for how to create in-house agreements.) The Revegetation Plan and the treatment details (developed above) are used to create a contract. The contract details the implementation work to be done by the contractor or agency personnel for that task, with clear definitions of roles and schedules.

Depending on the complexity of the project, multiple contractors are usually involved. As emphasized previously, developing contracts well in advance of the work is necessary in order to ensure proper scheduling. Contracts vary by the type of work to be done and by the types of parties involved. In general a contract should define:

- Supplies/services to be provided;
- Scope of work (size, schedule, and so on);

- Project location;
- Contractor obligations;
- Revegetation specialist obligations;
- Delivery details (who, how, when, including timelines and deadlines);
- Quality standards;
- Contractor quality assurance plan (to be provided by contractor);
- Revegetation specialist quality assurance plan (to be provided by revegetation specialist who will be inspecting the contractor's work);
- Price;
- Payment method (submission of invoices, approval of work);
- Contractor's designated representative (so you only coordinate with one person);
- Safety plan; and
- Other terms and conditions (e.g., what to do in the event of changes).

Usually you will put out a call for proposals for a task with most of the above details included. Contractors will provide their offers for completing the work, including their plans for safety and quality control. For technical work, the contractor usually provides an explanation of the proposed technical approach for each task to be performed. The most suitable contractor is selected for the task and then the details are worked out in writing. Make sure that the contractor designates one representative to be your contact person for the project; having just one "point of contact" reduces confusion and makes communication easier. Also, when detailing "other terms and conditions," especially for plant materials, make sure there are clauses that cover possible variations in quantity or quality. For example, low quality seeds may still be usable, but perhaps a fair price reduction can be agreed upon if the germination is below the contract specifications.

Quality control is essential for every implementation task. Quality control plans assure that the contracted tasks were performed as planned. Usually the contractor provides a quality control plan describing how their organization will monitor their work and assure that the contract is efficiently fulfilled. The revegetation specialist must also define, in advance, the standards by which work will be assessed and detail how work will be inspected. Predefined quality standards are essential to assure that everyone is working towards the same clearly defined goal to achieve the DFCs for the project. More information on quality control is provided in the next section. An example contract (between the USDA Forest Service and a private contractor) is provided on the following pages.

9.5 INSTALL TREATMENTS

The Revegetation Plan, in part, is based on the construction plans and predicted post-construction outcomes. However, after road construction is complete, you will often find that the predictions do not exactly match the reality. In addition, materials available may change. To adapt to these unplanned changes, implementation tasks are updated during and after construction based on actual changes to the site or actual materials available at the time of implementation. A concise revegetation plan, combined with clear contract performance work statements and consistent communication, will provide an adaptive framework from which change can readily occur.

Prior to installation of treatments, several questions should be asked and evaluated. First, determine if there are any major unplanned construction changes that require new road plans and cross-sections. If so, these changes need to be documented on the revegetation map and a plan needs to be developed to revegetate them. Second, reassess the limiting factors to revegetation success as described in Chapter 5. For example, is the rooting depth as predicted? Is there fracturing in the bedrock? Are some slopes steeper than originally designed? Was ground water intercepted? Is there enough topsoil salvaged to reapply at the planned rates? Are there areas of instability? Did unexpected weeds show up? If any of the answers are different than planned, mitigation treatments should be reevaluated. Third, reevaluate the revegetation unit map. Are the units located on the map correctly? Are the descriptions still valid? If they are not, then make the changes so each management unit can be developed properly. Adaptive

Example Contract							
Contract No.	53-04R3-4-045		Project Name:	Weston-Elgin Road Construction Project		County: Umatilla	
Contractor:			Issuing and Billing Office: Umatilla National Forest 2517 SW Hailey Avenue Pendleton, OR 97801				
Item No.	Sub-item No.	Description	Quantity to Date	Quantity Ordered	Unit	Unit Price	Amount
1		Hydraulically apply permanent seeding* to newly finished cut and fill slopes.					
	1a.	Fall 2005		40	Acre	\$3,000	\$120,000
	1b.	Fall 2006		5	Acre	\$3,300	\$16,500
2		Hand plant shrubs*, and conifers*, over 2 seasons.					
	2a.	Fall 2005, shrubs only		5,600	Plant	\$3.00	\$16,800
	2b.	Fall 2006**, conifers and shrubs. 2,700 conifers. 2,400 shrubs.		5,100	Plant	\$3.00	\$15,300
3		Pneumatically install compost/ mulch erosion blanket w/ seed* onto two (2) fill slopes.		2 acres	Acre	\$12,000	\$24,000
<p>Required Delivery Date: All work shall be completed by November 15, 2005. Work is estimated to begin October 15, 2005. All work shall be completed within 10 calendar days. Timing of current construction and access to work sites may necessitate work on weekends and short notifications to begin work.</p> <p>All items will be awarded to one (1) contractor.</p> <p>* Government supplied materials ** Contractor to perform subitems 1b and 2b together during Oct.-Nov. of 2006.</p>						<p>Total Price:</p> <p>\$192,600</p>	
Contractor: (Name and Signature)							
Requested By: (Name and Signature)							
Jim Scott, COTR							
Fund Authorization: (Name and Signature)							
Ordered By: (Name and Signature)							
Contracting Officer							
Order Date:			Job Code: WGF CNA				

EXAMPLE STATEMENT OF WORK

Weston-Elgin Road Construction Project, HWY 204
M.P. 10.65 to M.P. 20.77
Walla Walla Ranger District, Umatilla National Forest
Umatilla County, Oregon
Elevation 3,800 to 5,000 ft

Location of work:

The project area is located in Umatilla County, near Tollgate, OR and east of Athena, OR on Highway 204. Project is located between MP 10.65 and MP 20.77. Athena is located midway between Pendleton, OR and Walla Walla, WA along Highway 11. See attached map.

Construction of the road will span two seasons and require seeding and planting work to be performed in both the fall of 2005 and 2006, with the majority of work completed in 2005.

Description of Work and Standards:

- Item 1.** Hydraulically apply seeds, mulch, fertilizer, and tackifier to finished cut and fill slopes associated with new road construction. Provide permanent seeding for up to 45 acres of cut, fill, and adjacent obliterated road surfaces. Government will furnish all seeds. The majority of slopes will average 1V:2H with a small amount of 1V:1.5H. Areas are adjacent to existing paved road and/or graveled surfaces. The majority of work (95%) can be performed from the tower; however, a hose lay (up to 100 ft) will be required for a single large fill. The permanent seeding work window for this project will be between October 1 and November 15, 2005–6, unless alternative dates are mutually agreed upon.

Hydraulically combine and apply EcoFibre® (<http://www.canforpfd.com>) @ 2,000 lb/acre, Biosol® (<http://www.pawneebuttesseed.com>) at 1,200 lb/acre and Super Tack® at manufacturer's recommended rate; add XL crosslinker at 40% the weight of Super Tack® (<http://www.ranteccorp.com>) for slopes 1V:2H or steeper (approximately 5 ac).

Equivalent products may be substituted at the discretion of the government.

- Item 2.** Hand-plant 1+0 container and bareroot hardwood nursery stock in fall 2005. Hand-plant 1+0 hardwood container nursery stock and 2+0 conifer container stock in fall 2006. Use hand tools to plant styro-15 plugs, styro-40 plugs, and bareroot plant materials. Plant spacing distances will be assigned by the COTR for each site. Plant up to 10,700 individuals (in total, 2 years) in cut and fill slopes, obliterated road surfaces, and a short segment of riparian zones. Areas are adjacent to existing paved road and/or graveled surfaces. Planting work window for this project will be between October 1 and November 15, 2005–6, unless alternative dates are mutually agreed upon.

Contractor will be responsible for loading, transporting, and care of all living plant material once in possession in both 2005 and 2006. Contractor is responsible for all scheduling and delivery of plant materials from a private nursery in Milton-Freewater, OR. The facility is located on HWY 11 and is approximately 40 to 45 minutes from the project. Upon award, location and contact information will be provided.

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Roadside
Revegetation

Planned Weston-Elgin Revegetation Project Plant Materials for Fall Planting of 2005 and 2006

Species	Stocktype and Quantity			Total by Species
	Bareroot	Styro-15	Styro-40	
<i>Alnus viridis s. sinuata</i>	0	30	0	30
<i>Amelanchier alnifolia</i>	0	0	720	720
<i>Cornus sericea s. sericea</i>	0	175	0	175
<i>Holodiscus discolor</i>	0	0	1,160	1,160
<i>Physocarpus malvaceus</i>	476	250	1,330	2,056
<i>Populus trichocarpa</i>	0	0	80	80
<i>Rosa woodsii</i>	0	0	263	263
<i>Rubus parviflorus</i>	0	0	204	204
<i>Sambucus nigra s. cerulea</i>	0	192	0	192
<i>Sorbus scopulina</i>	0	0	620	620
<i>Spiraea splendens</i>	0	0	100	100
Total 2005	476	647	4,477	5,600
1+0 <i>Symphoricarpos albus</i>	0	0	1,500	1,500
2+0 Conifers	0		2,700	2,700
1+0 Additional shrubs			900	900
Total 2006				5,100

Item 3. Pneumatically install compost/mulch erosion blanket w/tackifier and seeds. Apply an even coverage 2 inches in depth over 2 acres of slopes ranging from 1V:2H to 1V:1.5H. Access will be from existing roads. **Contractor must provide compost specifications to the COTR prior to start work date.** Compost must conform to U.S. composting council standards and be state certified in Oregon and Washington. See evaluating compost quality (<http://www.compostingcouncil.org>) for standards of acceptable compost. **An accessible compost storage site will be provided within one (1) mile of the installation site. Site is accessible to trucks and trailers.**

Contractor Quality Control Plan:

The Contractor shall prepare a brief Quality Assurance Plan and submit it with the completed bid.

Government Quality Assurance Plan:

A qualified USFS COTR will be on site during all phases of project fieldwork, providing technical support and ensuring that project objectives are met. The contractor is fully expected to take an active role in providing, sharing, and advising in technical aspects that may benefit the project outcome.

The following plan is to be used by the Government for quality assurance:

Item 1. Application. Hydroseeding slurry mixture, rate of application, uniformity, and coverage will be inspected. Apply hydroseeding mix so no holes exist. Apply so that no gaps exist between the matrix and the soil. Application is not allowed over frozen ground or snow or during periods of extended rainfall. A tracer (mulch or dye) sufficient to visibly measure coverage and progress is mandatory

in each slurry unit. Follow-up monitoring to determine germination and survival will be carried out during May, July, and September 2006-7. Monitoring will be used to assess the effectiveness of treatment and determine whether follow-up treatments are needed to adequately stabilize seeded slopes. A follow-on contract may be issued for additional hydroseeding, if necessary, as determined by monitoring.

All equipment shall be free of weed seeds. Hydroseeding equipment shall be clean and free of all previous seeds, fertilizer, mulch, or any hydroseeding products used on prior jobs. Equipment will be inspected prior to initial applications. If equipment does not pass inspection, the contractor will be required to clean equipment off-site at an approved facility before returning to the project site. The Government may not be held liable for lost time due to re-cleaning of equipment.

Item 2. Shrub and tree planting. Vertical planting depth, site selection, species appropriateness, handling, mechanical damage during planting, that is, excessive broken branches, tops, and roots, excessive damage to bark which exposes cambium, will be inspected. Due to the perishable nature of trees and shrubs, care and protection is considered critical and will be carefully monitored throughout the planting schedule to ensure proper care. The COTR will frequently observe planting in progress, dig trees and/or shrubs to check underground planting quality, and observe planting methods. Follow-up monitoring to determine survival and establishment will be carried out during May, July, and September 2006-7. Monitoring will be used to assess the effectiveness of plantings and determine whether follow-up treatments are needed to adequately stabilize selected slopes. A follow-on contract may be issued for additional planting, if necessary, as determined by monitoring.

Item 3. Pneumatically install compost/mulch erosion blanket with tackifier, fertilizer, and seeds. Evenness and consistency of application to slopes will be monitored. Ingredients, additives, and injection will be monitored as well. Application is not permitted over frozen ground or snow or during periods of extended rainfall. Contractor must provide compost specifications to the COTR prior to work start date. Standards must conform to U.S. Composting Council standards. See evaluating compost quality (<http://www.compostingcouncil.org>) for standards of acceptable compost. The COTR will evaluate test results for compost furnished by contractor and randomly inspect and/or take samples from material stored on site. Government will furnish seeds.

Measurement and Payment:

Payment for hydroseeding will be on a per acre basis. Additional acreage will be paid at the stated contract price and performed via a follow-on contract. Payment for installed compost erosion blanket will be on a per acre basis. Payment for hand shrub and tree planting will be on a per plant basis.

Government Furnished Material:

The government shall provide all seeds to the project site. The government shall produce all conifers and shrubs; contractor is responsible for pick-up, delivery, and care during the contract period.

Schedule:

Treatment/Year	2005 (Acres/Plants)	2006 (Acres/Plants)	Total (Acres/Plants)
1) Hydroseeding	40 ac	5 ac	45 ac
2) Hand-plant shrubs and conifers	5,100 plants	5,600 plants	10,700 plants
3) Install compost and seeds	2 ac		2 ac

management is ongoing throughout all phases. Change is a certainty, and preparedness provides options and allows the revegetation specialist to respond to these situations.

The status of available materials must be determined. The final inventories should be obtained from the agency staff and contractors. The inventories will include the quantities of each species for seeds and/or seedlings, topsoil supply, and so on. Producers may not be able to deliver the exact quantities ordered. Seed producers may have succeeded in growing more seeds for certain species while producing less of other species. The nursery may have been affected by frosts, insects, disease, or other events that reduced the inventory for some species but not others. Just as likely, the nursery could have extra seedlings available for some species that could make up the shortage of others. Guided by the objectives and DFCs of the Revegetation Plan, the revegetation specialist must adapt to these changes and carry out the implementation tasks to the best of your ability using the materials and resources at hand.

9.6 KEEP GOOD RECORDS

During the Implementation Phase, keeping records often seems like a low priority. The field work demands a high level of energy and attention, and time for keeping records may tend to fall by the wayside. However, records are invaluable, and recordkeeping is an essential part of implementation. Records are essential in the short-term for reporting and accountability, including communicating with contractors and agencies. In the long-term, records are needed to assess what was done, what worked, and what did not work as the project unfolded so that optimal results can be recreated and failures can be avoided on future projects. It is almost impossible to remember what was done on a project several weeks, months, or years after implementation. However, it will be necessary to know what happened. Without good records, there will be no way of piecing together the causes of failure or success and little ability to share "lessons learned" with peers. Record-keeping and daily diaries are very important from a contractual view as well. As part of doing business, there is always a chance of a dispute leading to a claim by a contractor. Good records provide the foundation the contracting officer will need to defend the contract administrator.

Keep a notebook or manila folder that contains the final revegetation plan, contracts, diaries, spread-sheets, receipts, maps, and correspondence. Since the majority of this information may be electronic, keep a folder on your computer that contains all e-mails, spreadsheets, budgets, plans, and contracts. E-mails and phone conversations can be stored in one spreadsheet for all projects. The process of photo documentation of project development (as described in Chapter 11) is also important.

Keeping a simple daily log (or diary) is also invaluable. Take a few moments to jot down what happened at the project site each day until implementation is complete. Include thoughts of how things are going, any anticipated changes, and challenges and opportunities. An example daily diary form and template is provided in Figure 9.3. While the example shows a diary for contract work, the same template can be utilized to keep records of your own work, that of other agencies, and overall project development.

Records are also used to develop reports when it is necessary to document accomplishments to date. Reporting requirements vary, but some type of accomplishment report is usually due quarterly or annually. Monitoring reports (discussed more in Chapters 11 and 12) are essential in order for environmental agencies to ensure that you fulfilled objectives and appropriately addressed environmental regulations. While putting these reports together, take a few hours to organize the files and summarize the information in them. At the completion of the entire project, a final report is assembled based on the records that were kept throughout the project. For this reason, good record-keeping is essential.

9.7 CARRY OUT QUALITY ASSURANCE

To evaluate the effectiveness of implementation work, quality assurance standards are set and quality is monitored until each task is complete. The standards for quality assurance are linked to the DFCs that were set in the Planning Phase. In other words, many of the quality assurance standards translate aspects of the DFCs (e.g., desired percent vegetative cover) into short-term standards for implementation work (e.g., quantity of seeds applied). Details for quality assurance standards are defined in the contract specifications. The contractor will provide monitoring and inspection of their own work to assure that tasks are carried out as

Figure 9.3 – Example of contract daily diary (source: USDA Forest Service).

Contract Daily Diary <small>(Reference FSH 6309.11)</small>		1. PROJECT SITE Upper Grange Road																																	
		2. CONTRACT NO. 54-46-37																																	
3. PROJECT Upper Grange Road Revegetation (working on Reveg Units 1-3 today)																																			
4. CONTRACTOR Plant and Protect Inc.		5. CONTRACTOR REPRESENTATIVE ON SITE Jane McLean																																	
6. OFFICIALS ON SITE Me (Davis Lee)																																			
7. DATE 6/7/06	8. DAY OF WEEK Wed.	9. TIME ARRIVED 07:30	10. TIME DEPARTED 16:00																																
11. WEATHER Overcast, Thunderclouds west																																			
12. TEMPERATURE °F Min. 45 Max. 55		13. GROUND CONDITION Moist, firm — good condition																																	
14. CONTRACT TIME 6/7/06 to 6/14/06		15. DAYS USED 1	16. COMPLETION DATE																																
17. TIME USED (%) 14%	18. WORK COMPLETED (%) 20%	19. WORK ON SCHEDULE <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO																																	
20. CONTRACTOR'S WORK - (X Appropriate Box) <input checked="" type="checkbox"/> Acceptable <input type="checkbox"/> Unacceptable <small>Explain in Narrative</small>																																			
21. CHANGE ORDERS/AMENDMENTS ISSUED No changes yet, may reschedule tomorrow if heavy rain continues tonight.		22. WORK ORDERS ISSUED (Include SUSPEND/RESUME) Install hydromulch (blow on compost & seed mix)																																	
23. MATERIALS FURNISHED TO JOB SITE <small>(Furnished by G-Govt., C-Cont; S-Subcont.)</small> Seed mix RRCA5, 50 lbs for use w/mulch (G)		24. LIST EQUIPMENT ON SITE <small>(Furnished by G-Govt., C-Cont; S-Subcont.)</small>																																	
		Type	Contract Item Number and Location of Use																																
537 yards of certified compost (for mulch) (C)																																			
			Mack truck w/ lowboy (C)																																
			Cat 9506 loader (C)																																
			Kenworth truck with Finn blower																																
			Jane's SUV (C)																																
			Hydroseeder (C)																																
			Trailer w/ mulch loads																																
25. List Contract Payments, Reports, Correspondence, ETC. <table border="1" style="width: 100%;"><thead><tr><th>Item</th><th>Prep</th><th>Submit</th></tr></thead><tbody><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr><tr><td></td><td></td><td></td></tr></tbody></table>		Item	Prep	Submit													26. Workers On Site <table border="1" style="width: 100%;"><thead><tr><th rowspan="2">Classification</th><th colspan="2">Number</th></tr><tr><th>PRIME</th><th>SUB</th></tr></thead><tbody><tr><td>Harry Medford (truck)</td><td>1</td><td></td></tr><tr><td>Julio Valdovinos (hydro)</td><td>1</td><td></td></tr><tr><td>Lila Carey (mulch)</td><td>1</td><td></td></tr><tr><td>Jane McLean</td><td>1</td><td></td></tr></tbody></table>		Classification	Number		PRIME	SUB	Harry Medford (truck)	1		Julio Valdovinos (hydro)	1		Lila Carey (mulch)	1		Jane McLean	1	
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27. Government Provided Services Adequately and Timely <input type="checkbox"/> YES <input type="checkbox"/> NO - Explain in Narrative																																			
28. NARRATIVE REPORT Met with Jane and crew (Harry, Julio, Lila) from 07:30 - 08:15. Looked over project site and reviewed compost/seed installation strategy. Talked safety: traffic, orange vests, PPE, working around equipment, evacuation plan in case of injury, equipment, footing OK! I inspected compost, appears high quality (collected 6 samples to be combined for test later). 08:30 crew began to unload and stage equipment, loading compost into blower (25 yds) mounted on Mack truck. Jane and Davis inspect reveg units/areas and explored secondary source of water (east end) if needed, permit OK. 09:30 crew began blowing compost/seed mix onto Reveg Units 1 & 3. Good job with careful hose placement. 14:00, rain began, a sprinkle then a downpour. 16:00, stopped work for day, compost becoming heavy with too much water so not blowing as far. If dries out overnight, will resume application tomorrow. Otherwise will have to postpone until dry enough to blow. Looks like rate can be 7-8 loads/day possible in good conditions. No other issues.																																			
29. SIGNATURE Davis Lee 06/07/06		30. TITLE Reveg Specialist	31. ADDTL SPACE NEEDED <small>(Continued on 6300-21)</small>																																

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contracted. The revegetation specialist is responsible for assessing the quality of each task to assure all tasks were satisfactorily completed and all contract requirements have been met so the contractor can be released from further obligations and fully paid.

On revegetation contracts, project objectives or standards are typically referred to as contract specifications. For example, a hydroseeding contract has a specification to apply 30 lb of seeds, 1,000 lb of wood fiber mulch, and 50 lb of tackifier per ac to 20 ac of cut and fill slope. Quality control for this task might be to count the pounds of seeds, wood fiber, and tackifier going into the hydroseeder tank and measure the area to which the mix is applied. This assessment can assure that the rate of materials applied on a per-acre basis is appropriate. If the calculated amount of material per acre does not match the stated objective or contract specifications, the amount is adjusted to meet the specifications. Quality assessment not only assures that the contractor meets his or her obligations, but alerts them when specifications are not being met

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so that corrections can be made. For any task, quality assurance standards describe what form of measurements will be used to assess the work.

9.8 IMPLEMENT EARLY MAINTENANCE AND MONITORING

Just after implementation, short-term monitoring of the project begins. Short-term monitoring is necessary to confirm that efforts to establish vegetation on the site were effective, and to correct shortcomings to ensure project objectives are achieved. Quality assurance confirmed that the predetermined amounts of fertilizer, tackifier, hydromulch, and seeds were put into the hydroseeding tank as specified, and that the materials were placed in the correct areas at the correct density. Short-term monitoring then determines whether the revegetation objectives of the plan were met using these rates and materials. For example, were germination rates sufficient? Are the plants surviving and becoming established? Short-term monitoring assesses project development as it relates to the DFCs. If objectives are not being met, determining the reason(s) should become a priority before further revegetation work is proposed. Short-term monitoring and management of roadside revegetation projects is discussed in Chapters 11 and 12. The information from short-term monitoring determines the level of maintenance that will be carried out to keep the project developing as planned.

Timelines for roadside revegetation projects can span several seasons or even several years, which means that early maintenance of some road segments will be taking place at the same time that other segments are being implemented. Sometimes, maintenance work is built into the contract as part of implementation. Once contract work is completed and the contractor has been released (final satisfactory inspection), maintenance begins. Most maintenance tasks will have been planned in advance, such as applying fertilizers after three months, or passing through to control weeds. Early maintenance also includes identifying and correcting unforeseen problems quickly. Unforeseen events include weather problems (e.g., drought), an unexpected invasion of weeds, impacts of pests, vandalism, or other issues that might mean that the project will not develop as planned unless corrections are made. If corrective measures are needed, additional contracts may be issued to carry out the tasks. Road maintenance must also be coordinated with the revegetation plan. This could ensure that herbicide is not applied to the newly planted areas. Discussion of monitoring and management continues in Chapter 11.

9.9 CONCLUSION

The Implementation Phase calls for flexibility, adaptability, and opportunism. At times, the implementation work demands a willingness to travel to the construction site on short notice to assess issues as they arise. The process requires the vision to fulfill the overall project objectives while working with, and adapting to, the resources and conditions at hand. Keeping channels of communication open with the construction engineer and with the revegetation contractors is an essential aspect of effective implementation. Advanced scheduling and careful calculations of timing, supplies, and services needed are necessary. Issuing clear contracts for implementation work, regular evaluations and quality assurance as treatments are carried out, and good recordkeeping are necessary to ensure the revegetation is implemented effectively. Short-term maintenance and monitoring help to identify and correct any shortcomings quickly in order to fulfill project objectives. The Implementation Guides following this chapter provide further details about individual implementation tasks, including working with soil and site treatments, obtaining plant materials, installing and caring for plants.