EP-DIV-GUIDE-20211, R.0

Inspection Guidance for Environmental Programs Watershed, Retention, and No Exposure Controls

Effective Date: 12/19/2014

Guide Owner:	Signature:	Date:
Steven Veenis	/s/ Signature on File	12/16/14

REVISION HISTORY

Document No./ Revision No.	Issue Date	Action	Description
EP-DIV-GUIDE-20211, R0	12/19/14	New document	New Document

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1. PURPOSE AND SCOPE

The purpose of this document is to provide guidance on inspection requirements of watershed controls, retention controls, and no exposure controls.

2. BACKGROUND

Storm water controls, such as watershed and grade-control structures, require inspection and maintenance for the proper operation and long-term stability of the control. Watershed controls are installed as a requirement of the Compliance Order on Consent. Total retention and no exposure controls are installed to meet the requirements of the Individual Permit for Storm Water (National Pollutant Discharge Elimination System Permit No. NM0030759) (IP).

3. EMERGENCY ACTION PLAN

While the majority of controls addressed in this guidance do not impound enough water to cause major flooding in the event of a failure, structural failure and impending structural failure have the potential to result in a serious hazard to safety. If a structure is failing, or appears to be rapidly approaching failure, and a hazard exists, this Emergency Action Plan should be immediately activated. At a minimum, take the following actions.

- If the emergency is life-threatening, immediately call **911** and describe the nature of the emergency. Give the location (e.g., “the DP Canyon grade-control structure located at the northern edge of TA-21” or “the Pueblo Canyon grade-control structure located to the north of the NM 502/NM 4 intersection”). Let the 911 operator know if there are off-site roads or areas below the dam that need to be blocked and ask for assistance in warning people in downstream areas. Then call the Los Alamos National Laboratory (LANL) Emergency Management Response Operations Support Center at **(505) 667-6211**.
- Regardless of the nature of the emergency, call the Technical Area 64 (TA-64) Operations Center at (505) 665-2824. Tell them the details of the problem and give the location (e.g., “the DP Canyon grade-control structure located at the northern edge of TA-21” Or “the Pueblo Canyon grade-control structure located to the north of the NM 502/NM 4 intersection”). Tell them to check the status board for crews working downstream of the structure and to have them evacuate immediately.
- If necessary, evacuate the immediate area. **DO NOT TRY TO INTERVENE OR PHYSICALLY PREVENT FAILURE OF THE STRUCTURE.**

If you are in doubt about the severity of a problem, notify the TA-64 Operations Center and ask for an engineer or shift operations manager to visit the structure as soon as possible. See the phone numbers below.

Person/Office	Phone Number
Emergency Management (Injury/Death)	911
LANL Emergency Management Response (EMR)	(505) 667-6211
TA-64 Operations Center	(505) 665-2824
Occupational Medicine Emergency	(505) 667-0660 (24-h contact)
Protective Force (Station 100)	(505) 667-4437
LANL Directory Assistance	(505) 667-5061

4. INSPECTIONS

Controls are inspected to ensure that they are functioning properly and to provide a mechanism for initiating maintenance. Inspections may evaluate the following:

- debris/sediment accumulation that could impede operation;
- water levels behind retention structures;
- physical damage of structure, or failure of structural components;
- undermining, piping, flanking, settling, movement, or breeching of structure;
- vegetation establishment and vegetation that may negatively impact structural components;
- rodent damage;
- vandalism; and
- erosion.

4.1 Watershed Controls

The site-specific watershed controls requiring inspection are listed in the Maintenance Connection database. Example inspection forms are shown in Attachments 1-5. Inspections at watershed controls are required at the following times.

- *Biannual* – Conduct inspections in the spring and fall.
- *Flow Event* – Conduct following each significant flow event (flow >50 cubic feet per second as measured at nearest gage station to the structure) within 15 calendar days.

4.2 Retention and No Exposure Controls

Retention and no exposure controls requiring inspection are listed in the Maintenance Connection database. Inspections of these controls are required at the following times.

- *Post Storm*
    - ❖ Site Monitoring Area (SMA) Rain Event Inspection (conduct at retention and no exposure controls) – Conduct within 15 calendar days after every 0.25 in. or more intensive rain event within 30 min. The occurrence of a qualifying rain event is based on data from the associated precipitation gage.
    - ❖ Water Level and Sediment Inspection (conduct at retention controls) – Conduct within 24 h, or as soon as practicable, after every 0.5 in. or more intensive rain event within 24 h. Conduct a second water level inspection 7 days following the rain event. The occurrence of a qualifying rain event is based on data from the associated precipitation gage.
- *Annual* (conduct at retention and no exposure controls) – Conduct annually.
- *Significant Event* (conduct at retention and no exposure controls) – Conduct after an event such as a fire, flood, etc. that could significantly impact the controls.

Water level and sediment inspection requirements are described in section 4.8 of this guide. SMA rain event and annual and significant event inspection requirements can be found in EP-DIV-SOP-20012, *Post-Storm Inspection of NPDES Individual Permit Storm Water Control Measures and Installation and Maintenance of Non-Engineered Storm Water Control Measures*, and EP-DIV-SOP-20125, *Performing NPDES Storm Water Individual Permit Visual Inspections*.

4.3 Inspector Qualifications

Inspections will be conducted by qualified personnel that hold a current Certified Inspector of Sediment and Erosion Control certification (or equivalent). Findings that may impact structural integrity will be reviewed by a professional engineer licensed by the State of New Mexico who is familiar with the design, operation, and maintenance of the control.

4.4 Inspection Reports and Certification of Inspections

The database steward is responsible for entering all inspection form information into the tracking database (currently the Maintenance Connection database). Individual Permit inspection records will be forwarded

to the LANL Storm Water Program Manager, or designee, for review and certification prior to submitting inspection reports to Records Management.

The inspection reports provide recommendations for preventive and corrective maintenance. The Storm Water Program Manager, or designee, reviews the recommendation for maintenance and approves or denies the recommendation. If the maintenance recommendation is approved, a field work order request is developed and implemented.

4.5 Maintenance Types

Inspections may identify two types of maintenance requirements: preventive maintenance (PM) and corrective maintenance (CM). PM is maintenance of a control before the control ceases to function as designed. CM restores the function of a control. An example of an inspection requiring PM is rilling on the slope of a berm. An example of a control requiring CM is an eroded channel that has formed through a failed berm.

4.6 Inspection of Earth Embankments

Earth embankments are a subset of structural controls consisting of native or engineered fill used to impound or divert water. Earth embankments are often integrated into the construction of other structural controls, often forming the foundation, or abutments.

4.6.1 Vegetation

Establishment and maintenance of vegetation can prevent erosion of embankments and other earth surfaces. Uncontrolled growth of vegetation can damage the embankments, impede design flow through spillways/standpipes, and impact other structural components.

Native grass is an effective and inexpensive way to prevent erosion of embankment surfaces. Roots and aboveground vegetation tend to trap fine sediments, forming an erosion-resistant layer once well established. Inspections will monitor for the establishment of native grass.

Trees, brush, and woody vegetation should be removed before they impact certain controls such as the tops of water retention embankments (i.e., dams, berms, or levees), gabion structures, and concrete or asphalt structures. Removal may require the excavation of roots, but vegetation should be evaluated on a site-by-site basis.

4.6.2 Erosion

Erosion is one of the most common maintenance issues. Periodic and timely preventive maintenance is essential in preventing continuous deterioration and possible failure of best management practices (BMPs). Inspections should focus on identification and documentation of the erosion issues and determination of the cause of the erosion. Inspections should look for obvious signs of erosion, such as rills and gullies, as well as piping, scouring, and sloughing.

At embankments, a major erosion concern at a control is the interface between the embankment and any hard structures. Poor compaction adjacent to a structure or subsequent settlement can lower the constructed grade of the structure. Runoff often concentrates along these areas, resulting in erosion. Timely repair of eroded areas is necessary to prevent more serious damage to the control.

At no exposure controls, erosion can lead to exposure of soils below a no exposure cover or cap. Timely repair of the cover is necessary to prevent additional erosion and possible exposure.

Fluvial geomorphic evaluation of the cause of erosion may be necessary to determine a long-term strategy to arrest erosion issues. Geomorphic evaluation identifies larger trends in local hydrology such as overall degradation of the channel reach and headcut migration.

4.6.3 Settlement and Cracking

Settlement within the embankment can cause cracking, increase the potential for erosion, and compromise any overlying structure (e.g., concrete). Inspection should identify any settlement/cracking of the embankment.

4.6.4 Seepage

All embankments have the potential for seepage resulting from water percolating slowly through the structure. Seepage through the control can be normal if it does not result in erosion, piping, undermining, or settling. Inspections should identify and monitor seepage.

4.6.5 Piping

Piping is the progressive erosion and removal of sediment by concentrated seepage flows through an earth embankment. As material is eroded, the area of the “pipe” increases, and the quantity and velocity of flow increase, which in turn erode more material.

Piping may be recognized by the discharge of muddy or discolored water, sinkholes, or an erosion area on the downstream base of an embankment.

4.6.6 Rodent Control

Rodent burrows and dens can lead to water piping and subsequent deterioration of the banks. Inspection for rodent activity at an earth embankment should focus only on the areas where water impoundment will occur. Inspectors should not attempt to physically remove rodents.

4.7 Inspection of Other Structural Controls

Other structural controls include hard structures, such as riprap, gabions, and culverts, and control elements such as geotextiles, which are often components of earth embankments. Inspection recommendations are found in the following subsections.

4.7.1 Gabions

Gabions need to be inspected for broken wires, excessive bulging, or failures and repaired or replaced as necessary. If erosion is occurring at the gabion structure, the inspection should properly identify the cause and severity.

4.7.2 Concrete

Structural problems associated with concrete include cracking, misalignment of joints, undermining, and settlement. Concrete structural problems are often a result of issues with the foundation. Structural problems may arise at controls where concrete is poured in place, or where precast concrete is set in place (such as the use of Redi-Rock® or Jersey barriers). In both applications, structural problems should be thoroughly inspected to determine the cause and severity.

Nonstructural maintenance issues with concrete may not be a direct indicator of pending failure but rather may indicate deterioration of the concrete. These issues may include surficial exfoliation, cracking, and other deterioration. Concrete deterioration may result in the exposure of rebar, lead to cracking, and ultimately become a structural problem. The inspector should note any discoloration of the concrete that may be indicative of internal rebar exposure to water.

For concrete that requires repair or replacement, the U.S. Department of the Interior, Bureau of Reclamation (USBR) provides a detailed guide that should be evaluated prior to implementing maintenance (USBR, 1997).

4.7.3 Asphalt Pavement/Sealant

Maintenance issues associated with asphalt are deterioration, cracking, slumping, and erosion around and under edges. Asphalt and concrete sealants are subject to similar issues of deterioration and cracking. Many of these issues are related to the integrity of the foundation to which they are applied.

4.7.4 Culverts and Standpipes

Culverts and standpipes are inspected for the presence of debris, trash, or any other foreign objects that may obstruct flow. Minimizing the potential for soil erosion at the inlet and outlet areas reduces scour or undermining and caving of adjacent soil supporting the culvert. Deformation of the culvert barrel, corrosion of metal and loose or corroded bolts, piping along the pipe, and settlement or sideways movement should be noted in inspections.

4.7.5 Riprap

Inspect riprap areas for displaced rock, slumping, and erosion at edges.

4.7.6 Erosion Control Blankets

Erosion Control Blankets (ECBs) include a wide category of materials that function to promote soil surface stability and vegetation growth. These materials include turf reinforcement matting and straw/coir coconut/natural fiber blankets. ECBs require inspection for improper anchoring, damage, dislodging, and undercutting.

4.7.7 Drainage Systems

Drainage systems are installed to allow for the managed drawdown of surface water stored in detention/retention systems. Drainage systems may consist of perforated-pipe drains, aggregate drains (e.g., French drains), or other systems. Drainage systems may include multiple layers of aggregate or engineered biological material to benefit water quality during filtration. Drainage systems require inspection for clogging and maintenance of any cleanout areas. Because of the individual nature of the drainage system, site-specific inspection requirements will be detailed in the inspection form.

4.8 Water Levels and Sediment Inspection

4.8.1 Water Level Inspection

Retention structures must provide adequate drawdown of retained storm water (i.e., infiltration or evapotranspiration) in order to have capacity to capture the design storm volume within a given period of

time. Water levels will be recorded at a staff gage after a qualifying rain event and during one subsequent inspection. At sites that do not have a staff gage, a visual inspection will be completed. The initial inspection will be conducted within 24 h or as soon as practicable. The follow-up inspection will be conducted with 7 days from the rain event.

4.8.2 Sediment Evaluation and Removal

Storm water controls such as retention/detention basins, watershed grade-control structures, and related structures will be evaluated for sediment removal during inspections. Sediment evaluations are performed to determine if sediment accumulation has reached a point that impacts the function of the control.

4.8.3 Sediment Sampling and Management

In-situ sediment samples may be collected prior to sediment removal. The number and locations of samples and analytical parameters will be determined on a case-by-case basis. Acceptable knowledge (ENV-RCRA-QP-012.0) and the results of sediment sampling will be used to (1) verify that the sediment is not a hazardous waste, (2) support an ecological risk assessment for potential land application, and (3) characterize the sediment in accordance with U.S. Department of Energy (DOE) requirements for radiological materials (DOE Orders 5400.5 and 458.1). Requirements for sediment sampling characterization and management will follow the program-specific waste characterization strategy form and land application procedures, as necessary.

4.8.4 Assessing Water Levels and Sediment Accumulation

To provide a visual assessment of water levels and sediment accumulation, a staff gage may be installed and maintained at each control as shown in Figure 1. The figure depicts five key elevations:

A. Top of Outlet – The elevation of the outlet control (spillway, riser pipe, etc.) for the basin.

B. Bottom of Basin – The elevation of the lowest point of the basin.

C. Maximum Sediment – When sediment accumulates to this level, sediment removal is required.

D. Inspected Sediment – The elevation of sediment at the time of inspection.

E. Inspected Water Level – The water level at the time of inspection.

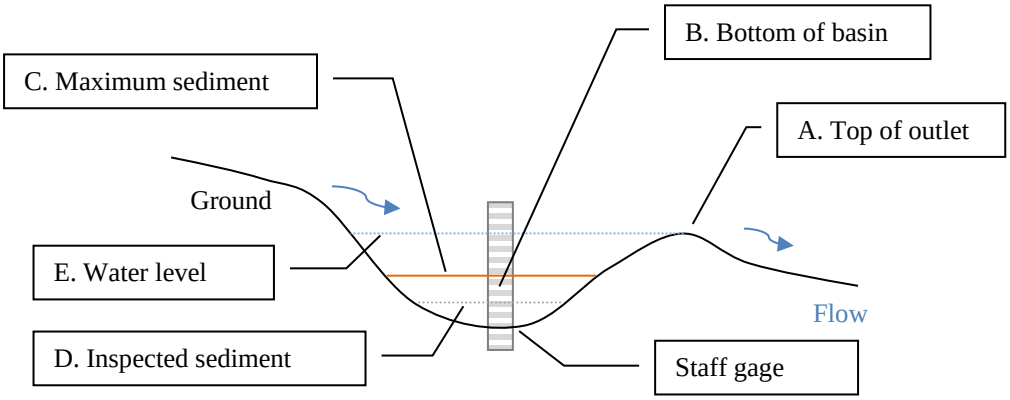

Figure 1 Example longitudinal cross-section of retention catchment basin

The difference in elevation between point A and point B is the designed depth of the basin. Point C represents the maximum amount of sediment accumulation that is allowed. Point D is the elevation of sediment documented at the time of inspection. If point D is equal to or greater than point C, sediment removal is required. Point E is the water level at the time of inspection. If ponded water does not allow for visual identification of sediment levels during retention inspections, sediment levels will be inspected during the annual inspection.

The elevations of points A, B, and C for each control are documented from as-built surveys. These as-built survey elevations are documented in the Maintenance Connection database.

To allow for accurate establishment and repeatable evaluation of staff gages, a pre-established off-set may be necessary at the control. The monument provides a point of constant elevation that is not subject to seasonal flooding or destruction during sediment removal efforts. The pre-established off-set also allows reestablishment of a gage should the gage be damaged or moved.

4.8.5 Watershed Controls

Watershed controls that integrate catchment basin(s) may require sediment monitoring and removal. Optimum function of the basin(s) relies on a prescribed basin depth that is specific to each control. When sediment accumulation exceeds the maximum sediment level, which is represented by point C in Figure 1, sediment removal is required.

4.8.6 Certified Total Retention Controls

Certified IP total retention controls are designed to capture 100% of the storm water runoff from the water quality design storm (EP-DIV-GUIDE-20087). To maintain this capture volume, sediment levels within retention area(s) need to be inspected to determine if sediment removal is necessary. The maximum sediment level is represented by point C in Figure 1. When sediment accumulation exceeds point C, the

total retention control no longer has the capacity to capture 100% of the design storm, and sediment removal is required. Capture volume between storm events is dependent on the drawdown time for each control. Drawdown times will be estimated from water levels (point E in Figure 1) recorded during retention inspections.

4.9 Vandalism

Dirt bikes, motorcycles, and four-wheel-drive vehicles can severely damage the vegetation on embankments surrounding the structure. Worn areas could lead to erosion and more serious problems. Constructed barriers such as fences, gates, and cables strung between poles are effective ways to limit access of these vehicles. Mechanical equipment located at a control is often a target of vandalism. Public safety is always an issue with controls, including the safety of people not authorized to use or encroach upon the facility. Any impacts associated with vandalism should be identified in the inspection of the control and scheduled for maintenance.

5. REFERENCES

Los Alamos National Laboratory. Design Storms for Individual Permit (IP) Corrective Actions and Control Measures – Design Guide. EP-DIV-GUIDE-20087, Latest Revision.

Los Alamos National Laboratory. Inspecting No Exposure, Engineering Retention and Watershed Storm Water Control Measures. EP-DIV-SOP-20208. Latest Revision.

Los Alamos National Laboratory. Post-Storm Inspection of NPDES Individual Permit Storm Water Control Measures and Installation and Maintenance of Non-Engineered Storm Water Control Measures. EP-DIV-SOP-20012. Latest Revision.

Los Alamos National Laboratory. ENV-RCRA-QP-012.0. Acceptable Knowledge Review Procedure. Latest Revision.

Los Alamos National Laboratory (2011). Storm Water BMP Manual. Latest Revision. http://int.lanl.gov/environment/water/guidance/best-management-practices.shtml

U.S. Department of Energy (1993). Radiation Protection of the Public and the Environment, DOE Order 5400.5.

U.S. Department of Energy (2011). Radiation Protection of the Public and the Environment, DOE Order 458.1.

U.S. Department of the Interior, Bureau of Reclamation (1997). Guide to Concrete Repair.

6. ACRONYMS AND ABBREVIATIONS

BMP	best management practice
DOE	U.S. Department of Energy
EMR	Emergency Management Response
IP	Individual Permit
LANL	Los Alamos National Laboratory
SMA	site monitoring area
TA	technical area
USBR	U.S. Bureau of Reclamation

7. ATTACHMENTS

Attachment 1: Example Los Alamos Canyon Weir Inspection Form
Attachment 2: Example Los Alamos Canyon Sediment Ponds Inspection Form
Attachment 3: Example Pueblo Canyon Grade Control Structure Inspection Form
Attachment 4: Example Sandia Canyon Grade Control Structure Inspection Form
Attachment 5: Example DP Canyon Grade Control Structure Inspection Form

ATTACHMENT 1

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Example Los Alamos Canyon Weir Inspection Form

LOS ALMAOS CANYON WEIR INSPECTION				Date:		
				Time:		
Inspection Type:			Weather & Site Conditions:			
Inspector (Z#):			Others:			
CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED		OBSERVATIONS	ACTION		
				REPAIR	MONITOR	INVESTIGATE
		EMBANKMENTS				
☐U/S SLOPE		Vegetation/erosion				
		Breaching/slides/damaged gabion mattresses				
		Undermining/erosion				
☐ABUTMENT		Vegetation/erosion				
		Sloughs/slides/damaged gabions				
		Seepage/wetness				
☐D/S SLOPE		Vegetation/erosion				
		Rodent burrows				
		Sloughs/slides/damaged gabions mattresses				
		Seepage/wetness				
		OVERFLOW WEIR STRUCTURE				
☐U/S FACE		Deteriorated or bulging gabions baskets				
		Gabion basket separation/displacement				
		Trash/Debris				
☐CREST		Deteriorated or bulging gabions baskets				
		Gabion basket separation/displacement				
		Poor alignment				
☐D/S FACE		Deteriorated or bulging gabions				
		Gabion separation/displacement				
		Seepage/piping				
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ATTACHMENT 1

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Example Los Alamos Canyon Weir Inspection Form

LOS ALMAOS CANYON WEIR INSPECTION						Date: Time:
Inspection Type:				Weather & Site Conditions:		
Inspector (Z#):				Others:		
CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION		
				REPAIR	MONITOR	INVESTIGATE
			STANDPIPE			
☐STANDPIE		Corrosion				
		Amount of sediment present				
		Trash/debris				
			OUTLET			
☐OUTLET		Seepage/piping				
		Undercutting				
		Erosion				
		Debris				
		Amount of sediment present				
GENERAL COMMENTS, SKETCHES, & FIELD MEASUREMENTS:						
Inspector's Signature:			Z#:			
Certified By:			Z#:			
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ATTACHMENT 2

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Example Los Alamos Canyon Sediment Ponds Inspection Form

LOS ALAMOS CANYON SEDIMENT PONDS INSPECTION					Date: / Time:
Inspection Type:			Weather & Site Conditions:		
Inspector (Z#):			Others:		
CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION: REPAIR	ACTION: MONITOR	ACTION: INVESTIGATE
		UPPER BASIN EMBANKMENT				
		Breaching/slides/cracks/sloughs				
		Erosion				
		Seepage/wetness				
		Rodent Burrows				
		LOWER BASIN EMBANKMENT				
		Breaching/slides/cracks/sloughs				
		Erosion				
		Seepage/wetness				
		Rodent Burrows				
		UPPER BASIN SPILLWAY				
		Erosion (e.g. flanking, piping, undercutting)				
		Alignment				
		Trash/debris				
		Stabilization				
		LOWER BASIN SPILLWAY				
		Erosion (e.g. flanking, piping, undercutting)				
		Alignment				
		Trash/debris				
		Stabilization				

ATTACHMENT 2

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Example Los Alamos Canyon Sediment Ponds Inspection Form

LOS ALAMOS CANYON SEDIMENT PONDS INSPECTION						Date: / Time:
Inspection Type:				Weather & Site Conditions: Clear		
Inspector (Z#):				Others:		
CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION		
				REPAIR	MONITOR	INVESTIGATE
		WETLAND and CULVERT				
		Vegetation				
		Undercutting				
		Erosion				
		Corrosion				
		Seepage/piping				
		Trash/debris/sediment accumulation				

GENERAL COMMENTS, SKETCHES, & FIELD MEASUREMENTS:

Inspector's Signature: Z#:

Certified By: Z#:

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ATTACHMENT 3

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Example Pueblo Canyon Grade Control Structure Inspection Form

PUEBLO CANYON GRADE-CONTROL STRUCTURE INSPECTION						Date: / Time:
Inspection Type:				Weather & Site Conditions:		
Inspector (Z#):				Others:		
CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION: REPAIR	ACTION: MONITOR	ACTION: INVESTIGATE
			EMBANKMENTS			
☐U/S SLOPE		Vegetation/erosion				
		Breaching/slides/cracks				
		Undermining/erosion				
☐ABUTMENT		Vegetation/erosion				
		Sloughs/slides/cracks				
		Seepage/wetness				
☐D/S SLOPE		Vegetation/riprap				
		Rodent burrows				
		Sloughs/slides/cracks				
		Seepage/wetness				
			OVERFLOW WEIR STRUCTURE AND STANDPIPE			
☐U/S FACE		Deteriorated joints				
		Cracking/spalling				
☐CREST		Deteriorated joints				
		Cracking/spalling				
		Poor alignment				
☐D/S FACE		Deteriorated joints				
		Cracking/spalling				
		Seepage/piping				

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Example Pueblo Canyon Grade Control Structure Inspection Form

PUEBLO CANYON GRADE-CONTROL STRUCTURE INSPECTION				Date:		
				Time:		
Inspection Type:			Weather & Site Conditions:			
Inspector (Z#):			Others:			
CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED		OBSERVATIONS	ACTION		
				REPAIR	MONITOR	INVESTIGATE
			OVERFLOW WEIR STRUCTURE AND STANDPIPE			
☐STANDPIPE		Corrosion				
		Amount of sediment present				
		Height of inlet				
		Trash/debris				
			SPILLWAY/OUTLET			
☐ FLOW WAY		Improper alignment				
		Deterioration				
		Trash/debris				
☐OUTLET		Seepage/piping				
		Undercutting				
		Erosion				
		Debris				
		Amount of sediment present				

GENERAL COMMENTS, SKETCHES, & FIELD MEASUREMENTS:

Inspector's Signature: Z#:

Certified By: Z#:

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Example Sandia Canyon Grade Control Structure Inspection Form

SANDIA CANYON GRADE-CONTROL STRUCTURE INSPECTION					Date: / Time:
Inspection Type:			Weather & Site Conditions:		
Inspector (Z#):			Others:		
CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED		OBSERVATIONS	ACTION: REPAIR	ACTION: MONITOR	ACTION: INVESTIGATE
		Upper Grade Control				
☐ South Bank		Vegetation				
		Erosion				
☐ North Bank		Vegetation				
		Erosion				
☐ Wetland		Vegetation				
		Channelization				
☐ Concrete Wall		Deteriorated Joints				
		Cracking/spalling				
		Middle Grade Control				
☐ South Bank		Vegetation				
		Erosion				
☐ North Bank		Vegetation				
		Erosion				
☐ Wetland		Vegetation				
		Channelization				
☐ Concrete Wall		Deteriorated Joints				
		Cracking/spalling				
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Example Sandia Canyon Grade Control Structure Inspection Form

SANDIA CANYON GRADE-CONTROL STRUCTURE INSPECTION					Date: / Time:		
Inspection Type:			Weather & Site Conditions:				
Inspector (Z#):			Others:				
CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION			
				REPAIR	MONITOR	INVESTIGATE	
		Lower Grade Control					
☐ South Bank		Vegetation					
		Erosion					
☐ North Bank		Vegetation					
		Erosion					
☐ Wetland		Vegetation			x		
		Channelization					
☐ Concrete Wall		Deteriorated Joints					
		Cracking/spalling					
		Cascade Structure					
☐ Riprap		Rock Displacement					
		Geotextile					
		Erosion					
☐ Cascade Pool		Rock Displacement					
		Erosion					
		Run-on Defense Cell Barriers					
☐ Upper		Erosion					
		Sediment Level					
		Vegetation					
☐ Lower		Erosion					
		Sediment Level					
		Vegetation					

ATTACHMENT 4

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Example Sandia Canyon Grade Control Structure Inspection Form

SANDIA CANYON GRADE-CONTROL STRUCTURE INSPECTION			Date:		
			Time:		
Inspection Type:		Weather & Site Conditions:			
Inspector (Z#):		Others:			
CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION		
			REPAIR	MONITOR	INVESTIGATE
GENERAL COMMENTS, SKETCHES, & FIELD MEASUREMENTS:					
Inspector's Signature:	Z#:				
Certified By:	Z#:				
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Example DP Canyon Grade Control Structure Inspection Form

DP CANYON GRADE-CONTROL STRUCTURE INSPECTION					Date: / Time:
Inspection Type:			Weather & Site Conditions:		
Inspector (Z#):			Others:		
CHECK AREA AS INSPECTED	CHECK/CIRCLE CONDITION NOTED		OBSERVATIONS	ACTION: REPAIR	ACTION: MONITOR	ACTION: INVESTIGATE
		EMBANKMENTS				
☐U/S SLOPE		Vegetation/erosion				
		Breaching/slides/cracks				
		Undermining/erosion				
☐ABUTMENT		Vegetation/erosion				
		Sloughs/slides/cracks				
		Seepage/wetness				
☐D/S SLOPE		Vegetation/riprap				
		Rodent burrows*				
		Sloughs/slides/cracks				
		Seepage/wetness				
		OVERFLOW WEIR STRUCTURE AND STANDPIPE				
☐U/S FACE		Deteriorated joints				
		Cracking/spalling				
☐CREST		Deteriorated joints				
		Cracking/spalling				
		Poor alignment				
☐D/S FACE		Deteriorated joints				
		Cracking/spalling				
		Seepage/piping				
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ATTACHMENT 5

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Example DP Canyon Grade Control Structure Inspection Form

DP CANYON GRADE-CONTROL STRUCTURE INSPECTION				Date:		
				Time:		
Inspection Type:			Weather & Site Conditions:			
Inspector (Z#):			Others:			
CHECK AREA AS INSPECTED		CHECK/CIRCLE CONDITION NOTED	OBSERVATIONS	ACTION		
				REPAIR	MONITOR	INVESTIGATE
			OVERFLOW WEIR STRUCTURE AND STANDPIPE			
☐STANDPIPE		Corrosion				
		Amount of sediment present				
		Height of inlet				
		Trash/debris				
			SPILLWAY/OUTLET			
☐FLOW - WAY		Improper alignment				
		Deterioration				
		Trash/debris				
☐OUTLET		Seepage/piping				
		Undercutting				
		Erosion				
		Debris				
		Amount of sediment present				
GENERAL COMMENTS, SKETCHES, & FIELD MEASUREMENTS:						
Inspector's Signature:			Z#:			
Certified By:			Z#:			
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